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Multi-factor Stock Selection Strategy: Value, Profitability, and Momentum

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Abstract. This study examines whether sequentially combining value, profitability, and momentum improves stock-selection performance in the U.S. equity market. Utilize company-level accounting and monthly return data from Compustat and Center for Research in Security Prices (CRSP) to build annually rebalanced, equally weighted portfolios of the 600 largest eligible firms over the 2016-2024 formation period for the analysis. Stocks are first screened by book-to-market ratio, then by return on equity, and finally by 12–1 momentum. Portfolio performance is shown by annualized return, volatility, the return-to-volatility ratio and maximum drawdown. The added factors do not always improve performance, according to the results. The value portfolio has an annual return of 10.39%, rises slightly to 10.74% after adding profitability, and then falls to 10.36% after the momentum screen. All factor-screened portfolios underperform the 11.50% return of the Top-600 benchmark and have higher volatility and larger drawdowns. Robustness tests using gross profit-to-assets and earnings-to-price also show that the results are sensitive to factor definitions and screening order. These findings caution against assuming that greater model complexity necessarily enhances performance. Overall, multi-factor performance depends on factor measurement, sequencing, and portfolio concentration.

Keywords: multi-factor investing, value factor, profitability factor, momentum factor

1. Introduction

Organizations have begun to offer quantitative investment products, and these have gradually gained some attention in the financial market. Quantitative strategies select stocks according to certain attributes of the market and financial data and do not use investors' subjective judgment. Factor investing is a type of stock selection that chooses stocks with attributes that may be related to future returns, such as valuation, profitability, and past stock performance. Bermejo et al. have studied the effect of value, profitability, and momentum on the European equity market, and found that strategies considering multiple factors generally outperform those based on a single factor [1]. Therefore, it is proposed that several kinds of information be used in combination for stock selection.

Relying on a single factor may also be insufficient. The performance of a factor will change over time, and factors that were effective in the past may no longer be effective in a different market environment. Recently, some research has begun to address this problem in the value premium.

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Gonçalves and Leonard believe that the reduction in the traditional value premium is partly due to how fundamental value is measured; that is, book equity may not fully reflect the increased weight given to intangible assets [2]. Yin and Liao also examine the recent difficulties faced by value strategies and emphasize the importance of profitability characteristics in identifying value stocks [3]. Therefore, it is suggested that a single index may not fully reflect the situation of a company.

The three factors examined in this study are value, profitability, and momentum, each of which captures a different dimension of stock characteristics. Value refers to how far above or below a stock's intrinsic value it is. A low valuation does not necessarily mean that a stock is a good investment; it may be that the firm has weak fundamentals. Profitability will offer more data on the financial situation of these companies. Recently, many studies have found that the features of profitability are positively associated with future stock price changes [4]. Another type is a momentum factor; it is a change in stock prices and not accounting data. Ehsani and Linnainmaa have examined the connection between factor momentum and individual stock momentum and determined that momentum is still effective in explaining earnings patterns [5].

Instead of building a completely new stock selection model, this paper extends the iterative multi-factor approach proposed by Bermejo et al. [1]. The strategy sequentially incorporates value, profitability, and momentum into the stock-selection process. In other words, it first uses a value factor to find relatively good stocks, then further filters these companies based on profitability and operating performance and finally adds a momentum factor for additional filtering according to recent changes in stock prices. Bermejo et al. have found that several such factors, when combined, are more effective at promoting the increase in investment returns than a single factor [1]. Research by these scholars has shown that the level of each factor changes over time. Therefore, this study evaluates the performance of the final multi-factor portfolio and examines the incremental effect of each factor on stock selection as it is introduced into the screening process.

Based on the above framework, this paper investigates how value, profitability and momentum cooperate in a multi-factor stock selection strategy. The two problems to be solved are: how the three factors affect stock selection and portfolio performance when they are added sequentially, and what may explain the contribution of each factor to the overall strategy. Based on the above stages of stock selection, this paper will investigate the influence of all these factors in greater detail and not only focus on the return of the final portfolio. The study provides a more specific reason for using the multi-factor model in quantitative stock selection.

2. Literature review

Factor investing is a system of investment that selects stocks based on attributes that are expected to be correlated with different future returns. Rather than employing individual assessments of the companies, factor-based strategies rank and select stocks according to measurable financial or market data. However, the impact of the individual factor is not always the same. Different factors may have different effects under different market conditions and at different times, so several factors are combined rather than using just one [6].

Recently, some studies have shown that this way is also beneficial. Bermejo et al. examine value, profitability, and momentum strategies in the European equity market by comparing single-factor, mixed, and conditional approaches [1]. Their results show that combined strategies generally outperform the individual approaches, and the order in which the factors are added also affects portfolio performance. At the same time, the authors also find that factor performance changes over time and that some factor-related alphas have decreased in recent periods. Based on the above

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results, multi-factor investment may offer a more all-encompassing way to select stocks, and the impact of individual factors is not expected to be stable either.

2.1. Value factor

Factor investing is a system of investment that selects stocks based on attributes that are expected to be correlated with different future returns. Rather than employing individual assessments of the companies, factor-based strategies rank and select stocks according to measurable financial or market data. However, the impact of the individual factor is not always the same. Different factors may have different effects under different market conditions and at different times, so several factors are combined rather than using just one.

Recently, some studies have shown that this way is also beneficial. Bermejo and others have studied factor-based stock selection in the European equity market and classified the three types as value, profitability and momentum [1]. Compare the pure single-factor method with the mixed and conditional approaches that consider multiple factors. Based on the above results, the combined approach generally outperforms the individual approaches, and the order in which the factors are added also affects portfolio performance. At the same time, the authors also find that factor performance changes over time and that some factor-related alphas have decreased in recent periods. Based on the above results, multi-factor investment may offer a more all-encompassing way to select stocks, and the impact of individual factors is not expected to be stable either.

2.2. Profitability factor

Profitability offers another perspective, as undervalued stocks are not necessarily attractive investments. A company may appear cheap because its core business is weak. Therefore, profitability can be used together with value to provide additional information about firm fundamentals. Bermejo et al. argue that profitability can help distinguish potentially undervalued companies from firms that are inexpensive because of low intrinsic value, which may reduce exposure to value traps [1]. Their study considers gross profitability on assets (GPA) and different measures of return on capital [7]. More recently, Kogan, Li, and Zhang proposed a theoretical explanation for the gross profit margin premium based on a company's production costs and systematic cash flow risk [4]. They also found that gross profit margin and value are two independent and negatively correlated factors. This supports the idea that profitability can contribute information that is different from value alone.

2.3. Momentum factor

Momentum differs from the first two factors because it is based mainly on market-price information rather than accounting fundamentals. It captures trends in past relative performance that may contain information about future returns [8, 9]. Bermejo et al. use a 12-month momentum measure that excludes the most recent month to reduce the influence of short-term reversal effects [1]. Recent research continues to find evidence of momentum patterns [10, 11]. Ehsani and Linnainmaa pointed out that the momentum of individual stock returns is closely correlated with the momentum of factor returns and found positive autocorrelation among multiple factors [5]. However, momentum performance is not necessarily constant. Huang finds that differences in past winner and loser returns can predict subsequent momentum profits across both the U.S. market and international

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markets [12]. Therefore, momentum can provide useful price-based information, but its effectiveness may also depend on market conditions.

2.4. Multi-factor investing and research gap

The three factors provide different types of information about stocks. Value focuses on whether the stock is relatively inexpensive, profitability provides information about the strength of the underlying business, and momentum gives information contained in recent market-price movements. Combining these factors may provide a more complete stock-selection process than using any one of them separately.

This idea is reflected in the conditional strategy developed by Bermejo et al. [1]. In their iterative approach, stocks are first ranked according to value, with the top 20% retained. The remaining stocks are then screened by profitability, with the top 50% retained, and momentum is finally applied to select the top 50% of the remaining stocks. This process reduces an initial universe of 600 stocks to a portfolio of 30 equally weighted stocks. The sequence also has an economic interpretation: value identifies potentially inexpensive stocks, profitability adds information about firm fundamentals, and momentum introduces information from market prices.

Based on this literature, the present study does not attempt to develop a completely new factor model. Instead, it uses the iterative framework of Bermejo et al. as the basis for examining how different factors contribute to the stock-selection process [1]. In particular, the analysis focuses on the changes that occur when profitability is added after value and when momentum is subsequently introduced. This makes it possible to examine not only the final performance of a multi-factor portfolio, but also the incremental role of each factor. The study therefore aims to connect portfolio performance with the economic mechanisms behind value, profitability, and momentum rather than evaluating the final investment return alone.

3. Data and methodology

3.1. Data and sample selection

This study uses company-level financial and stock return data from Wharton Research Data Services (WRDS). The accounting data is mainly taken from Compustat Fundamentals Annual, while monthly stock return data comes from the CRSP/Compustat Merged (CCM) database. Companies in Compustat are identified by GVKEY, while securities in CRSP are identified by PERMNO. Since these two databases use different identifiers, the historical linking information provided by CCM is used to match the accounting records with the corresponding stock return data.

The accounting data include total assets, common equity, stockholders' equity, net income, sales, shares outstanding, fiscal-year-end stock price, deferred taxes, and preferred stock. Additionally, a separate Compustat data set is provided, which includes cost of sales, a necessary variable for robustness analysis when calculating gross margin. For the stock market data, the monthly data set provides CRSP security identifiers, monthly closing prices, and total monthly returns.

One issue with using annual financial statements is that the information may not have been available to investors immediately after the fiscal year ended. To avoid using information too early, this study applies a six-month lag to the annual accounting data. The portfolios are formed at the end of June each year and held from July of that year to June of the next year. This setup helps ensure that the financial information used to select stocks would have been available to investors before the portfolios were formed.

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The sample focuses on relatively large companies. On each day the portfolio was constructed, companies were ranked by fiscal year market capitalization, and 600 eligible companies were selected. Financial firms are excluded when the Compustat data are downloaded by using the Industrial format. The initial Compustat sample includes both active and inactive firms, which helps reduce survivorship bias. Because the WRDS subscription service used in this study does not provide historical data for the S&P 500 index, large-cap companies were selected as benchmarks for comparing the performance of various portfolio factors.

The main portfolio analysis uses formation years from 2016 to 2024. These years are selected because complete return data for the following 12-month holding period are available.

3.2. Factor construction

Three stock characteristics are used in the baseline strategy: value, profitability, and momentum. These factors are selected because they are widely discussed in previous studies on multi-factor investing. Bermejo et al., for example, examine all three factors and test their performance both separately and in sequential portfolio strategies [1]. Their research also provides a useful reference for the portfolio formation process in this study, since they select 600 firms and construct their portfolios at the end of June.

3.2.1. Value

The baseline value measure in this study is the book-to-market ratio (B/M):

$$\frac{B}{M_{i,t}} = \frac{Book\ Equity_{i,t}}{Market\ Equity_{i,t}} \tag{1}$$

Book equity is calculated using the available information on shareholders' equity, deferred taxes, and preferred stock from Compustat. Market equity is measured using the fiscal-year-end stock price multiplied by the number of common shares outstanding. The book-to-market ratio (B/M) is then calculated by dividing book equity by market equity. A higher B/M ratio generally indicates that a stock is cheaper relative to its book value and is therefore considered more value oriented.

B/M is one of the most used measures of the value factor. Fama and French show that book-to-market and firm size are related to differences in average stock returns [13]. More recent research also continues to use this measure. For example, Bermejo et al. include book-to-market (BTM) as one of the value measures in their multi-factor analysis [1]. For these reasons, B/M is used as the main value measure in this study.

To check whether the results depend too much on the choice of B/M, earnings-to-price (E/P) is also tested as an alternative value measure. E/P is preferred to the P/E ratio because its ranking direction is consistent with that of B/M. In both cases, a higher value can be interpreted as indicating a relatively cheaper stock [14].

3.2.2. Profitability

The baseline profitability measure is return on equity:

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$$ROE_{i,t} = \frac{Net\ Income_{i,t}}{Book\ Equity_{i,t}} \tag{2}$$

Higher ROE indicates stronger profitability because the firm generates more earnings relative to its equity. Profitability based on book equity has also been widely discussed in previous asset-pricing research. For example, Fama and French examine profitability relative to book equity when studying differences in stock returns [15].

A second profitability measure, gross profits-to-assets (GPA), is used for robustness analysis:

$$GPA_{i,t} = \frac{Sales_{i,t} - COGS_{i,t}}{Total\ Assets_{i,t}} \tag{3}$$

This measure is also supported by previous research [7]. Bermejo et al., for example, use GPA as one of their profitability measures and discuss its use in earlier factor studies [1].

3.2.3. Momentum

Momentum is measured using the cumulative return over the previous 12 months while excluding the most recent month:

$$MOM_{12-1,i,t} = \prod_{k=2}^{12}(1 + R_{i,t-k}) - 1 \tag{4}$$

The momentum factor is measured using 12–1 momentum, which looks at a stock's past returns while excluding the most recent month [8]. This month is left out to limit the possible effect of short-term return reversals. Bermejo et al. also use this approach when measuring momentum [1]. Monthly total returns from the CRSP/Compustat monthly dataset are used to calculate the momentum factor.

3.3. Portfolio formation

Portfolios are formed at the end of June each year. The stock selection process is based on the sequential approach used by Bermejo et al., where stocks are screened step by step using value, profitability, and momentum [1].

The process starts with the 600 largest eligible firms. These firms are ranked by their book-to-market ratios, and the top 20% are selected to form the 120-stock Value portfolio (P1). This selection is similar to Bermejo et al., where 120 stocks also represent 20% of their 600-firm sample [1].

Next, the 120 stocks in P1 are ranked by ROE. The top half of the stocks are selected, leaving 60 firms in the Value + Profitability portfolio (P2).

Finally, the 60 stocks in P2 are ranked based on their 12–1 momentum. Again, the top 50% are selected, giving a final portfolio of 30 stocks. This portfolio is referred to as the Value + Profitability + Momentum portfolio (P3). The full selection process can be summarized as follows: 600 → 120 (Value) → 60 (Profitability) → 30 (Momentum).

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Each portfolio is equally weighted and held from July of the formation year to June of the following year. Factor values are winsorized at the 1st and 99th percentiles each year before the stocks are ranked. This is done to prevent extreme values from having too much influence on stock selection.

The three portfolios are then compared to see whether adding more factors improves the strategy. P1 includes only value, P2 adds profitability, and P3 adds momentum on top of value and profitability.

3.4. Performance evaluation and robustness tests

Portfolio performance is evaluated using monthly stock returns. Four portfolios are included in the comparison: the equal-weighted Top-600 universe, the Value portfolio (P1), the Value + Profitability portfolio (P2), and the Value + Profitability + Momentum portfolio (P3).

Performance is mainly evaluated using annualized return, annualized volatility, and maximum drawdown. A return-to-volatility ratio is also calculated to compare return with the level of risk taken by each portfolio. Since the downloaded data do not include a consistent monthly risk-free return series, a standard Sharpe ratio is not calculated in the baseline analysis. Therefore, the return-to-volatility ratio used here should not be treated as a formal Sharpe ratio.

Two robustness tests are also included to check whether the results change when different factor measures are used. In the first test, GPA replaces ROE as the profitability measure. In the second test, E/P is used instead of B/M to measure value. The definition of momentum remains unchanged as 12–1 momentum in both tests.

These tests help show whether the main results are sensitive to the way value and profitability are measured. This is important because different measures of the same factor do not always produce the same results. For example, Bermejo et al. find differences across several value and profitability measures and also show that factor performance can change over time [1].

4. Empirical results

4.1. Baseline multi-factor strategy performance

Table 1 shows the results of the baseline multi-factor portfolios. The benchmark is an equally weighted portfolio of the top 600 companies in the eligible universe. The first portfolio (P1) only uses the book-to-market (B/M) value screen. The second portfolio (P2) adds the return on equity (ROE) as a measure of profitability, and the third portfolio (P3) also includes 12-month momentum.

Table 1. Performance of baseline multi-factor strategies

Strategy	Annualized Return	Annualized Volatility	Return/Volatility	Maximum Drawdown
Top-600 Universe	11.50%	16.84%	0.68	−25.76%
P1: Value (B/M)	10.39%	19.16%	0.54	−37.35%
P2: Value + ROE	10.74%	20.29%	0.53	−41.78%
P3: Value + ROE + Momentum	10.36%	19.79%	0.52	−42.14%

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The Top-600 universe has the highest annualized return at 11.5% and the lowest annualized volatility at 16.84%. The Value portfolio (P1) produces a lower annualized return of 10.39%. After ROE is added, the return increases slightly to 10.74%. This is a small improvement over P1, which suggests that profitability adds some useful information after the value screen.

However, after the momentum is added in, the result does not improve. The annualized return of P3 falls to 10.36%, which is slightly below P1 and P2. In this sample, the incremental addition of profitability and momentum factors did not result in sustained growth in portfolio returns.

The risk results show a similar pattern. All three factor portfolios have higher volatility than the Top-600 universe. They also experience larger maximum drawdowns. Although the maximum drawdown of the Top-600 universe was 25.76%, the maximum drawdowns for the P1, P2, and P3 portfolios were 37.35%, 41.78%, and 42.14%, respectively. This indicates that factor portfolios with more concentrated holdings suffered greater losses during periods of worst performance.

As the additional factors are introduced, return ratio also decreases. The return-to-volatility ratio decreases from 0.683 for the Top-600 universe to 0.543 for P1, 0.529 for P2, and 0.524 for P3. Since the data downloaded from WRDS do not include a continuous monthly series of risk-free rates, this measure is not treated as a Sharpe ratio; instead, it serves as a simple measure for comparing portfolio returns relative to volatility.

Overall, the baseline results do not show a better performance for the factor portfolio compared with the broader Top-600 universe. Adding ROE does provide a small improvement in return from P1 to P2, but this comes with a higher volatility and a larger maximum drawdown. Under this current strategy, momentum does not give extra improvement. These findings show that adding more factors does not necessarily lead to better portfolio performance, at least for the sample period and portfolio construction method used in this study.

4.2. Portfolio construction and sample characteristics

Table 1 shows the results of the baseline multi-factor portfolios. The benchmark is an equally weighted portfolio of the top 600 companies in the eligible universe. The first portfolio (P1) only uses the book-to-market (B/M) value screen. The second portfolio (P2) adds the return on equity (ROE) as a measure of profitability, and the third portfolio (P3) also includes 12-month momentum.

Based on the 108 months of data from July 2016, all the portfolios were equally weighted in the back test. A six-month lag is applied to the annual accounting information, and thus the financial data are not immediately available after the fiscal year-end. This will not introduce look-ahead bias. Factor values are also minorized at the 1st and 99th percentiles each year to limit the impact of extreme observations.

The investable universe is progressively reduced at each screening stage. Momentum is not applied to all firms in the original Top-600 universe; it is used only for stocks that have passed both the value and profitability of screens. Consequently, P3 is a more concentrated portfolio of firms that satisfy all three criteria.

4.3. Robustness tests

Two robustness checks are conducted to determine whether the results change based on the measure of profitability and value. Robustness tests show the results using compound annual growth rate (CAGR) from 2016 to 2024, and Table 1 presents the annualized returns of the monthly back test. As the above measures are calculated differently, their results need to be compared individually.

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4.3.1. Profitability: GPA versus ROE

The first test uses gross profit to assets (GPA) instead of ROE. The value factor is still B/M, and momentum continues to be calculated as 12-1 momentum.

Table 2. Profitability robustness test

Strategy	CAGR (2016–2024)
Top-600 Universe	11.47%
P1: Value	10.21%
P2: Value + GPA	6.64%
P3: Value + GPA + Momentum	4.89%
P2: Value + ROE	10.95%
P3: Value + ROE + Momentum	9.82%

The two profitability indicators have different results, as shown above. Using GPA, the CAGR of the Value portfolio is 10.21%, which drops to 6.64% after adding profitability and then further declines to 4.89% after adding momentum. In this comparison, the ROE-based portfolios outperform their GPA-based counterparts. The CAGR of the Value + ROE portfolio is 10.95%, and that of the Value + ROE + Momentum portfolio is 9.82%.

ROE-based strategies generally deliver higher CAGRs than GPA-based strategies in this screening exercise. Because ROE and GPA capture different dimensions of profitability, they rank firms differently and produce different portfolios.

However, ROE is not consistently high in all years. The ROE-based P2 portfolio had higher returns than the GPA-based portfolio in 2016, 2018, 2020, 2022, 2023 and 2024, and GPA performed better in some of the other years. Therefore, the better overall performance of ROE is due to the results over the entire sample period rather than consistent outperformance in every year.

4.3.2. Value: B/M versus E/P

The second robustness test changes the value factor from book-to-market (B/M) to earnings-to-price (E/P) and keeps ROE and 12-1 momentum unchanged.

Table 3. Value robustness test

Strategy	CAGR (2016–2024)
Top-600 Universe	10.07%
B/M Value only	8.41%
B/M + ROE	8.61%
B/M + ROE + Momentum	8.22%
E/P Value only	9.51%
E/P + ROE	9.63%
E/P + ROE + Momentum	6.63%

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The E/P screen produces higher CAGRs than the B/M screen in the first two portfolio stages. The CAGR of the E/P Value portfolio is 9.51%, and that of the B/M portfolio is 8.41%. After ROE is added, the CAGR of the E/P + ROE portfolio is 9.63%, and that of the B/M + ROE portfolio is 8.61%.

The effect changes after momentum is added. The CAGR of the E/P + ROE + Momentum portfolio is 6.63%, compared with 8.22% for the B/M + ROE + Momentum portfolio.

Therefore, it can be seen from the above that the effect of a factor also depends on other factors. E/P is better than B/M in both cases, with and without the addition of ROE. However, after the momentum screen, the B/M-based strategy has a higher CAGR. Thus, the relative performance of E/P and B/M differs across stages of the sequential portfolio-construction process.

In short, the two robustness tests show that the choice of factor measure can change the results to some extent. In the profitability test, portfolios screened using ROE generally outperform those screened using GPA. In the value test, E/P outperforms B/M during the first two stages, but this advantage disappears after momentum is added. These results indicate that performance depends on how factors are measured, ordered, and combined.

5. Discussion

In the baseline strategy, adding more factors does not improve portfolio performance monotonically. The annualized return rises slightly from 10.39% for P1 to 10.74% for P2 but declines to 10.36% after momentum is added in P3. All three factor-screened portfolios underperform the Top-600 universe, which earns an annualized return of 11.50%.

The above results do not indicate that value, profitability, and momentum are ineffective factors. The results will vary according to the sample period, how each factor is measured, and how the portfolios are built. A typical case in this study is the sequential method. The value screen first reduces the universe of firms from 600 to about 120. The profitability screen then reduces it to around 60 firms, and the momentum screen leaves about 30 firms. As a result, each new factor is applied to a smaller group of stocks instead of the whole universe.

The profitability robustness test shows how much the choice of factor measure can affect the results. When ROE is used, the Value + Profitability portfolio has a CAGR of 10.95%. When GPA is used instead, the CAGR is only 6.64%. The difference remains after momentum is added, with a CAGR of 9.82% for the ROE-based portfolio compared with 4.89% for the GPA-based portfolio.

This does not mean that ROE is always a better profitability measure than GPA. It only performs better within the sample and strategy used in this study. ROE measures net income relative to book equity, while GPA measures gross profitability relative to assets. Since the two measures capture different parts of a firm's profitability, they can rank companies differently and lead to different portfolio selections.

The value robustness test gives a different result. E/P performs better than B/M during the first two stages. The E/P Value portfolio has a CAGR of 9.51%, compared with 8.41% for B/M. After ROE is added, the E/P-based portfolio produces 9.63%, compared with 8.61% for the B/M-based portfolio. However, this advantage disappears after momentum is introduced. The final E/P + ROE + Momentum portfolio has a CAGR of 6.63%, while the corresponding B/M portfolio produces 8.22%.

This difference shows that the performance of one factor may depend on the other factors used with it. E/P performs relatively well when used alone and when combined with ROE, but this does not continue after the momentum screen. Therefore, comparing individual factor measures alone may not be enough to understand how they will perform in a multi-factor strategy.

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Momentum shows a similar pattern across the different tests. In the baseline back test, adding momentum reduces the annualized return from 10.74% to 10.36%. In the profitability robustness test, it reduces the ROE-based CAGR from 10.95% to 9.82% and the GPA-based CAGR from 6.64% to 4.89%. A similar result appears in the value robustness test, where momentum reduces the B/M-based CAGR from 8.61% to 8.22% and the E/P-based CAGR from 9.63% to 6.63%.

Based on these results, the momentum screen does not improve returns in the sequential strategy used here. However, this should not be interpreted as evidence that momentum does not work in general. In this model, momentum is only applied after the value, and profitability screens have already reduced the number of stocks considerably. Its performance could be different if it were applied to a broader universe or combined with the other factors in a different way.

Risk is another important part of the results. All three factor portfolios have higher annualized volatility and larger maximum drawdowns than the Top-600 universe. The final three-factor portfolio has annualized volatility of 19.79% and a maximum drawdown of 42.14%, compared with 16.84% and 25.76% for the Top-600 universe. The more selective factor portfolios therefore do not provide lower risk during the sample period.

Overall, the results show that simply adding factors does not guarantee better portfolio performance. The way the factors are measured also matters, as shown by the differences between ROE and GPA and between B/M and E/P. In addition, the results change depending on how the factors are combined and when they are introduced into the screening process. This suggests that the design of a multi-factor strategy is just as important as the choice of factors themselves.

6. Conclusion

This study examines a multi-factor stock selection strategy based on value, profitability, and momentum. The strategy starts with the 600 largest eligible firms and applies B/M, ROE, and 12–1 momentum sequentially to form increasingly selective portfolios.

The baseline results show that increasing the number of factors did not improve performance. The Value portfolio has an annualized return of 10.39%, which increases slightly to 10.74% after ROE is added. After momentum is introduced, the return falls to 10.36%. All three factor-screened portfolios underperform the equally weighted Top-600 benchmark, which earns an annualized return of 11.50%, and they also exhibit higher volatility and larger drawdowns.

The robustness tests indicate that the measurement method of factors has a significant impact on performance. In this sample, before adding the momentum factor, ROE outperformed the average annualized return (AOR), and the price-to-earnings ratio (P/E) outperformed the market capitalization ratio (M/C). However, the advantage of E/P disappears in the final three-factor portfolio. Furthermore, the momentum factor did not improve the returns of any sequential strategy.

These results suggest that multi-factor investing is not simply about increasing the number of factors. The choice of factor measures, the order in which they are applied, and the resulting portfolio concentration can all affect the results. For this sample, a more complicated strategy does not necessarily produce better performance than a broader and simpler portfolio.

This study also has some limitations. The analysis period is relatively short, and it only focuses on large companies. The portfolios are equally weighted, and transaction costs, taxes, and a monthly risk-free rate are not included. Furthermore, the model employs a fixed-order selection process, meaning the importance of each factor remains constant over time. Future research could use longer sample periods, explore different weighting methods and factor combinations, incorporate transaction costs, or allow factor weights to vary based on market conditions.

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