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The Impact of Salience on Investor Behavior and Returns

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ABSTRACT:

This study examines through previous literature the influence of saliency on investor behavior and stock returns, focusing on different salient factors such as visual saliency, news, attention-grabbing events, advertising and salient features. Behavioral finance and its theories appear to explain short-term stock price movements and investor behavior more effectively than traditional finance. Traditional finance suggests that investors act rationally and that prices fully reflect all available information at all times, the evidence suggests otherwise.

Salient factors significantly impact investors' behavior and distract rational decision-making as investors tend to overemphasize salient attributes and information, which leads to behavior biases such as herding, anchoring, heuristics and representativeness. Individual investors are found to be more affected by behavioral biases and the influence of saliency than institutional investors. The saliency effect predicts negative returns for the future. The effect is significant in the short-term, but in the long-term, the effect reverses or diminishes. Stocks with salient attributes seem to be overvalued and yield lower future returns, while stocks with low salient attributes seem to be undervalued and yield higher future returns. Evidence from online platforms and advertising suggests that salient features and their timing are intentionally designed to influence decision-making.

KEYWORDS: Saliency, Salient factors, Behavioral biases, Stock returns, Retail investors, Attention

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TIIVISTELMÄ:

Tämä tutkimus tarkastelee aiempaan kirjallisuuteen perustuen, kuinka huomioarvo vaikuttaa sijoittajakäyttäytymiseen ja osaketuottoihin keskittyen erilaisiin huomioarvoisiin tekijöihin, kuten visuaaliseen huomioarvoon, uutisiin, huomiota herättäviin tapahtumiin, mainontaan ja muihin huomionarvoisiin piirteisiin. Käyttäytymistieteellinen rahoitus ja sen teoriat näyttävät selittävän lyhyen aikavälin osakekurssien vaihtelua ja sijoittajakäyttäytymistä tehokkaammin kuin perinteinen rahoitusteoria. Perinteinen rahoitusteoria olettaa sijoittajien toimivan rationaalisesti ja markkinahintojen heijastavan aina kaikkea saatavilla olevaa tietoa, tutkimusnäyttö kuitenkin osoittaa toisin.

Huomioarvoiset tekijät vaikuttavat merkittävästi sijoittajien käyttäytymiseen ja häiritsevät rationaalista päätöksentekoa, sillä sijoittajat painottavat liikaa huomionarvoisia ominaisuuksia ja tietoa. Tämä johtaa käyttäytymisvinoumiin, kuten laumakäyttäytymiseen, ankkuroitumiseen, peukalosääntöjen käyttöön ja edustavuusvinoumaan. Tutkimukset osoittavat, että yksityissijoittajat ovat alttiimpia käyttäytymisvinoumille ja huomioarvon vaikutuksille kuin institutionaaliset sijoittajat. Huomioarvon vaikutus ennustaa negatiivisia tuottoja tulevaisuudessa. Vaikutus on merkittävä lyhyellä aikavälillä, mutta pitkällä aikavälillä se kääntyy päinvastaiseksi tai heikkenee. Osakkeet, joilla on korkea huomioarvo, vaikuttavat yliarvostetuilta ja tarjoavat alempia tuottoja tulevaisuudessa, kun taas matalan huomioarvon osakkeet vaikuttavat aliarvostetuilta ja tuottavat korkeampia tuottoja. Verkossa toimivilta sijoitusaloilta ja mainonnasta saadut todisteet viittaavat siihen, että huomioarvoisia ominaisuuksia ja niiden ajoitusta suunnitellaan tarkoituksellisesti vaikuttamaan päätöksentekoon.

AVAINSANAT: Huomionarvo, Huomionarvoiset tekijät, Käyttäytymisvinoumat, Osaketuotot, Yksityissijoittajat, Huomio

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1 Introduction

We live in a world full of choices with different possible outcomes. People make decisions based on their preferences, but the decision is often influenced by other factors as well than just individual preferences. Some choices are rational and some are irrational. However, from all these different options we must choose the ones we consider more than the others. “When there are many alternatives, options that attract attention are more likely to be considered, hence more likely to be chosen, while options that do not attract attention are often ignored” (Barber & Odean, 2008).

Most of the time the reason for our attention is different. News, patterns, and colors can attract our attention. Perhaps something has been recently mentioned in the news, on social media, or by people you spend time with. Maybe you come across something that makes you feel like you have seen it before and now it is catching your attention again. The reason for the attention-grabbing event or factor can be anything, but whatever it is, makes people react to it, act based on it, or let it influence their behavior. The factor is salient because it grabs our attention and somehow stands out from the other alternatives.

Traditional finance assumes that investors act rationally and make rational decisions. Investors should have equal access to information and equal ability to make investments. Behavioral finance, on the other hand, challenges traditional finance as it considers how cognitive biases, like salience, influence investment decisions. Investors should make investment decisions based on fundamental information and company valuations, but other factors also seem to influence investment decisions. Salient factors and attention should not affect asset prices or investor behavior because markets are assumed to process only meaningful and new information efficiently. Investors globally face an overload of information in today’s markets, yet they have limited sources to access and interpret the information (Chen et al., 2022). With limited resources, both cognitive and physical, investors have to decide which information has their attention. In these cases, salient factors may play a major role in attracting attention.

1.1 Purpose of The Study

The main purpose of the thesis is to investigate how different salient factors affect investors' buying behavior and decision-making, and how salience impacts future returns. The thesis will mainly focus on the behavioral aspect of the impact of salience on retail investors, but will also cover institutional investors and future returns. The thesis will primarily focus on the stock market.

The thesis introduces various salient factors that influence investor behavior. Salience refers to the "phenomenon when one's attention is differentially directed to one portion of the environment rather than to others and the information contained in that portion will receive disproportionate weighting in decision-making" (Bordalo et al., 2012). Due to overconfidence, investors might think their information is high quality and they may overvalue things and information that stand out catching their attention (Barber & Odean, 2008). Such observations may also be related to other behavioral tendencies, such as anchoring, framing, herding, or heuristics which can lead to suboptimal decision-making. However, behavioral biases don't necessarily cause investors to make suboptimal decisions or to have negative results. They may also have positive results or no results at all when involved in the decision-making process. Prior research finds that investors' attention and processing power are limited when choosing between risky assets (Cosemans & Frehen, 2021). Bordalo et al. (2012) argue that because of the limits on how we process information, cognitive limitations, people tend to focus on the most unusual or standout features of their options. These salient features are given too much weight continuously, while less salient ones are ignored (Cosemans & Frehen, 2021). The first hypothesis is therefore:

H1: Investors overweigh salient factors and overemphasize the information on which their minds focus, distorting their ability to make objective and rational investment decisions.

If these salient factors affect investor behavior, the paper aims to study whether the effects are positive, negative, or neutral. The financial markets are usually divided into two different types of investors, sophisticated (institutional) and unsophisticated (retail). Institutional investors are organizations that invest large amounts of money on behalf of clients, while retail investors are individuals who invest with their personal accounts and usually smaller amounts of money. Institutional investors are seen as more educated and professional while retail investors are traditionally seen as more prone to behavioral biases and irrational behavior. With more time and resources, professionals can process a wider range of stocks and they are less likely to consider only attention-grabbing stocks (Barber & Odean, 2008). Cosemans and Frehen (2021) find that salience predicts future returns better in stocks that are more owned by retail investors. Their evidence also shows that the salience effect is stronger when investor sentiment is high, as less experienced investors are active in the market. The second hypothesis is:

H2: The salience effect has a stronger influence on retail investors than on institutional investors.

It would be false to argue that institutional investors are immune to the influence of salience as there is evidence that they are prone to behavioral biases as well. Based on traditional financial theory and the assumption of rational investors, behavioral biases should not affect decision-making or asset pricing. The thesis will study whether salience impacts asset prices. The famous economist, John Maynard Keynes, has said that “the market can stay irrational longer than you can stay solvent”, referring to how collective irrational behavior can lead to significant market movements. Stocks with increased attention can become more popular among investors and create buying or selling pressure on the stock. When a stock is under increased attention, it can be difficult to predict the next moves of the stock. For example, in 2024, artificial intelligence (AI) became one of the most salient trends in the market. News about AI and companies associated with the technology attracts investor attention and the companies have expectations of excellent performance. Barber and Odean (2008) argue that rational investors will recognize the

limitations of buying predominantly stocks that catch their attention and will realize that the market has probably already priced in the information from the attention-grabbing event. Saliency theory (Bordalo et al., 2012) predicts that stocks with negative saliency “become underpriced and earn higher future returns because investors focus on their downside risk” (Cosemans & Frehen, 2021). On the other hand, stocks with positive saliency may become overpriced and have lower future returns. Considering that investors can cause large market movements and that investors are also prone to behavioral biases, the third and final hypothesis is:

H3: Overweighing salient factors may reduce future returns and contribute to the overvaluation or undervaluation of stocks.

The impact of salient factors on asset prices is not always straightforward, as it heavily depends on the prevailing market conditions and time period. Evidence from different markets will be examined and analyzed to answer the expected results. All three hypotheses are based on previous literature and studies. While at least one hypothesis is expected to hold true, they may also face contradictions or conflicts.

1.2 Structure of The Study

Following the introduction, purpose of the study, and hypotheses, the second chapter presents the key theoretical perspectives. The chapter includes the Efficient Market Hypothesis, Prospect Theory, and Saliency Theory, along with an overview of behavioral biases related to saliency. The third and fourth chapters review existing literature on different salient factors and their impact on investor behavior. Chapter five provides empirical evidence on the influence of saliency on stock returns and pricing. Finally, the sixth chapter presents the conclusions, summarizing the key findings of the thesis. The complete list of references is included after the final chapter.

2 Theoretical Background

2.1 Efficient Market Hypothesis

Traditional finance assumes that markets operate efficiently. Most academic theories and valuation models are built on the premise of efficient markets. The main goal of the efficient market hypothesis (EMH) is that the market prices “fully reflect” all available information at any given moment. Other characteristics may include rational market participants (investors), no transaction costs, liquidity, and opportunities for risk-free profit do not exist or they are quickly exploited and eliminated. A market with all these characteristics can be called ideal. The efficient market hypothesis is closely linked to the concept of a “random walk”, which in financial literature refers to a pattern in which future price changes occur randomly and are not influenced by past prices (Malkiel, 2003). The logic of the random walk idea is that, assuming information is immediately reflected in prices, future price movements will depend only on new data and information and not on historical prices or movements (Malkiel, 2003).

Eugene Fama is often referred to as the father of EMH from his groundbreaking studies (Fama, 1965, 1970). The 1970s study categorizes efficient markets in three different forms based on how well they reflect information. The three levels of market efficiency are the weak, semi-strong and strong forms which will be discussed later. In his 1970s study, Fama argues that it’s almost impossible to sell overvalued stocks or to buy undervalued stocks as stocks always trade at their fair value. He finds no “significant evidence against the hypothesis in the weak and semi-strong form tests and only limited evidence against the hypothesis in the strong form tests”. The lack of significant evidence against the hypothesis in these tests implies that the model is robust and applicable in most scenarios, making it a reliable framework. However, Fama (1970) says that the model is a null hypothesis and like other null hypotheses, it is not perfect or expected to be literally true. Since it’s nearly impossible to buy undervalued stocks or to sell overvalued stocks, the key finding of Fama is that investors, especially retail investors, should invest in the market index. Investors can buy stocks that outperform the market but in the long

run it's almost impossible to beat the market as the prices already reflect available information and are "correct". Fama (1970) found evidence that small "filters" can generate profits that exceed the returns of a buy-and-hold strategy. However, the transaction costs required for these strategies, such as fees, effectively eliminate all their potential profits.

2.1.1 The Three Versions of the Efficient Market Hypothesis

Efficient markets can be categorized into three different forms depending on how well they reflect information. The three levels of market efficiency are the weak, semi-strong and strong forms. According to the weak form, all prices reflect past information such as historical stock prices and volumes. Therefore, technical analysis, which uses historical data to predict future prices and has become relatively popular among traders, is considered ineffective under this form. Technical indicators or chart patterns cannot consistently predict future stock prices as current stock prices include all historical information. The semi-strong form states that all publicly available information such as financial statements, earnings reports, news or balance sheets are reflected in the stock prices. This implies that fundamental analysis cannot consistently generate returns above the market average. For example, when a company's earnings report is released, the stock price quickly incorporates the new information, leaving no opportunity to profit from the announcement afterward. The strong form of efficiency suggests that all information, including private or insider information, is reflected in stock prices. If markets are highly efficient, even insider trading cannot generate consistent excess returns.

2.1.2 Criticism Against the Efficient Market Hypothesis

The EMH has come under severe criticism since its publication. Most of the criticisms relate to market frictions, extreme events, valuation anomalies, information asymmetry and behavioral biases. According to Shiller (2003), the 1980s was a period of important academic debate about the consistency of the efficient market model. In particular, the issue was whether stocks show excess volatility relative to what would be predicted by

the efficient markets model (Shiller, 2003). He argues that bond and stock prices are more volatile than can be explained based on real economic events (Shiller, 1979, 1981). It is also argued that the stock market is undervalued due to the inflation illusion (Modigliani & Cohn, 1979). Grossman and Stiglitz (1980) argue that because the information has its costs, prices can't perfectly reflect available information, because if they did, those who gather valuable information at a cost would not gain any advantage from doing so. There appears to be a fundamental conflict between the efficiency of market spreading information and the incentives to acquire information (Grossman & Stiglitz, 1980). The approach to fraud remains a question in the efficient market hypothesis. According to the theory, all available information should always be reflected in asset prices, and all market participants are assumed to have equal access to this information. However, it is interesting to consider how the theory deals with falsified information and fraudulent activities. Fraud cannot be considered as inside information because it's false. Markets that price information based on fraudulent activity cannot be considered truly efficient, because the information is not accessible to everyone and, more importantly, is fundamentally inaccurate. Famous examples of fraud in the financial markets are cases like Theranos, Enron, the Arthur Andersen accounting scandal, and Bernie Madoff's Ponzi scheme.

Arrow (1982) suggests that psychological models of irrational decision-making, such as the Prospect Theory (Kahneman & Tversky, 1979) can help explain behavior in speculative markets. Summers (1986) argues that these claims are often rejected because they rely on the assumption of market inefficiencies, which would suggest the existence of opportunities for excess profits. Behavioral finance complements the shortcomings of the efficient market theory as it seems market inefficiencies can be explained through theories from behavioral finance and human psychology.

2.2 Behavioral Finance and Prospect Theory

“The premise of behavioral finance is that conventional financial theory ignores how real people make decisions” (Bodie et al., 2023, p.382). Bodie et al. (2023, p.382) argue that conventional theory treats investors as rational while behavioral finance assumes that they are not. They also state that the irrationalities individual investors make can be divided into two categories:

1. Investors do not always process information correctly and therefore infer incorrect probability distributions about future rates of return.
2. Even when given a probability distribution of returns, they often make inconsistent or systematically suboptimal decisions.

Prospect theory by Kahneman and Tversky (1979) can be considered a fundamental theory in behavioral finance. Prospect theory describes how individuals make decisions under risk and uncertainty. Kahneman and Tversky (1979) find that psychological biases and cognitive distortions influence decisions. Prospect theory challenges the traditional theory of expected utility, introduced by Bernoulli in 1738, which assumes that individuals make rational choices by maximizing their expected utility. The conventional view sees that utility depends on the level of wealth while behavioral views see utility depending on changes in current wealth. According to the expected utility theory, individuals should prefer a certain gain over a gamble with the same expected value, since probabilities should be treated objectively since 50 % probability is exactly 50 %. People are assumed to evaluate outcomes in terms of their total wealth rather than in terms of gains and losses. However, Kahneman and Tversky find that people are loss averse and overweight small probabilities and underweight large probabilities.

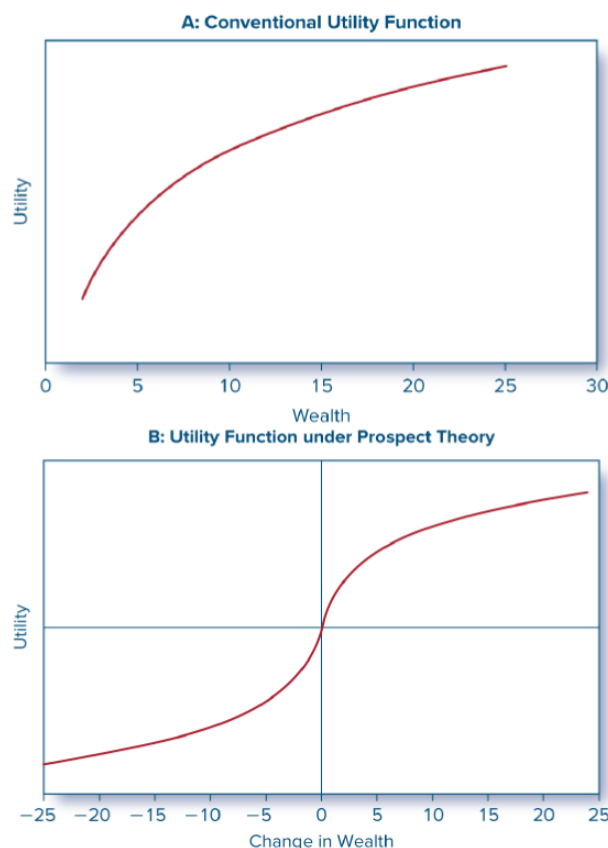


Figure 1: Panel A represents the behavior of a risk-averse investor, while Panel B depicts preferences driven by loss aversion. (Bodie et al., 2023, p. 388)

In panel A when wealth increases, an individual experiences greater satisfaction, or utility, but at a decreasing rate (Bodie et al., 2023, p. 387-388). This leads to risk-aversion, as gaining 1000\$ adds less satisfaction than losing 1000\$ takes away. As a result, the investors avoid or reject risky investments. In panel B, utility depends on the change in wealth from the current level (Bodie et al., 2023, p. 387-388). Panel B's convex curvature to the left shows investors being more risk-seeking than risk-averse regarding losses. Loss-averse investors react more strongly to a loss than to an equivalent gain. For example, losing 1000\$ hurts more than winning 1000\$ brings joy. This irrational behavior leads to the disposition effect that can be described as investors selling winners too early and riding losers too long (Shefrin & Statman, 1985). Investors seem to avoid losses and hope that the investment will pay off in the future. This can lead to increased losses in the future. Overweighting low probabilities refers to people overestimating the

likelihood of rare events such as extreme returns and profits from investment. At the same time high probability events, such as steady cash flows or steady growth of the investment, are underestimated.

2.2.1 Behavioral Biases Related to Salience

Heuristics are mental shortcuts or rules of thumb that individuals use to simplify decision-making under uncertainty. While heuristics can be efficient, they often lead to systematic biases and errors in judgment. Heuristics can cause investors to focus on easily available information rather than conducting analysis, resulting in overreactions to market news, price trends, or company announcements. These cognitive shortcuts may contribute to mispricing and create inefficiencies in the market. Herding bias on the other hand refers to a bias of investors following the actions of a larger group rather than doing their own research and making decisions based on their own opinion. This behavior leads investors to buy or sell assets simply because others are doing the same.

Representativeness bias occurs when investors judge the likelihood of an event based on how similar it is to past experiences or stereotypes rather than on actual probabilities. For example, if a company's stock has performed well in the past, an investor might assume it will continue to do so, even if current fundamentals suggest otherwise. Similarly, if a stock price has dropped significantly, an investor may assume it is a bad investment. Barberis, Mukherjee and Wang (2016) suggest that for many investors, their mental representation of a stock is the distribution of the stock's past returns. They argue that many investors may think past return distribution is a good estimate for future return distribution and that's why they choose the past as their mental representation of the stock.

Overconfidence bias refers to an investor's tendency to overestimate their knowledge, abilities, or the accuracy of their information when making financial decisions. This cognitive bias leads individuals to believe they are better at predicting outcomes than they actually are, often resulting in excessive risk-taking, frequent trading, and suboptimal investment decisions. Kahneman and Tversky (1979) find that investors are

systematically overconfident in their ability to predict either future stock prices or future corporate earnings. Odean (1998) suggests that many investors trade more than necessary because they are overconfident in the quality of their information. This overconfidence may lead them to overemphasize events that capture their attention, ultimately leading to suboptimal trading decisions. Information may already be priced into the share price, and it may not be relevant to future performance.

Recency bias refers to the cognitive tendency where individuals give excessive weight to recent events. Investors focus too much on the latest news, stock price movements, or economic indicators, which may result in poor decision-making and overreaction to short-term fluctuations. Recency bias is closely tied to salience effects as investors pay more attention to recent, vivid events which may lead to being too optimistic about the future of the stock and lead to overpricing and later corrections.

Both anchoring and framing biases influence salience by making certain information stand out and shape investors' perceptions unconsciously. Anchoring ties investors to previous reference points, such as 52-week highs (J. Li & Yu, 2012), while framing changes the way investors interpret risks and rewards, which can result in suboptimal or irrational investment decisions. Framing is done by setting the available information in a desired form. Framing can be made purposely to influence decision making as studies show (Barber et al., 2022; Barber & Odean, 2008; Bazley et al., 2021; Bordalo et al., 2021; Lou, 2014).

2.3 The Salience Theory

Bordalo, Gennaioli and Shleifer (2012) present a theory of choice under risk among lotteries where decision-makers attention is drawn to salient payoffs. In the theory, true probabilities are replaced by decision weights distorted in favor of salient payoffs (Bordalo et al., 2012). Salience is a phenomenon where attention is drawn more to a portion of information in the environment and this portion receives disproportionate weighting in their decisions (Bordalo et al., 2012). The idea in their theory is that decision-makers

overemphasize the information their minds focus on and don't take into account fully all the information available to them. Rational decision-makers should weigh all probabilities as they are and take into account all the relevant information. Bordalo et al. (2012) call these decision-makers local thinkers as they neglect potentially important data, overweight states that draw their attention and neglect states that don't.

In their model, both the size of the payoff and their ranking influence salience and probability weighting. Unlikely events are overweighted if they are associated with salient payoffs but are underweighted otherwise. As a result, a lottery's potential gain might still be underweighted if the associated payoff is not high enough to stand out. This feature explains shifts in risk attitudes. Decision-makers behave in a risk-seeking way when they overweigh the upside of the risky but salient choice and on the other hand, behave risk-averse when overweighing the salient downside. The authors find the second difference in their model more significant, arguing that decision weights depend on the context of how the available alternatives are presented to the decision-maker. This suggests that the original publisher of the information may have the ability to influence the recipient's perception. It raises the question of whether this happens and whether the intention is to potentially improve the publisher's position or, alternatively, weaken the opposing party's position or be neutral.

The Salience Theory (Bordalo et al., 2012) can be compared to the Prospect Theory (Kahneman & Tversky, 1979), as both assume decision-makers focus on payoffs rather than absolute wealth levels when analyzing risky alternatives. The key difference is that the Prospect Theory assumes that the probability weights people use differ from objective probabilities, whereas the Salience Theory argues that the weights depend on the actual payoff and their salience. Additionally, while Prospect Theory struggles to explain preference reversals, Salience Theory explains them. The Salience Theory's approach offers a clear and comprehensive explanation for the instability of risk preferences, including sudden shifts between risk-seeking and risk-averse behavior triggered by seemingly minor changes in decision scenarios. As we later discuss the different salient factors

investors face, it's important to keep in mind the rapid changes in risk preferences and behavior they might have and how they impact.

According to Cosemans and Frehen (2021), salience theory predicts that stocks with negative salience become undervalued and therefore earn higher future returns. Higher future returns can be explained by investors focusing on the downside risks of stocks. On the other hand, the salience theory predicts positive salience stocks to be overpriced and earn lower future returns. Lower future returns can be explained because both positive and negative attention-grabbing events lead to net buying (Barber & Odean, 2008). Salience theory suggests that investors tend to overestimate the future returns of stocks with salient upsides (Bordalo et al., 2013). This leads to an overvaluation of these stocks, which in turn results in negative abnormal returns over time. Conversely, when a stock's downside risk is highly salient, investors underestimate its expected returns, causing it to be undervalued.

3 Salient factors

To understand salience better, we must go through different salient factors and attributes that draw our attention. Bordalo et al. (2021) argue that there is a deep connection “between economic choice and the psychology of attention”. The authors point out three key factors that shape salience:

1. Contrast with surroundings
2. Surprise
3. Prominence

Contrast with surroundings refers to shapes and colors in the information we see. When a stimulus has high contrast with its surroundings, it quickly attracts attention (Bordalo et al., 2021). The authors also argue that visually noticeable features can significantly influence economic decision-making which is logical when considering the limited cognitive abilities humans have and the tendency to direct our limited attention to elements that naturally capture our focus. According to Liesefeld et al. (2017), humans are very sensitive to changes in sensory inputs like rapid changes in visual scenes. That is why surprise is covered as the second factor shaping salience. Surprises are not only visual but informational as well. For example, news, financial reports and stock price movements can also be seen as surprises due to their unpredictable nature which often trigger strong reactions among investors. Salience shocks can also be categorized as surprise and they will be covered more later. Prominence suggests that stimuli that are more noticeable to our senses or in our memory, stand out as more salient. Bordalo et al. (2021) argue that “centrally located stimuli in the visual field are more easily detected and stimuli or locations that have recently attracted our attention” continue to do so in the future. This aligns with recency bias from behavioral finance but conflicts with the efficient market hypothesis on the part where they attract attention even if they are no longer task relevant (Bordalo et al., 2021).

3.1 Visual salience

Bose et al. (2022) studied the visual salience of prices of stock price charts using the same machine-learning algorithm as Li and Camerer (2022) used when studying predictable effects of visual salience. The algorithm predicts both bottom-up and top-down salience. Top-down processes are derived from special experiences and goals that will guide attention while bottom-up processes are guided by stimulus. Bottom-up, stimulus-driven visual salience occurs naturally and without conscious effort, as it is not influenced by a person's intentional focus or objectives (X. Li & Camerer, 2022). Instead, it depends on the visual characteristics of the stimulus.

Bose et al. (2022) tests whether the visual salience model can predict the investment choices of experimental participants by using price charts drawn from actual stock returns, which are shown to investors. The investors decide how much to invest in the asset based on the charts shown, and earn money based on their investment allocations, and actual future returns of the asset. The data consists of a wide range of different price path shapes with concave and convex shapes but also clear positive and negative trends. Bose et al. (2022) state that the bottom-up salience of prices or price patterns increases when they are more visually distinct. Visually distinct price patterns can be rapid movements up or down, prices near all-time highs or lows, near the 52-week highs or lows, psychologically relevant prices like round numbers or prices near moving averages, or other technical indicators familiar from technical analysis. They find that visual salience significantly predicts invested amounts but more interesting is that the effect is entirely driven by losses. In other words, only variations in visual salience linked to losses have a significant impact on the amounts invested. This finding supports the idea that losses play a key role in directing attention and investors seeming to be loss averse.

Li and Camerer (2022) test bottom-up and top-down salience with a fruit test where the participant's goal was to create a portfolio of fruits with the highest induced value. The fruits had been given different monetary values which the participants had learned beforehand. To choose the highest value portfolio, the participants needed to use their

goal-directed perception rather than stimulus-driven. The visual characteristics of fruits, such as color and shape, were used to represent the potential influence of stimulus-driven salience. Li and Camerer (2022) found that under time pressure, stimulus-driven salience sometimes shifted choices toward high-salience options, even if those were low-value choices. This seems like irrational behavior as the goal was simple, to collect the highest valued portfolio. The same phenomenon can be applied to the stock market. The participants in the fruit test were distracted by visually striking fruits despite their lower value, investors may be influenced by visually prominent stock price movements, such as sharp spikes or drops in charts. Extreme performance may appear more salient which may lead investors to overweight their importance and influence them to make suboptimal decisions.

Li and Camerer (2022) find that salience is a good predictor of locations people choose. The salient location attracts attention and might lead to mistakes and irrational decision-making. In financial markets, news headlines, bolded stock tickers, or visually presented figures in earnings reports may attract investor attention. On the other hand, the way trading platforms and stock dashboards highlight certain stocks, like trending stocks, biggest gainers, and losers, can act similarly to the color and shape of fruits in the experiment. Investors may be drawn to visually striking information and act based on that rather than taking into account other details as well.

Both, Li and Camerer (2022) and Bose et al. (2022), agree that the predictability of investment choices improves when a model combines bottom-up and top-down decision weights. It is important to measure both since they have their own nature and use cases. Bottom-up salience seems to explain decisions more in the short term, when visual attributes are the only or primary factors considered in decision-making and also is a time pressure condition. Meanwhile, top-down salience seems to fit more in the longer-term decision-making and when other information is considered as well.

3.1.1 The Effect of Red Color

Financial industry and different platforms display stock charts in different colors, the most known way is to show losses in red and profits in green. Especially using the color red is interesting as it's often connected to dangers or when talking about red flags, it means looking for warning signs. Bazley, Cronqvist and Mormann (2021) study the influence of red on risk preferences and beliefs about future stock returns and trading decisions on individuals. According to standard financial theory, there should not be a difference in what colors the information is presented. However, they find wide evidence that the color red indeed influences individuals.

The authors did an experiment where participants had to choose from multiple options from higher and lower levels of risk. The potential losses were shown either in red or in black color to test whether color affects investor's risk preferences. The authors find that individuals avoid higher risk options more often when the potential loss is shown in red color. According to Bazley, Cronqvist and Mormann (2021), the red higher-risk options were chosen 29,21 % of the time, while black higher-risk options were chosen 36,45 % of the time. 7,2 percentage point difference can be seen as sizable and economically significant. Seeing potential losses in red elevates the investors in more risk-averse behavior according to their study, while according to traditional finance, the colors should not be relevant in decision-making. The study is also made vice versa where profits are shown in red and losses in black and also where both, profits and losses, are shown in red. However, the effect of the red color on risk preferences seems to occur only when the losses are shown in red and not when profits are shown in red (Bazley et al., 2021).

Other part of the study tests whether seeing the past negative performance in red and all other performance in black versus all performance in black have different outcomes when predicting the belief in future stock returns. The only difference in the price paths is the color they are shown to the participants. Bazley, Cronqvist and Mormann (2021) find that individuals see the price paths in red expect lower future returns than the ones

who see the paths in black. The result can be seen as significant as in the most likely scenario the red condition individuals expect a -1,87 % return per month and the black condition individuals expect a 1,49 % return in the same period with the same price path shown. The results between different colors are opposite and can be explained by the color but also by momentum beliefs and reversal beliefs (Bazley et al., 2021). Momentum beliefs come from the red condition where investors expect a continuing price decline in the stock and believe that the past returns reflect downside momentum. While individuals who see black color believe seeing a reversal in the stock price. The individuals seeing red price paths expect significantly lower returns than black price path viewers in all three scenarios, most likely, worst case and the best case. The effect is significant particularly in the worst case scenario estimates as the expected returns are excessively low compared to realized returns. Red color seems to steer investors toward less rational expectations (Bazley et al., 2021).

As discussed before, a factor is salient because it grabs our attention and somehow stands out from the other alternatives. It is logical to think that the color red in the cases before was the salient factor and that's why the results were the given ones. The color red indeed was salient compared to the color black but Bazley, Cronqvist and Mormann (2021) studied other salient colors like yellow and blue in the same context as well, finding that they do not have the same negative effects on behavior. The color red might also have some cultural and learned characteristics and therefore it is interesting to study those as well. The authors study individuals who might have lower financial sophistication by having a group of lower education and salary level compared to a group of educated and earning higher salary. However, they find that there is no significant difference or higher effect among individuals with lower financial sophistication. Culture can be seen as more of a top-down salience as it's learned and not influenced so much by stimulus. Bazley, Cronqvist and Mormann state that if their results were driven by bottom-up salience, the results would be the same across the cultures. However, they found no negative effects of red on financial behavior in China where the color red is associated with prosperity and fortune.

3.1.2 The Impact of Salient Features and Trading Platform Design

In today's stock market, participation has become more accessible to a wider audience compared to history. With online trading platforms and automated trading, most investors no longer need to call a brokerage to execute trades. Digital applications and digital brokerage services have lowered barriers to entry, allowing individuals to engage in the market with ease and minimal restrictions. This increased accessibility has contributed to a rise in retail investor participation. Online trading platforms have a crucial role in shaping the modern investment environment. Barber et al. (2022) study the relationship between fintech brokerages and individual investors trading and stock prices.

Barber et al. (2022) focus on the Robinhood platform, which is mostly used by individual investors who are new and inexperienced on the market. They find that the Robinhood app likely guides investors' attention as the platform has a reduced number of stimuli which makes it easy for the investors to focus their attention and it is likely to generate coordinated attention-driven reactions. By making the app gamified, showing only 5 charting indicators while other platforms show more indicators and the way they show the top movers list containing only 20 stocks that have the largest percentage change from the previous day close, the platform might steer the user in a direction that encourages them to trade more. The gamified app may influence the investor to trade more and make less rational investment decisions as the stock purchasing feels like a fun game. Also, showing fewer indicators than others restricts access to data and information and therefore might lead to irrational decision-making. Robinhood users trade both top losers and top gainers similarly, while other retail traders tend to buy top gainers more aggressively (Barber et al., 2022). Their findings align with Barber and Odean (2008), where individual investors are found to be net buyers of stocks that have abnormal one-day returns on both negative and positive days. The top movers list can be considered salient and attention-grabbing and therefore affect trading.

Barber et al. (2022) find that if a stock is on the Top Movers list, the probability of the stock being heavily bought increases by 5 % which can be considered a significant probability. The Top Movers list seems to predict the retail investor's buying behavior and tends to expose herding events. To make it to the Top Movers list, a company has to be above \$300 million in market capitalization. Barber et al. (2022) don't find similar buying behavior in stocks with the same absolute returns in the \$250 million to \$300 million range, companies that can't make it to the list, as they found with companies in the range of \$300 million to \$350 million. This finding does not necessarily indicate that investors perceive abnormal returns as the primary salient factor. If that were the case, it would be rational to expect similar buying behavior for stocks with comparable absolute returns, regardless of market capitalization. However, the results suggest that it is the Top Movers list that attracts attention and affects their behavior due to its visually salient factors. This suggests that a stock's placement on a highly visible and attention-grabbing list has a greater impact on retail investors' decision-making than the stock's actual return performance.

3.1.3 Salient shock and disposition effect

Frydman and Wang (2020) study the investors behavior after a salient shock. In their study, the salient shock refers to the increased salience of the stock purchase price and the capital gain of the stock on an online trading platform. They use data from Chinese brokerage and a natural experiment to see how the changes in information display influence trading behavior. Specifically, they examine data from a brokerage that enhanced the visibility of a stock's capital gains by making them more prominent on investors' online trading interfaces. They find that the salience shock causes a disposition effect on investors. Disposition effect is the bias of selling stocks with capital gains rather than selling stocks with capital losses. The effect is significant economically and statistically as the disposition effect increases by 17 % after the salient shock (Frydman & Wang, 2020). This aligns with the study from Shefrin and Statman (1985). In other words, when the capital gain becomes more salient, some investors exhibit a strong increase in the disposition effect (Frydman & Wang, 2020). The findings of Frydman and Wang suggest that

the way information is displayed significantly impacts investors' decision-making and actions. Their study highlights how online platforms and their visual interfaces influence investment choices, with the rise of online trading likely amplifying these effects.

4 Salient information

4.1 Advertising

Bordalo et al. (2021) argue that salience can be strategically manipulated by firms using advertising. Advertised information is attracting attention bottom up and therefore might distract investors. Grullon, Kanatas, and Weston (2004) find that firms who spend more on advertising have more institutional and individual investors but the advertising influences more individuals than institutions. According to Lou (2014), the advertising is planned to increase awareness of the firm's products, not its securities, but there seems to be a spillover effect. The higher number of owners can be explained through familiarity bias which states that investors tend to invest and pay attention to the stocks and companies they are more familiar with or companies that are more salient to them. Advertising increases familiarity of the company and helps attract attention. Grullon, Kanatas, and Weston (2004) also state that investors who are more attracted by advertising are seen as more uninformed which aligns with the common assumption of institutional investors being more educated and professional, while retail investors are seen as more prone to behavioral biases and less sophisticated. The study aligns with Barber and Odean (2008) that investors are more likely to own stocks that are more salient to them through extensive advertising.

Lou (2014) provides evidence that "managers adjust firm advertising to attract investor attention and influence short-term stock returns". Since advertising is intended to capture attention, an increase in advertising can lead to a temporary increase in a firm's value by "generating more buy orders than sell orders" (Lou, 2014). This suggests that advertising can lead to overly optimistic reactions and influence stock prices, especially in the short term. Lou finds that salient advertising is done opportunistically by managers before insider sales and less after insider sales. Managers seem to take advantage of the advertising and rising stock values by selling their shares. Lou (2014) states that advertising spending before insider sales is less motivated by business planning and more by the goal of attracting investors. The author's findings provide evidence that the

advertising spending is a wasteful investment in the long run perspectives as the spending does not generate higher future sales.

The behavior of managers questions market efficiency, as their decision to increase advertising spending before selling their shares suggests an attempt to influence stock prices. This strategy is questionable because advertising does not contribute to the company's long-term value, yet it can create short-term price increases. The primary objective of companies should be to maximize long-term value, but in this case, managers appear to exploit market inefficiencies, insider knowledge, and the tendency of irrational investors to overemphasize information presented in advertisements. This behavior could be perceived as manipulative or even unethical. Therefore, the environment of efficient markets is challenged as the three forms of efficiency do not take a stand on manipulation. Can markets be textbook efficient if there is manipulation? The strong form of efficiency suggests that all information, including private or insider information, is reflected in stock prices. However, managers seem to take advantage of their insider knowledge of upcoming share sales by increasing advertising, which investors may misinterpret as a signal of future growth as they overemphasize the salient information given.

Célérier and Vallée (2017) show evidence that in advertising retail structured products, the banks use analogies and powerful metaphors in the marketing material to attract investors' attention to sell more products that are more profitable for the banks. Their focus is to attract attention to the headline rate and that way to increasing investor demand. Salient advertising can therefore be other than just visual attributes or paid advertising but to rely also more on word choice. This kind of salient advertising takes investors' attention away from fees and from the complexity of the product. Célérier and Vallée (2017) find that savings banks that target lower-income households, offer more complex products than commercial banks and the products are found not to bring additional utility to rational investors. The findings are again in line with the common

assumption of retail investors being less sophisticated. The banks seem to be taking advantage of their poor financial sophistication and their proneness to advertising slogans.

4.2 Recent Salient Information

Barber and Odean (2008) argue that investors have a huge search problem of which stock to buy and they think that investors are solving the problem by considering only the stocks that have recently caught their attention. As discussed before, attention can be grabbed in multiple ways, but we haven't yet discussed attention from the news. According to Barber and Odean (2008), investors are likely to notice when stocks have extreme one-day returns, whether they are negative or positive. Usually, the extreme returns are associated with news of the firm (Barber & Odean, 2008). The news is grabbing the attention of some, but also the extreme return itself grabs the attention of others (Barber & Odean, 2008). The authors state that firms that are in the news are more likely to catch investors' attention than those that are not in the news.

Barber and Odean also find that investors are more likely to be net buyers of the stocks that are in the news than companies that are not in the news. This can be because of familiarity bias where investors buy companies they are more familiar with, or because of recency bias where the recently occurred target is bought. The buy-sell imbalance for the large discount brokerage is 2,70 % for stocks out of the news and 9,35 % for the stocks that are in the news (Barber & Odean, 2008). On the other hand, at the large retail brokerage the buy-sell imbalance is -1,84 % for the stocks out of the news and 16,17 % for those that are in the news, which is significantly higher than at the discount brokerage. Positive buy-sell imbalance indicates buying pressure and negative indicates selling pressure. Results from the retail brokerage suggest that retail investors are heavily influenced by news while institutional investors, who are customers of discount brokerages, are less influenced by the news coverage.

There seems to be a difference between the buying behavior of institutional investors and individual investors. Individual investors are net buyers on high-attention days

regardless of the negative or positive returns and regardless of the firm size. While institutional investors do not seem to participate in attention-driven buying. Regardless of the return's direction, individual investors tend to show greater imbalances on news days compared to non-news days. Additionally, for both news and non-news days, imbalances are higher on days with negative returns than on days with positive returns (Barber & Odean, 2008). The authors present that the possible explanation for this pattern is the disposition effect among investors. However, Barber and Odean (2008) find that news is the least informative indicator of attention grabbing from their sample of three indicators. Trading volume and returns seem to have more informative power than news, which is logical as it is extremely hard to define that certain behavior is based on news and nothing else.

Sicherman et al. (2016) study investors' behavior using panel data on daily online account logins. They state that financial market reporting by the news media attracts investors' attention and find that trading increases after media coverage. The attention is higher after positive returns. Additionally, they find that bad news and bad market environment cause ostrich effect among investors and the effect is more significant in men, older investors and wealthier investors (Sicherman et al., 2016). The ostrich effect refers to the behavior of avoiding information that may make the investor feel unpleasant. However, the more influenced group is also found to be paying more attention to their portfolios overall. Sicherman et al. (2016) find that investors who are more prone to the ostrich effect also trade less during market downturns even though trading increases after media coverage. This behavior aligns with irrational behavior as some of the investors seem to neglect the bad news and won't make changes to their portfolio.

Sicherman et al. (2016) states that investors experience positive emotions when their portfolio increases and negative emotions when it declines. Their level of attention influences how strongly they feel these emotions. To manage their psychological response to financial news, investors tend to control when they check their accounts. Sicherman et al. (2016) find that investors are more likely to log in when past returns indicate a

higher chance of seeing good news rather than bad news. This selective attention pattern is known as the ostrich effect. In other words, some investors seem to avoid seeing how their portfolios are performing and don't want to face the truth. Although the behavior does not make the bad news and bad performance go away, and eventually the investors need to face the development of the portfolio. Avoiding making changes in the portfolio of course is irrational, but it is not surprising as holding on to the portfolio losers is a common trait for investors, especially individual investors.

5 Evidence of the Saliency Effect on Stock Returns and Pricing

Bordalo et al. (2013) presents a saliency-based asset pricing model where they predict that the “demand for risky assets is influenced by the saliency of their payoffs” (Cosemans & Frehen, 2021). Companies with salient payoffs are the ones that attract attention and stand out compared to other companies, and investors seem to go after the salient upsides. The model seems to be effective and provides evidence of the saliency effect when studied across different markets (Cakici & Zaremba, 2022; Cosemans & Frehen, 2021; Lee et al., 2024; Sun et al., 2023). Evidence from advertising, online trading platforms, news, attention and lottery types of stocks impact on stock returns will also be covered (Barber et al., 2022; Barber & Odean, 2008; Chen et al., 2022; Gargano & Rossi, 2018; Kumar, 2009; Lou, 2014).

5.1 Evidence from the US Stock Market

Cosemans and Frehen (2021) study if the saliency-based asset pricing model has predictive power over stocks in the United States. They use a sample of firms listed in NYSE, Amex and Nasdaq from the years 1926-2015, also excluding companies with a closing price under \$5 per share at the end of the previous month to mitigate market microstructure effect (Cosemans & Frehen, 2021). They find empirical evidence that investors “overweight salient past returns when forming expectations of future returns”. As a result, investors are drawn to stocks with salient upsides, which tend to be overvalued and generate low returns in the future. On the other hand, stocks with salient downsides are undervalued and tend to deliver higher returns over time. Univariate portfolio analyses show that the stocks with the highest returns in the past month tend to generate lower returns in the following month compared to stocks with the lowest returns. The zero-cost strategy in their study, which buys high saliency effect stocks and shorts low saliency effect stocks generates an average return of -1,28 % per month for the equal-weighted portfolio and -0,60 % per month for the value-weighted portfolio. The results are statistically significant and economically large over the sample period 1931–2015 (Cosemans

& Frehen, 2021). To conclude, “stocks with salient upsides earn lower returns over the next month than stocks with salient downsides” (Cosemans & Frehen, 2021).

Cosemans and Frehen (2021) argue that the excess demand for salient upside stocks leads to overvaluation of the stocks and on the other hand, the lacking demand from nonsalient stocks leads them to be undervalued. It seems that the possible over- or undervaluation is based on investor demand and behavior rather than fundamental changes in the companies. They also state that the salience effect is stronger among companies with higher retail ownership, which aligns with the assumption that retail investors are more prone to behavioral biases and less sophisticated. Through bivariate analysis and firm-level Fama-McBeth regressions, they confirm the negative relation between salience and future stock returns. Herding can be a possible reason why their study also finds that the salience effect is larger during high investor sentiment where more unsophisticated investors enter the market.

5.2 Evidence from Australia and China

China and Australia are interesting countries to study the effect of salience as the Chinese market has “unique features in investor composition, information environment, and institutional arrangement” compared to the United States (Sun et al., 2023), while Australia has the highest individual stock ownership in the world (Lee et al., 2024). Especially Australia is interesting as the salience effect is predicted to impact more on individual investors. Both Lee et al. (2024) and Sun et al. (2023) use Cosemans and Frehens (2021) study as an example and model for their study but in a different market.

Both studies have similar characteristics and results as Cosemans and Frehen (2021) find from the US stock market. In the Chinese market Sun et al. (2023) find that stocks with larger salient downsides generate higher returns in the subsequent month and retail investors are more prone to be salient return thinkers as they prefer pursuing high salient return stocks and avoid low ones (Sun et al., 2023). Sun et al. (2023) find that the average excess return differences between the highest and lowest quantiles of the salient effect

returns vary between -0,471 % and -1,092 % per month in their sample period. In Australia, the results for equally weighted returns align with the results from the U.S., as “stocks with salient downsides earn significantly higher returns than stocks with salient upsides” (Lee et al., 2024). Stocks with salient upsides underperform stocks with salient downsides by a margin of 0,35 % in Australia.

The results from both countries have similar aspects as the theory and hypotheses assumed and former studies had already shown. However, there seems to be some differences in the results from the Chinese market compared to what the theories expect and former studies show. Both institutional and retail investors are shown to be salient thinkers when considering stock returns in the Chinese market (Sun et al., 2023). The authors find that sophisticated investors avoid trading the stocks with high salient returns or values, but on the other hand, they are more likely to sell stocks with low salient returns or values, which contributes to the underpricing of these stocks. The behavior of the sophisticated investors seems to deepen the undervaluation of stocks with low salient returns in the Chinese market. Cosemans and Frehen (2021) find that salience effect in the United States tends to be higher when the investor sentiment is high, but in the Chinese market the high investor sentiment is not a critical factor promoting salient thinking (Sun et al., 2023).

Kumar (2009) presents the concept of lottery types of stocks. Lottery types of stocks can be described as stocks with low negative expected returns, or salient upsides, and stocks with salient characteristics. Kumar (2009) analyzes the portfolio performance of lottery investors who invest a larger share of their investments in lottery-type stocks. Kumar (2009) finds that these investors tend to experience greater underperformance on average. Investing in these stocks results in an annual risk-adjusted underperformance of 1,10 %. For investors who dedicate at least one-third of their portfolio to lottery-type stocks, the underperformance exceeds 2,50 %. Sun et al. (2023) argue that investors who prefer lottery-type stocks dominate the Chinese market, so they study whether this type of preference influences the market in China. Regardless of the similar characteristics,

the author finds that the negative salience effects are not sensitive to lottery demand, nor are they sensitive to attention-grabbing news or events. “The bottom-up analysis provides evidence supporting the assumption that investors tend to purchase stocks with salient high returns”, as well as dislike stocks with salient low returns (Sun et al., 2023).

5.3 International Evidence

Cakici and Zaremba (2022) study the salience effect in an international context, where their data sample is from years 1990-2020 and consists of 49 countries from which they recognize 23 markets as developed and 26 as emerging markets. The study is interesting as it has data around the world and from markets that differ from each other. The authors are motivated by the past made study of Cosemans and Frehen (2021) where they take their approach. The key finding of their study aligns with Cosemans and Frehen (2021), Sun et al. (2023) and Lee et al. (2024), as from a larger sample of data and countries they find a negative relation between salience effect and future returns. On average, a portfolio consisting of an equal-weighted quintile of stocks with the highest salience effect values underperforms those with the lowest values by 0,34 % per month (Cakici & Zaremba, 2022). A long-short strategy that buys stocks with the highest salient effect scores and short-sells those with the lowest scores results in a six-factor alpha of -0,66 %. Both results can be considered significant and investing in high salience stocks would lead to significantly lower returns than investing in low salience stocks.

Cakici and Zaremba (2022) find that firm size matters how the salience effect influences. The authors find that the salience effect influences the pricing of only the smallest firms on the sample, microcaps, which are only 3 % of the total market capitalization. However, for the remaining 97 % of the market, the salience effect has little to no impact on stock prices. It seems that the salience effect is an anomaly of only a small percentage of companies in an international context. Simply, most stocks in the market do not show any unusual returns caused by the salience effect. Cakici and Zaremba (2022) also find that the salience effect seems to influence mostly in a relatively short period as the effect is

strongest when measured over one month. However, if the time frame is extended to three, six, or twelve months, the effect becomes weaker or disappears completely. Additionally, a large part of the salience premium comes from daily return reversals. If the most recent day is excluded from the analysis, the abnormal returns decrease significantly. This aligns with the findings of Barber and Odean (2008) where investors tend to notice stocks with extreme one-day returns, whether positive or negative, and become “net buyers on high-volume days following both extremely negative and extremely positive one-day returns”.

The salience effect is stronger when there are extreme market conditions such as market crashes (Cakici & Zaremba, 2022). Mispricing tends to occur after major market downturns and periods of instability. During stable or so-called “normal” market conditions, the salience effect is significantly weaker. The salience effect has a different influence depending on the market maturity level and risk levels. Cakici and Zaremba (2022) find that “countries with the highest average idiosyncratic volatility have a stronger salience effect” than other so-called safer countries. The authors prove that the idiosyncratic risk is the driver of international variation within salience-driven mispricing of stocks. Idiosyncratic risk or unsystematic risk is an investment risk that is firm or market specific and can be mitigated by a diversified portfolio. On the other hand, systematic risk is a risk that affects the market as a whole, risks like macroeconomic risks that can’t be mitigated by diversifying. Cakici and Zaremba (2022) find that abnormal returns become stronger when there are greater limits to arbitrage, which aligns with Cosemans and Frehen (2021), where they also find that the salience effect is stronger among stocks that have greater limits to arbitrage. After all, according to Cakici and Zaremba (2022), the biggest driver of the salience anomaly is past market performance and volatility.

5.4 Evidence from Online Platforms, Advertising, News and Attention

5.4.1 Robinhood Trading Platform

Barber et al. (2022) find that intense buying by Robinhood users forecasts negative returns. Their study finds that 35 % of Robinhood users' net purchases are focused on just 10 stocks, whereas for the broader retail investor population, this concentration is lower at 24 %. This concentration comes from the visually salient Top Movers list which distracts investors from searching for other potential investment targets rather than focusing on the ones they are shown by the platform. The average 20-day abnormal returns are -4,7 % for the top stocks purchased each day (Barber et al., 2022).

The size of the negative abnormal returns grows significantly when focusing on fewer but more extreme episodes of herding behavior. The authors describe a herding episode as a day when there is a sharp surge in the number of Robinhood users holding a specific stock. To examine the relationship between herding intensity and price reversal, they focus on stocks with at least 100 Robinhood users and define different herding episodes by adjusting the required daily percentage increase in users holding the stock, ranging from 10 % to 750 %. When the user base grows by 10 %, the authors identified over 20,000 herding episodes, whereas a 750 % increase results in only 45 episodes. The negative abnormal returns in the month following these events become more significant as herding intensity rises. When the number of users holding a stock grows by 10 % (>20,000 events), the average negative return is a statistically significant -1,8 %. However, as the herding behavior increases to the growth of 750 % (45 events) users, the negative abnormal return is significantly larger at -19,6 % (Barber et al., 2022).

Barber et al. (2022) find that before the herding events the stock returns are near zero, but one or two days before the event, returns start to rise and become significant. On the herding day, stocks see a sharp increase, with an average return of 14 % (Barber et al., 2022). It seems that it is possible to make significant profits with these high salient stocks but investors should time the markets that Robinhood users pay attention to

stocks with big negative returns as well. This also aligns with Barber and Odean (2008). After the herding event the trend shifts as returns drop immediately, turning negative. Within five days, stocks herding in the top 0,5 % show a negative abnormal return of -3,5 %. By the end of 20 days, the total decline reaches nearly 5 %.

The behavioral bias of herding, visually salient Top Movers list and simplified platform for trading seem to have a significant effect on the behavior of investors and on the future returns. The behavior of investors seems far from rational as they tend to make decisions based on prominent visual features, what others are doing and what stocks seem to move the most. The fact that herding behavior, visual salience, and trading platform design significantly impact investor decisions shows that markets are not perfectly efficient as traditional finance assumes that these factors should not have any impact on decision-making and especially not on asset pricing.

5.4.2 Evidence from Advertising

Lou (2014) show that an increase in advertising spending is linked to a rise in retail buying and abnormal stock returns, which is then followed by lower future returns in the next two years. Lou (2014) finds that companies that rank in the top 10 % based on annual increases “in advertising spending outperform those in the bottom 10 % by 12,85 % during the ranking year”. However, in the next two years, they underperformed by 6,96 % and 9,84 %. Per month the abnormal return for the first year is 1,07 % and for the subsequent years -0,58 % and 0,82 % per month. Fama-MacBeth regressions also suggest that an increase in advertising is associated with a rise in stock returns and that they are followed by lower future returns (Lou, 2014). The positive return that came from advertising is diminished as a whole after two years and the stock has negative returns on the period. The results of the abnormal returns can be considered significant due to their size.

Interestingly, Lou (2014) finds that this return effect is stronger for companies that produce consumer goods, have less analyst coverage, lower institutional ownership, higher

retail trading activity, and brand names that are close to the company name. These findings suggest that less sophisticated -or retail investors are more influenced by advertising made by companies. On the other hand, institutional investors appear to be better at recognizing stock returns driven by increased advertising and may avoid these stocks to minimize potential losses in the following years. These align clearly with the assumptions of the difference between retail- and institutional investors.

5.4.3 Evidence from News and Attention

Cosemans and Frehen (2021) study whether their findings are explained by an alternative explanation of investors overreacting to firm-specific news, earnings announcements, or to market-wide news and events like crises. They also study whether these events and levels of attention strengthen the salience effect since during market-wide crisis, investors' attention is usually increasing and the news are salient as they grab the attention of many. The authors exploit events that might distract investors, such as crises, but also study the influence of news pressure where days with the highest spike in news are studied. If the salience effect is caused by increased attention to stocks releasing earnings or by an overreaction to these announcements or to events or news, it would be expected to be stronger in months or days when earnings reports are published or the event is happening or when the spike in news pressure is happening. However, Cosemans and Frehen (2021) suggest that the salience effect cannot be explained by overreaction to earnings news nor their results are driven by sensational news events that distract investors. The salience effect does not seem to depend entirely on news or events, as these factors do not fully explain the results. However, they do have an impact, as investors tend to pay attention to news and events. The information they consume or the events they experience may influence their biases, leading to herding behavior, an overemphasis on recent news, or anchoring. These cognitive biases can shape their decision-making, as investors may use such information as a heuristic rule.

News and events can increase attention to the portion of the information and that way influence decision-making and future returns. Barber and Odean (2008) find that

individual investors tend to act as net buyers when stocks are in the news. This is supported by Chen et al (2022), where they find that when investor attention is high, net buying increases, but it slows down the next month and eventually fades away. Barber and Odean (2008) study also shows that institutional investors, especially investors who invest in value strategy, do not buy based on attention. Gargano and Rossi (2018) state that attentive investors outperform through purchasing attention-grabbing stocks with positive price momentum. On the other hand, Barber and Odean (2008) state that attention-driven buying patterns “do not generate superior returns or outperformance”. Chen et al. (2022), “use popular individual attention proxies, abnormal trading volume, extreme returns, past returns, nearness to 52-week high and nearness to historical highs, analyst coverage, changes in advertising expenses, mutual fund inflow and outflow, media coverage, search traffic on the Electronic Data Gathering, Analysis, and Retrieval (EDGAR) system and Google search volume, to measure their predictability over returns”. The authors find that when overall investor attention increases, stock portfolios with high market beta and high idiosyncratic volatility tend to have lower excess returns. This suggests that investor attention can lead to overpriced stocks, followed by lower future returns.

The results Gargano and Rossi (2018) find seem to be explained more by the momentum strategy introduced by Jegadeesh and Titman (1993), where stocks that have performed well in the past are found to continue outperforming in the short term, while stocks that have performed poorly continue to underperform. Aligning with short-term returns from advertising (Lou, 2014) or from herding behavior (Barber et al., 2022), the investors can have positive returns, but the longer-term returns seem to be negative according to several studies (Barber et al., 2022; Barber & Odean, 2008; Lou, 2014) and especially returns driven by the salience effect (Cakici & Zaremba, 2022; Cosemans & Frehen, 2021; Lee et al., 2024; Sun et al., 2023).

6 Conclusion

This study examines the influence of salience on investor behavior and stock returns, focusing on different salient factors, such as visual salience, news, attention-grabbing events, advertising and salient features. The study examines how these salient factors impact behavioral biases and affect stock returns and prices. Three hypotheses are tested through relevant academic literature and theoretical frameworks. The first hypothesis is that investors overweigh salient factors and overemphasize the information on which their minds focus, distorting their ability to make objective and rational investment decisions. The second hypothesis is that the salience effect has a stronger influence on retail investors than on institutional investors. Lastly, the third hypothesis is that overweighing salient factors may reduce future returns and contribute to the overvaluation or undervaluation of stocks.

The study finds that salient factors significantly impact investors' behavior and distract rational decision-making. Investors tend to overemphasize salient attributes and information, confirming the first hypothesis. Overemphasizing salient features leads to different behavior biases such as herding, anchoring, heuristics and representativeness. Especially individual investors are found to be more affected by behavioral biases and the influence of salience. Retail investors are particularly prone to the attention-grabbing features of online platforms and advertising. However, institutional investors are not entirely immune to biases either as they are prone to some behavioral biases and to the impact of the salience effect. Nonetheless, the literature and evidence clearly support hypothesis two.

The hypothesis three also holds true as stocks with salient attributes seem to be overvalued and yield lower future returns, while stocks with low salient attributes seem to be undervalued and yield higher future returns. Similar evidence is found through various markets, which makes the results robust. However, the salience effect seems to have a significant effect in the short-term but in the long-term, the effect reverses or diminishes. Salient factors, herding behavior and buying pressure can lead to abnormally

positive returns in the short-term and investors can benefit from the effect, especially from the one-day returns, but these benefits diminish in the subsequent month as the future returns are negative. Overall, the salience effect predicts negative returns for the future. The salience effect is stronger on high investor sentiment, when there are more unsophisticated investors in the market and companies with more retail owners.

Investors focus on different salient features, each with varying degrees of influence on decision-making. Visually prominent factors, such as design elements and platform features, appear to have the strongest impact. However, the cultural differences seem to play a role as the color red significantly affects investor behavior in many cultures, it has little to no influence in China. Interestingly, while news might seem like an obvious driver of investor behavior, the evidence suggests it has a weaker explanatory power than expected. Ultimately, investors are prone to salient factors, and evidence from online platforms and advertising suggests that these features and their timing are intentionally designed to influence decision-making.

Behavioral finance and its theories appear to explain short-term stock price movements and investor behavior more effectively than traditional finance. While the Efficient Market Hypothesis assumes that investors act rationally and that prices fully reflect all available information at all times, the evidence suggests otherwise. Investors often behave irrationally, and stock prices are influenced by salient factors, rather than by purely fundamental information. These findings highlight the limitations of traditional financial models in explaining short-term market fluctuations. However, this does not mean that markets are entirely inefficient as fundamental values still play a role and mispricing caused by behavioral biases tends to correct itself over time.

Suggestion for the future research would be to study how trading algorithms respond to strong salience effects and herding periods in financial markets, and how these conditions impact their decision-making processes. Some studies suggest that high frequency trading (HFT) might intensify flash crashes, increase volatility and market mispricing. On

the other hand, HFT is argued to improve market efficiency by adding liquidity and processing new information faster and more efficiently. Further research could examine whether the presence of HFT's impacts the salience effect, market pricing or future returns.

Appendix

Table 1.

Summary of existing literature on salience and its effect on investor behavior and stock returns.

Reference	Econometric models used	Variables	Data frequenc	Time period	Major Findings
Cosemans & Frehen (2021)	Factor models, Fama-McBeth regressions, Portfolio sorting	Stocks listed on the NYSE, Amex and Nasdaq with a closing price under \$5	Daily, Monthly	January 1926 - December 2015	Salient stocks are overvalued, non-salient stocks are undervalued. Investors' overweight salient past returns.
Sun et al. (2023)	Factor models, Fama-McBeth regressions, Portfolio sorting	A-share listed stocks on the Shanghai and Shenzhen stock exchanges	Daily, Monthly	January 2000 - December 2020	Salient past returns and volume negatively predict future stock returns.
Lee et al. (2024)	Factor models, Fama-McBeth regressions, Portfolio sorting	Stocks traded in the Australian Securities Exchange	Daily, Monthly	January 1998 - December 2018	Stocks with salient upsides are overpriced.
Cakici & Zaremba (2022)	Factor models, Fama-McBeth regressions, Portfolio sorting	Firm-level data from 49 countries; 23 countries developed, 26 emerging	Monthly	January 1990 - April 2020	High salient stocks underperform low salient stocks globally.
Barber et al. (2022)	Linear probability model, Regression analysis	All securities listed on the Robintrack website	Daily	May 2, 2018 - August 13, 2020	Robinhood herding predicts a 20-day abnormal return of -4.7% for the top purchased stocks.
Lou (2014)	Factor models, Fama-McBeth regressions, Portfolio analysis	Firm characteristics, insider sales, restricted shares, corporate events	Yearly	1974 - 2010	Increased advertising spending leads to rise in retail buying and abnormal stock returns, followed by lower future returns.
Chen et al. (2022)	Factor models, Principal Component Analysis, Partial Least Squares approach	12 major individual attention proxies from Nyse, Amex and Nasdaq	Daily, Monthly	January 1980 - December 2017	High investor attention leads to lower returns later, especially in the short term.
Barber & Odean (2008)	Newey-West correction, Buy-Sell Imbalance calculations, Kyle-style market microstructure model	Brokerage characteristics, Trade level variables	Daily, Monthly	January 1991 - June 1999	Individual investors are net buyers of attention-grabbing stocks. Attention-based buying is not necessarily profitable.

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