MARKET TIMING IN REGRESSIONS AND REALITY

Kenneth L. Fisher
Fisher Investments

Meir Statman
Santa Clara University

Abstract

We compare price-to-earnings ratios and dividend yields, which are indirect measures of sentiment, with the bullish sentiment index, which is a direct measure. We find that the sentiment index does better as a market-timing tool than do P/E ratios and dividend yields, but none is very reliable. We do not argue that market timing is impossible. Rather, we observe that stock prices reflect both sentiment and value, both of which are difficult to measure and neither of which is perfectly known in foresight. Successful market timing requires insights into future sentiment and value, insights beyond those that are reflected in widely available measures.

I. Market Timing in Regressions and Reality

Value and sentiment are the two drivers of security prices in Shefrin and Statman's (1994) behavioral capital asset pricing theory. Prices equal value in markets where only information traders trade and changes in value are the only driver of prices. However, noise traders join information traders in real-world markets and their sentiment, bullish or bearish, is the second driver of prices. Sentiment drives prices away from value.

One implication of the two-driver framework is that stock prices are predictable if sentiment, bullish or bearish, fades over time on a predictable path. Market timers with reliable measures of sentiment can accumulate more than buy-and-hold investors by switching from stocks to cash when sentiment is bullish and switching back to stocks when sentiment is bearish. But are there reliable measures of sentiment? And does sentiment fade on a predictable path?

    We compare price-to-earnings (P/E) ratios and dividend yields, which are indirect measures of sentiment, with the bullish sentiment index, which is a direct measure. We find that the sentiment index does better as a market-timing tool than do P/E ratios and dividend yields, but none is very reliable. We do not argue that market timing is impossible. Rather, we observe that stock prices reflect both sentiment and value, both of which are difficult to measure and neither of which is perfectly known in foresight. Successful market timing requires insights into future sentiment and value, insights beyond those that are reflected in widely available measures.

II. Sentiment and Value

We recall easily the rise of bullish sentiment of the late 1990s and its fall in the early 2000s. We do not recall earlier shifts in sentiment as easily, but sentiment is always shifting. In 1908 Shaw tried to dampen investors' bullish sentiment toward technology stocks:

> Perhaps the worst mistake that an investor can make is to become possessed of the idea that he should back a new invention. Just at the moment it is airships. A little while ago it was talking machines. Thousands of people in all the civilized countries of the world lost much money trying to reap fortunes from the much-heralded field of wireless telegraphy. It would be quite impossible to estimate the amount of money that has been thrown away by usually sane and sensible people during the past 10 years in an effort to make a substitute for the cable and the telegraph and the telephone. (p. 631)

    The 1929 stock market crash brought with it a long period of bearish sentiment where a repeat of the crash always loomed large. Old-timers were still bearish in the late 1950s but younger investors turned bullish. In 1958, Havemann writes:

> Today's new stock market customer . . . is often a man of under 40 . . . .He is too young to remember the 1930s. One broker has reported, in a spirit of mingled awe, admiration and horror, "We have lots of buyers nowadays who say, 'Sure I know stocks are too high but I don't care. They'll be even higher five years from now.'" (p. 98)

    Clendenin (1958) reports the shift of sentiment among investors during the time:

> Back in 1951, with the uncertainties of depression and war still uppermost in their minds, stockholders expressed strong preferences for conservative stocks, cash

> dividends, and safety above all. In 1958, after seven years of prosperity and stock-market boom, a majority of the answers indicate a willingness to own speculative as well as conservative stocks, a less positive emphasis on cash dividends, and an interest in market profits which is almost as great as that in income and safety. (p. 48)

There is much evidence that changes of value drives prices but also much evidence that changes of value are not the sole driver. For example, Roll (1988) finds that value-related news about events in the economy, industry, and company explains only 35% of the variation of the monthly stock returns, and Fair (2002) finds that many large changes in the price of S&P 500 index futures occurred with no value-related events. Changes in sentiment might explain changes in prices not explained by value-related events. For example, Fisher and Statman (2000a) find a negative relation between the sentiment of both individual and institutional investors and subsequent stock returns.

P/E ratios and dividend yields are indirect measures of sentiment because they combine sentiment with value. We can use P/E ratios and dividend yields as measures of sentiment if we subtract from their actual levels the levels consistent with value. If levels of P/E ratios and dividend yield that are consistent with value are constant, such as their long-term averages, it is possible to conclude that sentiment is bullish when actual P/E ratios exceed their long-term average or when actual dividend yields fall below their long-term average. Similarly, sentiment is bearish when actual P/E ratios fall below their long-term average or when actual dividend yields exceed their long-term average.

Studies published in the late 1990s and earlier, such as those of Campbell and Shiller (1988, 1998), find that high P/E ratios and low dividend yields predict low subsequent stock returns. In effect, such studies use P/E ratios and dividend yields as sentiment measures. That work led, in turn, to work by Brennan, Schwartz, and Lagnado (1997), and Campbell and Viceira (1999) who show how investors might use the predictability of returns to time the market. But doubts about the predictive power of P/E ratios and dividend yields are emerging now, just when the fall of stock prices in the early 2000s seems to provide their ultimate proof.

Although Campbell and Shiller (1988, 1998) find that P/E ratios predict subsequent returns, Malkiel (2003) notes that the relation between P/E ratios and subsequent returns is not tight; the points in the scatter diagram are indeed scattered. Malkiel writes, for example, that whereas the P/E ratio of the S&P 500 rose above 20 on June 30, 1987, and the dividend yield fell below 3%, predicting low future returns, the average annual return of the S&P 500 during the following 10 years was an extraordinary generous 16.7%.

Fisher and Statman (2000b) find that dividend yields and P/E ratios do not predict stock returns over 1- and 2-year periods, and they point out examples where high P/E ratios and low dividend yields were followed by high stock returns. More

recently, Goyal and Welch (2003) find that P/E ratios and dividend yields do not predict future returns out of sample.

The econometric method used in all studies but one section of Malkiel's (2004) study is a regression of returns on lagged P/E ratios and dividend yields. Returns are deemed predictable if regression coefficients are statistically significant. Many, including Campbell and Shiller (1998) and Goyal and Welch (2003), note the problems in the construction of regressions and the difficulty in the assessment of their statistical significance. Moreover, regressions require that we specify in advance a fixed holding period of securities, be it a month, a year, or a decade. But market timers need not have fixed holding periods. Instead, market timers look for trading rules that tell them when to buy stocks and when to replace them with other securities, such as short-term fixed-income securities, and the holding periods of stocks and short-term fixed-income securities might vary from a month at one time to a decade at another. We analyze U.S. data with a straightforward methodology, searching for trading rules based on P/E ratios, dividend yields, and the bullish sentiment index that market timers could have used to accumulate more than the sums accumulated by stock buy-and-hold investors.

U.S. stock returns, earnings, and dividends are provided by Wilson and are described in Wilson and Jones (2002). Returns on short-term bills for 1926–2002 are returns on Treasury bills (T-bills) from Ibbotson Associates. Returns on short-term bills for 1871–1925 are proxied by returns of prime commercial paper from Shiller's series.[1]

III. Market Timing with P/E Ratios

Buy-and-hold investors who invested $1 in U.S. stocks at the beginning of 1871 would have accumulated $67,672 by the end of 2002, 132 years later.[2] Consider P/E-based market-timing rules and begin with P/E ratios calculated for each calendar year as the ratio of price at the end of the year to earnings during the preceding 12 months. The median P/E ratio during the 132-year period was 14.4. If a 14.4 P/E ratio represents the value component of actual P/E ratios, P/E ratios above 14.4 imply bullish sentiment and those below 14.4 imply bearish sentiment. Market timers who expect bullish and bearish sentiment to fade over time act as contrarians, switching from T-bills to stocks in years that begin with P/E ratios lower than 14.4, and switching from stocks to T-bills in years that begin with P/E ratios higher than 14.4.

It turns out that market timers who were to follow this market-timing rule since 1871 would have accumulated only $8,513 by the end of 2002, trailing badly

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[1]The nominal interest rate series, Table 26.1, Series 4, is available at: http://www.econ.yale.edu/~shiller/data/chapt26.html.

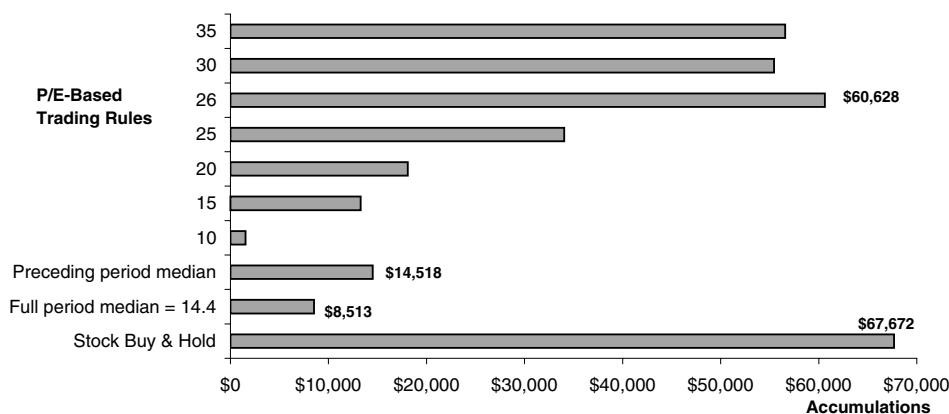[2]The $67,672 accumulation reflects a geometric average annual return of 8.8%.

Figure I. Market Timing with P/E Trading Rules: United States 1871–2002. (Accumulation at the End of 2002 from $1 Invested at the Beginning of 1871). Trading rules: Investors have $1 at the beginning of 1871 and that money accumulates over time as it is invested in stocks or T-bills. Investors switch from T-bills to stocks when the P/E ratio is lower than the P/E ratio in the trading rule and back to T-bills when it is higher. For example, the trading rule associated with a P/E ratio of 26 calls for switching from T-bills to stocks when the P/E ratio is lower than 26 and back to T-bills when the P/E ratio is higher. Investors who were to follow that rule from the beginning of 1871 to the end of 2002 would have seen their initial $1 accumulate to $60,628. Investors who bought stocks with their $1 at the beginning of 1871 and held them through the end of 2002 would have accumulated $67,672. We examine trading rules with P/E as integers from 5 to 40, but we report only some, including the one with the highest accumulation.

the $67,672 accumulated by buy-and-hold investors (see Figure I). The Sharpe ratio of such market timers would have also been lower than that of buy-and-hold investors.[3]

Market timers would have benefited from their switch to T-bills in 1931, when the 15.2 P/E ratio at the end of 1930 would have led them to T-bill that earned 1.09% in 1931 while stocks lost 45.16%, but they would have been harmed in 1959 when a P/E ratio of 19.1 at the end of 1958 would have led them to T-bills that earned 2.97% in 1959 while stocks earned 11.95%. The use of the 14.4 P/E market-timing rule implies that investors could have known in 1871 that the median P/E ratio during the following 132 years would be 14.4. Consider a more realistic case where market timers follow the median trading rule but calculate the critical P/E ratio as the median P/E ratio during the preceding years. We find that market timers who were to use this trading rule would have done somewhat better than

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[3]Note that the Sharpe ratio is biased upward when used to measure the performance of market timers. Market timers who are entirely in stocks in half the periods and entirely in cash in the other half are measured by the Sharpe ratio as equivalent to buy-and-hold investors who divided their money equally between stocks and bonds during all periods. "Diversification across time is not the same as diversification during each time period. Instead, it involves a lowered risk-corrected mean return" (Samuelson 1989, p. 8).

market timers who used the full-period median rule, accumulating $14,518. But this accumulation is still far smaller than the $67,672 accumulated by buy-and-hold investors.

Consider trading rules based on a range of critical P/E ratios, from 5 to 40 in increments of 1. It turns out that no trading rule in this range would have done better than the buy-and-hold rule. The best critical P/E ratio within the range is 26 but investors following its trading rule would have accumulated $60,628, still short of the $67,672 accumulated by buy-and-hold investors.

The fact that no P/E rule between 5 and 40 did better than a buy-and-hold rule is peculiar, considering that the P/E ratio at the end of 1932 was an extraordinarily high 136.5. That P/E ratio would have sent market timers into T-bills that earned a measly 0.32% in 1933 while stocks earned a whopping 56.50%. The P/E ratio at the end of 1932 came about because earnings during 1932, in the midst of the Great Depression, were only slightly better than zero.

The low earnings in 1932 are one of many examples of the high volatility of annual earnings. Campbell and Shiller (1998) dampen that volatility by replacing earnings during the preceding 12 months in the P/E ratio with the average annual earnings during the preceding 10 years. The 10-year averaging of earnings makes a great difference in the market-timing success of trading rules. The median P/E ratio where earnings are averaged over the preceding 10 years is 16.4, and market timers who were to use it as the critical P/E ratio would have accumulated $72,750 by the end of 2002, more than the $67,672 of buy-and-hold investors. But accumulations are very sensitive to the averaging method. For example, market timers who were to use a median P/E ratio where earnings are averaged over the preceding five years would have accumulated only $24,194, and those who were to use a median P/E ratio where earnings are averaged over the preceding 15 years would have accumulated only $16,450. Both figures are lower than the $67,672 accumulated by buy-and-hold investors.[4]

IV. Market Timing with Dividend Yield

The median dividend yield in the United States from 1871 to 2002 was 4.35%, where dividend yield is calculated as the ratio of the price at the end of a year to dividends during the year. Consider market timers who were to use that median dividend yield as the critical dividend yield in their market-timing trading rule, beginning with $1 at the end of 1871 and switching from T-bills to stocks when the dividend yield rose above 4.35% and back to T-bills when the dividend

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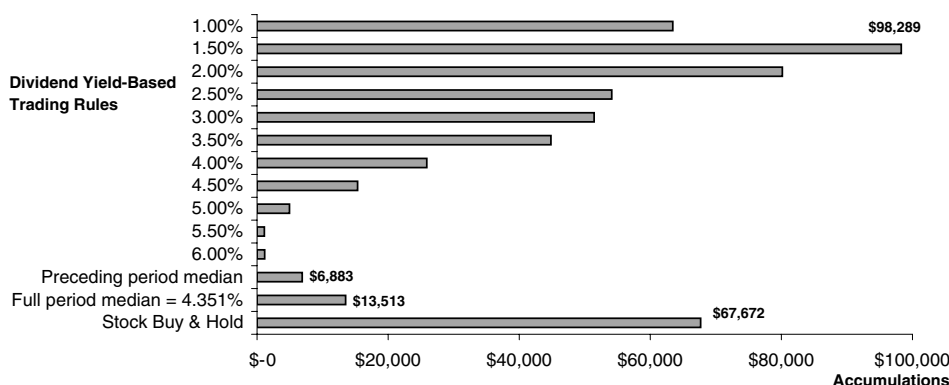[4]Money is invested in stocks during the years where the P/E ratio cannot be calculated for lack of data.

Figure II. Market Timing with Dividend Yield Trading Rules: United States 1871–2002. (Value at End of 2002 from $1 Invested at the Beginning of 1871). Trading rules: Investors have $1 at the beginning of 1871 and that money accumulates over time as it is invested in stocks or T-bills. Investors switch from T-bills to stocks when the dividend yield is higher than the dividend yield in the trading rule and back to T-bills when it is lower. For example, the trading rule associated with a dividend yield of 1.50% calls for switching from T-bills to stocks when the dividend yield is higher than 1.50% and back to T-bills when the dividend yield is lower. Investors who were to follow that trading rule from the beginning of 1871 through the end of 2002 would have seen their initial $1 accumulate to $98,289. Investors who bought stocks with their $1 at the beginning of 1871 and held them through the end of 2002 would have accumulated $67,672. We examine trading rules with dividend yields from 1.00% to 10.50%, but we report only some, including the one with the highest accumulation.

yield fell below 4.35%. Such market timers would have accumulated $13,513 by the end of 2002, less than the $67,672 accumulated by buy-and-hold investors. The median dividend yield from 1871 to 2002 could not have been known before the end of 2002. As in the case of P/E ratios, consider a more realistic case where market timers use the median dividend yield in preceding years as the critical dividend yield for the trading rule. Such market timers would have accumulated only $6,883, much less than the $67,672 accumulated by buy-and-hold investors.

Consider a range of dividend yields, from 1.00% to 10.50% in increments of 0.50%, a range that encompasses all dividend yields during the period. The best critical value for a dividend yield market-timing rule was 1.50%. Market timers who held stocks when the dividend yield rose above 1.50% and switched to T-bills when the dividend yield fell below 1.50% would have accumulated $98,289, more than the $67,672 accumulated by buy-and-hold investors. The 1.50% rule would have kept market timers in stocks all the way from 1871 through 1998 and switched them to T-bills at the end of that year and through 2002. These market timers would have missed the gain of stocks in 1999 but would have also missed the losses in 2000, 2001, and 2002 (see Figure II).

V. Market Timing with the Bullish Sentiment Index

The Investors Intelligence Sentiment Index reflects the outlook of more than 100 independent financial market newsletter writers. Investors Intelligence classifies newsletters into three camps: bulls, bears, and correction. Bulls are those who offer an optimistic outlook with suggestions to buy stocks, bears are those who offer a pessimistic outlook with suggestions to sell stocks, and corrections are those who are cautiously optimistic but suggest waiting for price pullbacks before buying. The bullish sentiment index is the ratio of the number of bullish newsletters to the sum of bullish and bearish newsletters. The bullish sentiment index, unlike P/E ratios and dividend yields, is a direct measure of sentiment. Other direct sentiment measures exist, such as the survey of the sentiment of individual investors by the American Association of Individual Investors and the survey of Wall Street strategists by Merrill Lynch, but the bullish sentiment index has been published since 1963, a considerably longer period than other sentiment measures. The bullish sentiment index was published every two weeks in the early years, and weekly since then.

Investors Intelligence offers the bullish sentiment index as a contrarian market-timing tool. Investors are advised to sell stocks when the bullish sentiment index is high and buy them when it is low. Solt and Statman (1988), Clarke and Statman (1998), and Fisher and Statman (2000a) find that there is indeed a negative relation the bullish sentiment index and subsequent stock returns but that relation is weak.

We calculate the bullish sentiment index every December since 1963 by adding the number of bullish newsletters in weekly Investors Intelligence reports during December and dividing that number by the corresponding sum of bullish and bearish newsletters. The median bullish sentiment index during the Decembers of 1963 through 2001 was 60.93%.

Buy-and-hold investors who invested a dollar in stocks at the beginning of 1964 would have accumulated $43.88 by the end of 2002. Market timers who switched from stocks to T-bills when the sentiment index exceeded its median and switched back to stocks when it fell below the median would have accumulated more, $48.29, and enjoyed a higher Sharpe ratio as well (see Figure III).

The bullish sentiment provided better guidance for market timers during the period than did P/E ratios or dividend yields. The median P/E ratio at the end of Decembers from 1963 through 2001 was 16.3 when earnings are those of the preceding 12 months. Market timers who were to use this median P/E ratio as the critical market-timing level would have accumulated only $36.45, less than the $43.88 of buy-and-hold investors. The Sharpe ratio of such market timers would have been higher than that of buy-and-hold investors but not as high as the Sharpe ratio of market timers who used the bullish sentiment index. The same is true for market timers who used the median P/E ratio where earnings are the mean annual

Market-Timing Trading Rule	Accumulation from $1 at the Beginning of 1964 to the End of 2002		Sharpe Ratio	
	Buy-and-Hold	Market Timing	Buy-and-Hold	Market Timing
Bullish Sentiment Index Switch from T-bills to stocks when the bullish sentiment index is lower than its median and from stocks to T-bills when it is higher than its median.		$48.29		0.393
P/E1 (With earnings during the preceding 12 months) Switch from T-bills to stocks when the P/E1 is lower than its median and from stocks to T-bills when it is higher than its median.		$36.45		0.322
P/E10 (With mean annual earnings during the preceding 10 years) Switch from T-bills to stocks when the P/E10 is lower than its median and from stocks to T-bills when it is higher than its median.	$43.88	$32.78	0.315	0.317
Fed Model Switch from T-bills to stocks when the P/E ratio according to the Fed model is higher than the actual P/E ratio and from stocks to T-bills when it is lower than the actual P/E ratio. P/E ratios are P/E10.		$29.25		0.341
Dividend Yield Switch from T-bills to stocks when the dividend yield is higher than its median and from stocks to T-bills when it is lower than its median.		$34.04		0.323

Figure III. A Comparison with Market-Timing Trading Rules and Buy-and-Hold Positions: 1964–2002. The Sharpe ratio is biased upward when used to measure the performance of market timers. Market timers who are entirely in stocks in half the periods and entirely in cash in the other half are measured by the Sharpe ratio as equivalent to buy-and-hold investors who divided their money equally between stocks and bonds during all periods.

earnings in the preceding 10 years as their critical market-timing levels, or those who used the median dividend yield .

Malkiel (2004) notes that P/E ratios tend to rise and fall inversely with interest rates, a tendency that is described in the so-called Federal Reserve model (hereafter referred to as the Fed model). The regression equation that links P/E where earnings are the mean annual earnings during the preceding 10 years to 10-year T-bond yields during 1963 to 2001 is:

$$E/P = 0.008 + 0.006[\text{10-year Treasury yield}]$$

$$(1.271) \quad (7.337)$$

$$R^2 = 0.59^*$$

*Uncorrected for serial correlation. The *t*-statistics are in brackets.

Consider sentiment measured as the deviation of actual P/E ratios from P/E ratios corresponding to the Fed model equation. A positive deviation indicates
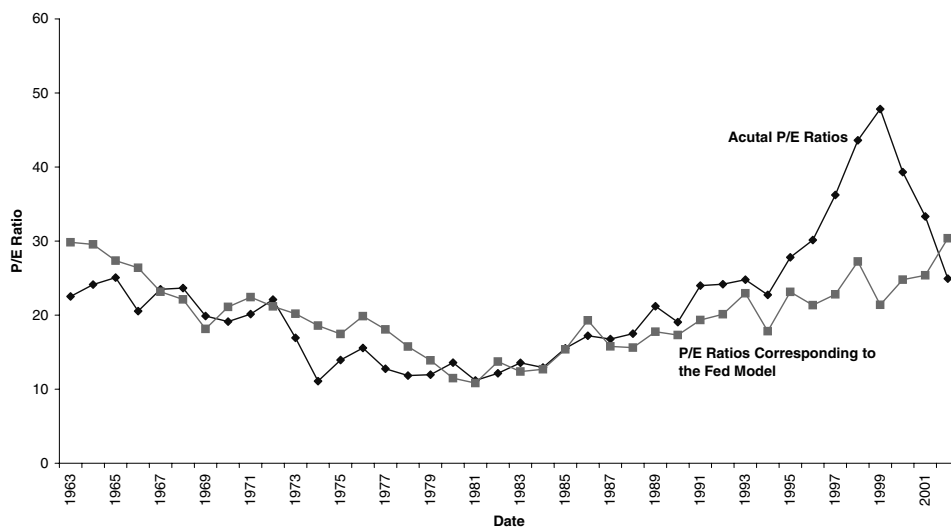
Figure IV. Actual P/E Ratios and P/E Ratios Corresponding to the Fed Model: 1964–2002. P/E ratio is of the end of the preceding year. P/E ratios are P/E10 where price is divided by mean earnings during the preceding 10 years.

bullish sentiment and a negative deviation indicates bearish sentiment. Actual P/E ratios and those corresponding to Fed model P/E ratios are presented in Figure IV, which, like the regression equation, is similar to the one in Malkiel (2004). Market timers who were to switch from stocks to T-bills when the deviation was positive and back to stocks when it was negative would have accumulated $29.25, less than the $44.88 accumulated by buy-and-hold investors. Their Sharpe ratio would have been higher than that of buy-and-hold investors but not as high as the Sharpe ratio of market timers who followed the bullish sentiment index.

VI. Conclusion

P/E ratios and dividend yields gained popularity as market-timing guides in the early 2000s just as evidence casts increasing doubts about their usefulness. We add to these doubts. We adopt the perspective of market timers who search for market-timing rules that would guide them from stocks to T-bills and back to stocks, such that they accumulate more than the sums accumulated by buy-and-hold stock investors.

P/E ratios and dividend yields are indirect measures of sentiment because they combine value with sentiment. Sentiment is bullish when a P/E ratio is higher than the P/E ratio that is consistent with value, and sentiment is bearish when a P/E ratio is lower than the P/E ratio that is consistent with value. The implied

assumption in the use of P/E ratios as market-timing guides is that the P/E ratio that is consistent with value is constant, equal to the average P/E ratio over time. We compare the indirect sentiment measures of P/E ratios and dividend yields with the direct sentiment measure of the bullish sentiment index and find that the latter does better as a market-timing guide than do the two former. But none is very reliable.

The difficulty in finding trading rules that do better than buy-and-hold strategies might be testimony to efficient markets where prices always equal value and sentiment plays no role. But there is much evidence that prices deviate substantially from value. For example, Roll (1988) finds that broad economic influences, industry influences, and specific news about companies explain less than 40% of the monthly return volatility in the typical stock, and Fair (2002) finds that many large price changes in the S&P 500 correspond to no obvious event and that of the hundreds of fairly similar announcements that have taken place between 1982 and 1999, only a few have led to large price changes.

Changes in sentiment, bullish or bearish, might explain changes in stock prices that are not explained by changes in value, but sentiment among all investors is difficult to ascertain because different groups of investors have different sentiment and because we have only incomplete data about the sentiment of the various groups. Moreover, the use of sentiment as a market-timing tool requires predictions of future sentiment and such predictions are difficult because sentiment does not move on an easily predictable path. Brunnermeier and Nagel (2004) report a market-timing success story. Hedge fund managers correctly forecasted increasing bullishness among investors toward technology stocks in the late 1990s. They bought these stocks at the time and sold them just before bullishness turned into bearishness in the early 2000s. But success stories are not assured. Successful market timing is likely to remain difficult because it requires insights into future sentiment and value, insights beyond those that are reflected in widely available measures.

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