Are Value Stocks Still Valuable: A Study of Value Strategy using Stock Data from 1999 to 2020

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ABSTRACT
This study uses two essential factors, book-to-market (B/M) ratio, and cash flow to price (C/P) ratio, to generate decile portfolios. Additionally, decile portfolios sorted by two factors from high to low are formed for five years with annual returns. By comparing the five-year average returns of each decile portfolio, it is determined that the value strategy is still effective in the market.

Keywords: *value strategy; value stock; glamor stock; book-to-market ratio; cash-to-price ratio*

1. INTRODUCTION

In the last century, value strategy has been proven profitable in the market practice. The value strategy means purchasing the stocks at a lower price relative to their earnings, book to market ratio, cash flow, and other fundamental factors that may gain higher profits. However, with the development of communication technology and fluctuation in the market, predictability has currently become undetermined. In this article, two variables, the B/M ratio and the C/P ratio are the keys to generating portfolios. These variables are also used to verify if the value strategy is still feasible in the recent 20 years.

In this paper, the stock data of American stocks from the New York Stock Exchange (NYSE) and National Association of Securities Dealers Automated Quotation (NASDAQ) from 1999 to 2020 will be divided into ten decile portfolios

2. LITERATURE REVIEW

The stock market is always supposed to be efficient. And the efficient market hypothesis believes that an efficient market equips a sound law system, sufficient competition, and high transparency. Information will be reflected on the stock price accurately, timely, and sufficiently. (Fama 1970 [6]) But in years of studies, value strategy has been proved to achieve abnormal performance. As well as more return would be obtained by buying stocks with a high B/M ratio. Due to this phenomenon, the real market is inefficient, as the delay of information transition helps people predict future stock prices (Rosenberg, Reid, and Lanstein, [3]). Also, the paper (Chan, Hamao, and Lakonishok, [1]) tests the cross-sectional differences in the Japanese market with variables, especially cash-flow yield, to illustrate that both manufacturing and non-manufacturing firms exhibit higher return with higher cash-flow to price. Their results further prove the feasibility and universality of a value strategy.

Additionally, Fama and French [2] studies book-to-market equity to capture the cross-sectional variation in average stock returns. According to Fama and French, beta value cannot fully explain the difference of returns of different stocks, but factors like book-to-market ratio, price-earing ratio, and market value can explain it. And they show that higher ratios earn higher returns by using a portfolio sorting strategy.

As for the portfolio sorting strategy, Lakonishok, Shleifer, and Vishny [1] divide all the stocks in the New York Stock Exchange (NYSE) and National Association of Securities Dealers Automated Quotation (NASDAQ) into ten portfolios based on its book-to-market ratio and cash-flow to price ratio. Their results show that firms with higher book-to-market ratios and cash-flow to price ratios will gain higher returns.

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This paper will further examine the feasibility of the value strategy based on Lakonishik's research [1]. This paper assumes that the stock market from 2000 to 2020 still conforms to the value strategy. In other words, the value stocks will earn more return than glamour stocks.

3. METHODOLOGY

The sample contained data from the end of July in 1999 to the end of July in 2020. Based on our strategy, accounting data from one year prior to this date range is needed to eliminate look-ahead bias. The final result is presented in the form of a series of monthly formed portfolios starting at the end of July 1999. All the data used in this study was collected and merged together from the Center for Researcher in Security Prices (CRSP) and COMPUSTAT. The book-market ratio was taken from COMPUSTAT for the end of the last fiscal year, and the market value was from CRSP. The data set contains 11,331 stocks from three U.S. stock exchanges: NASDAQ, AMEX, and NYSE.

One problem with data acquisition is eliminating the duplication of data. As the article motioned above, the data used in the study is from CRSP and COMPUSTAT. However, the stock data downloaded from WRSD is not unique. For example, CUSIP is a code that is used to represent one stock in CRSP. CUSIP changes when a stock is split or the company name changes. Thus the CRSP data downloaded from WRDS are required to delete the duplicated data in STATA until every CUSIP represents one individual stock.

Similarly, the data from COMPUSTAT are also needed to be selected. COMPUSTAT assigns each company a new permanent identity Compustat Proprietary Company ID (GVKEY). But COMPUSTAT does not provide a separate stock permanent identity, so I need to identify a stock by combining the company permanent identity with the Compustat Issue ID (IID) of the securities issued by each company. Then processed data will be merged together by using CCM and linkfile. Any data cannot be matched will be deleted.

Then, 11,331 stocks are extracted return data for Years +1, +2..., +5 from the formation. Within each month, stocks were divided into 10 portfolios to compute average returns. The two different benchmarks in this article are the book-market ratio and the Cash-price ratio. These two factors were chosen because they are related to value strategy and focus on different aspects of stock's market value and book value. Also, the decile benchmark used in dividing the portfolios was from NYSE in order to reduce the bias of small-cap companies from other stock exchanges.

In each portfolio, the average returns were value-weighted using a buy-and-hold strategy for a different time horizon from the formation month. If some accounting data was missing due to delisting or changes in the stock exchange, these stocks were deleted directly. Financial companies are not included in the research because their accounting regulations are different from typical industries. Finally, when dealing with extreme data, 1% Winsorize was applied. Any companies that are missing return data during the portfolio holding period were excluded.

One problem to eliminate in the sample was the significant look-ahead bias. To deal with that, yearly data was expanded into monthly views from 1 to 12. For counting a portfolio's monthly book equity, the data chosen was from the previous year to avoid look-ahead bias because their data was not available until the end of the fiscal year. This method was also used when calculating the cash-flow to price ratio.

Using variables from COMPUSTAT, cash-to-price ratio, and book-to-market ratio, in addition to various investment returns, were computed. The cash flow was computed as depreciation (dp) plus income before extraordinary items (ib) (Lakonishok, Shleifer, and Vishny [1]).

Firstly, one table was made with B/M and C/P, respectively, as references to compare their influence on return. Secondly, returns for each portfolio were computed using a buy-and-hold strategy for Years +1, +2..., +5 relative to the time of formation. When calculating the yearly return, the results were cumulative. Therefore, when calculating the annual return, the logarithm of the data obtained should be taken and subtracted from the logarithm of the previous year to obtain the logarithm of the return data of the current year. Logarithms are mathematically convenient for return addition and subtraction. Finally, all logarithmic data was restored to obtain the actual average return for each year.

TABLE I. B/M&C/P TABLE

Glamour										value
	1	2	3	4	5	6	7	8	9	10
						Panel Ⅰ: B/M				
R1	0.043	0.046	0.082	0.067	0.064	0.080	0.076	0.120	0.117	0.184
R2	0.085	0.053	0.043	0.060	0.081	0.073	0.076	0.035	0.108	0.148
R3	0.008	0.045	0.082	0.069	0.031	0.039	0.064	0.101	0.120	0.180

R4	0.0622	0.041	0.058	0.057	0.127	0.075	0.112	0.090	0.037	0.101
R5	0.058	0.033	0.064	0.041	0.123	0.177	0.0412	0.053	0.150	0.120
AR	0.051	0.044	0.066	0.059	0.085	0.089	0.074	0.080	0.106	0.147
Panel Ⅱ: C/P										
R1	0.075	0.035	0.055	0.057	0.067	0.074	0.120	0.075	0.065	0.094
R2	0.064	0.040	0.035	0.035	0.065	0.078	0.088	0.068	0.081	0.136
R3	0.103	0.053	0.047	0.066	0.047	0.037	0.001	0.056	0.056	0.093
R4	0.169	0.084	0.042	0.042	0.080	0.093	0.073	0.060	0.103	0.061
R5	0.051	0.062	0.053	0.014	0.028	0.065	0.057	0.085	0.070	0.112
AR	0.093	0.030	0.047	0.043	0.058	0.070	0.068	0.068	0.075	0.099

Decile portfolios are formed at the end of each July between 1999 and 2020, ranking from low to high based on B/M and C/P. The return values listed here are averages over all formation time periods. R1 means the return of the portfolio one year after its formation. Similarly, R4 represents the return of a portfolio four years after its formation. Rn is the average return in year n after its formation, and t could be 1 to 5. AR is the yearly average return overall outformation years. The glamour portfolio is for the portfolio with the lowest B/M or C/P, while the value portfolio contains stocks ranked highest on B/M or C/P, such as portfolio 10.

TABLE II. Three-dimensional cube diagram of B/M

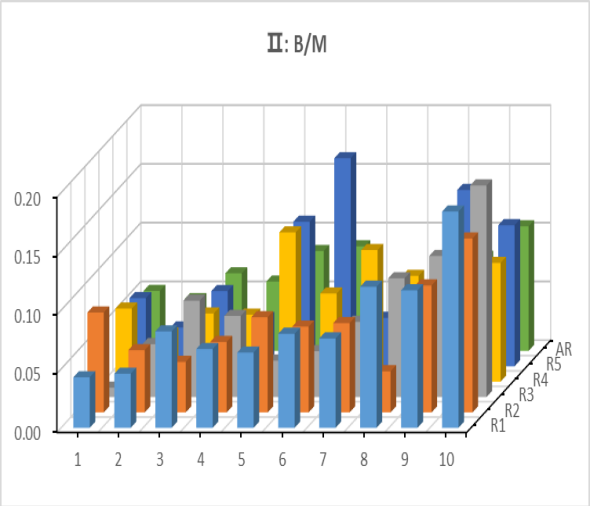
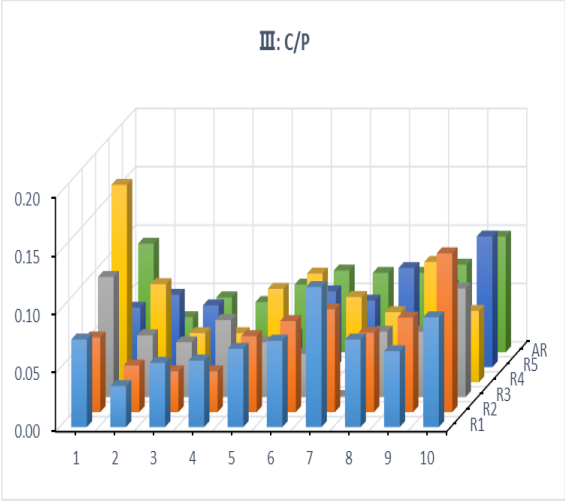


TABLE III. Three-dimensional cube diagram of C/P



4. ANALYSIS

Table I Panel I mainly reflect the influence of B/M on returns named the book-to-market strategy. Each year's stocks are divided into ten decile portfolios based on B/M size. The market value is taken from CRSP at the time of portfolio formation, and the book value is taken from COMPUSTAT at the end of each fiscal year. This study mainly focuses on the return performance of different portfolios over a specific period of time to test whether the value strategy works or not. Moreover, this study focuses on long-term returns (5 years Max). The sample contains a large time horizon to examine whether or not long-term investors are also using this investment strategy.

In Panel I, the pea presents the returns of 10 portfolios from year 1 to year 5 after the formation time and the average annual 5-year return (AR). All the numbers represented are the average returns across the time period. The ten portfolios are sorted from high to low using B/M ratio, and the highest is portfolio 10 and the lowest is portfolio 1. The conclusions of Fama and French [2], Lakonishok, Shleifer and Vishny [1], and Rosenberg, Reid and Lanstein [3] are confirmed again in our study. On average, the return from the portfolio with

lowest book-market ratio (glamour stock) has an average return of 5.13 percent. Similarly, the return from portfolio 2 has a return of 4.37 percent, which is the least return obtained from the 10 portfolios. The main trend in this panel is that portfolios with a higher B/M ratio get the highest return. The last two portfolios, especially (portfolio 9 and 10), which consisted of stocks with the lowest B/M ratio, achieved a high return of 10.6 percent and 14.7 percent, respectively. The highest rate of return (14.7% from portfolio 10) is 10.3 percent higher than the lowest one (4.37% from portfolio 2). The result is basically in line with our initial expectations, stocks with higher B/M ratios gain higher returns.

Table II represents the portfolio performance of Panel I visually. Generally, the portfolio with a low B/M ratio gets a relatively lower return. And portfolios with high ratios have the opposite performance.

The more profound question is: what is the book-to-market ratio exactly represented? The formula of B/M is book value divided by market value. The ratio represents the market value of a company relative to its actual worth. In general, if one stock's B/M ratio is low, then investors are willing to pay more for a company than its net assets value. This reveals that investors have an optimistic forecast about this company and are willing to pay a premium for it. It is possible, however, that the stock is just simply overvalued. I explain this point because although the value strategy is feasible here, it is still not an exclusive variable to explain certain companies' financial situations.

Panel II represents the return sorted by the cash-flow to price ratio (C/P). As in Panel II, all the numbers represented here are the average returns in a portfolio across a certain time period. All the data are divided into 10 portfolios with the help of NYSE benchmark from lowest C/P ratio to highest C/P ratio. The highest average return is on portfolio 2 of 2.98 percent while the lowest one is on the portfolio 10 of 9.93 percent. The highest return is 6.95 percent more than the lowest one. In general, in this panel, the average returns of the glamour stocks are relatively lower than that of value stocks (the stocks with low cash-flow to price ratio). For portfolio 2 to portfolio 10, returns go up with an increase in C/P. In other words, the portfolio with the higher C/P ratio tends to make higher returns. Despite some order deviations, the overall pattern is clear. This result also confirms the conclusion of Lakonishok, Shleifer and Vishny [1].

Table III illustrates the visual representation about Panel II. In this table, the returns of portfolio 1 have unexpected high return in all the 5 year range. The performance of portfolio 2 to 10 generally matches our expectation, the portfolio with a higher C/P ratio gains a higher return.

However, there is an exception in our study that is the five-year average return of portfolio 1. Theoretically, according to our assumption, portfolio 1 will have the least return among 10 portfolios because this portfolio has the lowest C/P ratio. However, the percentage of portfolio 1 is 9.25, which ranked as the second-highest return. This result is clearly anomalous. The problem may be the cash-flow calculation. According to Jonathan Lewellen and Katharina Lewellen [5], this formula contains four limitations. For example, it ignores the effects from "special events" like natural disasters and lawsuits. Because of that, I plan to use other formulas to check the cash flow in portfolio 1. The alternative formula could be EBIT - tax paid + depreciation or use cash flow variable, CF, from the Statement of Cash Flows (SCF) rather than income statement [5].

5. LIMITATIONS

The study still needs some improvement. The cash flow data is necessary to double-check because of the abnormality in portfolio 1. Also, many critical factors that may affect value strategy's performance are ignored, like the financial crisis in 2008 and the COVID-19 event. The follow-up study will focus on specific industries such as manufacturing.

6. CONCLUSION

Firstly, the final result of this study once again proves market inefficiency. Anyone's investment behaviors are irrational, and the information has a time delay. Because of this time lag, the stock price does not directly reflect everything about a company. Share prices can therefore be predicted and even manipulated. Also, with the assumption of the market efficiency existence, I started looking at the value strategy.

This article proves that from July 1999 to July 2020, the average return of the value strategy, buying stocks that have a book value higher than the market value, is higher than the return of the glamour strategy. This study uses two variables: the B/M ratio and the C/P ratio to test this conclusion, and both studies showed that the portfolios of value strategies yielded higher returns. Moreover, the study also proves that glamour stocks are consistently overvalued in the stock market.

The question is, why the value strategy can keep its efficiency for such a long period? I can give two possible explanations. First, most investors have blind faith in big companies. Because of big companies' brand effect and industry status, investors are overconfident in investing in such "great" companies. They do not notice, however, that the data listed on the website is occasional and deceptive. For those large companies with a glorious history, the past glorious return ratio is generally not reproducible. Just as it is almost

impossible for Apple to repeat the explosive growth of the business like when the iPhone 4s was first released. This investment behaviors of chasing ups and downs is more likely a psychological error. Some institutions' behaviors worsen the situation. Some institutions or agents will perform more professionally and calmly when they are making investing plans. However, it is also complicated for them to convince clients to invest in companies with poor historical performance as clients may mistakenly believe that value stocks are riskier than glamour stocks. With the threat of disinvestment from their clients, institutional investors tend to use a conservative strategy. Therefore, institutions will cram in some glamour stocks into their investment plan to reflect their "professionalism" and "prudence." For them, attracting clients is more important than earning five percent more returns.

A second possible reason is that most investors are eager for short-term high profits instead of waiting for five years or more. This kind of investors' expective time spans are shorter than value strategy. The stocks selected by the value strategy are not as convincing as glamour stocks in the short term. And, for the same reason, institutions cannot afford to see any dramatic fluctuations or drops. It is difficult to explain with sponsors that they are chasing profit in five years. The risk of being fired by sponsors because value investing seems higher risk than glamour investing. Because of this trend, quantitative investment has gradually become the new favorite investment in the 21st century.

In this study, the value strategy is proven to be feasible again in the first 20 years of the 21st century, despite the 2008 financial crisis and the impact of COVID-19. Stocks with a higher B/M ratio or C/P ratio are proven to achieve higher returns in each fiscal year compared to other stocks. For the follow-up study, I plan to look at the effects of these global financial crises on the effectiveness of the value strategy.

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