Investor Expectations and the Performance of Value Stocks versus Growth Stocks

Why value stocks outperform growth stocks.

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The choice of a portfolio style is considered an important step in the investment decision-making process. *Growth stock style* and *value stock style* have received a great deal of attention in recent years. The growth stock style, frequently associated with stocks with relatively high price/earnings ratios, has been a popular portfolio strategy in the post-war period, especially during times of strong economic growth. Advocates of this approach, such as David L. Babson and T. Rowe Price, claim that investing in well-managed companies in industries experiencing above-average growth leads to superior portfolio performance (Babson [1951]).

In more recent years, however, the value style has received increased attention; the contrarian approach is considered a subset of this style. Value stocks characteristically have relatively low market prices in relation to earnings per share (EPS), to cash flow per share, to book value per share, or to dividends per share, and may be less popular stocks that have recently experienced low or negative growth rates in corporate earnings. In our study, growth stocks are considered to have the opposite characteristics.

The value style was advocated by Benjamin Graham in the 1930s (see Graham and Dodd [1934]) and subsequently by Graham's understudy, Warren Buffet. It is explicated in Dreman [1982]. An early advocate for the profitability of the low price/earnings ratio approach was S. Francis Nicholson [1960]. Positive risk-adjusted returns associated with low

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price/earnings ratio stocks were first documented by Basu [1977]. Subsequently, anomalies have been documented for stocks with low price-to-book value ratios and with low price-to-cash flow ratios by Fama and French [1992, 1995] and by Lakonishok, Shleifer, and Vishny [1994].

The purpose of our study is to compare the performance of value stocks with growth stocks, and to offer the adaptive expectations hypothesis as an explanation for the differences in their performance. This hypothesis asserts that forecasters rely too heavily on past trends when formulating their expectations about the future. (For a discussion of this hypothesis, see Gwartney and Stroup [1992, pp. 338-339].) This, in turn, may lead to biased forecasts of future equity returns.

The adaptive expectations hypothesis is consistent with a growing body of literature on "behavioral finance" that recognizes psychological influences on human decision-making in which experts (in this case, investors) tend to focus on and overuse predictors of limited validity (in this case, earnings trends in the recent past) in making forecasts. Studies on behavioral aspects of investment decision-making include De Bondt and Thaler [1985, 1987], Hunter and Coggin [1988], Kahneman, Slovic, and Tversky [1982], Thaler [1993], and Wood [1995].

To test the adaptive expectations hypothesis, samples of stocks were selected as of March 31 for each of fourteen years commencing with 1980. The stocks consist of those with the necessary information provided in the Compustat Annual Industrial and Research data files, listed in the Center for Research in Security Prices (CRSP) data files for NYSE, AMEX, and Nasdaq stocks, with December fiscal years and positive EPS. To avoid "survivorship bias," the Compustat Research files and the CRSP files retain the records of stocks for the years in which they were listed, regardless of subsequent delistings.

Although a substantial majority of stocks in the data files have December year-end fiscal years, such companies tend to be concentrated in some industries, to be larger, and to have lower betas. The earnings per share forecasts of securities research analysts are used as a proxy for the expectations of investors about future returns, inasmuch as corporate earnings are considered an important determinant of investment value.

To focus on yearly return results, EPS forecasts are chosen on only one date each year: March 31. In order for forecasters to rely on the historical record of annual EPS with year-end accounting adjustments covering the same time period, only December fiscal year-end companies are selected. This permits the market performance of the stocks to be measured over time periods ending on the same date each year, which is March 31, a date that reflects the response of market prices to earnings surprises resulting from the disclosure of the actual EPS for the prior fiscal year.

Stocks with deficit EPS are excluded in order to avoid the problem of dealing with price/earnings ratios of stocks with negative EPS. Studies by Basu [1977], Cook and Rozeff [1984], and Dowen and Bauman [1986] have found that the effects of portfolio return rankings are essentially the same, whether stocks with deficit EPS are included in or excluded from portfolio groups. In addition, each stock is required to have EPS forecasts made by at least two research analysts entered in the Zacks Investment Research data file in March of the years under study.

These sample eligibility specifications are consistent with those in previous published research. The annual samples range between 329 to 611 stocks, averaging 489.

PERFORMANCE OF VALUE STOCKS AND GROWTH STOCKS

For purposes of this study, value stocks, as of March 31 of each year, are considered to be those with relatively low market prices in relation to EPS, to cash flow per share, or to book value per share. Growth stocks, correspondingly, are considered to have relatively high market prices. Portfolios are formed into quartiles on the basis of these criteria in each of fourteen years.

Price/Earnings Ratio Criterion and Portfolio Performance

Exhibit 1 presents the performance of the portfolios formed on the basis of price/earnings ratios (PER). Commencing with the first year studied in 1980, price/earnings ratios are determined on the basis of the closing market price at the end of March of 1980 divided by the EPS for 1979. Portfolio A, considered to be composed of value stocks, consists of one-fourth of the sample with the lowest PER; Portfolio B consists of one-fourth of the sample with next-highest PER, and so on, with Portfolio D consisting of the one-fourth with the highest PER. Portfolio D is considered to be composed of growth stocks in which investors expect above-average EPS growth rates

EXHIBIT 1
ANNUAL RETURNS FOR PRICE/EARNINGS RATIO PORTFOLIOS

Year Beginning 3/31– (1)	Number of Stocks (2)	Price/Earnings Ratio Portfolios A (Low) (3)	B (4)	C (5)	D (High) (6)	Total Sample Return (7)	Difference Between A&D[a] (8)	Market Index Return[b] (9)
1980	347	52.7%	41.4%	43.8%	50.0%	47.0%	+2.7	43.8%
1981	539	2.7	−7.2	−14.2	−16.6	−8.8	+19.3***	−12.9
1982	666	49.6	49.0	44.1	61.1	50.9	−11.5*	44.8
1983	620	18.4	14.1	9.7	4.9	11.8	+13.5***	7.9
1984	646	31.4	26.2	19.0	12.1	22.2	+19.3***	18.2
1985	671	43.2	42.7	35.5	31.2	38.2	+12.0***	36.9
1986	637	17.4	17.8	19.6	24.3	19.8	−6.9*	23.0
1987	630	−9.3	−6.4	−2.9	−6.6	−6.3	−2.7	−8.3
1988	750	15.1	15.7	12.1	14.8	14.4	+0.3	16.7
1989	784	6.1	10.1	14.0	15.3	11.4	−9.2***	18.0
1990	771	1.5	8.4	9.2	9.4	7.1	−7.9**	12.7
1991	733	26.4	22.3	14.9	13.1	19.2	+13.3***	11.7
1992	634	28.6	22.8	17.1	22.0	22.6	+6.6*	15.2
1993[c]	690	0.8	3.7	3.2	9.4	4.3	−8.6***	6.0
Geometric Mean		19.3	17.8	15.3	16.2	17.2		15.9
Arithmetic Mean		20.3	18.6	16.1	17.5	18.1		16.7
Standard Deviation		19.3	17.2	16.4	20.2	17.7		16.9
Return-to-Risk Ratio		1.05	1.08	0.98	0.87	1.02		0.99
Median PER		7.20	10.60	14.70	27.10	12.70		

[a]***Significant at the 1% level.
**Significant at the 5% level.
*Significant at the 10% level.

[b]CRSP value-weighted.
[c]Nine-month return through December 31, 1993.

(although the portfolio can include some stocks considered to have temporarily depressed EPS).

Portfolios are formed in this fashion in March of each of the subsequent thirteen years. The performance of each portfolio is measured as the equally weighted annual rate of return of the stocks from the end of March in the year the samples are selected to the end of March in the following year.

Study years commence at the end of March in order for the EPS in the prior year to be fully reflected in market prices and in the analyst forecasts. Study years end on the following March 31 so that portfolio returns fully reflect the known EPS in the year studied.

Portfolio A, the value stock portfolio, outperforms Portfolio D, the growth stock portfolio, in eight out of fourteen years. The difference is statistically significant (column 8) at the 1% level in five years (1981, 1983, 1984, 1985, 1991) and at the 10% level in 1992. By contrast, Portfolio D outperforms Portfolio A in the other six years, with the difference statistically significant at the 1% level in only two years (1989, 1993), at the 5% level in one year (1990), and at the 10% level in two years (1982, 1986).

The annual compound (geometric mean) return over the total period for Portfolio A is 19.3%, or 310 basis points more than for Portfolio D (16.2%). The standard deviation of annual returns for Portfolio A at 19.3% is moderately lower than for Portfolio D at 20.2%. Therefore, the risk-adjusted return, measured as the return-to-risk ratio (the arithmetic mean return to the standard deviation) for Portfolio A at 1.05 is substantially higher than for Portfolio D at 0.87.

The returns of *individual* stocks are not risk-adjusted using an asset pricing model. In terms of an equilibrium pricing model, this implies that each stock has a beta of one against a market proxy. The risk adjustment procedure used in our study employs a modified Sharpe portfolio return-to-risk ratio in which

the numerator is represented by total return instead of excess return (total return less the risk-free rate). Because the risk-free rate is subtracted as a constant from the returns of all portfolios, the performance rankings of portfolios are unaffected by the modified ratio. Many if not a majority of fundamental equity investors hold portfolios over long-term periods, so risk-adjusting the returns of portfolios in annual time intervals is not inconsistent with the investment objectives of such investors.

Although the relative performance of Portfolios A and D follows an irregular pattern on an annual basis, a strong central tendency emerges over the longer term that favors Portfolio A over Portfolio D on both a total return and a risk-adjusted basis. Over the fourteen years, Portfolio A consisted of 2,311 annual stock returns with a mean return of 19.0%, and Portfolio D consisted of 2,272 stocks with a mean return of 16.8%. The difference in returns between the two portfolios is statistically significant at the 0.044 level.

These results generally confirm those of prior studies regarding the low PER anomaly. The median PER over the fourteen-year period for the four portfolios shows a substantial difference between Portfolio A at 7.2 and Portfolio D at 27.1.

Price/Earnings Ratio Criterion and Earnings Surprises

To test the adaptive expectations hypothesis, the next step is to measure the expectations of investors and determine the presence of forecast bias. A proxy for investor expectations is the consensus forecast of EPS for each stock in each year. This forecast is the mean of the individual analyst forecasts for year t made in March of study year t. The existence of a systematic forecast bias is indicated by the *earnings surprise* for a stock, measured as the difference between reported EPS and the consensus forecast; this difference is divided by a normalization factor, which is the standard deviation of the individual analyst forecasts.

The EPS of some stocks are more difficult to forecast, as reflected by a wide range of forecasts among analysts. In such instances, we would expect a greater divergence in forecasts to be associated with a correspondingly larger difference between reported EPS and the consensus forecast. To adjust for differences in the uncertainty of expectations among stocks, the normalization factor is applied as the denominator to the forecast error that is in the numerator.

The earnings surprise for a stock is calculated as:

$$ES_i = \frac{A_i - F_i}{SD_i}$$

where

ES_i = earnings surprise indicator for stock i;
A_i = reported (actual) EPS in year t for stock i;
F_i = consensus forecast of EPS for year t made in March of year t for stock i; and
SD_i = standard deviation of the individual analyst forecasts in reference to the consensus EPS forecast for stock i.

The earnings surprise indicator, ES_p, for portfolios is the mean of the ES indicators for the stocks in the respective portfolios:

$$ES_P = \frac{\sum_{i=1}^{n} ES_i}{n}$$

The earnings surprises for the respective price/earnings ratio Portfolios A through D are presented in Exhibit 2. With but few exceptions, the earnings surprises become progressively more disappointing as the PER increases from Portfolio A, to B, to C, and to D. Portfolio A, the value portfolio, has the fewest earnings disappointments (three negative values) and the most positive (eleven) earnings surprises. By contrast, Portfolio D, the growth portfolio, experiences earnings disappointments in every year and the most negative earning surprises in each year as compared to all the other portfolios.

The difference in the ES indicator between Portfolios A and D is statistically different in every year — at the 1% level in eleven years and at the 5% level in the other three years. These results strongly suggest that a major explanation for differences in performance between low-PER stocks and high-PER stocks is EPS forecasting errors.

Over the fourteen years as a whole, Portfolio A is the only one with an average positive earnings surprise indicator (0.99), which means that this portfolio is the only one in which the analysts consistently underestimated EPS. By contrast, Portfolio D has the largest

EXHIBIT 2
EARNINGS SURPRISES FOR PRICE/EARNINGS RATIO PORTFOLIOS (ARITHMETIC MEANS)

Year Beginning 3/31– (1)	Number of Stocks (2)	Price/Earnings Ratio Portfolios A (Low) (3)	B (4)	C (5)	D (High) (6)	Total Sample (7)	Difference Between A&D[a] (8)
1980	347	2.73	0.87	−1.01	−1.39	0.31	4.12**
1981	539	0.83	−1.53	−0.54	−1.01	−0.55	1.84**
1982	666	0.76	−0.04	−1.88	−2.87	−1.00	3.63***
1983	620	−1.64	−2.65	−3.84	−4.08	−3.05	2.44***
1984	646	0.99	−0.15	−0.82	−1.80	−0.44	2.79***
1985	671	1.99	−0.25	−1.63	−3.01	−0.72	5.00***
1986	637	0.47	−1.50	−2.30	−4.75	−2.03	5.22***
1987	630	−0.12	−1.11	−0.27	−3.70	−1.30	3.58***
1988	750	−0.86	−0.66	−1.02	−4.13	−1.21	3.27***
1989	784	2.12	0.37	−1.07	−2.77	−0.32	4.89***
1990	771	0.47	−0.99	−1.53	−4.39	−1.60	4.86***
1991	733	1.36	−2.06	−3.47	−3.50	−1.90	4.86**
1992	634	1.33	0.51	−2.42	−4.92	−1.37	6.25***
1993[b]	690	2.05	−1.50	−1.28	−3.77	−1.09	5.82***
Average	9,118	0.99	−0.80	−1.68	−3.40	−1.21	4.39

[a]***Significant at the 1% level. *Significant at the 10% level.
**Significant at the 5% level. [b]Nine-month return through December 31, 1993.

average negative earnings surprise indicator, at −3.40. Over the fourteen years, Portfolio A was represented by 2,311 EPS forecasts and Portfolio D had 2,272; the difference in ES indicators between these two groups is significant at the 0.0001 level.

In terms of performance, once investors realize the earnings disappointments with the stocks in Portfolio D, returns appear impeded and more volatile, as revealed in Exhibit 1. In the case of Portfolio A, however, returns appear to be enhanced as favorable earnings surprises become apparent to investors. Among the 9,118 EPS forecasts in the aggregate, the average ES for the total sample is −1.21, which means that the average analyst forecast appears to have an optimistic bias.

Price-to-Cash Flow Ratio Criterion and Earnings Surprises

It is sometimes argued that the ratio of price-to-cash flow per share is a better measure of value than the PER because the annual depreciation expense is determined arbitrarily and in different ways by companies, which can result in distortions in EPS. To minimize these arbitrary differences between companies for valuation purposes, cash flow per share (CF) is used, which is measured as earnings per share plus depreciation expense per share. Portfolios are formed into quartiles on this basis in each of the fourteen years.

The performance of these portfolios is presented in Exhibit 3. Portfolio A consists of one-fourth of the sample with the lowest P/CF ratios, while Portfolio D represents one-fourth of the stocks with the highest P/CF ratios. Although the annual returns for Portfolio A tend to be higher than the returns for Portfolio D, the difference appears less pronounced than for the PER ratio portfolios in Exhibit 1. The risk level of the low P/CF ratio Portfolio A, as measured by standard deviation (16.5%), however, is noticeably lower so that its return-to-risk ratio of 1.21 is considerably higher than ratios for both Portfolio D (0.89) and the low PER ratio Portfolio A (1.05).

Exhibit 4 reveals the earnings surprises for the P/CF ratio portfolios. Although the portfolio differences are less pronounced compared to the PER ratio portfolios, the high P/CF ratio Portfolio D has the greatest earnings disappointments of any of the portfolios in ten out of fourteen years, while the low P/CF

EXHIBIT 3
ANNUAL RETURNS FOR PRICE/CASH FLOW PORTFOLIOS

Year Beginning 3/31– (1)	Number of Stocks (2)	Price/Cash Flow Portfolios A (Low) (3)	B (4)	C (5)	D (High) (6)	Total Sample Return (7)	Difference Between A&D[a] (8)	Market Index Return[b] (9)
1980	347	47.3%	43.0%	44.6%	53.2%	47.0%	−5.9	43.8%
1981	539	5.7	−11.3	−15.3	−14.2	−8.8	+19.9***	−12.9
1982	666	45.3	47.9	49.7	61.0	50.9	−15.7***	44.8
1983	620	19.2	13.1	11.0	3.7	11.8	+15.5***	7.9
1984	646	26.1	21.0	24.4	17.3	22.2	+8.8***	18.2
1985	671	40.3	35.0	39.4	38.0	38.2	+2.3	36.9
1986	637	23.6	22.5	12.1	20.9	19.8	+2.7	23.0
1987	630	−7.1	−4.4	−7.5	−6.3	−6.3	−0.8	−8.3
1988	750	17.7	16.5	10.9	12.4	14.4	+5.3**	16.7
1989	784	10.6	8.9	8.8	17.1	11.4	−6.5**	18.0
1990	771	1.4	5.2	8.8	13.1	7.1	−11.7***	12.7
1991	733	16.9	15.5	25.2	19.1	19.2	−2.2	11.7
1992	634	28.6	21.6	19.3	20.9	22.6	+7.7**	15.2
1993[c]	690	5.2	3.7	4.7	3.4	4.3	+1.8	6.0
Geometric Mean		19.4	16.2	15.8	17.2	17.2		15.9
Arithmetic Mean		20.0	17.0	16.9	18.5	18.1		16.7
Standard Deviation		16.5	16.8	18.6	20.8	17.7		16.9
Return-to-Risk Ratio		1.21	1.01	0.90	0.89	1.02		0.99

[a]***Significant at the 1% level.
**Significant at the 5% level.
*Significant at the 10% level.

[b]CRSP value-weighted.
[c]Nine-month return through December 31, 1993.

ratio Portfolio A has the most favorable ES indicator of any portfolio in nine years. The differences between Portfolios A and D are statistically significant in eleven out of fourteen years. These results suggest that the difference in portfolio performance is explained at least partially by earnings forecast errors.

Price-to-Book Value Ratio Criterion and Earnings Surprises

Because the EPS in a specific year can be an unreliable or inconsistent indicator of the future profitability of a corporation because of cyclical fluctuations or non-recurring adjustments to reported earnings, some value investors prefer to relate market price to book value per share, which is a more stable proxy for corporate equity values. Therefore, the price-to-book value per share (P/BV) ratio is computed at the end of March of each year using the book value as of December 31 of the prior year. Portfolios are then formed into quartiles on this basis for each year.

Exhibit 5 shows the performance of these portfolios. Portfolio A, considered the value portfolio, consists of one-fourth of the stocks with lowest P/BV ratio; Portfolio B reflects the one-fourth of the stocks with the next lowest P/BV ratio, and so on.

As is the case for the P/CF ratio portfolios, the lowest P/BV Portfolio A tends to have the highest return, and the highest P/BV Portfolio D tends to have the lowest returns, although the return differences are less distinct than for the PER portfolios. Nevertheless, the return-to-risk ratio for Portfolio A (1.13) is clearly higher than for Portfolio D (0.92) because the variability in annual returns as measured by standard deviation is somewhat lower for Portfolio A than for Portfolio D.

The earnings surprise indicators for the P/BV portfolios are reported in Exhibit 6. Surprisingly, the results tend to be the opposite of what is expected. The highest P/BV Portfolio D tends to have the least optimistic forecast bias, with an average earnings surprise indicator of −0.48, while the lowest P/BV Portfolio A

EXHIBIT 4
EARNINGS SURPRISES FOR PRICE/CASH FLOW PORTFOLIOS (ARITHMETIC MEANS)

Year Beginning 3/31– (1)	Number of Stocks (2)	Price/Cash Flow Ratio Portfolios A (Low) (3)	B (4)	C (5)	D (High) (6)	Total Sample (7)	Difference Between A&D[a] (8)
1980	347	2.73	0.87	−1.01	−1.39	0.31	4.12**
1980	347	1.92	1.44	0.10	−2.23	0.31	4.15**
1981	539	−0.51	−0.45	−1.45	0.20	−0.55	−0.71
1982	666	0.15	−0.56	−1.55	−2.06	−1.00	2.21***
1983	620	−2.20	−2.57	−3.46	−3.96	−3.05	1.76**
1984	646	0.64	−0.73	−0.23	−1.47	−0.44	2.11***
1985	671	0.86	−0.68	−1.03	−2.05	−0.72	2.91***
1986	637	−1.09	−2.14	−2.66	−2.22	−2.03	1.13*
1987	630	−0.77	−1.24	−2.75	−0.44	−1.30	−0.33
1988	750	−0.13	−0.07	−0.92	−3.77	−1.21	3.64***
1989	784	1.33	−0.15	−0.55	−1.96	−0.32	3.29***
1990	771	−0.91	−1.28	−1.11	−3.13	−1.60	2.22***
1991	733	−1.32	−2.59	−3.04	−2.70	−1.90	1.38*
1992	634	−1.08	−1.99	0.67	−3.06	−1.37	1.98**
1993[b]	690	−1.35	−1.63	−0.21	−1.18	−1.09	−0.17
Average	9,118	−0.37	−1.12	−1.33	−2.20	−1.21	1.83

[a]***Significant at the 1% level.
**Significant at the 5% level.
*Significant at the 10% level.
[b]Nine-month return through December 31, 1993.

EXHIBIT 5
ANNUAL RETURNS FOR PRICE/BOOK VALUE RATIO PORTFOLIOS

Year Beginning 3/31– (1)	Number of Stocks (2)	Price/Book Value Ratio Portfolios A (Low) (3)	B (4)	C (5)	D (High) (6)	Total Sample Return (7)	Difference Between A&D[a] (8)	Market Index Return[b] (9)
1980	347	47.4%	42.2%	43.3%	55.1%	47.0%	−7.7**	43.8%
1981	539	4.5	−8.6	−17.1	−14.2	−8.8	+18.7***	−12.9
1982	666	45.6	49.8	52.7	55.8	50.9	−10.2***	44.8
1983	620	20.7	16.8	7.8	1.8	11.8	+18.9***	7.9
1984	646	24.9	26.0	18.5	19.4	22.2	+5.5	18.2
1985	671	40.6	40.2	35.5	36.4	38.2	+4.2	36.9
1986	637	17.7	20.0	18.7	22.7	19.8	−5.0***	23.0
1987	630	−7.6	−5.6	−8.1	−4.0	−6.3	−3.6	−8.3
1988	750	19.1	13.4	12.9	12.0	14.4	+7.1**	16.7
1989	784	2.2	10.8	13.8	19.0	11.4	−16.8***	18.0
1990	771	−0.5	5.7	5.5	17.8	7.1	−18.3**	12.7
1991	733	27.4	17.8	17.4	14.0	19.2	+13.4***	11.7
1992	634	27.8	29.8	18.3	14.6	22.6	+13.2***	15.2
1993[c]	690	5.6	2.4	3.4	5.6	4.3	0.0	6.0
Geometric Mean		18.9	17.8	14.8	17.1	17.2		15.9
Arithmetic Mean		19.7	18.6	15.9	18.3	18.1		16.7
Standard Deviation		17.4	17.6	18.6	19.9	17.7		16.9
Return-to-Risk Ratio		1.13	1.06	0.85	0.92	1.02		0.99

[a]***Significant at the 1% level.
**Significant at the 5% level.
*Significant at the 10% level.
[b]CRSP value-weighted.
[c]Nine-month return through December 31, 1993.

EXHIBIT 6
EARNINGS SURPRISES FOR PRICE/BOOK VALUE RATIO PORTFOLIOS (ARITHMETIC MEANS)

Year Beginning 3/31– (1)	Number of Stocks (2)	Price/Book Value Ratio Portfolios A (Low) (3)	B (4)	C (5)	D (High) (6)	Total Sample (7)	Difference Between A&D[a] (8)
1980	347	0.24	1.59	−0.62	0.02	0.31	0.22
1981	539	−1.95	0.07	−0.85	0.54	−0.55	−2.49
1982	666	−1.02	−0.97	−1.09	−0.94	−1.00	−0.08
1983	620	−3.69	−2.26	−3.49	−2.75	−3.05	−0.94
1984	646	−0.61	0.22	−1.09	−0.28	−0.44	−0.33
1985	671	−0.97	0.05	−1.04	−0.93	−0.72	−0.04
1986	637	−2.45	−1.44	−2.68	−1.54	−2.03	−0.91
1987	630	−1.85	−1.96	−2.23	0.86	−1.30	−2.71
1988	750	−1.89	−2.07	−0.89	0.05	−1.21	−1.94**
1989	784	−0.85	−0.10	−0.20	−0.11	−0.32	−0.74
1990	771	−2.38	−1.08	−1.55	−1.40	−1.60	−0.98
1991	733	−2.74	−2.74	−3.23	1.11	−1.90	−3.85*
1992	634	−1.72	−1.68	−1.90	−0.16	−1.37	−1.56
1993[b]	690	−1.54	−0.88	−0.92	−1.02	−1.09	−0.52
Average	9,118	−1.73	−1.05	−1.57	−0.48	−1.21	−1.25

[a]***Significant at the 1% level. *Significant at the 10% level.
**Significant at the 5% level. [b]Nine-month return through December 31, 1993.

has the most optimistic bias, with an average of −1.73. Moreover, in only one year (1980) does Portfolio A have more conservative forecasts than Portfolio D, and the difference is not statistically significant.

Given these puzzling results, earnings surprises are not correlated with P/BV ratios. It appears that book value, per se, has only a weak direct influence on expectations, and perhaps other relationships to book value, such as return on equity, may be more meaningful.

HISTORICAL EPS GROWTH AND EARNINGS SURPRISES

To test the adaptive expectations hypothesis as applied to common stock earnings surprises in our study, we next examine the relationship between historical trends in EPS and earnings surprises. Malkiel and Cragg [1970] find a highly significant positive relationship between the historic ten-year growth rate of earnings per share and price/earnings ratios.

Ball and Watts [1972] and others, however, find that changes in annual earnings correspond to a random walk. That is, changes in annual earnings for the average company appear to be serially independent.

Consequently, we analyze the relationship between past EPS growth rates and earnings surprises in order to determine whether investor and analyst expectations rely too heavily on past EPS trends. The past EPS trend for a stock in study year t is computed as the log-linear annual growth rate over the previous four years, t − 4 through t − 1 (t − 5 is the base year). The past growth rate for the 1980 study year, for example, is the growth rate for EPS in the years 1976 through 1979 (1975 is the base year).

Portfolios are formed into quartiles as of the end of March in each of the fourteen years studied according to the past EPS growth rates. Portfolio A, considered to be composed of value stocks, consists of one-fourth of the sample with the lowest past growth, while Portfolio D, the growth stock portfolio, consists of the one-fourth with the highest past growth. The average annual performance of these portfolios over the fourteen-year period is shown in Exhibit 7.

Portfolio D tends to have the lowest return, and has the highest standard deviation in returns (21.2%) as compared to the other portfolios. Portfolio A has the

EXHIBIT 7
ANNUAL RETURNS FOR FIVE-YEAR GROWTH RATE PORTFOLIOS
MARCH 31, 1980–DECEMBER 31, 1993

	Five-Year Growth Rate Portfolios				Total Sample Return	Difference Between A&D	Market Index Return*
	A (Low)	B	C	D (High)			
	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Geometric Mean	17.4%	17.3%	17.2%	16.1%	17.1%	+1.3	15.9%
Arithmetic Mean	18.0	18.0	18.4	17.5	18.0	+0.5	16.7
Standard Deviation	15.2	16.1	19.4	21.2	17.7	−6.0	16.9
Return-to-Risk Ratio	1.18	1.12	0.95	0.83	1.02	0.35	0.99

*CRSP value-weighted.

lowest standard deviation (15.2%) and the highest return-to-risk ratio (1.18), while Portfolio D has the lowest one (0.83).

Exhibit 8 presents the earnings surprise indicators for the four portfolios. The EPS of stocks in Portfolio D tend to be overestimated to a greater extent than EPS of the other portfolios; they were more greatly overestimated on average in ten out of fourteen years as compared to Portfolio A. The EPS for Portfolio A is underestimated in three years (1980, 1981, and 1984) and, in general, tends to be the least overestimated. In a cross-sectional time series correlation analysis of the 6,850 stock earnings surprises with respect to their past growth rates, the correlation is −0.04, which is significant at the 0.001 level.

This evidence supports the adaptive expectations

EXHIBIT 8
EARNINGS SURPRISES FOR FIVE-YEAR GROWTH RATE PORTFOLIOS (ARITHMETIC MEANS)

Year Beginning 3/31–	Number of Stocks	Five-Year Growth Rate Portfolios				Total Sample	Difference Between A&D[a]
		A (Low)	B	C	D (High)		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1980	329	2.18	0.44	0.47	−1.81	0.31	3.99**
1981	510	0.13	−1.16	−0.82	−1.10	−0.74	1.23
1982	611	−0.85	−0.92	−0.77	−1.48	−1.00	0.63
1983	556	−2.10	−2.79	−3.58	−4.09	−3.14	1.99***
1984	550	0.12	0.01	−0.90	−1.15	−0.48	1.27***
1985	534	−0.97	−1.30	0.05	−0.56	−0.70	−0.41
1986	507	−2.05	−2.27	−1.48	−2.07	−1.97	0.02
1987	475	−2.18	−1.90	−1.37	−1.53	−1.75	−0.65
1988	492	−0.51	−2.07	−2.11	−1.91	−1.65	1.40
1989	505	−1.99	−0.60	−0.13	−0.08	−0.70	−1.91**
1990	492	−1.97	−2.90	−2.43	−1.85	−2.79	−0.12
1991	451	−2.36	−3.83	−2.77	−2.87	−2.96	0.51
1992	413	−1.47	−2.06	−3.44	−2.84	−2.45	1.37*
1993[b]	425	−0.82	−1.72	−2.03	−1.14	−1.43	0.32
Average	6,850	−1.12	−1.66	−1.52	−1.73	−1.51	0.39

[a]***Significant at the 1% level.
**Significant at the 5% level.
*Significant at the 10% level.
[b]Nine-month return through December 31, 1993.

hypothesis, inasmuch as analysts appear to overestimate EPS to a greater extent (produce a larger negative ES indicator) for stocks with higher past growth rates than for stocks with lower past growth rates.

According to previously cited studies, changes in annual EPS tend to resemble a random walk. To test for existence of this phenomenon in our sample, we conduct a cross-sectional time series correlation analysis of the 6,850 past four-year EPS growth rates with their respective current-year (year t) growth rates. The resulting correlation coefficient is −0.03, which is significant at the 0.012 level. This negative relationship suggests that EPS growth rates have a mean reversion tendency.

This evidence suggests that analyst and investor expectations and current price/earnings ratios tend to reflect past EPS growth rates. When expectations are derived by a tendency to extrapolate past growth rates into the future, and by pursuing a growth stock policy, defined as owning stocks with high PER ratios and high historic EPS growth rates, there appear to be greater disappointments in expected EPS and lower risk-adjusted portfolio returns. By contrast, investors who pursue a contrarian, value stock policy, by owning stocks with low PER ratios and with lower historic EPS growth rates, appear to experience relatively more favorable EPS surprises and higher risk-adjusted portfolio returns.

Persistence of the Earnings Surprise Indicator

The next question we ask is why the differences in earnings expectations between value stocks and growth stocks persist over an extended period. First, we observe that the earnings surprise indicator for our total sample is negative in each year except in 1980, which experiences a modest positive ES. (1980 was a recession year in which corporate earnings trended down but recovered sharply in the fourth quarter, possibly accounting for a positive surprise.)

Therefore, analysts tend to have expectations that are optimistically biased, except for the sample quartile with the lowest PER. Why do these biases persist? Several possible explanations are suggested.

First, investors and analysts can become psychologically attached to their industries and companies, and may tend to extrapolate past EPS growth rates into the future, as suggested by the adaptive expectations hypothesis. If the pattern of successive annual EPS growth rates reflects a random walk or a reversion to the mean, then growth stocks with high past EPS growth rates will tend to have PER that are too high and earnings expectations that are too optimistic.

Second, companies with a recent record of low EPS growth or adverse performance tend to appear less popular, and frequently have low PER. Because most sell-side analysts are ultimately compensated on the basis of brokerage commissions generated, analysts have an incentive to sell stocks to customers.[1] It is easier for analysts to present an enthusiastic and persuasive argument for the purchase of a stock of a company that has been performing well and that is supported by a favorable EPS growth rate forecast. Similarly, it is easier for an investment advisor or portfolio manager to justify the purchase of such a stock. If the EPS are subsequently disappointing, the analyst and portfolio manager may merely explain that the performance of the company changed unexpectedly.

Conversely, it is more difficult to justify a less popular stock of a company with a poor recent performance. In this instance, the analyst needs to build the case that the future for the company will be better than its past. The fear among analysts and portfolio managers, who recommend and purchase such a stock, of course, is that if the performance of the company fails to improve, they have the awkward burden of explaining why they recommended a company at the time it had a mediocre performance. Therefore, these stocks may become too neglected, and their PER fall to too low a level. It is interesting to note that some prominent portfolio managers who pursue value-oriented contrarian approaches appear to be quite individualistic and independent-minded.

Third, there are other practical reasons for optimistic analyst EPS projections. One of the most important sources of research information is corporate management. Analysts can stay on favorable terms with these contacts only if their projections do not seriously differ from favorable corporate management biases.[2] In addition, broker-dealer firms want to maintain friendly relations with corporate managers in order to exploit lucrative investment banking and pension fund brokerage business.[3]

These are reasons frequently given to explain why brokerage firms rarely publish *sell* recommendations and why *hold* recommendations are frequently interpreted by investors as *sell* recommendations. Another reason why the consensus forecast may have an optimistic bias is that analysts who have less optimistic opinions about a company suspend their research of the company and make no EPS forecast;

therefore, the consensus forecast may reflect a biased sample of analysts.

Capitalization Size and Portfolio Performance

The final question explored is the effect of the size of equity capitalization on the performance of value stocks relative to growth stocks. Capitalization size of a stock in each year is measured as the market price at the end of March times the number of shares outstanding. The portfolios previously formed as quartiles in each study year, designated as Portfolios A, B, C, and D, are subdivided into four groups on the basis of cap size so that a total of sixteen portfolio groups are formed. The annual returns of the stocks in these sixteen groups are then averaged over the fourteen years.

Exhibit 9 presents the average annual performance for the PER portfolios subdivided by cap size. Reading down the columns, a small-firm effect tends to appear. The smallest size group, Group 1, has the highest average return (19.0%) as shown in column (6), while the largest size group, Group 4, has the lowest average return (15.5%).

The low PER effect is also reflected by reading across the rows. In the last row, Portfolio A, with the lowest PER, has the highest return (19.0%), while Portfolio D, with the highest PER, has a lower return (16.8%).

In general, the groups with the highest returns are the stocks with lower PER and smaller capitalizations. One major exception is Portfolio D-1, composed of the smallest stocks with the highest PER, which has the highest return, 21.2%. This group may include value stocks with EPS in year $t - 1$ that were cyclically depressed, or of companies with non-recurring accounting adjustments such as start-up expenses or write-offs. The annual return on this group is also very volatile, with a standard deviation of 26.6% and a return-to-risk ratio of only 0.85.

A comparable analysis of the cap size effect conducted for the price/cash flow portfolios and the price/book value portfolios yields similar results. Moreover, the groups composed of the smallest stocks with the highest P/CF ratios and the highest P/BV ratios have the highest returns (23.5% and 22.1%, respectively). This suggests that the past operating performance of relatively small firms is sufficiently volatile that a financial ratio analysis of historical income statements and balance sheets is less indicative of future performance.

CONCLUSIONS

The adaptive expectations hypothesis gains support with the results of this study. Value stocks, with relatively low prices in relation to EPS and to cash flow per share, and low past EPS growth rates, evince favorable investment performance. These observations are documented in other studies, as previously noted. We find here, however, that the difference in performance may be associated with large negative earnings surprises for stocks with high prices relative to EPS and cash flow per share, and high past EPS growth rates.

Although these biased forecasts persist over the entire fourteen-year study period, there is, of course, no assurance that such biased behavior will continue in the future. It is possible that forecasters will learn from past mistakes, although the low price/earnings ratio

EXHIBIT 9
AVERAGE ANNUAL RETURNS FOR PRICE/EARNINGS RATIO PORTFOLIOS DIVIDED INTO QUARTILES BY FIRM SIZE — MARCH 31, 1980–DECEMBER 31, 1993

	Price/Earnings Ratio Portfolios				
Firm Size Group	A (Low)	B	C	D (High)	Total
(1)	(2)	(3)	(4)	(5)	(6)
Smallest 1	21.1% ($163.6)	18.2% ($168.7)	15.2% ($158.2)	21.2% ($150.4)	19.0% ($160.2)
2	20.2 (504.3)	18.5 (492.7)	17.6 (487.4)	16.0 (486.9)	18.1 (493.0)
3	17.8 (1328.6)	18.7 (1281.6)	16.4 (1340.2)	13.7 (1246.5)	16.7 (1300.9)
Largest 4	16.9 (5681.1)	16.6 (7443.2)	12.8 (7416.5)	15.8 (7708.5)	15.5 (7072.7)
Total	19.0 (1885.4)	18.0 (2221.7)	15.4 (2458.0)	16.8 (2486.9)	17.3 (2261.3)

Average capitalization in millions of dollars in parentheses.

anomaly has persisted over many decades.

Given these findings, investors and analysts need to be sensitive to the possibilities that the future performance of companies will be either better or worse than recent past performance. Investors should attempt to determine whether current market prices appear reasonable in relation to realistic current corporate fundamentals and to discount any non-recurring elements affecting past performance.

ENDNOTES

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[1]Bonuses for securities analysts appear to relate to selling securities as opposed to accuracy of earnings estimates, according to a survey of brokerage firms. See Dorfman [1991].

[2]Analysts claim that they are blacklisted if their analysis of a corporation is considered to be negative by the corporate management, and management will provide less information in the future. See *AIMR Newsletter*, Vol. 5, No. 4, 1994; and letter to Thomas Veit, Managing Director, New York Stock Exchange, from Michael S. Caccese, Senior Vice President and General Counsel, Association for Investment Management and Research, dated January 18, 1994.

[3]In a well-publicized case, an analyst's professional objectivity and independence was attacked when he downgraded the bonds of one of Donald Trump's Atlantic City casinos. Trump demanded that the analyst's boss order the analyst either to reverse his action or to resign from the brokerage firm. The Association for Investment Management and Research objected to this pressure in a news release dated March 28, 1990. See "Trump the Information Flow" [1990].

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