How Efficiently Does the Stock Market Process News of Price Anomalies?

If markets are efficient, then equity prices should adjust to reflect any news that bears on the value of underlying firms. Yet the literature is filled with anomalies of equity prices that deviate from what appears to be rational pricing. One example is the value effect – the observation that stocks with a low price relative to earnings (or relative to other fundamental measures) generate superior returns. Does this mean markets are inherently inefficient? Or, perhaps, does it mean that efficiency is as much a process as a property? Perhaps it takes time for investable anomalies such as the value effect to be discovered and awareness to spread. As this happens, traders seeking to profit from the effect may bid it out of existence, leaving the market that much more efficient as a result. If this is the case, successful investing techniques that are not kept secret will sow the seeds of their own demise, at least in the long run.

Our paper tests whether that has happened with the value effect.

A Short History of Value

Long before Sharpe [1964] and Lintner [1965] formalized the notion of rational prices with the Capital Asset Pricing Model (CAPM), there existed a firmly held belief among investors that it was possible to find stocks trading at discounts to their true value. Graham [1949] employs the entertaining analogy of Mr. Market, who appears on the investor's doorstep daily offering to buy or sell stocks at certain prices (today he would be something of a pest – showing up every fifteen minutes). Graham argues that most of Mr. Market's prices are reasonable, but that some are quite daft. Graham's behavioral theory is that markets are made up of humans susceptible to the quirks of emotions and groupthink. As such, as a group they sometimes misprice a stock in the short run. In the long run, earnings and prospects clarify and investors dial price closer to true value. To take advantage of this dynamic, investors should identify issues priced at a bargain to true value, buy them and wait for Mr. Market to realize his mistake.

Academic researchers developed a body of evidence consistent with this view of investor behavioral biases. Nicholson [1960, 1968] documents that stocks with low P/E's, as a group, outperform those with high P/E's. This effect appears to be a systematic case of mispricing by the market. Stocks selling at high prices relative to earnings are often the glamorous darlings of market consensus, expected to grow into their lofty valuations over time. If, in fact, those stocks underperform as a group, it is evidence that the market got it wrong, perhaps due to overreaction to positive news or overly optimistic projections. Conversely, when low P/E stocks outperform it could be attributed to a return to rational values after a previous market overreaction to negative news, or simply just because of an increasing awareness of an overlooked company.

The CAPM appeared to debunk this logic by asserting that price variation is due to a stock's relative risk, as measured by beta. Supporters of CAPM theorized if low P/E stocks gain greater returns, it is only because they have greater risk. Yet Basu [1977] shows that the P/E effect holds even after adjusting for beta.

Other valuation opponents contend that comparing the P/E ratio across industries is an apples-to-oranges assessment and would simply drive an investor to hold concentrations in specific business groups. Peavy and Goodman [1982] agree that this concentration does not lead to an optimal portfolio and introduces unnecessary risk. They suggest the appropriate adjustment is to neutralize sector weights then calculate a relationship they call the Price Earnings Relative (PER), which measures a firm's P/E versus its own peer group norm. At the time of the first study the peer groups were often called industries but today the commonly referenced groupings are sectors.
For firm i in sector I:
$PER_i = (P/E)_i / (P/E)_I$

PER measures a firm's P/E versus its own peer group norm. Hence a PER of 2 would indicate a P/E twice the norm for a particular group. Ranking individual stocks by their PER, Peavy and Goodman find that the P/E effect is enhanced rather than diminished. They go on to show that the effect applies regardless of firm size or trading frequency [1983, 1986] and across all risk levels [1985].

The Multifactor Approach
While much of the early research focused on relative P/E ratios, the value anomaly is broader than that. It can appear in virtually any relative ratio which compares the market's valuation of a firm to some fundamental, more concrete measure of worth, such as Price-to-Cash Flow (P/CF) or Price-to-Sales (P/S). For instance, Fama and French [1992] employ Book-to-Market Value (BV/MV) to capture the value effect in their famous three-factor model. By claiming that return comes from three different factors (beta, firm size as measured by capitalization, and degree of value), their model definitively overturns the CAPM's simplistic worldview of beta as the sole source of returns. This created a new level of legitimacy for the value effect, and in the intervening years value investors responded by implementing a multi-factor approach to their valuation modeling process, including combinations of metrics to capture various mispricing inefficiencies.

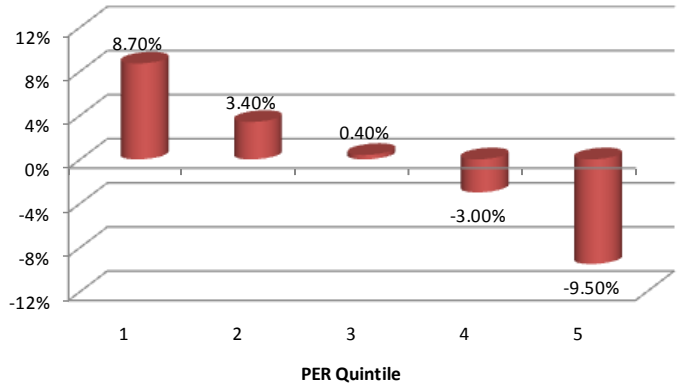
By now, after decades of published research and extensive quantitative modeling, the existence of the relative value effect would seem to have attained a level of awareness and consensus such that rational traders would begin to arbitrage it away by increasing demand for undervalued stocks and the associated higher attainable returns. But is there any evidence that this has happened?

The Test

In this paper we test the hypothesis that arbitrage has diminished the advantage gained from relative value selection rules as knowledge of the effect has spread. One challenge is that there are many ways to implement a trading strategy based on relative value. To begin with, we will focus solely on the P/E effect, which has a very long history in literature. For consistency, we employ a particular investing system of Peavy and Goodman [1985] which they not only expounded in academic and professional journals but also in a book that sold well and received coverage in mainstream publications such as *The Wall Street Journal*, *Barron's*, *Fortune Magazine* and many major newspapers. Thus we can assume that knowledge of this particular approach to value investing was well disseminated to investors large and small, amateur and professional.

In that earlier period, Peavy and Goodman take the top 2,600 public companies by market capitalization and rank them according to relative P/E for the 1962-1980 timeframe. They divide the list into quintiles, with quintile 1 containing the lowest relative P/E stocks and quintile 5 the highest. Re-sorting the list annually, they calculate average annual returns to each quintile "portfolio." They find a marked inverse relationship between relative P/E quintile and return. This is shown in Exhibit 1, which plots the spread of excess return across quintiles. The annual return spread between the top and bottom groups is 18.2%. Directly below the return graph are the average betas for each quintile. Beta increases at higher quintiles, so the excess returns are not a compensation for volatility as CAPM would suggest.

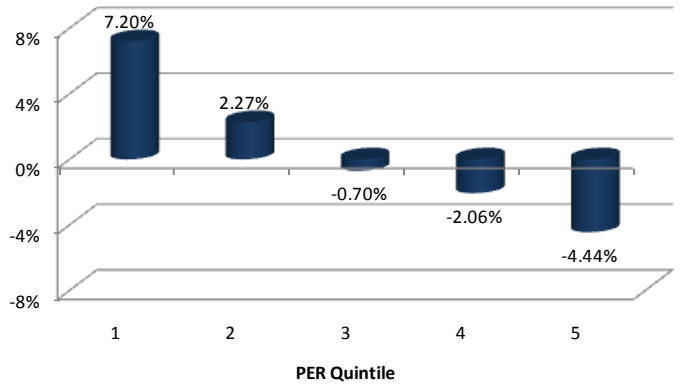
Exhibit 1. Annual excess return and average beta by relative value quintile (1962-1980)



	1	2	3	4	5
Average	.96	.97	1.01	1.02	1.12

In our first test we replicate the original Peavy & Goodman research in a more contemporary period. If the hypothesis is correct widespread investor use of P/E as a decision tool would have diluted the efficacy of the relative P/E measure and its use should not result in superior returns. The hypothesized graph should look dramatically different, but does it? Exhibit 2 answers that question.

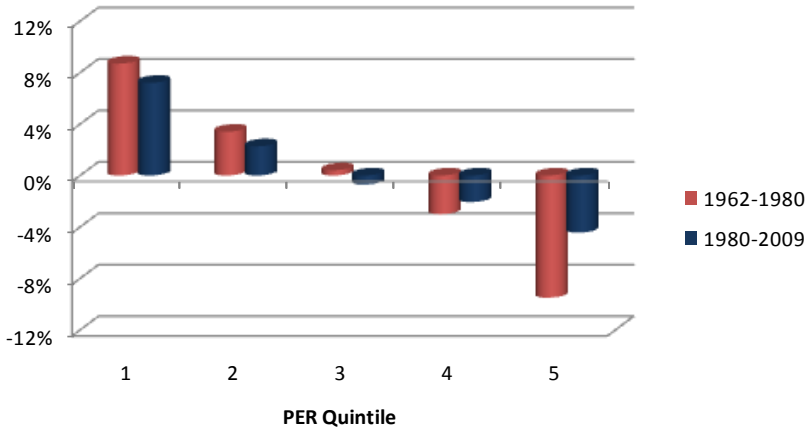
Exhibit 2. Annual excess return and average beta by relative P/E quintile (1980-2009)



	1	2	3	4	5
Average	1.11	1.05	1.09	1.17	1.32

We actually see a strikingly similar pattern in the updated graph. The relative P/E effect continued to offer superior returns. Once again, beta is highest in the worst ranked (lowest return) quintile. A small amount of flattening in returns did occur, with the spread between top and bottom quintiles shrinking to 11.6%. This flattening can be easily seen in Exhibit 3 which plots both the original and updated periods side-by-side.

Exhibit 3. Annual excess return by relative P/E quintile for original and updated periods

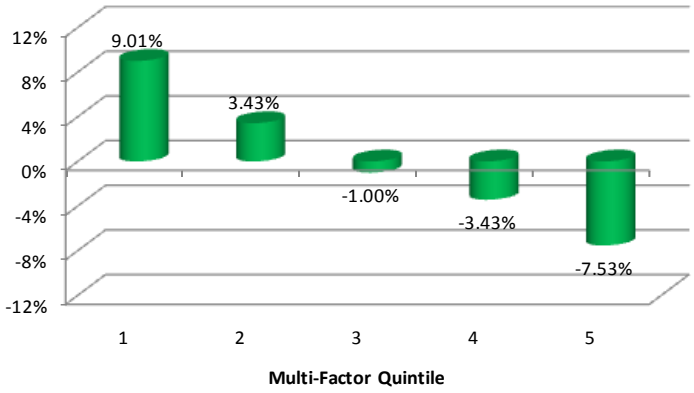


This flattening of the return spread across quintiles could conceivably be the result of investors exploiting the relative value anomaly, and arbitraging away part of its potential. Testing whether that potential can be recovered with an expanded, multi-factor value strategy is the next step in our study.

The Multi-Factor Test

In practice many value investors no longer rely solely on P/E-based strategies, but employ more robust, multi-factor value models. To further test for erosion of the relative value effect, we employ a five-factor model which takes as its inputs Price-to-Sales, Price-to-Cash Flow, Price-to-Book, and both trailing and forward P/E. All five factors are measured relative to sector peer groups and weighted equally. For 1980-2009, our multi-factor quintiles produce the excess return pattern shown in Exhibit 4 below. Once again, the relative value premium is plainly seen with returns that decline sharply in the most expensive quintiles, where beta is also higher.

Exhibit 4. Annual excess return and average beta by multi-factor relative value quintile (1980-2009)

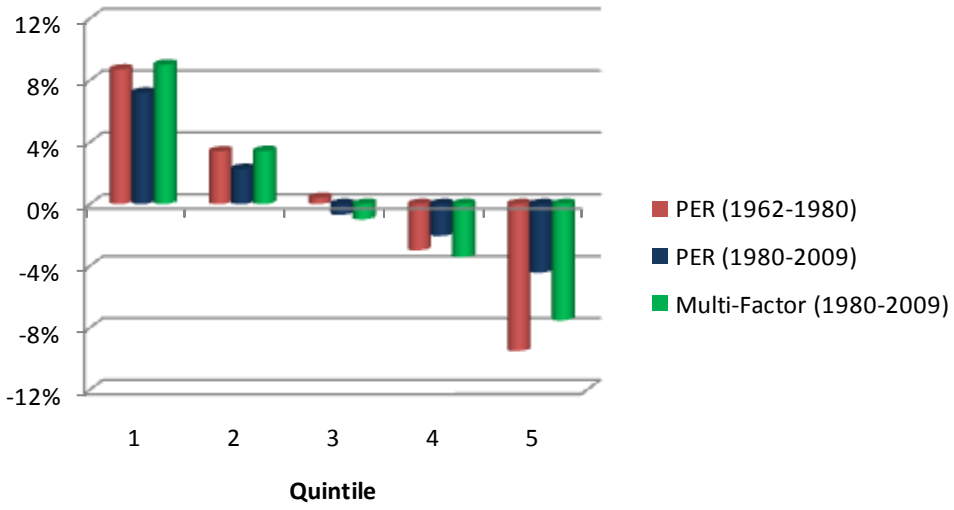


	1	2	3	4	5
Average	1.09	1.09	1.11	1.15	1.23

Moreover, the multi-factor approach undoes much of the flattening seen in Exhibits 2 and 3. Exhibit 5 illustrates this more clearly by plotting the multi-factor spread against both relative P/E spreads. The return spread for the multi-factor model is 16.5%, almost as wide as the 18.5% of the original relative P/E study.

By focusing on the excess returns attributed to the least expensive quintile (quintile 1) we can better understand the return potential for long value investors. After all, the least expensive grouping represents stocks of primary interest for such valuation focused proponents. Interestingly, quintile 1 performance was 9.01% in the multi-factor analysis which compares favorably to the 8.70% excess return in the original relative P/E study and 7.20% in the updated study. Such findings argue that the relative value effect has not experienced decay.

Exhibit 5. Annual excess returns by PER and multi-factor relative value quintiles



Using the one factor strategy, we find evidence of a small diminution of the relative value effect that may be due to awareness and consensus of its existence. But the diminished relative P/E spread appears to be mostly recaptured by employing a strategy based on a more robust, multi-factor relative value model. Moreover, excess returns associated with the least expensive stocks have been remarkably consistent and slightly improved with the multi-factor approach. These findings would seem to present a challenge to proponents of efficient markets, but is welcome news for relative value investors, particularly those who have not let their modeling efforts stray.

Conclusions

What do our findings say about markets and the investors who make them up? The story told by those who seek value in stocks is that crowds, be it a mob of vigilantes or a market of nattily dressed stock traders, are prone to overreaction or inattention to the less glamorous story. These behavioral conditions fit our data. We believe it also fits common sense. Stock valuations hinge on future outcomes. It seems odd to claim that markets are so efficient that the consensus expectation they currently reflect is in every case the best possible outcome.

Like Chan and Lokonishok, we believe the value premium is real and not a compensation for risk. We believe it has behavioral roots, and that ascribing it to risk is an attempt to shoehorn an inconvenient observation into a worn-out assumption of investor behavior. Nonetheless the question remains arguable. Many still doubt that the relative value effect represents a real opportunity for better returns without more risk, and perhaps this is the secret of the relative value effect's longevity. Perhaps the day when everyone is convinced will be the day when the effect is finally arbitraged away. Thankfully for relative value investors, it does not appear that day will come any time soon.

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