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The impact of economic crisis on momentum strategy and profitability in global stock market

Differences in momentum strategy profitability in developed and emerging markets

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Abstract: The thesis examines how market crises affect the profitability of the momentum strategy in different markets. It also considers the impact of the COVID-19 pandemic and compares it to previous market crises. The momentum strategy assumes that high-performing stocks will continue to rise, and low-performing stocks will continue to fall in the short term. The strategy has been shown to be effective in normal market conditions, but its performance deteriorates in uncertain times. The paper analyses previous research on investor and market behavior in developed and emerging markets. The aim is to observe how market changes affect the profitability of the momentum strategy and to compare differences across markets. Previous studies have found a decline in the profitability of momentum strategies during market crises and identified significant regional differences in their performance. A significant reason for the collapse of the momentum strategy is the irrational behavior of investors and increasing market volatility. These challenge the continuation of a predictable trend and can lead to losses for the strategy. Despite these challenges, the strategy has historically been profitable in stable market conditions.

Tiivistelmä: Opinnäytetyössä tarkastellaan, kuinka markkinakriisit vaikuttavat momentum-strategian kannattavuuteen erilaisilla markkinoilla. Tutkielmassa otetaan myös huomioon COVID-19-pandemian vaikutus talouden kehitykseen ja vertaillaan sen suoriutumista aikaisempiin markkinakriiseihin. Momentum-strategia perustuu oletukseen siitä, että hyvin menestyvät osakkeet jatkavat nousemista ja heikosti menestyvät osakkeet jatkavat laskemista lyhyellä aikavälillä. Strategia on todettu tehokkaaksi normaaleissa markkinaolosuhteissa, mutta epävarmoina aikoina sen suorituskyky heikkenee. Tutkielmassa analysoidaan aikaisempia tutkimuksia sijoittajien ja markkinoiden käyttäytymisestä kehittyneillä, sekä kehittyvillä markkinoilla. Tavoitteena on havainnoida, kuinka markkinoiden muutokset vaikuttavat momentum-strategian kannattavuuteen ja vertailla markkina-alueiden eroja. Aikaisemmista tutkimuksista havaitaan momentum-strategian kannattavuuden heikentymistä markkinakriisien aikana ja löydetään alueellisia eroja markkinoiden välillä. Merkittävimmät syyt momentum strategian romahduksiin ovat sijoittajien irrationaalinen käyttäytyminen ja kasvava markkinoiden volatiliteetti. Nämä haastavat ennustettavan trendin jatkumista ja voivat johtaa strategian tappioihin. Haasteista huolimatta strategia on historiallisesti ollut kannattava vakailla markkinaolosuhteilla.

Keywords: Momentum strategy, financial markets, COVID-19 pandemic, Behavioral finances, Anomaly

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Abbreviations

EMH	Efficient Market Hypothesis
RWT	Random Walk Theory
CAPM	Capital Asset Pricing Model
SMB	Size factor (Small Minus Big)
HML	Value factor (High Minus Low)
CMA	Investment factor (Conservative Minus Aggressive)
RMW	Profitability factor (Robust Minus Weak)
MOM	Monthly Momentum factor (Momentum anomaly)
WML	Winners Minus Losers
VIX	Chicago Board Options Exchange (CBOE) Market Volatility Index

1. Introduction

Financial markets are known to be highly sensitive to global shocks, and economic changes and business cycles affect investor behavior. Markets work efficiently when investors act rationally and information on investment opportunities is available to all investors. Under such conditions, markets are expected to be more predictable and investment trends tend to follow rational expectations (Eyden, Gupta, Nielsen & Bouri, 2023). However, in times of crisis, markets become unpredictable, which means that trends no longer work normally, and traditional investment strategies can fail. Financial markets have faced many types of market crises throughout history (Förster, Paparella, Duchek, Wolfgang, 2022). One of the biggest crises in recent history is the COVID-19 pandemic. This pandemic started in early 2020 and then spread into a global financial crisis. This led to widespread economic uncertainty, which was also strongly reflected in stock markets (Fortin, Hlouskova, Sögner, 2023).

In this thesis, I examine how market crises affect the profitability of the momentum strategy globally and how the COVID-19 pandemic affects the profitability of the strategy. The momentum strategy is one of the most well-known anomalies, which challenge the predictions of traditional asset pricing models. The financial anomaly refers to a deviation in asset returns that cannot be fully explained by traditional financial theories. (Azevedo, Kaserer, Campos, 2021).

Such economic anomalies include the "Monday effect", where stocks perform best on Fridays and worst on Mondays. The momentum strategy studied in this thesis is based on the momentum anomaly, where stocks that have previously performed well tend to continue performing well and stocks that have previously underperformed continue to decline in the short term. The exact reason for the occurrence of anomalies is not fully understood, but under normal market conditions anomalies are very frequent (Grobys, Kolari & Rutanen, 2021). During market crises, investors change their investment behavior, which in turn changes the way momentum anomaly functions. The purpose of this thesis is to investigate how momentum strategy changes during market crises, such as the COVID-19 pandemic.

Historically, market crises have come as a surprise when investment strategies based on the past have not worked well. Sudden market changes lead investors to panic and change their investment strategies. The COVID-19 pandemic is a good example of a crisis that created a unique market environment for studying the profitability of momentum strategies (Eun Jung, Yu Kyung, Ryumi, 2022).

The objective of this thesis is to examine whether the momentum strategy remains effective during the COVID-19 pandemic and to identify the key factors that affect the strategy's performance.

1.1. The background and meaning of the research problem

The Momentum strategy is a widely used investment strategy in the financial sector and has historically performed well by tracking price trends in financial markets. However, price trends change in times of economic volatility, altering the profitability of the strategy (Paule-Vianez, Lobão, Gómez-Martínez, Prado-Román, 2021). This leads to the research problem for this thesis:

How do market crises affect the profitability of the momentum strategy?

The idea behind the Momentum strategy is to take advantage of the continuation of market trends. The stock price continues to move steadily as investors underreact to market news. During economic turbulence, investors underreaction can turn into overreaction, which challenges the effectiveness of the momentum strategy and can lead to significant losses (Kelly, Moskowitz, Pruitt, 2021).

Market crises are usually preceded by periods of economic growth, which can lead to excessive market optimism and an inability to identify economic risks. Once economic growth is no longer stable and risks are identified, markets tend to recover or collapse. This creates a market crisis, which usually begins in financial systems (Henning, Iossifov and Varghese, 2023). However, the COVID-19 pandemic is a shock caused entirely by an external factor that could not have been predicted. The pandemic creates a unique opportunity to study how markets react to a different market shock compared to previous financial crises. Markets reacted globally to this pandemic, and it affected economies around the world in different ways (Yang, Shuxin, 2025). This creates a unique context for examining the second research problem:

How did the COVID-19 pandemic affect the efficiency of the momentum strategy?

Understanding the behavior of momentum strategies during market crises is also important for investors' decision-making. The strategy has been proven to work well in stable markets, but during crises the performance of the strategy changes due to market and investor behavior (Butt, Kolari, Sadaqat, 2024). The purpose of this thesis is to find out if the strategy remains effective when the market deviates from a stable situation.

1.2. Research questions and objectives

The purpose of this thesis is to examine the research problems presented in the previous section and to answer the first research question:

How did the profitability of the momentum strategy change during the COVID-19 pandemic compared to normal market conditions?

The research question of the thesis aims to find out how different market conditions affected the profitability of the momentum strategy. The research question compares normal market conditions and the market during the COVID-19 pandemic. Comparing these two different market conditions helps to identify how the market reacted and what factors influenced market development.

The COVID-19 pandemic was global, and its effects spread rapidly across markets. However, there are many differences between markets that affect their ability to overcome economic shocks (Zishu, Mingchen, Ruhong, Yunjie, Shouyang, Yongmiao, 2024). Since markets react differently around the world, the second research question is:

How did the profitability of the momentum strategy differ between developed and emerging markets?

These research questions help structure the thesis and guide the literature review. The aim of the research questions is to analyze the academic studies related to the questions and identify the key findings. These findings will help answer the thesis questions and problems.

The final objective of the thesis is to understand the difference in market behavior and how these changes the effectiveness of investment strategies.

1.3. Hypotheses

The objective of this thesis is to examine the behavior of momentum strategies and investors reactions during global crisis. Based on previous studies and research questions, the thesis presents the following hypotheses:

H1: The momentum strategy produced significantly lower returns during the COVID-19 pandemic compared to normal market conditions.

The hypothesis assumes that markets become volatile during crises, which changes investor behavior. The Momentum strategy is based on the continuation of price trend, but during the economic crisis, stock prices are expected to drop. Previous research shows that momentum strategies experience a "momentum crash" when there is an abnormal change in the market (Daniel and Moskowitz, 2016). The pandemic created a highly uncertain situation in the market, which led to the formation of hypothesis.

The second hypothesis assumes that markets differ economically from each other. This difference is reflected in the behavior of investors in the markets, as well as in terms of economic structures. The research suggests that the momentum strategy works more effectively in developed markets than in emerging markets. This difference is influenced by market stability, policy decisions and the level of healthcare systems (Fama and French, 2012). The second hypothesis of the thesis is:

H2: The COVID-19 pandemic weakened the performance of the momentum strategy more in emerging markets than in developed markets

The thesis examines both hypotheses by comparing them with academic studies on the impact of the market crisis on the economy. The hypotheses are evaluated in a literature review, and it is assessed whether the literature review supports the hypotheses. Finally, the thesis analysis conclusions based on the literature findings to assess if momentum strategies remain viable during a crisis.

1.4. Limitations of the research

To keep the thesis simple and manageable, the following limitations have been set. The thesis focuses only on the momentum strategy and its profitability in changing economic circumstances. The strategy examines the performance of stock portfolios based on previous research to provide a broad understanding of stock performance. Therefore, the thesis does not consider the performance of individual stocks. Different economic crises are used as a reference, but the focus of the study is the period of the COVID-19 pandemic. The thesis focuses on market behavior during the pandemic, but for illustrative purposes the period before and after the pandemic is also considered. Other financial crisis periods are also used

as background information for market developments and for comparing the behavior of other financial crises with the COVID-19 pandemic.

Geographically, the thesis compares the performance of the momentum strategy in developed and emerging markets. The thesis examines the performance of the largest developed markets, such as the US and the larger European economies. The performance of these markets is compared to the performance of emerging markets. The study does not cover all global market economies.

As a literature review, this thesis does not include new empirical data or analyses. The aim of the thesis is to test the validity of the hypotheses presented against the results of previous academic research. The final conclusions will be based on the findings and the results of academic research.

2. Theoretical frameworks

The theoretical framework provides a basic understanding of the factors influencing market behavior under different market conditions. During financial crises, such as the COVID-19 pandemic, markets dynamics differ from normal conditions. This chapter reviews key financial theories that help analyze market behavior, asset pricing models and the psychological decision-making of investors. Understanding these theories is essential for assessing how market factors influence the economy.

By using financial theories, the profitability of momentum strategies can be analyzed more effectively, as well as the impact of financial crises on markets. While this study focuses on the COVID-19 pandemic, lessons learned from previous financial crises, such as the 2008 financial crisis and the 2010-euro crisis, provide valuable background information on the effectiveness of momentum strategies. These market environments provide an excellent opportunity to compare how momentum strategies react under extreme market conditions during different crises. Financial theories can help to assess whether a momentum strategy is in line with traditional asset pricing models or whether financial crises affect investors' behavioral decisions.

The purpose of this theoretical framework is to support the empirical analysis presented in the subsequent chapters by providing a basic understanding of the theories used in the literature review. This chapter covers the efficient market hypothesis (EMH), asset pricing models, including the Fama-French and Carhart models, and behavioral finance. These theoretical frameworks are used to analyze market behavior and form the basis of this study.

2.1. Efficient market hypotheses (EMH)

The Efficient Market Hypothesis (EMH) is a theory of financial economics introduced by Eugene Fama in 1970. The EMH describes financial markets that operate in an information-efficient manner. This means that in efficient markets all relevant information about the value of a firm is immediately and fully reflected in stock prices. In efficient markets, price reactions occur quickly and in the right direction. When all available information is fully reflected in asset prices, there is no possibility of arbitrage. Price reactions are influenced by the importance of news (e.g., major economic shifts such as interest rate changes or large corporate mergers), as well as by market structure and market behavior. (Fama, 1970: 383–417)

Informationally efficient markets are difficult to predict, which means that individual investors do not have the opportunity to consistently achieve extra returns more than the market's risk-adjusted rate of return. The efficient market hypothesis assumes that investors act rationally and base their decisions on all available information. However, investors react to the market and make decisions irrationally, making impulsive and panic decisions during crises. As a result, investors tend to over- or under-react to information. This behavior is particularly pronounced during financial crises and speculative bubbles, leading to deviations from market efficiency. While Fama (1970) defined markets as perfectly efficient, more recent studies have challenged this assumption. Agarwal, Taffler & Wang (2025) investigate the relationship between informational investor sentiment and market bubbles in the Chinese stock market during 2005–2008 and 2014–2016. The study found that emotional factors explain about two-thirds of market behavior during these periods. Furthermore, it is found that strong emotions have a much larger impact on market behavior than weaker emotions. However, the research shows that investors did not appear to have learned lessons from previous bubbles, as investors repeated their mistakes in the next bubble (Agarwal, Taffler & Wang, 2025: 339–369).

2.1.1. Random Walk Theory

Eugene F. Fama (1965) presents the Random Walk theory in his article "Random Walks in stock market prices". The theory is developed to explain the behavior of stock prices and assumes that stock price movements are completely unpredictable and independent of past prices. According to the Random Walk Theory (RWT), stock prices contain all available market information, therefore it is impossible to predict market prices and "beat the market". Future stock price movements are therefore unpredictable, and the history of past prices cannot be used to predict the future (Fama, 1965: p.55-59).

Random walk theory is often related to the efficient market hypothesis. In an efficient market, there are many rational investors who seek profit by predicting the future values of stocks. Information about stocks is available to almost all investors, so stock prices incorporate information from the market. Competition between investors causes stock prices to fluctuate randomly around the actual stock price. Random walk theory models are used to analyze market efficiency and stock prices. These models attempt to track the random movements of stock prices and identify potential market efficiency inefficiencies (Fama, 1995: p.75–80).

2.1.2. Three Levels of market efficiency

The efficient market hypothesis is categorized into three levels of efficiency based on how much available information is incorporated into security prices:

Weak form efficiency refers to a market in which security prices incorporate all historical price information. This includes past share prices and trading volumes. Therefore, investors cannot achieve excess returns by simply comparing past price information. Therefore, stock pricing is unpredictable and follows a so-called random walk (Fama, 1970: 383-417).

Semi-strong form efficiency refers to a market in which security prices reflect all publicly available information. This includes financial statements, company earnings releases, and other public information. Investors cannot consistently achieve excess returns by exploiting public information because prices have already internalized this information (Fama, 1970: 383–417).

Strong form efficiency refers to a market in which security prices incorporate all available information, including inside information. If the market is strongly efficient, even non-public information (insider information) cannot produce excess returns. In an efficient market, this information is also reflected in the price (Fama, 1970: 383–417).

The momentum anomaly challenges the efficient market hypothesis. Momentum anomalies suggest that strong past performance (winners) stocks continue to win and poorly performing (losers) stocks continue to lose**.** This contradicts the efficient market hypothesis, which asserts that markets do not allow the exploitation of trends, public information, or insider knowledge. If momentum strategies consistently generate excess returns, it suggests that markets are not fully efficient, challenging both the weak and semi-strong forms of EMH (Woo, Mai, McAleer, Wong, 2020: p.1–51).

2.2. Asset pricing models

Asset pricing models are fundamental tools for understanding how stock returns are determined and what factors influencing stock prices (Bhaskaran, Sukumaran, 2022). This section examines three widely recognized models - Capital Asset Pricing Model (CAPM), Fama-French factor models and Carhart four-factor model. These models can be used to analyze stock return and investment strategies. These include momentum investing, profitability valuation, especially during market shocks such as the COVID-19 crisis. These models are important to this study as they provide both theoretical and empirical references for analyzing the profitability of momentum strategies under varying market conditions. By comparing normal market behavior to the economic crisis, this study aims to assess whether

momentum strategies remain profitable or fail, challenging assumptions about market efficiency and risk-return ratios.

2.2.1. Capital asset pricing model (CAPM)

The Capital Asset Pricing Model (CAPM) is developed by Sharpe (1964), Lintner (1965) and Mossin (1966) and is used to estimate the expected return on a stock. The CAPM assumes that the risk and return of a stock are correlated. This means that higher returns can only be earned by taking higher risk, while lower risk will only produce moderate returns.

The CAPM builds on the principles of modern portfolio theory developed by Markowitz (1952). The central idea of modern portfolio theory is diversification, where the objective is higher returns with lower risk. Proper diversification of investments can protect against unsystematic risk, as the variations in returns of individual securities compensate each other and reduce the overall risk of the portfolio. Portfolio diversification should cover different industries and different geographical areas. However, diversification cannot eliminate systematic risk due to overall market conditions and developments. Common systemic risks include changes in interest rates, economic cycles and the global economic situation (Markowitz. 1952: 77–91).

2.2.1.1. CAPM model assumptions

CAPM is based on a set of assumptions about investors and investment opportunities. Because of these assumptions, the model does not fully reflect real world conditions, but it serves as a useful tool for pricing risky assets. In this hypothetical world, the following assumptions apply:

1. Investors are risk averse and seek to maximize their wealth
2. Investors accept market prices and are unable to influence them. Investors also have common expectations about asset returns, which are expected to follow a normal distribution.
3. There is a perfectly risk-free investment in the market that can be freely borrowed or lent at a risk-free rate.
4. The quantity of all assets is constant and can be freely exchanged in secondary markets.
5. The market is accessible to all, and there are no transaction costs.
6. There are no market distortions, such as taxes and short-selling regulations. (Copeland, 1988: 193-194)

2.2.1.2. CAPM model mathematical formulas

According to the CAPM, the expected return on a stock is influenced by the risk-free interest rate, the stock´s beta coefficient and the required return of the market portfolio. Mathematically, the CAPM can be expressed as follows (Copeland, 1988: 197):

$$E(R_i) = R_f + \left[E(R_m) - R_f\right]\beta_i \quad (1)$$

Explanation of the formula:

$E(R_i)$ = Expected return of stock (i)

Rf = Risk-free interest rate

$E(Rm)$ = Market portfolio's required return

β_i = Beta coefficient of stock (i)

Using this formula (1), the expected return on a stock is influenced by the risk-free rate, the beta coefficient of the stock and the market portfolio return requirement.

The beta coefficient of the stock describes the sensitivity of the stock price changes to changes in the value of the market portfolio. The beta factor of a stock can be expressed by the following formula: (Copeland, 1988: 199):

$$\beta = \mathrm{COV(Ri, Rm)} \,/\, \mathrm{VAR(Rm)} \quad (2)$$

Explanation of the formula:

$\mathrm{COV(Ri, Rm)}$ = Covariance between the returns of stock (i) and the market portfolio

$\mathrm{VAR(Rm)}$ = Variance of the market portfolio returns

The beta coefficient of a stock measures how its value changes relative to the market portfolio. The beta value of a market portfolio is 1. This means that:

- When the beta of an individual stock is *less than 1*, the stock's value fluctuates less than the value of the market portfolio.
- When the beta is *more than 1*, the stock's value fluctuates more than the value of the market portfolio.
- When the beta is *exactly 1*, the stock's return moves on average in line with the market.
- When the beta of a stock is *zero*, its return is not correlated with the market return. Such a stock is considered risk-free in the market portfolio (Fama, E. F. & French, K. R. 2004: 29–30)

2.2.2. Fama-French factor models

Fama-French factor models are used to study stock returns and assess the factors that influence their performance. These models provide a framework for analyzing and comparing stock returns. They offer a broader understanding of stock price formation and market behavior than the CAPM model. Based on empirical research, Fama-French found that the CAPM model had weaknesses in explaining stock returns, so the Fama-French factor was developed to complement the CAPM model (Taib, Benfeddoul, 2023).

2.2.2.1. Fama-French three-factor model

The Fama-French three-factor model (1993) is an asset pricing model that considers two other risk factors in addition to the capital asset pricing model (CAPM). These factors are the size premium (SMB - Small Minus Big) and the value premium (HML - High Minus Low). Due to the inclusion of these three factors, the model is called the Fama-French three-factor model. This model provides a more comprehensive and accurate explanation of stock returns compared to the CAPM. It explains the finding that small companies and value stocks tend to generate higher average returns than large companies and growth stocks (Fama, E. F. & French, K. R. 1993: 3–56).

Fama-French three-factor model can be represented by the following equation:

Figure 1. Fama-French three-factor model

The Fama-French three-factor model can be expressed in a more comprehensive mathematical form:

$$E(R_i) = R_f + \beta_i^{\{Mkt\}\,[E(R_{\{Mkt\}})-R_f]} + \beta_{\{SMB\}E(R_{\{SMB\}})} + \beta_{\{HML\}E(R_{\{HML\}})} + \varepsilon \quad (3)$$

Explanation of the formula:

$E(R_i)$ = Expected rate of return on the asset i

R_f = Risk-free rate

$\beta_i^{\{Mkt\}\,[E(R_{\{Mkt\}})-R_f]}$ = **Market risk factor** (Market premium, CAPM)

$\beta_{\{SMB\}E(R_{\{SMB\}})}$ = **Size factor** (Small Minus Big (SMB), measures the return difference where the return of small companies is subtracted from the return of large companies

$\beta_{\{HML\}E(R_{\{HML\}})}$ = **Value factor** (High Minus Low (HML), measures the return difference where the return of value companies is subtracted from the return of growth companies)

ε = Error term

2.2.2.2. Fama-French five-factor model

In 2015, the Fama-French three-factor model was extended to include two new factors: profitability and investment, which forms the Fama-French five-factor model. The profitability factor, RMW (robust minus weak), measures the excess return of highly profitable firms over less profitable firms. The investment factor, CMA (conservative minus aggressive), measures the excess return of firms with conservative investment strategies over firms with aggressive investment strategies. (Fama, E. F. & French, K. R. 2015: 1-22)

These additional factors aim to provide a more precise explanation of stock return variations and to answer questions that are not fully answered by the Fama-French three-factor model.

Mathematically, the Fama-French five-factor model is expressed as:

$$E(R_i) = R_f + \beta_i^{\{Mkt\}[E(R_{\{Mkt\}})-R_f]} + \beta_{\{SMB\}E(R_{\{SMB\}})} + \beta_{\{HML\}E(R_{\{HML\}})} + \beta_{\{CMA\}E(R_{\{CMA\}})} + \beta_{\{RMW\}E(R_{\{RMW\}})} + \varepsilon \quad (4)$$

Explanation of the formula:

$\beta_i^{\{Mkt\}[E(R_{\{Mkt\}})-R_f]}$ = **Market risk factor** (CAPM)

$\beta_{\{SMB\}E(R_{\{SMB\}})}$ = **Size factor,** SMB (small minus big)

$\beta_{\{HML\}E(R_{\{HML\}})}$ = **Value factor**, HML (high minus low)

$\beta_{\{CMA\}E(R_{\{CMA\}})}$ = **Investment factor,** CMA (conservative minus aggressive)

$\beta_{\{RMW\}E(R_{\{RMW\}})}$ **= Profitability factor,** RMW (robust minus weak)

2.2.3. Carhart four-factor model

The Carhart four-factor model is an extended version of the Fama-French three factor model, including a momentum deviation. Carhart implemented this extension in 1997, recognizing that the Fama-French three-factor model did not account for the one-year movement anomaly identified by Jagadeesh and Titman (1993). (Carhart 1997: 60–61)

Carhart's four-factor model is a measure of stock market performance consisting of four factors: market risk (CAPM), size (SMB), value (HML) and one-year momentum (MOM). Carhart (1995) found that the Fama-French three-factor model provide more accurate performance estimates than CAPM. However, the Carhart four-factor model reduced the average pricing errors of both the CAPM and Fama-French three-factor models and better explain the formation of returns. Carhart (1997) examined the CAPM model with pricing errors of 0.35 % per month and the Fama-French three-factor model with pricing errors of 0.31 % per month. The average pricing error of the four-factor model is 0.14 % per month. (Carhart 1997: 61–62)

The Carhart four-factor model can be expressed mathematically by the following equation:

$$E(R_i) = R_f + \beta_i^{\{Mkt\}[E(R_{\{Mkt\}})-R_f]} + \beta_{\{SMB\}E(R_{\{SMB\}})} + \beta_{\{HML\}E(R_{\{HML\}})} + \beta_{\{MOM\}E(R_{\{MOM\}})} + \varepsilon \quad (5)$$

Explanation of the formula:

$\beta_i^{\{Mkt\}[E(R_{\{Mkt\}})-R_f]}$ = **Market risk factor**, CAPM

$\beta_{\{SMB\}E(R_{\{SMB\}})}$ = **Size factor**, SMB

$\beta_{\{HML\}E(R_{\{HML\}})}$ = **Value factor**, HML

$\beta_{\{MOM\}E(R_{\{MOM\}})}$ = **Momentum factor**, MOM (Momentum anomaly)

2.3. Behavioral finances

Behavioral finance examines how psychological factors influence individual decisions and thus the functioning of financial markets. Traditional financial theories assume that investors act rationally and maximize their wealth. Behavioral finance recognizes that emotions and cognitive biases play a significant role in shaping investors' behavior. These psychological influences can create market anomalies that challenge the efficient market hypothesis (EMH) (De Bondt & Thaler, 1985).

De Bondt and Thaler (1985) investigate whether stock markets overreact to unexpected news, leading to market inefficiencies causing anomalies. Their research aims to understand why individuals make irrational decisions in stock markets and how herd behavior occurs in financial markets. (De Bondt & Thaler, 1985).

The impact of these behavioral factors on momentum strategy is significant. The momentum strategy assumes that price trends will continue but as investors act emotionally, the profitability of the strategy changes. Psychological effects such as herd behavior and overreaction can lead to large price movements that can increase the risk of a momentum crash. (Agarwal, Taffler & Wang, 2025).

Understanding behavioral finance is important for explaining why momentum anomalies form in markets and why they recur over time.

2.3.1. Investor behavior

Behavioral finance theory can be used to explain momentum strategies. Barberis, Shleifer & Vishny (1998) studied investor behavior and found that both under- and overreaction contribute to momentum anomaly.

A key assumption in behavioral finance is that investors do not act in a fully rational way, but make decisions emotionally, which causes market behavior to deviate. Investors’ emotions can directly impact market behavior and market returns. During bull markets, there is a general state of excitement in the market, where investors make quick and ill-considered investment decisions. In contrast, during economic downturns, markets panic, with investors looking to exit investments made imprudently during bull markets. Overreaction is a key theory of behavioral finance when investors tend to react too strongly to unexpected information. Investors overreact to unexpected and new information, leading to excessive stock price fluctuations. Investors' overconfidence leads them to overestimate their own knowledge and underestimate risk. Investors often believe they are making the right

decisions based on heuristics, which often ignore probabilities and lead to systematic errors (Agarwal, Taffler & Wang, 2025).

When emotions are running high, investors react weakly to various news and warnings. During bull markets, investors ignored important collective information about the target and denied reality. The result of this behavior is that investors fail to learn from past economic crises and repeat the same mistakes in the future. This reflects investor underreaction (Agarwal, Taffler & Wang, 2025).

Investors often behave in the same way, a phenomenon known as herd behavior. It is easier for investors to make investment choices if socially others behave in a similar way. As more and more investors make similar investment decisions, this will affect market performance. Market bubbles in the market are often caused by herd behavior of investors (Agarwal, Taffler & Wang, 2025). Investor behavior is also reflected in differences in stock performance. De Bondt and Thaler (1985) showed in their study that investors' overreaction to news causes poorly performing stocks to outperform well performing stocks in the long run (De Bondt & Thaler, 1985: 793-795).

Traditional financial theories do not consider the psychological decision making of investors but assume that investors are rational and make decisions to maximize their utility (De Bondt & Thaler, 1985: 793). The CAPM model, the Fama-French models and the Carhart four-factor model do not consider the psychological effects of investors on asset pricing. The inclusion of behavioral finance in asset pricing provides a more comprehensive analysis of market behavior and pricing anomalies.

2.3.2. Cognitive bias and heuristics

Psychological studies have found that investors make heuristic decisions in uncertain times. Heuristic decisions are related to the limitations of people's cognitive abilities and the state of the economic environment. When making investment decisions, investors often simplify complex decisions because of the large amount of information and limited cognitive ability to get close enough to the best solution. This can lead to various biases in decision-making, such as loss aversion. (Andreas Hüsser & Werner Wirth, 2014).

Barberis, Shleifer and Vishny (1998) present a model based on heuristics well known in psychological research, such as representativeness and conservatism. These reactions result from beliefs and expectations. Conservatism bias causes investors to underreact to new information, which means that investors adjust their beliefs slowly when new information becomes available. This leads to underreaction and misinterpretation of economic results. On the other hand, heuristics can also lead to overreaction, as investors may assume that past performance will continue indefinitely, despite the inherent uncertainty of financial markets.

Investors believe that companies that have performed well over a long period of time will continue to grow earnings, even though sustainable long-term economic growth is unlikely. (Nicholas, B., Andrei, S., & Robert, V. 1998: 308–316)

Investors have limited cognitive abilities due to the sheer volume of information in the market. It is a challenge to get all the information and to internalize it, which leads to biasing investor attention. Investor attention bias is selective, which means that investors' attention is focused on the most visible information. Researchers have found that investors pay attention to the past performance of funds and believe in the continuity of returns, described by the term "hot hand". Investors are found to make more purchases the more attention investors pay to the past returns of the fund. Confirmation bias occurs when investors focus attention on data that confirms their beliefs (Andreas Hüsser & Werner Wirth, 2014).

3. Literature review

This chapter reviews previous studies on momentum strategy, momentum anomaly and their profitability under different market conditions. The literature review provides a theoretical basis for understanding momentum strategy, and its behavior under different market conditions. It aims to analyze the difference between normal and abnormal market.

This chapter is structured to begin with a discussion of the basic concepts of momentum strategy, how it works and the challenges it has faced over its history. It then assesses the impact of COVID-19 on the strategy's profitability compared to normal market conditions.

The studies look at a range of data from different parts of the world and over different time periods. Studies also look at investor behavior in times of crisis and how macroeconomic decisions affected economic recovery.

3.1. Momentum strategy

The momentum strategy is one of the most well-known anomalies exploited by both private and institutional investors. This strategy challenges the efficient market hypothesis and seeks to exploit historical price movements of stocks. However, in times of economic distress, such as crises like COVID-19, the risks associated with the momentum strategy increase, providing a unique opportunity to examine its viability and effectiveness in exceptional market conditions. (Guobužaitė & Teresienė, 2021).

The momentum strategy is an investment strategy that focuses on capitalizing on the continuation of historical price trends in securities. The idea is to buy stocks that have recently outperformed and sell stocks that have recently underperformed. Typically, investment periods of 3-12 months are used. This strategy assumes that price trends will continue in the same direction over the short to medium term, creating opportunities for profit. This investment strategy is also referred to as a relative strength strategy (Ryou, Kyong, Han hee Bae, Hee Soo Lee, 2020).

Jegadeesh and Titman (1993) studied the profitability of using this strategy and found that it produced positive returns over investment periods of 3-12 months. In their study, stocks were selected based on their recent returns and then held for about 1-4 quarters. Stocks were selected from the New York Stock Exchange (NYSE) and the American Stock Exchange (AMEX) for the period 1965-1989. In total, 32 strategies were tested, which constituted decile portfolios. The top decile of the portfolio contained the "losers", while the bottom decile included the "winners". Each month the "losers" were sold, and the "winners" were bought. (Jegadeesh, N., & Titman, S. 1993: 65-91)

A study by Jegadeesh and Titman (1993) found that the results show positive returns under normal market conditions. The study supports the hypothesis by showing that the momentum strategy is effective in normal markets over a longer period. Subsequent studies have shown that the profitability of the momentum strategy declines during market crises, when investors make uncertain decisions in panic situations and confidence in the market declines.

Adedeji Ajadi's research article (2023) examines the profitability of the momentum strategy in the Nigerian stock market between 1996 and 2016. The objective of the study is to examine the profitability of the momentum strategy, and to identify how the momentum phenomenon responds to market conditions. The study examines all stocks listed on the Nigerian Stock Exchange (NGX), and the results find that half of the strategies examined generated significant excess returns. The most significant returns came from "winning portfolios", all of which returned well into positive returns. The study tested the performance of the momentum strategy in Nigeria under different market conditions. The results show that in bull markets, momentum returns on average 0.2938 % per month, a statistically significant return. In the bear market, the average momentum return was -0.0237 %, which was not statistically significant. The study also finds that in developed countries the momentum strategy is effective in almost all markets. The Nigerian stock market was found to have many similarities with developed markets; however, the largest momentum returns generally come from developed countries such as the United States and Europe (Adedeji, 2023: 31–40).

Studies show that the momentum strategy works effectively in normal markets when examined over the long term. Studies find that in bull markets the strategy works effectively in both developed and emerging markets, while in bear markets the average return of momentum is negative. Overall, the strategy works because the positive returns in bull markets are on average higher than the average losses in bear markets. However, the study has found increasing similarities between emerging and developed markets in Nigeria, which could challenge hypothesis H2 if this trend continues.

3.1.1. Profitability of momentum strategy globally

The momentum strategy is followed in stock markets worldwide, but its impact varies from region to region. Fama & French (2012) studied international stock returns in four geographical regions based on the effect of momentum. Their study found that momentum strategy was strong in developed markets in North America, Europe, Asia and the Pacific, except for Japan. In Japan, no momentum strategy was found in any size of firm. The study found that the average monthly return on volume, measured as WML (winners minus losers), was 0.64% in North America, 0.92% in Europe and 0.69% in Asia Pacific, while in Japan the return was close to 0%. These geographical differences can be partly explained by cultural

factors. It has been suggested that higher momentum returns are associated with cultures that value individualism. Individualism refers to a culture where everyone is responsible for themselves and their own decisions. In this culture, the world is seen as individual-centered, and adults have the right to make their own life choices. However, there is no consensus on this argument. Fama & French also found that momentum returns varied with market value. Stocks with a low market capitalization returned more than stocks with a high market capitalization. Globally, the WML momentum return for small-cap stocks was 0.82% per month, while for large-cap stocks it was 0.41% per month. (Fama, E. F. & French, K. R. 2012: 457-472)

Fama-French (2012) founds that markets behave differently in emerging and developed markets. These differences are likely the result of a combination of market volatility, investor behavior and economic conditions factors. In general, market volatility, investor behavior and economic conditions affect the differences in returns between markets. In times of economic downturns and uncertainty, these factors affecting the market change a lot, which can cause financial crises in the market.

The results of the Fama-French (2012) studies also indicate that momentum strategies can be globally profitable in a wide range of markets. The results also illustrate that momentum strategies are more profitable in developed markets compared to emerging markets. This may be because developed markets have more efficient markets and more investors who support systematic price behavior. Emerging markets tend to have higher volatility and higher risks, which can lead to unpredictable price movements. Thus, the profitability of the strategy is affected by structural differences between markets.

Carhart (1997) found that actively managed funds generate significant transaction costs that erode the strategy's profits. This study shows that momentum strategies are not always profitable because future returns cannot be reliably predicted over the long term based on past performance. Sudden economic crises can take markets by surprise and alter projected future returns. This was apparent during the COVID-19 pandemic, which caused rapid market volatility and disrupted expected returns. This illustrates that historical returns do not provide investors with reliable certainty about future price developments, but that a stable market environment is necessary for a strategy to work. (Carhart, M.M. 1997: 57-82)

3.1.2. Profitability of momentum strategy in an emerging market

Zulfiqar Ali Imran, Woei Chyuan Wong and Rusmawati Ismai (2020) test the performance of the momentum strategy in 13 emerging countries, and found significant negative momentum returns in most markets. The study covers the period 1996-2018 and includes Brazil, Indonesia, Malaysia, Pakistan, Poland, South Korea, Taiwan, Thailand and Turkey. The study

applied the momentum strategy of Jegadeesh and Titman (1993), where investment portfolios were followed for six months, after which investments were either sold or held. The study showed that only Poland has significant positive momentum returns over the whole period, while in the other markets returns were either significantly negative or close to zero. The study concludes that investors were unable to achieve abnormal returns using the momentum strategy as it produced negative returns in almost all countries, expect Poland (Imran, Wong and Ismai, 2020).

The performance of the Momentum strategy has also been studied in emerging markets in Latin America, including Argentina, Brazil, Chile and Mexico. Luis Muga & Rafael Santamaría (2007) studied the momentum returns in these emerging markets from 1994 to 2005 and found that they generate profits. The momentum strategy analyzed 3-month, 6-month, 9-month and 12-month momentum periods, finding higher momentum returns for shorter periods. The sample period of the study is relatively short and covers a relatively calm period, so these need to be considered for the final conclusions. Carhart (1997) found that the transaction costs of investing reduce the returns of the momentum strategy, but this study found that the highest returns came from the 3-month strategy. This finding suggests that transaction costs alone may not fully explain the strategy's return performance (Muga & Santamaría, 2007).

Similarly, on the Nairobi Stock Exchange (NSE), the strategy was found to be profitable. Josephat Lisiolo Lishenga, Peterson Obara Magutu, Joseph Lumumba Barasa and Cliff Ouko Onsongo (2011), studied the NSE stock market over the period 1995-2007, and found profitability to be mainly driven by behavioral factors. The researchers found that traditional risk models cannot explain momentum strategy returns but are driven by time series continuity components. This study also found that the strategy is profitable after transaction costs, so higher trading volume does not have a large impact on momentum returns (Lishenga, Magutu, Barasa and Onsongo, 2011).

3.2. Momentum Anomaly

Momentum anomaly is a market phenomenon that momentum strategies seek to exploit. It can be seen as the theoretical basis of a momentum strategy. If there were no momentum anomaly in the market, it would not be possible to obtain excess returns from a momentum strategy (Kelly, Moskowitz, Pruitt, 2021).

Investors incorporate the momentum effect into their investment strategies to achieve excess returns and manage risk more effectively. Sudden market changes, such as COVID-19, expose markets to significant price volatility, which can lead to significant losses for momentum investors. (Padungsaksawasdi, Treepongkaruna, 2023)

3.2.1. Factors affecting momentum anomaly

Behavioral finance is often associated with momentum, in particular investors' over- and under-reaction to market information. Investor behavior can be described as quasi-rational, meaning that investors overestimate their knowledge and make mistakes when interpreting new information. Investors tend to be particularly confident when they have done their own research to gather new information. This leads to an overestimation of their own successes, while failures are often attributed to external factors. (Daniel, K., Hirshleifer, D., & Subrahmanyam, A., 1998, pp. 1839-1885)

Operational funding and investor behavior are often linked to momentum anomalies, but these factors alone do not fully explain the development of momentum anomalies. Jiaqi, Peng and Youwei (2022) investigate which factors explain the phenomenon of momentum anomaly. The study uses decomposition analysis to evaluate and compare the contribution of competing explanations to the phenomenon. Using this analysis, explanations are classified into anchoring effects, fundamental factors, prospect theory and firm-specific characteristics. These factors were examined monthly in terms of stock returns from 1963 to 2016 under different market conditions and during market crises. A key finding was that of all the explanations examined, 31% of the variance in turnover was due to these factors, while 69% remained unexplained. The most significant momentum factor was found to be the firm's fundamentals, which refer to the core factors of the firm, such as earnings surpluses and revenues. (Jiaqi, G., Peng, L., Youwei, L., 2022, pp. 6184–6218)

These studies show that external factors, such as market shocks, influence the formation of a momentum strategy. Only about 30% of the factors influencing the momentum strategy can be identified, but the rest remain unknown. This suggests the existence of complex and unidentified factors that influence momentum deviations. This leaves a significant gap in the market, as such a large and well-known anomaly cannot be fully explained. Hirshleifer and Subrahmanyam's research suggests that investors are particularly confident in their own research and do not make mistakes themselves. Investors blame their mistakes on external factors. Jiaqi, Peng and Youwei found that unknown external factors explain 69% of the deviation, which may help explain why such a large portion of momentum remains unexplained and why investors have limited understanding of momentum phenomenon. Investor behavior varies geographically and is influenced by structural differences between economies and the development of financial markets. As a result, the performance and continuity of the momentum strategy varies across markets, challenging the strategy to exploit.

3.3. Previous studies on the profitability of the momentum strategy during market crises

Market conditions have a significant impact on the company's performance and therefore its share price. In times of economic growth and recession, the impact of the momentum strategy is strongly reflected in earnings. These turbulent periods have attracted the interest of researchers studying the key factors influencing market cycles (Vatsa, Basnet, Mixon, Upadhyaya 2024).

Cooper, Gutierrez and Hameed (2004) studied how momentum slack affects stock markets and how its profitability depends on market conditions. Their study found that momentum strategies yielded positive returns mainly in bull markets. The study analyzed two different market situations:

- "UP" markets, where the lagged three-year market return is positive, and

- "DOWN" markets, where the three-year lagged market return is negative.

A study covering the period 1929 to 1995 found that in the "UP" market periods, momentum returns averaged +0.93% per month, while in the "DOWN" market, momentum produced returns of -0.37% per month. This analysis is consistent with the overreaction hypothesis, which suggests that momentum gains diminish over time as the market stabilizes and mispricing corrects. The study found that market conditions are a significant factor in predicting the profitability of momentum strategies and that a six-month momentum portfolio is profitable only after "UP" market periods. (Cooper, Gutierrez, and Hameed, 2004: 1345–1363)

A study by Cooper, Gutierrez and Hameed (2004) demonstrates how the profitability of a momentum strategy depends on different market conditions. Analyzing market conditions and understanding market behavior is important for the strategy. The market can change a lot in a single month, so it is more logical to make inferences from longer-term market trends than from short-term movements.

3.3.1. Momentum crashes

The Momentum strategy works well in stable and predictable market environments, but during downturns it is exposed to significant losses. Daniel and Moskowitz (2016) study "Momentum Crashes", which refers to situations where momentum strategies generate sudden negative returns. Economic crashes have occurred in the past and are likely to continue to happen in the future. Some of these downturns can be predicted after long

periods of market growth, but others, such as the COVID-19 pandemic, come unexpectedly. The study presents a dynamic momentum strategy designed to be more efficient than a static strategy. The dynamic strategy adjusts the WML (winners minus losers) weighting based on expected returns and variance. Results suggest that dynamic weighting can also reduce risk and potentially help avoid momentum crashes (Daniel & Moskowitz, 2016: 221-247).

In times of economic uncertainty, it is natural to look at how different investment strategies work and which strategies should be avoided. Renata and Deimante (2021) examine the performance of momentum strategies during the COVID-19 financial market pandemic. The study analyses the correlation between short- and long-term momentum series during the pandemic. The study finds that the correlation between these time periods increased significantly compared to the whole sample period. Based on this study, both short- and long-term momentum portfolios performed exceptionally well during the COVID-19 pandemic. It was also found that by taking macroeconomic variables into account and adjusting portfolios to reflect economic market conditions, it was possible to achieve better than normal performance. (Renata & Deimante, 2021: 1–16)

In this thesis, my research question focuses on comparing the profitability of the momentum strategy during the COVID-19 pandemic and in normal market conditions. The results of Renata and Deimante (2021) suggest that the momentum strategy is not always negative during a market crisis. Dynamic strategies and strategies with short- and long-term momentum signals have been successful in generating positive returns during the crisis. Research by Renata & Deimante (2021) and Daniel & Moskowitz (2016) suggests that momentum portfolio construction can avoid momentum losses or even achieve better than normal returns. These results show that there are many differences in the performance of strategies due to their design and the consideration of macroeconomic factors. This underlines the fact that effective strategies require active market following and rapid strategy adaptation to market conditions. The results also show that there are structural and macroeconomic differences between emerging and developed markets that affect the returns and profitability growth of strategies across markets.

3.3.2. VIX-index

Market behavior is analyzed using various market condition indicators, such as the CBOE Market Volatility Index, more commonly known as the VIX index. This indicator helps to measure market uncertainty and identify critical moments in the financial markets, together with the ESI (Economic Sentiment Indicator). The VIX index measures the expected volatility of the S&P 500 index based on option pricing over the next 30 days. It reflects overall market sentiment and reacts to economic changes. A high VIX value indicates increased uncertainty and risk in the market. (Renata & Deimante, 2021: 1–16)

Under normal market conditions, stock prices tend to rise slowly overtime before falling suddenly. This reflects investor nervousness and causes the VIX index to rise. The VIX index and S&P 500 stocks have generally shown a negative correlation. However, during the COVID-19 pandemic, the correlation was found to be positive. This has led researchers to question whether stocks behave differently after such an unusual period (Apergis, Mustafa, Malik, 2023).

Figure 2 below illustrates the S&P 500 and its 10-day correlation with the VIX index. The figure reveals several significant variations in the VIX index. However, these fluctuations have not led to a decline in S&P 500 stocks. This positive correlation is a very rare phenomenon and there is no direct explanation.

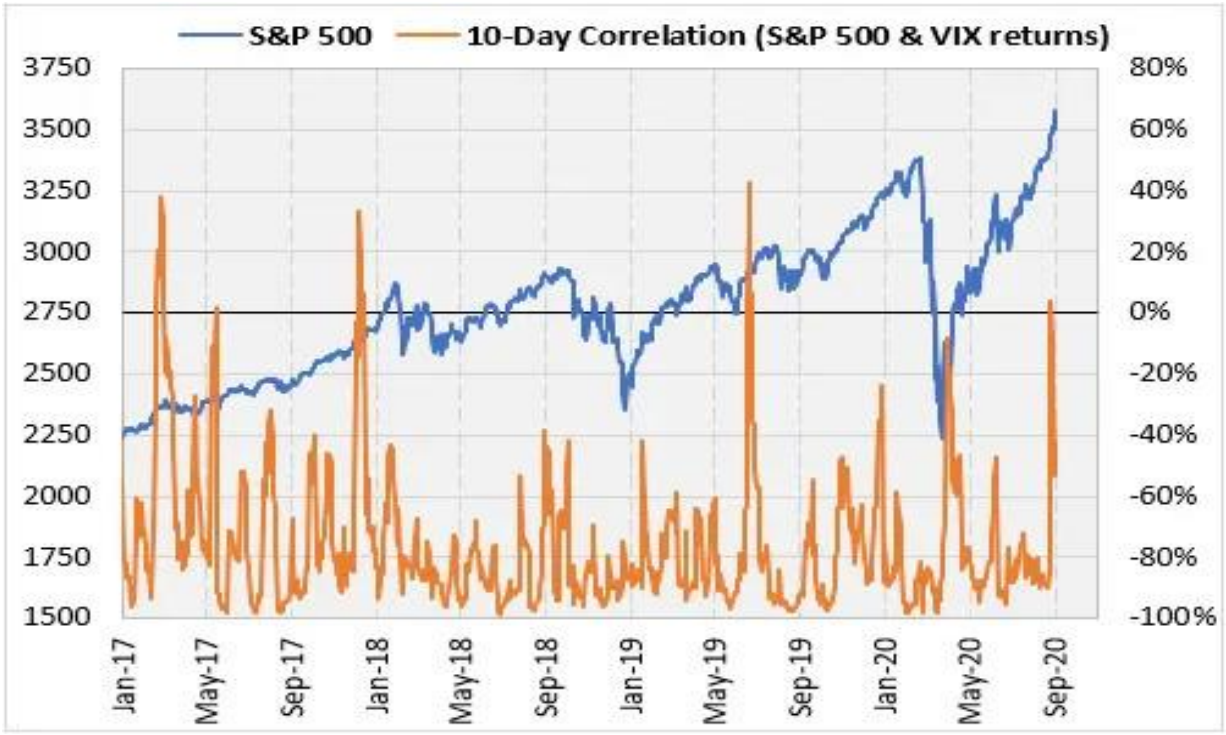

Figure 2. SP VIX Correlation (Rocky White, 2020)

The positive correlation between the VIX index and the S&P500 index reflects the abnormal behavior of investors during the COVID-19 pandemic. Market uncertainty and increased risk led to a rise in the S&P500 index, which is a rare phenomenon. This finding is valuable in examining whether the profitability of the momentum strategy changed during the COVID-19 pandemic. High market uncertainly and increased risk caused the VIX index to fluctuate, but stock values continued to rise, suggesting that momentum strategies may not have worked as expected during the pandemic. While S&P500 stocks fell significantly, the VIX index fluctuated very moderately. These findings challenge the predictability of the momentum strategy and affect its profitability. As the VIX index reflects US market expectations, investor behavior may act differently in emerging markets.

3.4. The impact of COVID-19 on global markets

The COVID-19 pandemic caused one of the most serious economic crises in modern history and caused extreme instability in global financial markets. Governments around the world imposed various restrictions to curb the spread of the virus, leading to significant economic disruption. Investors engaged in panic selling, leading to a sharp fall in stock markets. Various investment strategies, including the momentum strategy, suffered significant losses (Emre, Altinkeski, Cevik, Ismail, Dibooglu, 2022).

3.4.1. Healthcare and quarantines

The COVID-19 pandemic led to a global health crisis, causing many infections and deaths. Chatjuthamard, Jindahra, Sarajoti and Treepongkaruna (2021) study how COVID-19 deaths and infection rates affected the quality of stock markets globally. The study measured market effects through returns, realized volatility and price increases. The results show that an increase in COVID-19 cases and deaths led to higher volatility and jumps in stock prices, while reducing returns. Countries with higher political and economic risks incurred the largest financial losses. The COVID-19 pandemic also exposed the vulnerability of global health systems. The study suggests that improving detection techniques could help to monitor future periods of market volatility more effectively**.** (Chatjuthamard et al., 2021: 4923-4953)

As an unprecedented and unpredictable crisis, the global impact of COVID-19 has been extensively studied afterwards. Kapar, Buigut and Rana (2021) examined the early effects of COVID-19 on global stock markets. The researchers used the event study methodology of Brown and Warner (1985) to analyze abnormal returns. The study assessed the negative effects of the Wuhan closure on European, North American and other markets - even before domestic restrictions were introduced or contagion spread significantly in these regions. The results show that the rise in infections and increased restrictions worldwide led to a widespread market decline. The study analyzed daily stock market data from January 2019 to March 2020, found that on the day of the Wuhan shutdown (23 January 2020), China's SSE index experienced a very significant market reaction with a negative abnormal return of -2.86%. Other global markets also reacted, such as the French FCHI index (-2.8%) and the Australian AFLI index (-1.3%)**.** (Kapar, Buigut & Rana, 2022: 438-463)

Several economic factors influenced the financial impact of COVID-19. Orhun (2021) examined which economic variables affected global stock markets during the pandemic. The study analyzed key pandemic events and their impact on stock index returns and market reactions in 15 countries. Equity markets reacted negatively to news related to the closure of Wuhan, the first quarantine measures and the World Health Organization (WHO) pandemic

declaration**.** Countries with higher infection rates, greater foreign direct investment exposure to China, or a higher percentage of Chinese tourists were more vulnerable to the negative economic impact of the health crisis**.** Conversely, countries with better preparedness for pandemics and higher health spending had fewer economic losses**.** (Orhun, 2021: 142–159)

Studies show that COVID-19 has a significant global impact on healthcare and quarantine decisions in countries. Results showed that COVID-19 infection rates and mortality rates reduced stock returns. The findings suggest that financial losses can be reduced if a country has a developed health infrastructure and more permissive quarantine restrictions. These create differences between developed and emerging markets, as developed markets have better healthcare levels and financial stability than emerging markets. As a result, developed market equities are less sensitive to pandemic uncertainty than emerging markets. This supports the view that difference in the degree of healthcare system and financial stability affects the performance of the momentum strategy.

3.4.2. Economic impact

The COVID-19 pandemic has caused economic disruption around the world. Ullah, Zhao, Sayed, Amin and Riaz (2023) investigated how COVID-19 affected business and economic conditions in China using the quantile-quantile regression (QQR.) The study assessed the impact of COVID-19 by using QQR and examined whether there were differences in business and economic performance across quantile. It also examined how economic and business conditions recovered after the pandemic. The pandemic was found to have had a significant impact on Chinese exports, investment, household income and retail sales. At first, the pandemic had negative effects on both the economy and business, even during periods when COVID-19 case rates were low. Over time, the economy showed signs of recovery, and thanks to effective government action, China was able to stimulate economic growth. The Chinese government introduced various stimulus packages and closure measures that helped boost exports and revive the economy. (Ullah, Zhao, Sayed, Amin, and Riaz, 2023: 61766–61777)

Previous research provides valuable information on the economic impact of the pandemic and the recovery process. Ullah, Zhao, Sayed, Amin and Riaz (2023) found that the Chinese economy was able to recover from the pandemic relatively quickly thanks to strong government support and stimulus measures. These findings suggest that government actions and policy making play a crucial role in restoring economic stability. Economic crises such as the COVID-19 pandemic are very rare, and crises have not been fully prepared for. There are many differences in government responses and measures between markets, which affect market performance. Markets perform differently in response to economic crises, leading to differences in the productivity of the momentum strategy.

Baker, Bloom, Davis and Terry (2020) examine how the COVID-19 pandemic increased economic uncertainty. The study analyzed three real-time and forward-looking measures of economic uncertainty: survey-based business expectations, stock market volatility and newspaper-based indicators of economic uncertainty. These measures will be used to assess the macroeconomic impact of the pandemic. The results show that COVID-19 caused significant economic damage. The researchers focused on the period from 19 February to 31 March 2020 and found that the US stock market fell by 28% - a magnitude comparable to the Great Depression of 1929-1933. Real US GDP fell by 9% in the second quarter of 2020, and annualized GDP contracted up to 11% by the last quarter of 2020. Researchers estimate that up to half of the output decline could be explained by the uncertainty caused by the COVID-19 pandemic. (Baker, Bloom, Davis, and Terry, 2020: 1-16)

A study by Baker, Bloom, Davis and Terry (2020) shows that economic uncertainty can lead to a decline in GDP and stock markets, potentially exacerbating the economic situation. An economic downturn increases uncertainty and further aggravates the economic situation. Uncertainty also affects the performance of momentum strategies, which assumes that market trends will continue in the short term. As uncertainty increases, investor behavior becomes more unpredictable. This interrupts market trends and reduces the profitability of momentum strategies. The COVID-19 pandemic caused large economic losses, which were reflected in a decline in stock markets and GDP. These economic declines are also reflected in the profitability of momentum strategies.

The results of these two studies suggest that the impact of momentum strategies varies across regions. Macroeconomic policies and government support packages can facilitate economic recovery and improve the performance of investment strategies. Government measures can reduce market uncertainty, thereby creating investor confidence and helping the economy to recover.

3.5. Key findings from prior research

Momentum strategy and momentum anomaly are the fundamental concepts of this thesis, which aims to provide a theoretical understanding of how the COVID-19 crisis affected investment strategies and how anomalies work. The momentum strategy is based on the momentum anomaly. The idea behind these concepts is that stocks that have done well in the past will continue to do well, while stocks that have done poorly will continue to underperform. In other words, “winners” keep winning and “losers” keep losing (Jegadeesh & Titman, 1993). This whole strategy challenges the traditional efficient market hypothesis (EMH). The momentum anomaly allows us to challenge traditional asset pricing models by showing that past price trends are efficient and can continue.

Market shocks, such as the COVID-19 pandemic, created an extreme market environment to test whether the momentum strategy remained viable or failed. Overall, the pandemic increased market volatility, lowered stock returns globally and caused panic among investors (Chatjuthamard, 2021). Market shocks trigger a variety of investor reactions. Investors may over- or underreact (Barberis, Shleifer & Vishny, 1998), or increased emotional buying and selling may lead to increased volatility, which may result in a "momentum crash". (Daniel & Moskowitz, 2016).

3.5.1. Profitability of the Momentum strategy

The profitability of the momentum strategy varies depending on market conditions, geographical location and the country's economic development. Under normal market conditions, momentum strategies can be evaluated, but during crises, investor reactions become unpredictable, reducing the profitability of the strategy. Sudden investor reactions can cause momentum crashes, leading to significant losses. In general, momentum strategies often perform poorly in "DOWN" markets but generate positive returns in "UP" markets (Cooper, Gutierrez & Hameed, 2004).

Momentum strategies have been found to perform particularly well in developed markets such as the US, Europe and Asia. In emerging markets, however, the strategy has shown weaker performance. This difference is explained by cultural and structural factors (Fama & French, 2012).

The strategy has been studied in emerging markets, where regional differences in returns and variations between study periods have been observed. A study by Imran, Wong and Ismai (2020) examined the returns of 13 emerging market strategies from 1996 to 2018, with only Poland achieving significant positive returns (Imran, Wong and Ismai, 2020). On the other hand, a study by Muga and Santamaria (2007) found that in Latin American markets, the strategy generated positive returns over the period 1994-2005 (Muga & Santamaria, 2007). Similarly, in the Kenyan stock market over the period 1995-2007, the strategy is found to be effective (Lishenga, Magutu, Barasa and Onsongo, 2011). Studies also find that the momentum strategy is profitable in emerging markets after transaction costs, so they do not reduce momentum profits (Lishenga et al., 2011, Muga et al., 2007).

Recent studies have examined the behavior of global stock markets during the COVID-19 pandemic. Jiaqi, Peng & Youwei, (2022) studies show that the momentum strategy performs poorly in markets with high volatility. Researchers use the VIX index to monitor market volatility and to estimate what is expected to happen in the market. During the COVID-19 pandemic, researchers found a positive correlation between the VIX index and US S&P 500

stocks. This raises further questions about whether traditional risk indicators work effectively during global crises.

These findings have implications for the viability of momentum strategies, as markets can behave abnormally, making it difficult to predict market trends (Renata & Deimante, 2021). Economic crises create significant uncertainty in markets. Baker, Bloom, Davis and Terry (2020) study the impact of economic uncertainty on market performance and GDP in the US. Their study finds that increasing uncertainty reduces the profitability of the momentum strategy.

These findings confirm the idea that the profitability of a momentum strategy is highly sensitive to external shocks and market uncertainty. The COVID-19 pandemic triggered unexpected reactions from both markets and investors, challenging the application of momentum strategies. Some markets showed resilience and recovered quickly, while others faced long-term economic challenges.

In summary, momentum strategies have historically been considered effective, but their profitability declines during market crises. Their effectiveness also varies from market to market depending on geography and economic development. Research shows that emerging markets have performed less well than developed markets.

4. Conclusion

The purpose of this chapter is to evaluate the validity of the research questions and hypotheses based on the findings of the literature review. The purpose is to summarize the findings of previous studies and finally to provide suggestions for future research topics.

4.1. Summary of findings

The purpose of this thesis is to assess how economic crises affect momentum strategy in different market environments. This study focuses on the period of the COVID-19 pandemic and its impact on strategy development. The study is approached with two key research questions to observe how and from which perspective the topic is examined. These research questions are Q1: how did the profitability of the momentum strategy change during the COVID-19 pandemic compared to normal market conditions, and Q2: how did the profitability of the strategy differ between developed and emerging markets.

Based on the studies in the literature review, it is found that the momentum strategy has historically produced efficient long-term returns during normal market conditions, but profitability declines during market crises (Jegadeesh, N., & Titman, S. 1993; Adedeji, 2023; Cooper et al., 2004; Daniel & Moskowitz, 2016). Although the EMH assumes that investors behave rationally, during market crises, investors' behavior becomes emotional and impulsive, leading to increased uncertainty and panic in the market. Investor behavior is often associated with momentum anomalies, but this does not fully explain the formation of momentum. Up to 69% of the factors that contribute to momentum cannot be explained (Daniel et al., 1998; Jiaqi et al., 2022). Research suggests that the profitability of the momentum strategy declined during the COVID-19 pandemic but has left many questions about the factors undermining the strategy.

Geographically, the momentum strategy has been found to work effectively in both emerging and developed markets. However, the impact of the strategy varies widely from region to region. The largest momentum returns come from developed markets such as the US and Europe, while in Japan momentum returns are small. Differences in returns in these countries have been explained by cultural and market value factors (Adedeji, 2023; Fama, E. F. & French, K. R. 2012). Markets are better prepared to withstand economic crises if they have a strong economic structure, a stable healthcare system and lower political risk. During the COVID-19 pandemic, market performance was also affected by the number of infections and the resulting quarantine measures (Chatjuthamard et al., 2021; Orhun, 2021). Research suggests that the strategy works more effectively in developed markets, but there are also many similarities between emerging and developed markets.

In summary, previous studies support the view that COVID-19 reduced the profitability of the momentum strategy (H1), and that regional differences were found between markets (H2). These findings are used to assess how previous studies support or challenge the hypotheses.

4.1.1. Practical Implications from behavioral finance for investors

Behavioural finance found that investors act irrationally, making investment decisions based on emotions, cognitive biases and herd behaviour (Agarwal, Taffler & Wang, 2025). Understanding investor behavior is important when analyzing the effectiveness of a momentum strategy. This is because psychological factors have a large impact on market performance, especially during market crises.

Investors overreact to market shocks and unexpected news that cause dramatic price movements in the market, such as during the COVID-19 pandemic (Agarwal, Taffler & Wang, 2025). Investors should remain calm during market shocks and not make panicked investment decisions. In a phase of sudden market change, investors react emotionally, which worsens sudden market changes and can lead to a market bubble. Over-optimism and over-estimation of one's own information leads to a distorted perception of the state of the market. Research shows that momentum strategies are effective in stable markets, but their profitability declines during market crises. Investors should take a long-term perspective when making investment decisions on momentum strategies, as short-term losses often turn into long-term gains. It is also useful to adapt own strategy to market conditions, such as reducing risky investments and investing in safe havens (Daniel & Moskowitz, 2016). In uncertain times, investors follow the actions of others, leading to herd behavior. This behavior reinforces the market trend, leading to greater volatility changes and potential momentum collapses (De Bondt & Thaler, 1985). Investors should make their own decisions and analyses and not just follow the opinions of others. It is also important to learn from their own mistakes and apply the lessons of past crises to their investment strategy. Portfolio diversification can also help to reduce risk and volatility, so that the value of an investment portfolio is less affected by sudden momentum collapses. Market trends cause various cognitive biases in the market, such as attention bias and confirmation bias. These biases distort investors' perception of market trends and can cause investors to make incorrect choices (Andreas Hüsser & Werner Wirth, 2014). This highlights the importance for investors to seek information from multiple sources and consider different options.

Understanding the psychological behavior of investors can help them to act more wisely and achieve higher returns. The articles I have studied do not provide direct investment advice, but they do offer some good insight into the momentum strategy that investors should consider.

4.1.2. Practical Implications for Momentum Strategy Investors

Momentum strategy investors should choose their markets and investment time horizon carefully, as significant differences exist between markets and time horizons. Developed markets such as the US, Europe and the Pacific have seen significant returns of momentum, while in emerging markets the strategy has not been as profitable (Jegadeesh et al., 1993; Fama et al., 2012; Imran et al., 2020). Research suggests that excessive trading should be avoided and focus on shorter investment periods, as shorter investment periods have been associated with higher momentum returns (Muga et al., 2007). Excessive trading increases transaction costs, eroding momentum returns (Carhart, 1997). In addition to market selection, several studies suggest that the highest returns are found in winning stocks. Shorting loser stocks can be costly and selling may be limited (Muga et al., 2007). Thus, investors may consider a strategy that focuses on buying winner stocks, especially in emerging markets. The momentum effect has been found to offer higher returns for small companies compared to large companies (Fama et al., 2012). This means that investors may benefit from higher momentum returns by investing in small companies. However, small companies have higher risks and therefore higher volatility.

For the Momentum strategy to be effective, it is preferable to monitor the overall market situation. In bull markets, the strategy works well and in bear markets, the strategy can incur large losses, such as during the COVID-19 pandemic (Adedeji, 2023). Investors should be cautious with momentum strategies and be prepared for potential momentum crashes, as in the longer-term market conditions often stabilize and returns can recover.

4.2. Does literature confirm or reject the hypothesis?

The purpose of this chapter is to assess how previous literature supports the hypotheses and what conclusions can be drawn. Hypotheses aim to assess whether the momentum strategy performed significantly lower during the COVID-19 pandemic compared to normal market conditions, and how the effectiveness of the strategy differed between developed and emerging markets.

H1: The momentum strategy produced significantly lower returns during the COVID-19 pandemic compared to normal market conditions.

Previous studies strongly support this hypothesis. Several studies show that in stable market conditions the strategy works effectively, and in economically challenging situations such as during COVID-19 the strategy has proven to be less effective (Adedeji, 2023). In the early phase of the pandemic, risk volatility increased, and equity returns declined. Rapid market changes reflect the difficulty for investors to adapt to changing circumstances, with investors making decisions in panic (Baker et al., 2020; Chatjuthamard et al., 2021). In markets, panics and increasing uncertainties create "momentum crash" situations, where previous price trends collapse and undermine the profitability of a strategy (Daniel & Moskowitz, 2016). However, there are also studies that challenge hypothesis H1. According to Renata and Deimante (2021), better than normal returns could be achieved by taking macroeconomic variables into account and by adjusting investment portfolios according to economic market conditions. This illustrates that a momentum strategy can adjust the portfolio as market conditions change and generate returns during an economic crisis. Not all factors affecting momentum have been recognized, making it difficult to assess the effectiveness of the strategy and challenging the research question. Up to 69% of the factors affecting momentum remain unidentified (Jiaqi et al., 2022).

Based on these findings, the studies support hypothesis H1.

H2: The COVID-19 pandemic weakened the performance of the momentum strategy more in emerging markets than in developed markets

Previous studies and literature partly support hypothesis 2. According to a study by Adedeji (2023), between 1996 and 2016, excess returns from the momentum strategy were observed in both developed and emerging markets. However, the largest strategy returns were generated in developed countries such as the US and Europe. Adedeji (2023) found that the Nigerian stock market has many similarities with other developed countries, such as significant returns in bull markets and small losses in downturns (Fama, E. F. & French, K. R. 2012; Adedeji, 2023). Regionally, there are many differences between emerging countries, such as economic conditions, investor behavior and government policies. Thus, under certain circumstances, emerging markets have similar opportunities for momentum returns as developed markets.

Previous studies investigated the factors that influenced the divergence between markets during the COVID-19 pandemic. It was found that the greatest economic disadvantages come from markets with weaker economic conditions, higher political risks and poor healthcare. Thus, markets that can prepare for pandemics economically and keep infection rates moderate suffer smaller economic losses (Orhun, 2021; Chatjuthamard et al., 2021). This

supports the view that emerging markets are more vulnerable, affecting the effectiveness of the momentum strategy.

Based on these findings, literature partially supports the hypothesis. There are regional differences between emerging and developed markets in terms of strategy performance, so no direct conclusion can be drawn. In summary, the studies confirm that the profitability of the momentum strategy declined during the COVID-19 pandemic, which supports hypothesis H1. On the other hand, hypothesis H2 is partially valid as the studies provide mixed results on the performance of the market and the momentum strategy. Similarities between regions are observed, suggesting that further research is needed to understand all factors.

4.3. Future research suggestions

This thesis is a literature review analyzing the impact of market crises on the profitability of the momentum strategy. The thesis also considers the COVID-19 pandemic and its impact on different markets. The thesis does not include empirical research of its own, so the next possible research idea could be to collect momentum strategy data from different market conditions. This would help to outline the performance of the market in a more effective way, as well as facilitate comparisons between market crises and market areas. In the future, comparisons could be made between previous economic crises, such as the 2008 financial crisis and the 1990s recession, and the COVID-19 pandemic. The pandemic is not a traditional economic crisis but was caused by an external factor. Therefore, research could help to understand whether COVID-19 operates in the same way as traditional economic crises and what factors the crises have in common. The thesis suggests that the strategy works better in developed markets, compared to emerging markets. However, only a very small part of the factors influencing the momentum strategy are known, so future research could look more closely at the underlying causes and identify more factors influencing the strategy. In summary, the momentum strategy remains a viable investment strategy, but its performance varies according to market regions and market conditions. By adapting strategies to changing market conditions, investors can potentially generate momentum returns in both emerging and developed markets.

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