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50 years of Value, Momentum, and a Combination of both: a study of returns from the past to the new era of trading

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Abstract

This paper examines the development of the Value and Momentum strategies, and a Combination of both in the US stock market for the period April 1972 to April 2022. This study utilizes a simple Momentum strategy, three different Value strategies, and two different 50/50 Combination strategies and finds that the profitability of all these strategies has declined over time. Momentum has remained very profitable even 10 years after the initial publication of Jegadeesh and Titman (1993), but its profitability has drastically dropped afterward. Value strategies have experienced a decrease in performance in the past two decades but have enjoyed increasing returns during the Covid-19 crisis. A 50/50 Factor Combination portfolio outperforms all pure-play value strategies on each criterion and performs better than the pure-play Momentum strategy on a risk-adjusted basis. Both combination portfolios benefit from the negative correlation of Value and Momentum and have provided stable growth and little fluctuation in their returns even in times of crisis.

The views stated in this thesis are those of the author and not necessarily those of the supervisor, second assessor, Erasmus School of Economics or Erasmus University Rotterdam.

Contents

1 Introduction

Two of the most investigated capital market anomalies in the financial literature are the value and the momentum strategies (Vayanos & Woolley, 2013). Their abnormal returns and persistence in the capital markets have encouraged researchers to create a solid body of academic literature. In recent years, however, the interest around these strategies seems to have taken a downturn, but enthusiasm around a new strategy of combining those two has arisen from their ashes. Combining value and momentum is a relatively new topic in academic research, with most studies analyzing the profitability of the strategy in markets outside the US. No recent study has recorded how profitable are these strategies today in the US market, in an environment that has vastly changed over the last decade, and how their profitability has developed in the past 50 years. Therefore, this research aims to fill the gap in the literature by largely expanding the sample period and updating the beliefs about the profitability of these strategies by focusing on the evolution of value and momentum, and the progress of the combined value/momentum portfolio for the past half a century.

Most of the literature on momentum and value investing agrees that these strategies are profitable. Therefore, a large part of the new papers in this field does not track the strategies' profitability anymore. The overall popularity of these topics in the academic world has deteriorated after their initial prevalence in the financial literature in the early 90s and the new Millennium. In fact, most of the last published articles on momentum and value strategies are dating around 2016. It seems that the academic world has moved on from this topic, as the vast majority of researchers have labeled these investment strategies as profitable and superior to market returns. However, the financial field has seen some drastic changes in the last several years. Apart from the Covid 19 crisis, we have witnessed the development of trading apps, the improvement of high-frequency trading, changes in trading regulations, and an increase in the importance of retail investors. All of these factors could have had an impact on momentum and value trading, hence impacting the profits of such strategies.

Chu, Hirshleifer, and Ma (2020) studied the SHO regulation, which relaxed the short-sale constraints for stocks in the US, and conclude that the decreased limits to arbitrage reduced market pricing anomalies. The authors found a significant decrease in the returns of the momentum portfolio for pilot stocks (Chu, Hirshleifer & Ma, 2020). Corresponding to the findings of Chu et al. (2020), Chordia, Subrahmanyam, and Tong (2014), and Franz and Regele (2016) discover that most capital market anomalies have attenuated exactly due to increased arbitrage. In addition, the rise of new fintech firms led to the development of trading apps, which in turn made access to trading easier for individual investors and

lowered transaction costs. Moreover, during Covid-19 more and more retail investors started trading, established new trading positions, and increased the funding to their trading accounts (Ortmann, Pelster & Wengerek, 2020). Pagano, Sedunov, and Velthuis (2021) find that retail investors have decreased momentum trading and increased value trading activity during the first phase of the COVID-19 crisis. However, their research focus only on Robinhood data, which is not representative of the whole US equity market, since institutional investors, who may also use those strategies, do not use this platform for trading. Therefore, a new study, comprehensive for the broader US stock market is needed, to establish if the profits of the momentum and the value strategy have changed compared to the returns signaled by the previous literature.

In addition, a new branch of the literature has emerged. More recent publications by Asness, Moskowitz, and Pedersen (2013), Fisher, Shah, and Titman (2015), and Grobys and Huhta-Halkola (2019) study how traders can combine the momentum and value effects into one portfolio. The research on the combined momentum and value portfolio offers some very intriguing findings. Asness et al. (2013) study diverse asset classes and markets in 8 different countries and find out that in every market, a 50/50 combination portfolio of value and momentum outperforms either value or momentum by itself. Grobys and Huhta-Halkola (2019) discover that combining value and momentum significantly increased the Sharpe ratios and gives investors serious diversification benefits in the Nordic stock markets. They also find that all but one of the combined portfolios showed higher raw returns than pure-play strategies (Grobys & Huhta-Halkola, 2019). Furthermore, in line with prior studies, Franz and Regele (2016), who study the German equity market, find that the strong negative correlation between value and momentum makes the portfolio strongly resistant to market movements, and thus a very good diversification tool.

Most recent studies on the combined strategy do not focus on the US equity market, which is the largest capital market, and thus the most important area of equity trading. The fact that the combined portfolio provides great diversification benefits and that it can outperform pure value and pure momentum strategies, makes a new study, one which follows the development of the combined strategy next to the pure-play strategies in the US equity market, even more imperative.

The aforementioned recent significant changes in capital markets signify that the usage and profits of value and momentum strategies may have significantly changed over time. Moreover, the rise of the new combination strategy, which has excellent diversification capabilities, may be key to how both value and growth investors would trade in the future. Hence, a study on how it performed in the past 50 years

on the comprehensive US equity market is an important part of understanding and adopting the strategy. To fill in this gap in the literature, this paper strives to answer the following research question:

How has the profitability of momentum and value strategies, and strategies which combine them changed in the period from April 1972 to April 2022?

To answer this research question three main hypotheses will be evaluated. Based on the papers of Chu et al. (2020), and Chordia et al. (2014) one expects that with the decrease in transaction costs, there are fewer limits to arbitrage, which in turn made markets more efficient. Hence, the profitability of asset pricing anomalies such as momentum should have decreased in the past decade. Furthermore, Daniel and Moskowitz (2016) discover that after the 2008 financial crisis the loser portfolio started to perform very strongly, driving the performance of the momentum strategy further down. Nevertheless, fairly recent literature suggests that momentum is still profitable. For instance, Korajczyk and Sadka (2004) show that certain momentum strategies remain profitable even after accounting for transaction costs, although some momentum portfolios' profits decline drastically after transaction costs. Moreover, in a more recent research Chabot, Ghysels, and Jagannathan (2014) disclose that momentum portfolios had a significant and positive alpha in the period from 1927 to 2012. Hence, the first hypothesis predicts:

H1: The profitability of momentum strategies has decreased with time, but such strategies are still profitable.

The influential papers of Lakonishok, Shleifer, and Vishny (1994), Fama and French (1992), and Asness, Moskowitz, and Pedersen (2013) have signified for the abnormal returns of value investing in the past. However, more recent papers by Lev and Srivastava (2019), and Israel and Richardson (2020) show that there is a significant decline in the profitability of the value strategy in the past two to three decades. On the other hand, a research by Rizvi, Mirza, Naqvi, and Rahat (2020) found that many European equity funds made a transition from growth stocks to value stocks during the early stages of the Covid-19 pandemic, so another trend move toward value investing becomes very likely. Therefore, the second hypothesis states:

H2: Profitability of value strategies has decreased in the past 20 years and increased around the Covid-19 crisis.

The studies on the combined value/momentum portfolio report that the combined portfolio both outperforms the pure-play value and momentum strategies in terms of raw returns, but also is less risky (Asness, Moskowitz & Pedersen (2013), Fisher, Shah & Titman (2015), Grobys & Huhta-Halkola (2019)).

Moreover, from 1972 to 2022, several big crises made markets extremely volatile. The combination portfolio, being volatility-resistant, should on theory make it a more lucrative option than sticking with one or both of the separate strategies. Hence, the third hypothesis states:

H3: A combination of momentum and value has outperformed trading the strategies separately.

In the remainder of this paper, first past literature will be reviewed in section 2. The data and sample selection will be discussed in section 3. Section 4 explains the methodology of the paper and how the combination portfolio is constructed. In section 5 the results from this paper will be analyzed. Finally, section 6 makes concluding remarks and outlines some limitations and suggestions for future research.

2 Literature Review

This paper essentially focuses on 3 investment strategies, which share common literature, but value and momentum also exist independently from one another. Therefore, to facilitate the flow of information from the past literature for each strategy, the following section will be split into three parts. Each subsection focuses on a different strategy.

2.1 Momentum

Momentum investing entails buying stocks with high past returns over the previous 6–12 months and short-selling stocks with low past returns. Perhaps, the most influential paper in the momentum literature is by Jegadeesh and Titman (1993), who also coined this term. According to them momentum strategies rely on the underreaction hypothesis. Jegadeesh and Titman (1993) argue that investors do not respond sufficiently quickly or at all to new information, hence security prices do not adjust adequately. As a result of this, returns exhibit medium-term, up to 12 months, momentum and longer-term reversals. A big part of the literature in this field has focused on determining what are the main factors that drive the profitability of the strategy. Next to Jegadeesh and Titman (1993), Asness (1995) also shows that stocks with high positive momentum (high returns in the past 6 to 12 months) perform better than stocks with low momentum. A more recent study by Avramov, Chordia, Jostova and Philipov (2013) finds that momentum profits are mostly driven by the short leg of the momentum portfolio.

Another question about the drivers of momentum profitability that has concerned the literature is whether this phenomenon is rational and relates to risk or is it due to some behavioral biases. An important paper by Asness, Moskowitz, and Pedersen (2013) challenges both rational and behavioral

perspectives. The authors examine value and momentum strategies across different asset classes in 8 different countries. Asness et al. (2013) found a strong correlation between value and momentum strategies across different asset classes. According to the authors, this cannot be easily explained by existing behavioral theories. Asness et al. (2013) attribute this strong correlation to the existence of a set of common market risks across all markets and asset classes, an explanation which is in line with the rational risk-based model. However, another finding in the same paper challenges the rational theory as well. Therefore, in their novel study, Asness et al. (2013) indicate that a more general framework should be considered when looking for an explanation of the momentum and value profitability.

Another possible explanation for the profitability of the momentum strategy is provided by the behavioral literature. Chan, Jegadesh, and Lakonishok (1996) study whether the predictability of future returns from past returns is largely due to the market's underreaction to information. They find results consistent with their hypothesis and conclude that the market responds to new information only gradually (Chan, Jegadesh & Lakonishok, 1996). Chui, Titman, and Wei (2010) show that momentum is more pronounced in individualistic cultures, which provides further evidence that momentum profitability cannot be entirely explained by rational risk-pricing models.

2.2 Value Strategies

For almost half a century, scholars and professional investors have supported the thesis that value strategies should outperform the market (Dreman, 1977). Value investing refers to buying stocks that appear cheap relative to some fundamental anchor, and short-selling stocks which seem expensive relative to that same fundament.

In their review of the value investing literature, Chan, and Lakonishok (2004) state that academic researchers generally agree that the value investment approach yields higher returns than growth strategies, on average. However, no consensus has been reached on where their superior performance comes from. According to the authors, two main possible explanations can be found in the literature – the first explains value strategies as fundamentally riskier, thus is consistent with rational risk premia models, whereas the second points out behavioral shortcomings as the reason (Chan & Lakonishok, 2004). The influential paper of Fama and French (1992) agrees with the first explanation. Fama and French (1992) consider their results as being consistent with the Market Efficiency Hypothesis and ascribe the higher returns of value investing to their higher fundamental risk. Fama and French (1992)

forcefully argue that the systematic patterns in fundamentals signify that the book-to-market ratio can be seen as a proxy for risk factors in returns, hence it is rationally priced in expected returns.

On the other side stands the explanation that value investors profit from the behavioral shortcomings of other investors. According to De Bondt and Thaler's (1985) overreaction hypothesis, investors overreact to new information, thus exacerbate asset price movements. Investors who use value strategies might receive higher returns because they are contrarian to naïve investors, who might falsely extrapolate high past earnings growth, overreact to news, or assume a non-existent trend in stock movements (Lakonishok, Shleifer & Vishny, 1994). This is, some investors tend to get overhyped about stocks that have done extremely well recently and start buying a lot of them, hence these stocks become overpriced. Lakonishok, Shleifer & Vishny (1994) use the term "glamour" stocks to describe such stocks. Similarly, investors overreact to stocks that have done very badly recently, thus oversell them, and these out-of-favor "value" stocks become underpriced (Lakonishok, Shleifer & Vishny, 1994). As value investors invest in underpriced stocks and underinvest in overpriced stocks, they outperform the market (De Bondt & Thaler (1985), Haugen (1994)). It is considered that if the abnormal returns of value strategies persist strongly in the long term, then the second, behavioral explanation is more probable. However, it is still open for debate in the academic world if this is truly the case.

As this paper analyzes three different value strategies in a time period of 50 years, it has the potential to also shed light on the question of where the superior performance of value stocks comes from. If the research shows that value strategies yield consistently higher returns than growth strategies in the long term, this will provide further support for the behavioral explanation. This is another academically relevant contribution to the abovementioned debate in the financial literature.

2.3 Combining Value and Momentum

The massive body of literature on value and momentum led researchers to experiment and seek how these two profitable strategies can interact. This interaction was first studied by Asness (1997), who finds that value and momentum are negatively correlated across assets, but positively correlated to the cross-section of average stock returns. Seven years later, Bird and Whitaker (2004) find that the best long-only portfolio performance can be achieved by investing in stocks with low-value measures (low book-to-price ratio) using the six-month momentum factor as a timing indicator. Most of the early literature on combining value and momentum focuses on investing via one of the strategies and using the other as a buy/sell indicator.

The literature on combining value and momentum has evolved since then, with the most recent papers actually implementing different methodologies of combining value with momentum portfolios. For example, the notable paper of Asness, Moskowitz, and Pedersen (2013) uses a simple 50/50 combination, which turns out to be quite effective. Asness et al. (2013) discover that the 50/50 combination portfolio of value and momentum outperforms the pure-play value and momentum strategies. Another key paper on this topic is that of Fisher, Shah, and Titman (2015), who report that they have found an optimal way of combining the two portfolios. Fisher et al. (2015) create characteristic scores based on the momentum and value factors of stocks, and the market values of the firms. Then they use these scores to try out three new combination strategies, and discover that combining value and momentum based on their average characteristic scores provides the highest returns.

From 2015 to 2017 there is a slight peak in the literature after the abovementioned two papers. But most of the literature analyses the European stock market or focuses on different segments in it. Grobys and Huhta-Halkola (2019) use both the methods outlined by Asness et al. (2013) and by Fisher et al. (2015) to analyse combinations of value and momentum in the Nordic markets. Franz and Regele (2016) also use the optimal way of combining value and momentum according to Fisher et al. (2015) to study the German equity market. Leivo (2012) focuses on Finland in his research of examining the added value of combining a momentum indicator with a value indicator in varying stock market conditions. Azeredo (2015) looks at the combination portfolio in the Portuguese market. However, a newer study for the broader US equity market is missing.

This paper, therefore, adds to the existing literature by analysing the US stock market for the past 50 years, and reviewing how the combination strategy performed during the Covid-19 pandemic. Previous papers that study value and momentum jointly also focus only on the B/M ratio as representative of the value strategy. I expand on the current academic literature by simultaneously analysing two other measures of value – the Earnings-to-Price and the Cashflow-to-Price ratios.

3 Data

I examine Value, Momentum, and Combined portfolios of individual stocks for the US equity market. The US stock market is the biggest capital market in the world. It is not a coincidence that the vast majority of novel and important findings are first discovered using US equity data and are later

replicated in other markets. The importance of US stock data and the high demand for it by researchers, facilitated the process of easily accessing the data. Moreover, one of the biggest advantages of US stock data, using the CRSP database, is that it is survivorship bias-free.

I use monthly data from April 1972 to April 2022. This large sample period is taken for 2 reasons. First, data from 1972 to 1993 is needed to evaluate the performance of momentum prior to the key paper of Jegadeesh and Titman (1993). As the momentum strategy became famous after their publication, which could lead to more exploitation of the strategy and consequentially lower returns with time, one should be able to observe superior returns at least in the data before the paper. Second, data up to 2022 is chosen, in order to analyze the profitability of the two trading strategies during the Covid-19 crisis, hence bring the beliefs of investors and researchers up to date. Note that for some strategies there is no available data for the whole sample period. For example, momentum requires 12 months of past trading so that a portfolio can be formed, and data for all value strategies is unavailable after December 2021. The Combination portfolios are restricted the most since they need both momentum and value data.

To form the momentum portfolios data on past returns is required. I use the CRSP database to obtain data on past returns, prices, and shares outstanding. The latter two are then used to construct a variable that equals the market capitalization of the firms. The past return variable (RET) accounts for stock splits, payment of dividends, and rights offerings, which if not incorporated may lead to falsely inflating or deflating the return variable.

Value strategies require data on firm fundamentals. The academic literature on value strategies has found several accounting ratios that are widely used to select the stocks that form the value portfolio. For example, Fama and French (1992) outline the book-to-market ratio (B/M), Basu (1977) uses the earnings-to-price multiple (E/P), and Lakonishok, Shleifer, and Vishny (1994) highlight the cash-flow-to-price ratio (CF/P) as a good indicator of value stocks. To obtain data on these ratios, the Financial Ratios Suite database provided by WRDS is used. Financial Ratios Suite provides data on the B/M ratio, the price-to-earnings ratio (P/E), and the price-to-cash flow ratio. Therefore, the latter two ratios had to be reversed into their reciprocal ratios. This is done by dividing 1 by the corresponding ratio, e.g. E/P = 1/(P/E). Using the PERMNO identifier, I merge the CRSP and Financial Ratios Suite datasets in order to have stock prices and accounting data in one place and thus be able to evaluate the strategies.

Data on the market equity risk premium, the risk-free rate, the size factor (SMB), and the value factor (HML) for the sample period is provided by Kenneth French's website. This data is used in the

construction of the Sharpe ratio and detecting the alpha of the portfolios via the Fama-French three-factor model (Fama & French, 1993).

Table 3.1 shows the descriptive statistics of the momentum, value, and 50/50 combination portfolios for the sample period from April 1972 to April 2022. Table 3.1 discloses that the momentum strategy achieved the highest raw returns for the last 50 years. The average 12% return on momentum is almost two times higher than the average return of the most profitable value strategy (CF/P) and around one-third higher than the Factor combination portfolio. In addition, momentum has achieved the highest abnormal returns with a monthly alpha of approximately 1%. However, when looking at the portfolios performance on a risk-adjusted basis, the Factor combination portfolio is the highest performer. It has a Sharpe ratio of 0.89, which is almost twice as high as that of momentum and the most profitable value strategy. The superiority of the combination portfolio in terms of volatility can be also observed from the simple 50/50 combination (P3-P1) portfolio. It has the lowest standard deviation, and a Sharpe ratio that is almost as high as those of Momentum and CF/P. Lastly, one can see that at least one representative from each strategy exhibits positive abnormal returns on the 5% significance level.

Table 3.1 Descriptive statistics of the different Momentum, Value, and Combination portfolios over the period April 1972 – April 2022.

	Momentum	Value			50/50 Combination	
	Mom	B/M	E/P	CF/P	P3-P1	Factor
Mean Raw Return	12.0%***	3.3%	6.1%**	6.5%***	4.4%***	8.0%***
(t-stat)	(3.72)	(1.47)	(2.23)	(3.83)	(3.63)	-6.2
St. dev	22.7%	15.7%	19.3%	12.0%	8.4%	9.00%
Sharpe Ratio	0.53	0.21	0.32	0.54	0.52	0.89
Alpha	0.0103***	0.0031	0.0051*	0.0056***	0.0039***	0.0070***
(t-stat)	(3.53)	(1.41)	(1.71)	(3.90)	(3.74)	-5.79
Minimum	-0.41	-0.22	-0.33	-0.11	-0.15	-0.26
Maximum	0.24	0.20	0.22	0.14	0.12	0.13

Note. This table shows the descriptive statistics for the Momentum, B/M, E/P, CF/P, Simple combination (P3-P1), and Factor Combination portfolios for the period April 1972 – April 2022. Reported are the average raw returns, t-statistic of the average returns standard deviations, Sharpe ratios, intercepts (Alphas), t-statistic of the intercept, minimum and maximum of each value, momentum, and 50/50 value and momentum combination strategy. All portfolios in the table are the value-weighted LMS (long in the winner and short in the loser portfolios) portfolios for each strategy. The combination portfolios use the B/M ratio as a measure of value. The raw returns, standard deviations, and Sharpe ratios are annualized measures. The Alphas, minimum and maximum statistics are presented in monthly terms. The intercepts reported are established from Fama-French three-factor regression. T-

statistics are in parentheses. Test statistics are computed with Newey West Standard Errors. Stars represent the significance levels for a two-sided t-test (* p<0.10, ** p<0.05, *** p<0.01).

4 Methodology

The following section is divided into four parts. The first three parts explain the portfolio formation of each of the three strategies. The last section concentrates on breaking the 50 years sample into 5 subperiods in order to deepen the analysis.

4.1 Momentum Portfolios

This paper uses the traditional cross-sectional momentum as in the seminal paper of Jegadeesh and Titman (1993), and not the newly presented by Moskowitz, Ooi, and Pedersen (2012) "time-series momentum". The core difference between the two approaches is that cross-sectional momentum allocates stocks to the winner and loser portfolios based on their relative performance whereas time-series momentum appoints stocks based on their absolute performance (Bird, Gao & Yeung, 2017). Following Asness et al. (2013) this paper concentrates on the interaction between cross-sectional momentum and value strategies.

This paper uses the standard measure of the past 12-month cumulative raw return skipping the most recent month's return (Jegadeesh & Titman, 1993). Skipping the most recent month is a standard procedure in the momentum literature, in order to avoid the 1-month reversal in stock returns (Asness (1994), Grinblatt & Moskowitz (2004), Asness et al. (2013)). Throughout the momentum literature various approaches exist to creating the momentum portfolios. This paper sticks with the standard formation of momentum portfolios for two reasons. First, Bird, Gao, and Yeung (2017) study several combinations between formation and holding periods, and find out that typically formations that have a total periodicity of around 15 months turn out to be most successful. The total periodicity of the standard method, used in this paper, is 13 months (12 months formation period and 1 month holding period), which is very close to the optimal one. Second, much of the literature which combines value and momentum also uses this standard and simple method (Asness et al. (2013), Fisher, Shah & Titman (2015), Grobys & Huhta-Halkola (2019)).

After the momentum factor is created, the stock universe is allocated into quintile portfolios. The lowest quintile portfolio corresponds to the "Loser" portfolio. The highest quintile portfolio corresponds to the "Winner" portfolio. The LMS portfolio is computed by going long in the winner portfolio and short in the

loser portfolio. Stocks are rebalanced monthly as in Jegadeesh and Titman (1993). In addition, Bird, Gao, and Yeung (2017) and Franz and Regele (2016) point out that value-weighted portfolios are superior to equally-weighted portfolios. Therefore, the momentum portfolios are value-weighted based on the previous month's market capitalization.

4.2 Value Portfolios

Following Lakonishok, Shleifer & Vishny (1994) this paper will look at several values strategies. Value portfolios are sorted using three different value metrics: the book-to-market (Fama & French, 1992), the earnings-to-price (Basu, 1977), and the cash flow-to-price ratio (Lakonishok et al., 2014). This allows us to capture the profitability of the value strategy, regardless of the method used to form the value portfolio. Looking at the four different methods can also disclose important differences for building a value portfolio, and what kind of method was more profitable throughout this time span of 50 years.

For each method, this paper follows the same strategy. Consistent with the momentum portfolios, the value portfolios are also value-weighted and split into quintiles. The first and the last quintile portfolios show the portfolios with the lowest value stocks, called the "glamour" portfolio, and with the highest value stocks, called the "value" portfolio respectively. The LMS value portfolio is computed by going long in the "value" portfolio and short in the "glamour" portfolio.

4.3 The Combination Portfolio

Asness et al. (2013) state that the high negative correlation between value and momentum and their high positive expected returns imply that a simple combination of the two should be closer to the efficient frontier than either strategy alone. Therefore, Asness et al. (2013) create a simple 50/50 combination portfolio and a 50/50 Factor portfolio. This paper replicates their methodology.

The first combination strategy is a simple linear 50/50 combination. Stocks are separately sorted in 3 portfolios, once sorting on momentum and once sorting on value. This is different than the quintile sorting for the pure-play momentum or value strategies, but the combination portfolios follow the methodology of Asness et al. (2013), who also create 3 portfolios. Consistent with the previous literature on combining value and momentum the B/M ratio is used as a measure of value. The return of each portfolio p= 1, 2, 3 at time t is measured separately for both momentum and value. The return of the simple 50/50 combination strategy is then defined as

$$r_{pt}^{simple\ COMB} = 0.5 r_{pt}^{VALUE} + 0.5 r_{pt}^{MOMENTUM} \qquad (1)$$

The simple 50/50 combination portfolio is defined as the P3 – P1 portfolio. Hence, going long into the highest combined portfolio and going short in the lowest combined portfolio.

The second combination strategy is called Factor combination as in Asness et al. (2013). The Factor combination portfolio is a self-financed portfolio. For each stock i at time t with indication Sit (value or momentum), I weight securities in proportion to their cross-sectional rank based on the signal minus the cross-sectional average rank of that signal. Thus, the weight of security i at time t is:

$$w_{it}^{S} = rank(S_{it}) - \frac{\sum_i rank(S_{it})}{N} \quad (2)$$

The return on each portfolio is described as

$$r_t^S = \sum_i w_{it}^S r_{it} \quad (3)$$

where S ∈ (value, momentum). Finally, the return of the 50/50 combination portfolio is defined as:

$$r_t^{COMBINED} = 0.5 r_t^{MOM} + 0.5 r_t^{VALUE} \quad (4)$$

4.4 Subperiod Study

One of the main aims of this paper is to analyze the development of the momentum, value and combination strategies over the last 50 years. Therefore, next to the analysis of the strategies for the whole period, a subperiod analysis will be performed. The 50 years sample period is split into 5 equal parts each with length of 10 years. The first period starts from April 1972 and runs to April 1982. Each following period traces the next 10 years with the last period finishing in April 2022.

Part of the analysis will be looking at the equity curves of the different portfolios. The equity curves are normalized to 1 in the first month and then plot the cumulative product of the portfolio returns (1 + r_{it}), where r_{it} denotes the return of strategy i in month t. The equity curves trace the development of the different strategies over time and record the profitability of each strategy.

Splitting the sample period into 5 equal periods is logical and allows us to see how the strategies have developed in the past 50 years. First, the fact that the periods are equal allows for an easier comparison across years. As equity curves are normalized to 1 in the beginning of each period, and the periods have the same time length, strategies will be compared in a fair way. Second, periods are chosen to be well-adjusted to important historical events. For instance, the first two periods record the performance of the momentum strategy before the introduction of the strategy by Jegadeesh and Titman (1993), where

momentum returns are expected to be high. After the publication of Jegadeesh and Titman (1993) momentum returns are expected to decrease in the next periods. Moreover, the financial crisis in 2008 is in the middle of the third period. This provides a good overview of how the strategies performed during the crisis. Lastly, the final period provides a good sketch of how strategies performed during the Covid-19 crisis, hence updating the current literature.

5 Results

The results section is structured as follows. The first part presents the overall performance of all strategies during the 50-year sample period. The second section examines how each strategy has developed throughout the 5 different time periods, while looking at the strategies separately. The last section investigates how the strategies evolved in the 5 time periods compared one to another.

5.1 Overall Performance

Table 5.1 presents a more comprehensive review of all studied strategies for the whole sample period. The momentum strategy in Panel A shows a clear trend, average raw returns and alphas are increasing as we go from the low momentum portfolios to the higher momentum portfolios. The average return of the momentum portfolio of 12%, is very similar to that recorded by Jegadeesh and Titman (1993) in their original paper. The Sharpe ratio of the momentum portfolio is close to that reported by Asness et al. (2013). It seems that the momentum strategy has been profitable when looking at the whole sample period. It has provided abnormal returns, with a statistically significant Alpha of 1.03% per month.

Table 5.1 Overall performance of all Momentum, Value, and Combination portfolios over the whole sample period of April 1972 to April 2022.

Panel A: Momentum Portfolios						
	Loser				Winner	
	1	2	3	4	5	LMS
Mean Raw Return	3.3%	9.0%	10.4%	12.7%	15.3%	12.0%
(t-stat)	(0.85)	(3.29)	(4.69)	(5.74)	(5.62)	(3.72)
St. dev	27.0%	19.2%	15.6%	15.5%	19.1%	22.7%
Sharpe Ratio	0.09	0.43	0.62	0.77	0.76	0.53
Alpha	0.0028	0.0076***	0.0088***	0.0108***	0.0130***	0.0103***
(t-stat)	(0.77)	(3.14)	(4.56)	(5.61)	(5.20)	(3.53)

Panel B: B/M Portfolios						
	Glamour				Value	
	BM 1	BM 2	BM 3	BM 4	BM 5	BM LMS
Mean Raw Return	11.4%***	12.0%***	11.8%***	12.2%***	14.7%***	3.3%
(t-stat)	(4.49)	(5.28)	(5.24)	(5.19)	(5.20)	(1.47)
St. Dev	17.9%	15.9%	15.9%	16.5%	19.9%	15.7%
Sharpe Ratio	0.59	0.70	0.69	0.69	0.70	0.21
Alpha	0.0095***	0.0100***	0.0102***	0.0106***	0.0126***	0.0031
(t-stat)	(4.01)	(5.02)	(5.21)	(4.85)	(4.80)	(1.41)
Panel C: E/P Portfolios						
	Glamour				Value	
	EP 1	EP 2	EP 3	EP 4	EP 5	EP LMS
Mean Raw Return	9.3%**	9.6%***	11.3%***	14.0%***	15.4%***	6.1%**
(t-stat)	(2.45)	(3.22)	(4.87)	(6.41)	(6.71)	(2.23)
St. Dev	26.7%	21.0%	16.4%	15.3%	16.1%	19.3%
Sharpe Ratio	0.32	0.42	0.64	0.86	0.91	0.32
Alpha	0.0081**	0.0078***	0.0094***	0.0119***	0.0132***	0.0051*
(t-stat)	(2.08)	(2.69)	(4.43)	(6.50)	(6.68)	(1.71)
Panel D: CF/P Portfolios						
	Glamour				Value	
	CFP 1	CFP 2	CFP 3	CFP 4	CFP 5	CFP LMS
Mean Raw Return	9.1%***	8.6%***	11.7%***	13.4%***	15.6%***	6.5%***
(t-stat)	(2.81)	(2.96)	(5.20)	(6.28)	(6.25)	(3.83)
St. Dev	22.8%	20.4%	15.9%	15.1%	17.6%	12.0%
Sharpe Ratio	0.36	0.38	0.69	0.84	0.84	0.54
Alpha	0.0078***	0.0069**	0.0098***	0.0115***	0.0134***	0.0056***
(t-stat)	(2.63)	(2.57)	(4.86)	(6.50)	(5.90)	(3.90)

Panel E: Combination Portfolios					
	Loser		Winner		
	P1	P2	P3	P3-P1	Factor
Mean raw return	8.7%***	10.5%***	13.1%***	4.4%***	8.0%***
(t-stat)	(3.57)	(5.11)	(5.98)	(3.63)	(6.20)
St. dev	18.6%	15.5%	16.2%	8.4%	9.0%
Sharpe Ratio	0.47	0.68	0.81	0.52	0.89
Alpha	0.0079***	0.0096***	0.0118***	0.0039***	0.0070***

(t-stat)	(3.30)	(4.98)	(5.60)	(3.74)	(5.79)

Note. This table shows the average raw returns, t-statistic of the average returns, standard deviations, Sharpe ratios, intercepts (Alphas), and t-statistic of the intercept of each Value, Momentum, and 50/50 value and momentum Combination strategy. Each panel refers to a different strategy. Each panel displays all created portfolios for the respective strategy – quintiles for momentum, B/M, E/P, CF/P, three portfolios for the simple 50/50 combination, and the Factor portfolio, which is a self-financed portfolio. Before being added to their corresponding portfolio the universe of stocks is sorted by either momentum or one of the value strategies. For the pure-play value and momentum strategies, the universe of stocks is then broken into quintiles to form five portfolios. The first quintile is the Loser portfolio, the fifth quintile is the Winner portfolio, and the LMS portfolio is defined as the "Momentum"/ "Value" portfolio. Panel E shows two different combination strategies. They both use the B/M ratio as a measure for the Value part. The first combination strategy sorts the universe of stocks into three portfolios, taking 50% weight of the returns coming from the momentum part and 50% weight of the returns coming from the value part. Then the simple combination portfolio is defined as the LMS (P3 – P1) portfolio. The second combination strategy is the Factor portfolio which is reported in the last column of the table in Panel E. All portfolios in the table are value-weighted. The raw returns, standard deviations, and Sharpe ratios are annualized measures. The Alphas are presented in monthly terms. The intercepts reported are established from Fama-French three-factor regression. Data on the three factors is taken from the Keneth French website. T-statistics are in parentheses. Test statistics are computed with Newey West Standard Errors. Stars represent the significance levels for a two-sided t-test (* $p<0.10$, ** $p<0.05$, *** $p<0.01$).

Panels B, C, and D in Table 5.1 analyze the different value strategies. It seems that the B/M strategy has been the least profitable among the 3. The relatively high returns of the lower quintiles, which are consistent with those found by Lakonishok et al. (1994), prevent the LMS B/M portfolio from having a better performance. The results for the B/M strategy are very similar to those of Asness et al. (2013), indicating the not so good performance of this particular value strategy over the past 50 years.

Looking at the E/P and the CF/P ratios in panels C and D respectively, one can see a striking similarity between their performance. Lakonishok et al. (1994) also discover a big resemblance between the returns of the two strategies, with the CF/P portfolios slightly outperforming the E/P portfolios. The only notable difference between one of their performance characteristics in Table 5.1 is the higher Sharpe ratio of the CF/P LMS strategy. Looking at raw returns and abnormal returns, it seems that the momentum portfolio is outperforming all the value portfolios. However, when looking on a risk-adjusted basis, the CF/P strategy has provided a slightly better risk-return tradeoff.

Lastly, looking at Panel E one can observe that the Factor combination portfolio has outperformed the simple combination portfolio according to every performance measure. The results from the two combination portfolios are in some ways analogous to those captured by Asness et al. (2013). The Factor Combination portfolio has a superior average return (8.0%) and monthly Alpha (0.7%) to all value strategies. Only the momentum portfolio has a higher raw return and abnormal return than the Factor Combination portfolio. However, when the risk/return tradeoff is considered, the Factor Combination

portfolio outperforms every other portfolio with a Sharpe Ratio of 0.89. This superior performance on a risk-adjusted basis is consistent with the findings of Asness et al. (2013) and Fisher et al. (2015).

5.2 Subperiod study – Development of each strategy

Table 5.2 Performance of Momentum, CF/P, Simple and Factor Combination strategies in different periods of time.

Panel A: Momentum					
	Period 1	Period 2	Period 3	Period 4	Period 5
Mean Raw Return	16.3%***	15.7%**	17.1%**	3.8%	4.6%
(t-stat)	(2.60)	(2.52)	(2.29)	(0.40)	(1.31)
Std. deviation	21.9%	16.9%	28.9%	25.5%	18.1%
Sharpe Ratio	0.75	0.93	0.59	0.15	0.25
Alpha	0.0152**	0.0154***	0.0133*	0.0087	0.0047
(t-stat)	(2.47)	(2.78)	(1.95)	(1.12)	(0.94)
Panel B: CF/P					
	Period 1	Period 2	Period 3	Period 4	Period 5
Mean Raw Return	12.2%***	7.5%**	7.8%**	5.2%	0.8%
(t-stat)	(3.52)	(2.07)	(2.29)	(1.46)	(0.20)
Std. deviation	10.2%	10.8%	12.8%	12.6%	13.2%
Sharpe Ratio	1.19	0.70	0.61	0.41	0.06
Alpha	0.0089***	0.0057*	0.0085**	0.0061*	-0.0001
(t-stat)	(3.01)	(1.70)	(2.59)	(1.89)	(-0.03)
Panel C: Simple Combination					
	Period 1	Period 2	Period 3	Period 4	Period 5
Mean Raw Return	11.9%***	4.0%*	6.3%**	0.9%	-0.5%
(t-stat)	(4.25)	(1.90)	(2.31)	(0.31)	(-0.32)
Std. deviation	9.4%	6.9%	11.1%	8.1%	12.7%
Sharpe Ratio	1.27	0.58	0.57	0.11	-0.04
Alpha	0.0097***	0.0044***	0.0052**	0.0021	-0.0008
(t-stat)	(4.02)	(2.62)	(1.99)	(0.85)	(-0.50)
Panel D: Factor Combination					
	Period 1	Period 2	Period 3	Period 4	Period 5

Mean Raw Return	8.9%***	11.1%***	12.1%***	4.2%	4.4%*
(t-stat)	(3.65)	(4.57)	(3.72)	(1.19)	(1.78)
Std. deviation	6.9%	7.0%	13.9%	8.8%	6.5%
Sharpe Ratio	1.29	1.59	0.87	0.48	0.68
Alpha	0.0081***	0.0099***	0.0105***	0.0054*	0.0032
(t-stat)	(3.66)	(4.88)	(3.37)	(1.75)	(1.43)

Note. This table shows the average raw returns, t-statistic of the average returns, standard deviations, Sharpe ratios, intercepts (Alphas), and t-statistic of the intercept of the Momentum, the CF/P, the simple 50/50 value and momentum combination, and the 50/50 Factor value and momentum combination strategies. Each panel refers to a different strategy. Each column in the table refers to one of 5 periods. Period 1 refers to the first period, between April 1972 and April 1982. Period 2 refers to the second period: April 1982 to April 1992. Period 3 refers to the third period: April 1992 to April 2002. Period 4 refers to the fourth period, between April 2002 and April 2012. Period 5 refers to the fifth period, between April 2012 and April 2012. Note that Period 1 for some strategies begins at a different date, e.g. the Momentum strategy needs past data, hence, the first trade occurs in March 1973. The Value strategies have data only up to December 2021, hence the 5th period is shorter. Analogically the combination strategy requires data on Momentum, hence the first period starts in March 1973, and on Value, hence the last period ends in December 2021. All portfolios in the table are value-weighted. The raw returns, standard deviations, and Sharpe ratios are annualized measures. The Alphas are presented in monthly terms. The intercepts reported are established from Fama-French three-factor regression. Data on the three factors is taken from the Keneth French website. T-statistics are in parentheses. Test statistics are computed with Newey West Standard Errors. Stars represent the significance levels for a two-sided t-test (* p<0.10, ** p<0.05, *** p<0.01).

Table 5.2 examines the strategies more in-depth by disclosing their performance in different periods. The performance of the momentum strategy in Panel A is as expected. In the periods (P1 and P2) before the original paper of Jegadeesh and Titman (1993), the strategy yields very high raw and abnormal returns. The results shown in Period 3 are consistent with a follow-up research by the two authors, which suggests that the strategy remains profitable almost a decade after the release of their original paper (Jegadeesh & Titman, 2001). From then on, the profitability of the momentum strategy drastically decreases, both in terms of risk-adjusted return and abnormal profits. This is also in line with the literature, e.g. Hwang and Rubesam (2015) report insignificant abnormal returns from momentum for the period from 1999 to 2010. The decreasing average returns, and alphas support the first part of Hypothesis 1. It seems that the profitability of the momentum strategy has largely decreased. However, there is little evidence to support the second part of Hypothesis 1, which claims that momentum is still profitable. The insignificant average returns and alphas in the past two decades indicate that the results of Chabot, Ghysels, and Jagannathan (2014) might be driven by the highly significant momentum alphas in the past.

The same trend can be observed for the CF/P strategy in Panel B of Table 5.2. The CF/P strategy is presented instead of the B/M strategy for two reasons. First, the analysis made so far shows that the CF/P was the most profitable value strategy for the sample period. This is consistent with the findings of Lakonishok et al. (1994), who also report that the CF/P strategy makes bigger differences in LMS portfolio returns than the B/M strategy. Second, few papers analyse a different value strategy than the B/M strategy. Hence, this paper expands the literature on value. The results for the B/M and E/P portfolios are displayed in Appendix A. Essentially the conclusions do not differ if another strategy was used. The decline in the performance of the value strategy can be seen as one moves from the first to the last period. This finding is in line with the papers by Lev and Srivastava (2019), and Israel and Richardson (2020) who report a significant decline in the profitability of the value strategy in the past two to three decades. The evidence presented in Panel B provides further support for the second Hypothesis, which claims that the profitability of the value strategy has decreased in the past 20 years.

A similar trend can also be observed for both Combination strategies in Panels C and D. However, the two combination strategies differ in terms of performance throughout the years. The relatively good returns of the simple 50/50 combination start fading away from the second period onwards. Whereas the Factor Combination portfolio remains highly profitable up to the third period. Even in the last two periods, the Factor Combination portfolio provides average returns of around 4% per year, whereas the average returns of the Simple Combination strategy levitate around 0% per annum.

Comparing across the different strategies, the momentum portfolio has yielded the highest average returns and the highest abnormal returns. The momentum portfolio has provided a maximum of 17.1% of average yearly return and 0.0154 of abnormal returns (Alpha). However, consistent with the analysis in the previous section, when comparing the strategies on a risk-adjusted basis the Factor Combination portfolio outperforms every other. The Factor Combination portfolio has demonstrated a much higher Sharpe ratio than all other strategies throughout most periods, with the highest Sharpe Ratio being 1.59. Hence, this provides support for the third Hypothesis, as the Combination portfolio has outperformed the pure-play value and momentum strategies on a risk-adjusted basis.

All panels in Figure 5.1 confirm the trend established in Table 5.2. The profitability of all strategies seems to be decreasing. This is in line with the literature on value and momentum which started recording a decline in their profitability in the last two decades. This downward change in performance could be coming from the changing market environment. It seems that the development of fintech, the decrease

in trading costs (e.g., SHO Regulation), and the increased participation of retail investors in the past 20 years could have indeed decreased the profitability of these capital market anomalies.

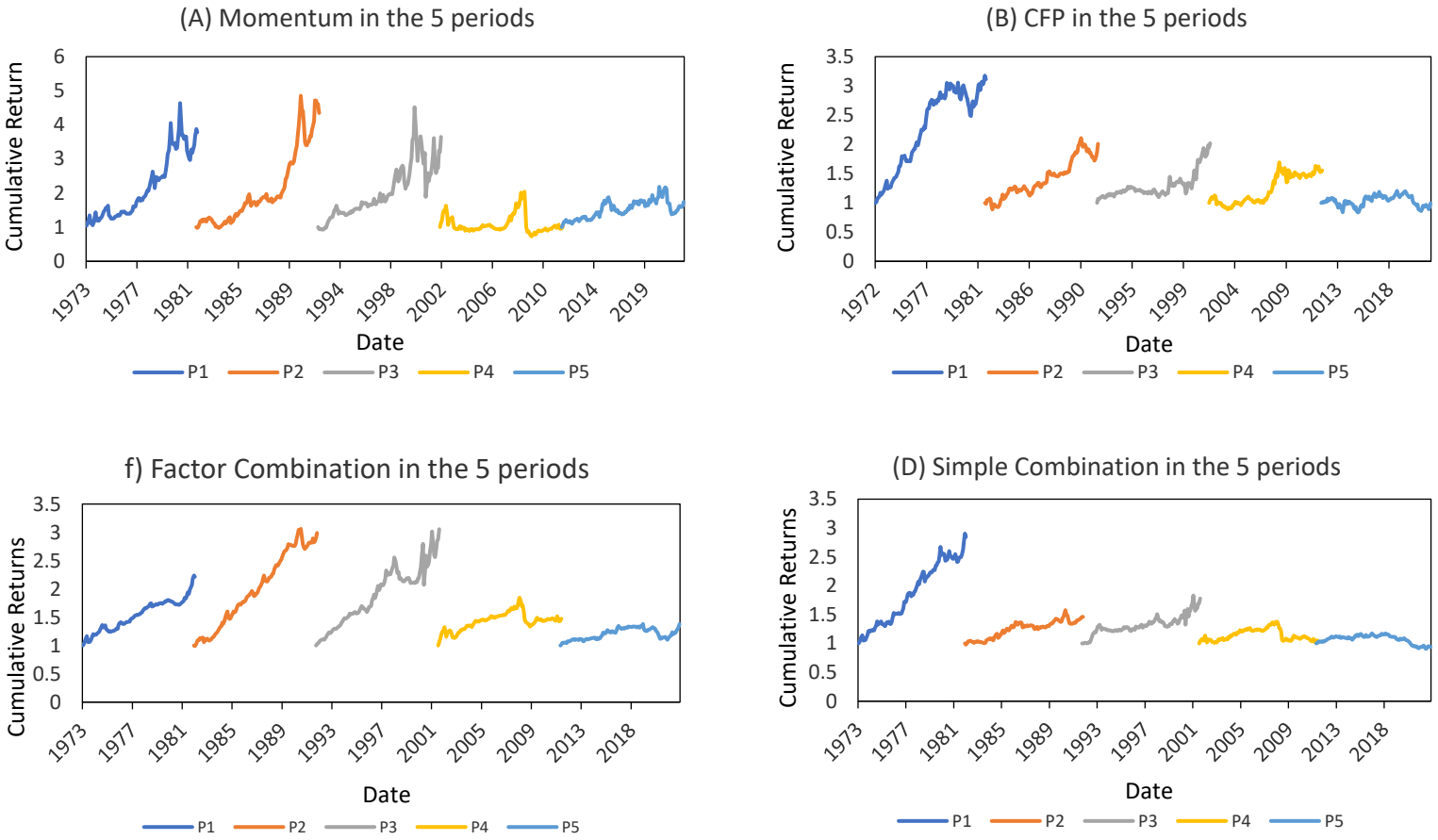

Figure 5.1 The individual development of the Equity curves of the Momentum, B/M, Factor Combination, and Simple Combination portfolios throughout the different periods

Note. Each panel in the figure shows the development of the equity curves of one of the Momentum, B/M, Factor Combination, or Simple Combination portfolios for each of the 5 periods. The 5 periods split equally the period from April 1972 to April 2022. The Equity curves disclose the cumulative returns of investing $1 in each portfolio in the beginning of the period. All the portfolios presented are the value-weighted LMS portfolios for each strategy. Note that Period 1 begins in March 1973, because to compare the strategies under equal conditions, they need to start at the same time, and the momentum strategy needs past data. Analogously, the 5th period ends in December 2021, as the B/M strategy has data only until then.

5.3 Subperiod study – Comparing Strategies

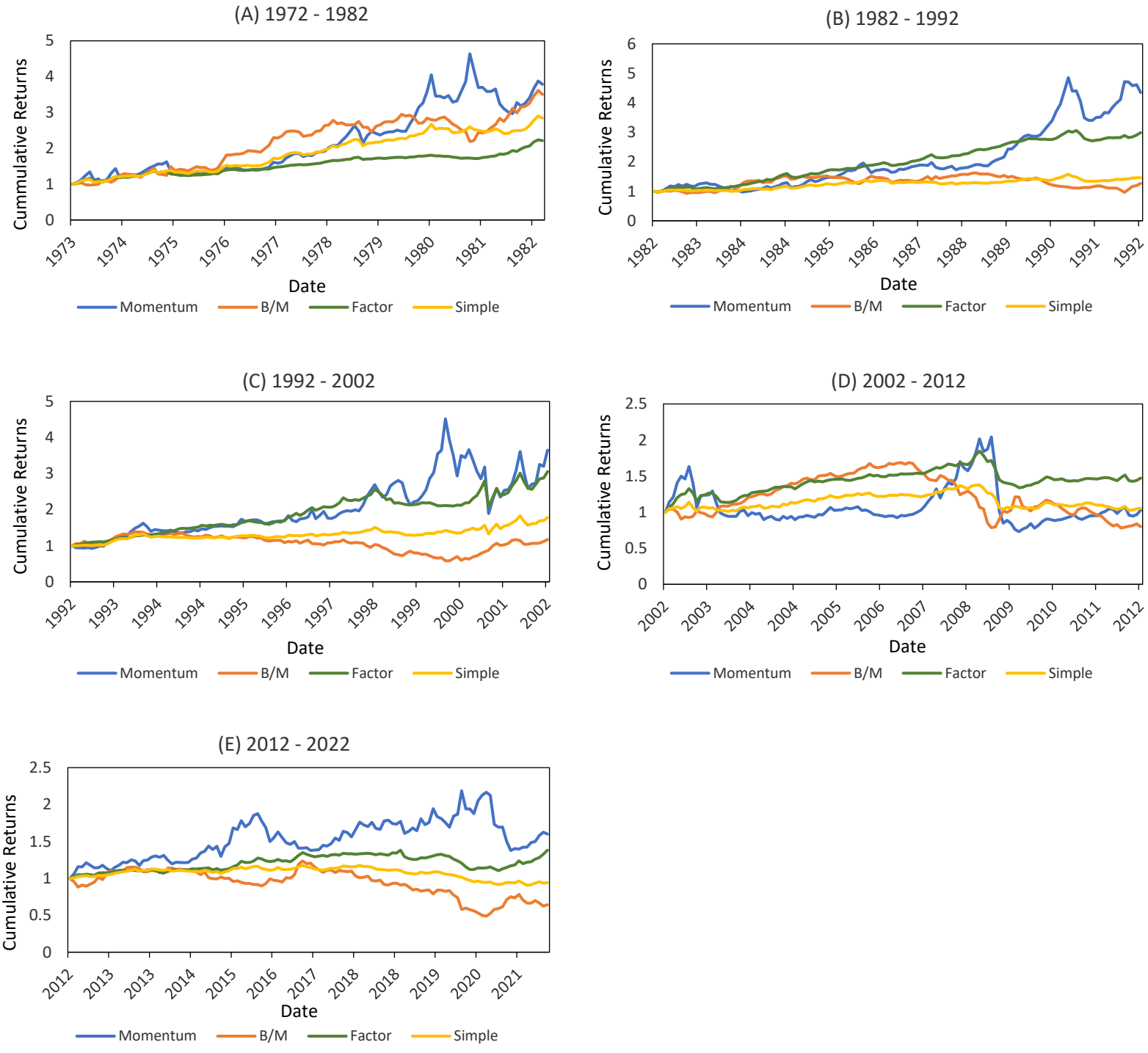

Figure 5.2. Comparison of the Equity curves of the Momentum, B/M, Factor Combination, and Simple Combination portfolios for the 5 different periods.

Note. Each panel in the figure shows the equity curves of the Momentum, B/M, Factor Combination, and Simple Combination portfolios for each of the 5 periods. The 5 periods split equally the period from April 1972 to April

2022. The Equity curves disclose the cumulative returns of investing $1 in each portfolio in the beginning of the period. All the portfolios presented are the value-weighted LMS portfolios for each strategy. Note that Period 1 begins in March 1973, because to compare the strategies under equal conditions, they need to start at the same time, and the momentum strategy needs past data. Analogously, the 5th period ends in December 2021, as the B/M strategy has data only until then.

Figure 5.2 compares the equity curves for one Value, momentum and both Combination strategies in the 5 different periods. Contrary to section 5.2, here the B/M portfolio is used as a representative for the value strategy. This is done because the Combination portfolios are partially created by the B/M portfolio. Hence, graphically presenting the equity curves of the B/M portfolio next to these of the Combination portfolios in the figure makes more sense, than presenting the CF/P equity curves. Comparison of the CF/P and E/P equity curves with the momentum and combination portfolios can be found in Appendix B. Regardless of the Value strategy used conclusions do not change.

Looking at all panels from Figure 5.2 simultaneously, one can again confirm the conclusions drawn from Table 5.2. Overall, the cumulative returns of each strategy have been declining in the past 2 decades. The momentum portfolio seems to provide the highest cumulative return in almost all periods, excluding the period between 2002 and 2008. For example, in Panel (B), if you have invested $1 in the momentum portfolio in April 1982, you would have cashed out approximately $4.35 in April 1992. This is higher than the Factor combination portfolio ($2.99), the Simple combination portfolio ($1.46), and the value portfolio ($1.2). In contrast, 30 years later, in Panel (E), the momentum portfolio is still the most profitable one, but achieves a cumulative return of only $1.6 at the end of the period. The graphs presented in Figure 5.2 provide further support for Hypothesis 1. The overall profitability of the strategy has decreased over time, but the strategy has still provided the highest cumulative return among all the other strategies.

Another trend that can be observed when looking at all the panels is that the Factor combination portfolio also has an outstanding performance. Most of the time it moves very closely with the momentum portfolio, which seems to be the best portfolio when looking at cumulative returns. In fact, although the momentum portfolio succeeds in finishing with the highest return most of the time, the Factor portfolio is often outperforming it for the biggest part of the period. Furthermore, the Factor portfolio is much more stable than the value and momentum portfolios. While the value and momentum portfolios are often experiencing large spikes up and down, the equity curves of the Factor

portfolio seem like a stable upward trend. The highly negative correlation between the value and momentum, allows both Combination portfolios to avoid large market fluctuations and remain stable.

A good example of the stability of the Combination portfolios can be seen in Panel (D). Around the 2008 financial crisis, the momentum portfolio experienced a huge drop. This drop was softened for the Combination portfolios due to their value part, which experienced an increase at that same time. Exactly this diversification capability of the Combination portfolios allowed them to yield a higher cumulative return than the pure-play value and momentum strategies at the end of the period. After the 2008 financial crisis, the Factor Combination portfolio managed to bring a $1.47 cumulative return at the end of the period. This is much better than the almost non-existing cumulative return of the momentum portfolio ($1.02) and the negative return of the B/M portfolio ($0.8) compared to the $1 invested in the beginning of the period. The equity curves presented in Figure 5.2 present more evidence to support Hypothesis 3. They look very stable and have an excellent performance, increasing their effectiveness on the risk/return scale. The fact that they are outperforming pure-play momentum and value even when only looking at cumulative returns, consolidates the statement that the Combination portfolio is performing the best among the others.

The equity curves in Panel (E) allow us to analyse how the strategies responded during the Covid-19 crisis. The returns of all strategies dropped down in March 2020, the beginning of the pandemic. However, the decline in returns for both Combination portfolios was much smoother. Six months later, around September 2020, the momentum portfolio experienced a drastic drop, larger than the one in March. At the same time, the value strategy rebounded, and the B/M equity curve started going up. By March 2021, one year after the initial Covid-19 shock, the momentum portfolio has dropped by approximately 37 percentage points. For the same year, the B/M portfolio has not only recovered to its pre-Covid level, but actually increased its cumulative return by approximately 30 percentage points. This is in line with the findings of Pagano, Sedunov, and Velthuis (2021), who used Robinhood data and established that retail investors have increased value trading and decreased momentum trading. This confirms Hypothesis 2, because despite the decrease in the overall profitability of the strategy, it had an upsurge in its profitability around the Covid crisis. The Factor Combination portfolio has almost returned to its pre-Covid levels for this year, but it was still down by 2.8 percentage points compared to before the pandemic. Similar to the 2008 financial crisis, the diversification advantage of the Combination portfolio helped it to perform relatively well during the Covid-19 crisis. In fact, the Factor Combination portfolio was the portfolio, which achieved the highest cumulative return when looking only at the

Covid crisis. Therefore, it can be said that it outperformed the pure-play value and momentum strategies during Covid-19, further supporting Hypothesis 3.

6 Conclusion and Discussion

This paper investigates the performance of two of the most important strategies in the financial literature and a combination of those strategies for the past 50 years. An important implication from this study is how recent changes in the financial markets such as the Covid-19 crisis have affected the overall profitability of these strategies. Hence, the research question of this paper examines the performance of momentum, several value, and two combination strategies for the period April 1972 – April 2022. I use US data on returns and financial ratios to construct several portfolios to explore these strategies. Looking at the raw returns, alphas, Sharpe ratios and tracking the equity curves of these strategies in a subperiod study, this paper finds that the overall profitability of all strategies has decreased. These results are consistent with the previous literature. The analysis of the three Hypotheses disclosed some important implications for the scientific and investor community.

The first hypothesis predicts that the profitability of the momentum strategy has decreased over time, but the strategy remains profitable. The decrease in the average annual returns from the first subperiod (16.3%) to the last subperiod (4.6%) confirms the decrease in profitability. However, the second part of the hypothesis, that the strategy remains profitable, is more controversial. Raw returns and alphas are insignificant for the past two decades. On the other side, the momentum strategy succeeded in providing the highest cumulative returns in most of the periods. Therefore, this paper could not find enough evidence to reject the first hypothesis.

The second hypothesis states that the performance of the value strategy has declined over the years, but it has increased around the Covid-19 crisis. The subperiod study follows the performance of the CF/P and the B/M strategies. The decrease in the average annual returns from 12.1% in the first subperiod to 0.8% in the last subperiod confirms the decline in the performance of the CF/P portfolio. Moreover, the equity curves recording the performance of the B/M portfolio also show diminishing profitability of the value strategy. In addition, the hypothesis predicts an increase in the performance of value strategies around the Covid pandemic. This can be confirmed by the rebound of the B/M portfolio in September 2020 and the fact that at the end of the studied period they finished above their pre-Covid levels. Therefore, this paper found evidence in support of the second Hypothesis.

The third hypothesis expects that a simple combination of the value and momentum strategy can outperform the pure-play value and momentum portfolios. Looking at average raw return and abnormal returns the Factor Combination portfolio outperforms every value portfolio, but not the momentum portfolio. However, when considering risk next to returns, the Factor Combination portfolio is the best performer with an average Sharpe Ratio of 0.89 compared to 0.53 for momentum and 0.54, the highest one for value. Moreover, when looking at the Equity curves in the subperiod study, one can notice the obvious advantage of the Combination strategy. Due to the diversification benefits coming from the highly negative correlation between its two components the Combination portfolio is extremely stable even in times of crisis. In fact, the Factor Combination portfolio is always outperforming pure-play value and momentum in crises. These findings introduce more support in favor of Hypothesis 3. These findings also have important implications for investors, whose decisions are often at the center of the financial literature. This paper can be, therefore, used as a stepping stone for further research in the combining value and momentum literature, which is a relatively new field of interest.

The results from this study add to the debate about where are the excess returns of the value strategy coming from. Since the performance of all three value strategies has declined in the past two decades, the difference between the performance of value and glamour stocks seems to be closing. This provides evidence consistent with the view of Fama and French (1992) that the high excess returns from value strategies come from the fact that value strategies are fundamentally riskier and not due to behavioral shortcomings.

Several important limitations of this study should be outlined. First, this study does not take into account any transaction costs. Transaction costs can significantly reduce the profitability of the strategies. This limitation is especially important for Hypothesis 1, which claimed that momentum strategies are still profitable. If transaction costs were incorporated in the analysis the outcome of this hypothesis could have been different. It is recommended that future research considers transaction costs, as this will provide a more realistic picture of the profitability of all strategies and will show if the relatively good performance of these anomalies completely disappears with time.

Second, this paper used two simple 50/50 combination strategies rather than combining value and momentum according to stocks' Average V/M score, which produces the best combination portfolio (Fisher, Shah & Titman, 2015). Third, this paper considers only one momentum strategy with a formation period of 12 months and a holding period of 1 month. However, Bird, Gao and Yeung (2017) suggest a holding period of 3 months to be more optimal. If these best practices were used, the

performance of the Combination strategy could be even more superior to the pure-play value and momentum strategies. Since the literature on combining value and momentum is relatively new, it would be intriguing to check how using different momentum and value strategies can be combined. For example, this paper found out that out of the three value strategies, the CF/P portfolio was the most successful one. Nevertheless, following the current literature on Combining Value and momentum, it used the B/M portfolio. Therefore, future research could analyze if a 50/50 combination between the CF/P portfolio and a 12-3 momentum portfolio, where the formation period is 12 months and the holding period is 3 months, is better than the combination specification in this paper.

Lastly, due to COMPUSTAT's major expansion of its database in 1978 up to 5 years of data were added retroactively for many of the newly added firms. This raises concerns about a look-ahead bias (Kothari, Shanken, & Sloan, 1995). According to Lakonishok et al. (1994) specifically among low-priced firms, only those that perform well were added to the database. Therefore, among the firms with the lowest market valuations on COMPUSTAT, many has a good 5-year past performance record. According to Lakonishok et al. (1994) this could be a possible explanation for the positive association between low initial valuation and future returns.

One of the novel aspects of this study is how these strategies performed during the Covid-19 crisis. This paper found out that the performance of the value portfolio increased compared to its pre-covid levels, and this of the momentum portfolio decreased. However, this study does not aim to concentrate on the effect of the Covid-19 crisis on the value and momentum anomalies. This study also does not take into consideration two important factors. First, due to the unavailability of data after December 2021 for the value portfolio, this study could not follow the performance of the strategies in 2022. A future study should incorporate data for 2022, because of the major socio-economic events during this year. These events brought high inflation and big insecurity to the market, which translated into high volatility and a drastic drop in stock prices. Therefore, an intriguing topic for future research is to analyse the effect of Covid-19 on the profitability of these strategies, by isolating the effect from the Covid crisis from the adverse effects from the Ukrainian war, such as the increase in inflation and the shortage of supply. Second, the Covid pandemic is not completely over yet, as countries are still struggling with coping with the virus. Hence, future research on the topic may consider waiting until the end of the pandemic and until a more complete access to data is available.

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8 Appendix

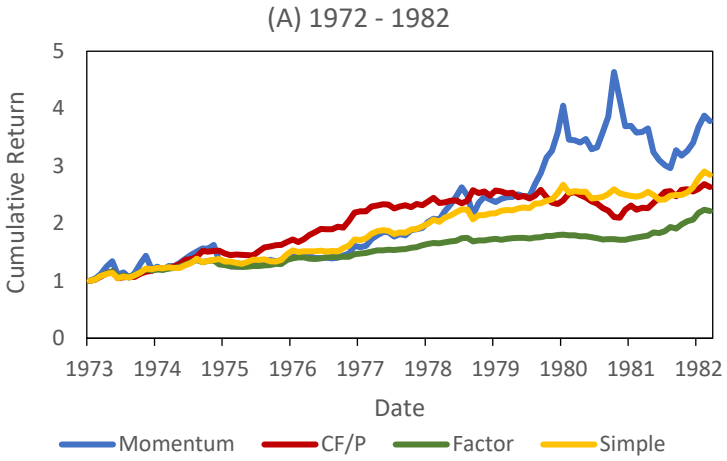
8.1 Appendix A

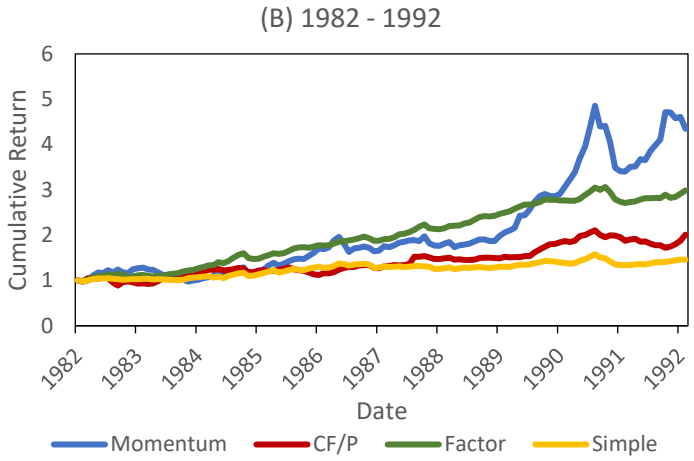
Table A1. Performance of B/M and E/P portfolios in different periods of time.

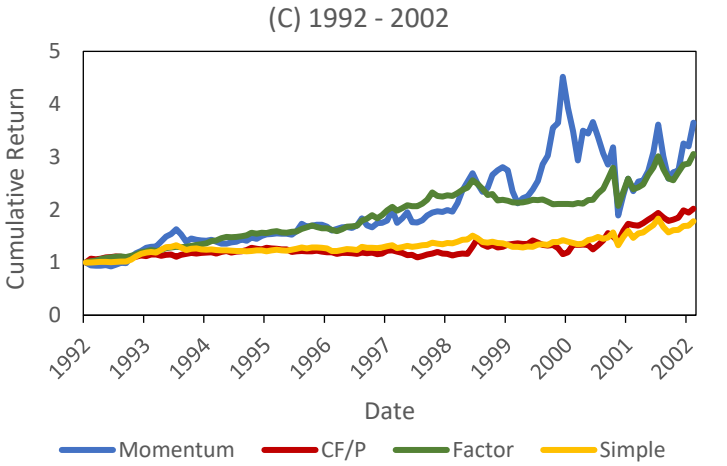
Panel A: B/M					
	P1	P2	P3	P4	P5
Mean Raw Return	14.71%***	3.2%	2.9%	-1.0%	-3.2%
(t-stat)	(3.18)	(0.72)	(0.47)	(-0.17)	(-0.51)
Std. deviation	16.4%	13.1%	16.7%	15.7%	16.1%
Sharpe Ratio	0.90	0.25	0.18	-0.06	-0.20
Alpha	0.0121***	0.0021	0.0033	-0.0023	-0.0028
(t-stat)	(2.97)	(0.56)	(0.57)	(-0.44)	(-0.56)
Panel B: E/P					
	P1	P2	P3	P4	P5
Mean Raw Return	7.4%*	3.6%	11.5%	7.4%	1.2%
(t-stat)	(1.69)	(0.54)	(1.18)	(0.96)	(0.21)
Std. deviation	14.2%	16.0%	26.9%	20.4%	16.3%
Sharpe Ratio	0.52	0.23	0.43	0.36	0.08
Alpha	0.0054	0.0032	0.0108	0.0090	-0.0012
(t-stat)	(1.35)	(0.50)	(1.18)	(1.34)	(-0.24)

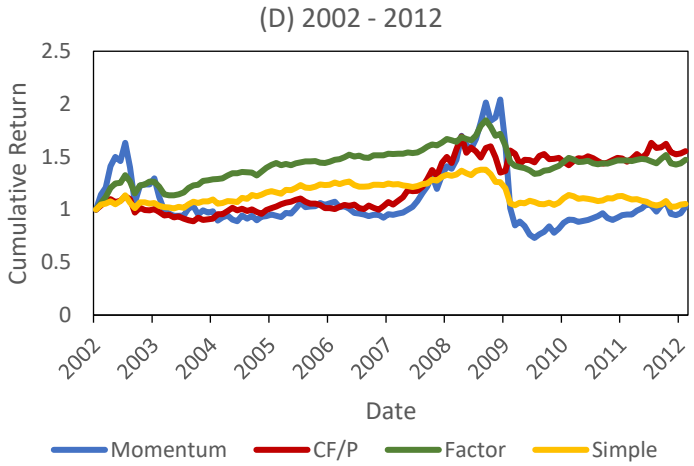
Note. This table shows the average raw returns, t-statistic of the average returns, standard deviations, Sharpe ratios, intercepts (Alphas), and t-statistic of the intercept of the B/M and E/P strategies. Each panel refers to a different strategy. Each column in the table refers to one of 5 periods. Period 1 refers to the first period, between April 1972 and April 1982. Period 2 refers to the second period: April 1982 to April 1992. Period 3 refers to the third period: April 1992 to April 2002. Period 4 refers to the fourth period, between April 2002 and April 2012. Period 5 refers to the fifth period, between April 2012 and April 2012. The Value strategies have data only up to December 2021, hence the 5th period is shorter. All portfolios in the table are value-weighted. The raw returns, standard deviations, and Sharpe ratios are annualized measures. The Alphas are presented in monthly terms. The intercepts reported are established from Fama-French three-factor regression. Data on the three factors is taken from the Keneth French website. T-statistics are in parentheses. Test statistics are computed with Newey West Standard Errors. Stars represent the significance levels for a two-sided t-test (* p<0.10, ** p<0.05, *** p<0.01).

8.2 Appendix B









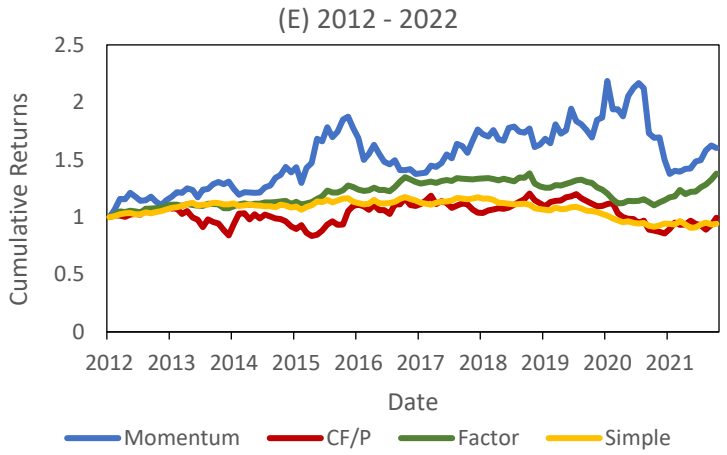
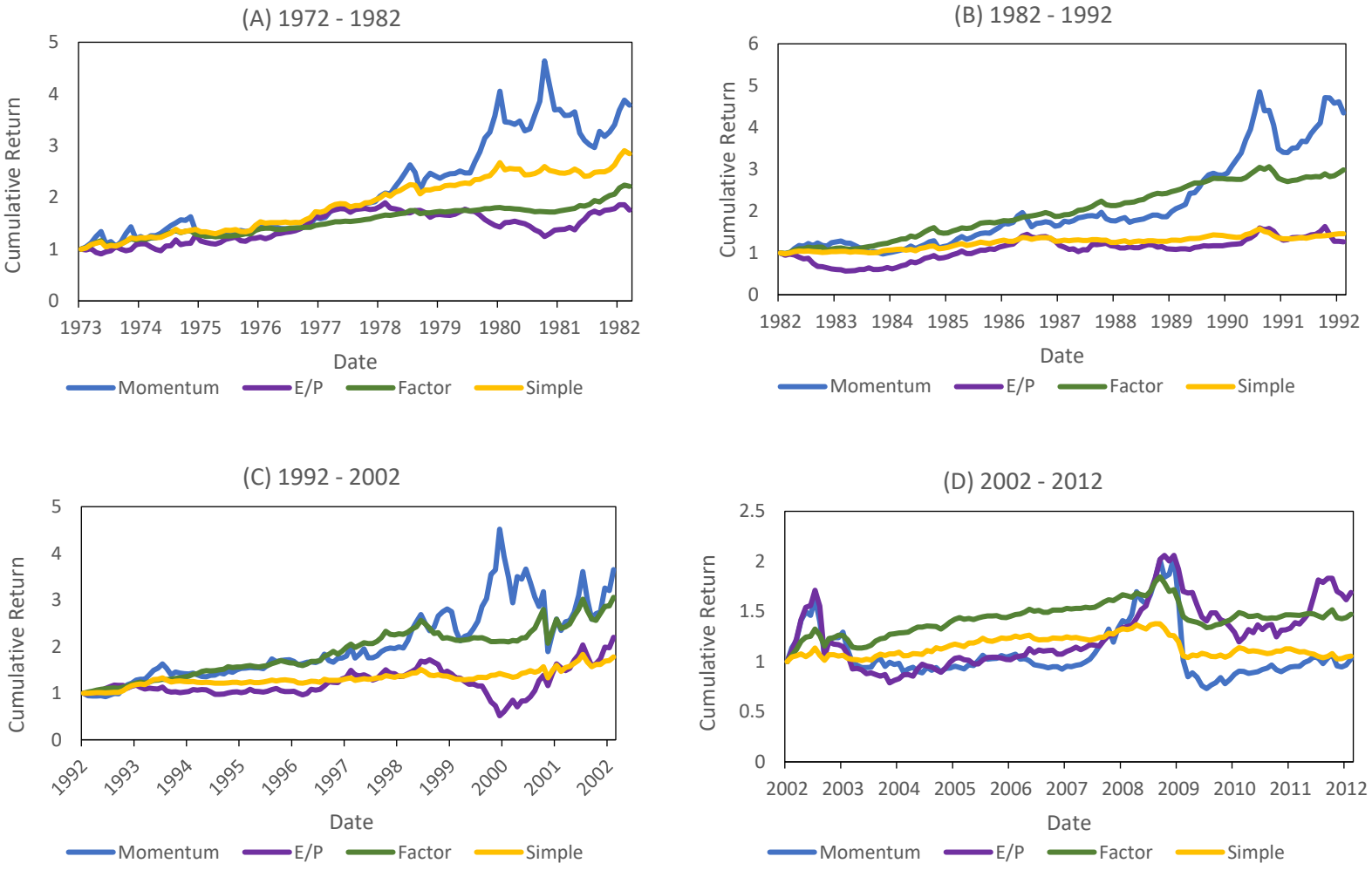


Figure A1. Comparison of the Equity curves of the Momentum, CF/P, Factor Combination, and Simple Combination portfolios for the 5 different periods.

Note. Each panel in the figure shows the equity curves of the Momentum, CF/P, Factor Combination, and Simple Combination portfolios for each of the 5 periods. The 5 periods split equally the period from April 1972 to April 2022. The Equity curves disclose the cumulative returns of investing $1 in each portfolio in the beginning of the period. All the portfolios presented are the value-weighted LMS portfolios for each strategy. Note that Period 1 begins in March 1973, because to compare the strategies under equal conditions, they need to start at the same time, and the momentum strategy needs past data. Analogously, the 5th period ends in December 2021, as the CF/P strategy has data only until then.



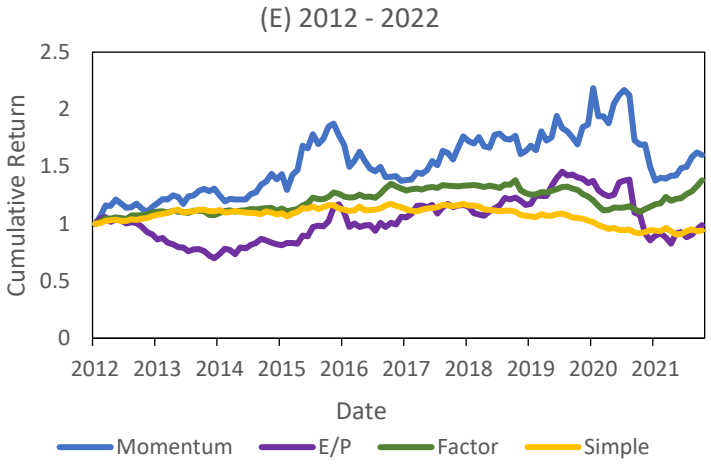


Figure A2. Comparison of the Equity curves of the Momentum, E/P, Factor Combination, and Simple Combination portfolios for the 5 different periods.

Note. Each panel in the figure shows the equity curves of the Momentum, E/P, Factor Combination, and Simple Combination portfolios for each of the 5 periods. The 5 periods split equally the period from April 1972 to April 2022. The Equity curves disclose the cumulative returns of investing $1 in each portfolio in the beginning of the period. All the portfolios presented are the value-weighted LMS portfolios for each strategy. Note that Period 1 begins in March 1973, because to compare the strategies under equal conditions, they need to start at the same time, and the momentum strategy needs past data. Analogously, the 5th period ends in December 2021, as the E/P strategy has data only until then.