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Weak Economic Data Raises Stock Prices?

Analysis of the impact of macroeconomic indicator releases on stock prices

School of Accounting & Finance
Bachelor's thesis
Finance

Vaasa 2025

UNIVERSITY OF VAASA
School of Accounting & Finance
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Title of the thesis: Weak Economic Data Raises Stock Prices?: Analysis of the impact of macroeconomic indicator releases on stock prices
Degree: Bachelor of Science in Economics and Business Administration
Programme: Finance
Supervisor: Enamul Hasan
Year: 2025 **Pages:** 63

ABSTRACT:
This thesis examines how stock prices respond to macroeconomic indicator releases, focusing on three key variables: GDP, unemployment rate and central bank interest rate decisions. The objective is to determine whether these announcements systematically affect equity markets, and if so whether the reactions are consistent and efficient as suggested by traditional finance theories. The analysis combines theoretical aspects with empirical findings from prior literature.

The results indicate that only interest rate decisions consistently move stock prices under neutral conditions, while GDP and unemployment data show mixed effects. However, when the broader economic context and investor sentiment are considered, all three indicators exhibit more systematic impact on stock returns. Importantly, the reactions are often asymmetrical: weak economic data appears to increase stock prices during expansions, but decrease them in contractions. This is attributed to shifts in investor focus: during expansions markets emphasize central bank interest rate expectations, but expectations about future corporate earnings and cash flows dominate in contractions. Moreover, it is observed that macro data seems to have stronger impact when the investor sentiment is low and when the data is particularly negative.

These findings challenge the assumption of investor rationality and suggest that emotions, behavioral biases and media framing have a significant role in shaping stock market reactions to macroeconomic information. In addition, evidence of earning abnormal returns based on post-announcement drift questions the concept of market efficiency. Hence, it is clear that stock market responses to macroeconomic indicators depend heavily on the prevailing sentiment and the phase of the business cycle.

KEYWORDS: Macroeconomic indicators, Stock prices, Market efficiency, Behavioral Finance, Business cycle, Investor Sentiment, Valuation, Monetary policy

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1 Introduction

News coverage in financial media widely suggests that stock prices are sensitive to news about broader economy. For example, news headlines and news wires are every now and then explaining stock market movements with surprises in economic data releases. These are for instance scheduled macroeconomic indicator releases, statistics used for describing and measuring the state, and performance of the economy (Bodie et al., 2023). Thus, macroeconomic releases are widely followed in the media and among investors.

Over the past decade, performance of the U.S economy and its equity markets has been strong. However, recent events in the country's politics, along with the current global situation, have heightened uncertainty about future economic outlook. Also fears of a potential recession are growing in the world's leading economy. As a result of this ongoing turmoil, macroeconomic indicators – and their impact on stock prices – are currently drawing increasing attention.[1][2][3] For example, a news article from early 2025 reads roughly as follows: "US stocks seesawed to cap a volatile week as investors digested a crucial monthly job report amid uncertainty driven by President's trade policy"[4]. Similar articles have also appeared recently in the media.[5] This raises the question this thesis seeks to explore: Do macroeconomic indicators releases systematically and predictably affect stock prices?

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[1] Blaine (2025*)* Economic Week Ahead: Reports will signal if slowdown is a real threat. *The Street*.
[2] Schafer, J. (2025). RBC lowers S&P 500 year-end target, citing economic growth concerns*. Yahoo Finance*.
[3] Pylypenko, O. (2025). Stocks Slip Before the open after FED-Fueled Rally, U.S. Economic Data and Earning in Focus. *The Globe and Mail.*
[4] Dubrovsky et al. (2025). Stock market today: S&P 500 posts worst week since September as Trump tariffs rattle markets. *Yahoo Finance.*
[5] Cherian et al. (2025) Wall Street ends lower as blowout job data spooks traders*. Reuters*.

The relationship between macroeconomic indicators and stock market has been studied extensively. However, at first glance, the empirical evidence appears to be mixed. Therefore, as macroeconomic data seems to be moved to the center of media and market attention right now, it becomes important to deepen understanding of how releases of such information actually affect stocks. For investors and traders, a good understanding of these dynamics is important, as it helps to better assess the likely impact of the macroeconomic news and reallocate their portfolios accordingly.[6]

This thesis's analysis focuses mainly on U.S. stock markets due to the large amount of existing literature, and due to their global influence through market integration. As global market co-movement and spillover effects have grown, understanding how U.S. markets react to economic indicator releases may also help to anticipate how similar announcements affect in other developed markets as well.

1.1 Purpose of the Study

The purpose of this thesis is to elucidate the impact that macroeconomic indicator releases have on equities. Economic data and stock prices tend to be intuitively connected over the long term, on a monthly or quarterly basis for example (Cutler et al., 1988). However in this paper, the focus is partly on shorter-term stock price reactions following indicator announcements, and whether these reactions align with the assumption of rational investor behavior, as suggested by common theories of finance.

The analysis focuses on three key indicators: GDP[7], the unemployment rate and central bank interest rate decisions. These indicators have been selected because each reflects

[6] Funke, N. & Matsuda, A. (2006)
[7] Along with industrial production data releases

a different dimension of the economy —output, labor market conditions and monetary policy —and together they offer a broad picture of economic performance. Moreover, there are two main reasons for choosing these particular indicators. First, they are among the most followed and frequently discussed macroeconomic data releases in financial media. Second, as they've been extensively featured in academic literature, it provides a robust foundation for analyzing their effect on equity prices. Specifically, this thesis aims to provide insight into the stock market effect of macroeconomic indicator releases by examining whether stock price reactions are immediate, systematic, and consistent in terms of direction and magnitude after the publication of GDP, unemployment rate, and central bank interest rate decisions. The hypothesis are as follows:

First, according to Fama's (1970) Efficient Market Hypothesis (EMH) stock prices reflect all available information and adjust only to new information. Thus, only the portion of the macroeconomic data releases which doesn't meet the market's expectations should cause prices to move.[8] Also in traditional finance theory, stock prices are based on economic fundamentals and determined as the present value of expected future earnings or cash flows. Therefore, as these indicators provide information about the fundamentals of the overall economy, it is expected that their announcements will impact stock prices. As a result, the first hypothesis is:

H_1: Releases of GDP, unemployment rate and central bank's interest rate decisions systematically impact stock prices.

Secondly, traditional finance theories regarding market dynamics, asset pricing and valuation, such as the EMH, CAPM, and DCF model, are based on the assumption of rational investors. Hence, it could be expected that stock prices will react to economic indicator releases in a consistent and predictable manner in terms of both direction and magnitude. That is, better-than- expected figures would systematically lead to an increase in

[8] Pearce, D. & Roley, V. (1985).

stocks and worse-than-expected ones to a decrease. And if investors process information rationally, similar surprises will consistently result in price reactions of similar strength. Therefore, the second hypothesis is:

H_2: Stock price reaction to macroeconomic indicator releases is consistent in both direction and magnitude.

Third, if macroeconomic indicators systematically affect stock market, EMH suggests that this impact should occur, in full, immediately after the announcement. GDP, unemployment rate, and interest rate decisions, are publicly announced information, with their release times known in advance. Therefore, the information they contain can be expected to be incorporated into stock prices without delay, eliminating the possibility to earn excess returns based on these releases. Hence the third hypothesis is:

H_3: Stock prices adjust immediately and efficiently to new information from macroeconomic indicator releases, eliminating the possibility of earning excess returns.

1.2 Structure of the Study

Chapter 1 presents the motivation, purpose and hypotheses of the thesis. Chapter 2 provides a more detailed overview of macroeconomic indicators and in-depth definitions of the indicators examined in this thesis. The theoretical framework, and broader justification of the hypotheses is provided in chapter 3. It covers theories relying on investor rationality but also introduces some aspects of behavioral finance as an alternative perspective. Chapters 4 and 5 deliver empirical findings related to the topic through a comprehensive literature review. Chapter four presents baseline findings, while chapter five focuses on results observed when contextual or time-varying factors are taken into account. Chapter 6 concludes.

2 Overview of Macroeconomic Indicators

Macroeconomic indicators (or economic indicators) are statistics which describe and measure the state, activity and performance of the economy (Bodie et al., 2023). They compress crucial aspects of economic development into numerical information which can be used for decision-making regarding investments, for example. Also, by measuring levels and changes in economic activity and output, indicators reveal whether the economy is experiencing growth and help identify phases of the business cycle (Bodie et al., 2023; World Bank, n.d.).

Economic indicators can be categorized into leading and lagging. According to Bodie et al. (2023), leading indicators provide forecasts on the direction of future economic development because they tend to change before the trend of overall economy. Correspondingly, lagging indicators measure economic development over a specific period. Hence, at the time of their publication, they provide information about past performance and reflect how the economy has already developed (Investopedia, 2023).

Stock prices themselves are often seen as leading indicators because stocks are priced based on expectations about the future economy (Camilleri et al., 2019). This might indicate that backward-looking economic information from lagging indicators does not impact equities. However, it is argued that stock market can in fact occasionally act as lagging indicators too, responding to lagging economic data releases (Camilleri et al., 2019).

2.1 GDP

GDP is a comprehensive economic indicator which measures the total value of all produced goods and services in the economy during a certain period. (Bodie et al., 2023). It reflects the performance of the economy from the view of output and activity. Hence,

change in GDP is one of the most popular indicators to describe overall fluctuations in economy's strength, state, and business cycle (Bodie et al., 2023; BEA,2023).

In the U.S., GDP is calculated quarterly by the BEA based on data from the previous quarter. Preliminary GDP estimates are published approximately one month after the quarter's end and the final statistics are released even later (BEA, 2023). Thus, GDP data describes economic activity from way past and its information is several months old at the time of the release. This makes GDP a clearly lagging indicator (Bodie et al., 2023).

2.1.1 Industrial Production

Due to the slow calculation process and significantly lagging nature of GDP, Industrial production (IP) index is often used as an alternative indicator to measure economic activity and output (Bodie et al., 2023). The IP is less comprehensive than GDP, as it measures the previous month's output based on only the production provided by the manufacturing side of the economy (Bodie et al., 2023). Additionally, since the non-manufacturing sector nowadays constitutes a significant portion of GDP in the U.S. and many other economies, changes in the IP may not always reflect overall activity accurately (Bhuiyan & Chowdhury, 2020). However, in the U.S. changes in the manufacturing sector can still explain a great part of fluctuations in overall economic output (FED, 2025). Thus, IP still provides relevant information for evaluating the whole activity.

In the U.S., the central bank calculates and publishes the IP index monthly from production data reported by industrial firms (FED, 2025). This implies that the IP provides relatively similar information about the economy as GDP, but it has a time lag of only one month instead of a quarter. This makes information from the IP indicator more current and accessible. Chen (1991) states that, on annual basis, changes in industrial production can forecast future aggregate production measured with GNP. Therefore, the IP can be — and in literature traditionally has been — used as a proxy for GDP, and as economic output indicator (Stanger, 2020).

2.2 Unemployment rate

The unemployment rate (UR) represents the proportion of unemployed people in relation to the entire labor force. (FED, 2024; Bodie et al., 2023). In the U.S., it is calculated by using labor market surveys and published monthly by the Bureau of Labor Statistics (Mankiw, 2009; FED, 2024). Like GDP and IP, the unemployment rate is also a lagging indicator, because it reflects labor market conditions based on data collected from the month preceding its publication (BLS, 2015).

Despite being lagging, the UR is a key economic indicator to illustrate economic activity, due to its close relationship with previously presented output indicators. According to Okun's law, a 1% decrease in the unemployment rate predicts approximately 3% more output (Prachowny, 1993). In other words, it reflects the extent to which the economic capacity is operating (Bodie et al., 2023). Low unemployment rate indicates high-capacity utilization and signals potential growth in output, whereas high unemployment suggests the opposite. Hence, rising unemployment rate is generally considered negative, while declining rate can be seen as positive for the economy (Boyd et al., 2005).

Given its link to economic output, the unemployment rate is also a crucial indicator for policymakers. In the U.S., the central bank closely monitors the UR, and its changes influences the FED's interest rate decisions (FED, 2024). This indicates that changes in the unemployment rate can provide information not only about economic activity but also future interest rates (Boyd et al., 2005). Additionally, in the same report with the unemployment rate is always announced the Nonfarm Payroll (NFP) figure. It measures the number of employed people (excluding those in farming and a few other sectors) during the previous month. Thus, NFP is also considered as a key labor market indicator along with the unemployment rate (Flannery & Protopapadakis, 2002).

2.3 Policy rate

Policy rate is a key economic indicator, which reflects the monetary policy of the central bank (CB) (Bodie et al., 2023; Bernanke & Blinder, 1992). More precisely, it is an interest rate set by central bank that determines the short-term rate at which banks lend to each other (Mankiw, 2009). The policy rate also affects overall borrowing and lending costs through its effect on market rates, thus influencing business activities, firms' profitability and overall economic conditions (FED, 2024).

Central banks may often decide on the policy rate on the basis of economic data that capture past developments, such as the indicators discussed above. However, with interest rate changes, CB aims to influence future values of these other economic indicators and guide future economic development (Ioannidis & Kontonikas, 2008; FED,2024). Hence, although the policy rate is often considered as a lagging indicator, because it is typically adjusted only after the major economic trends have already shifted, it is a vital tool for the CB to achieve objectives regarding future economic activity. That is, interest rate decisions provide information also about upcoming movements of other indicators (Bernanke & Kuttner, 1992). Additionally, since policy rate changes have indirect and lagging effects on economic activity indicators, the direct consequences of interest rate decisions may first appear in asset prices (Ioannidis & Kontonikas, 2008).

In the U.S., the Federal Open Market Committee (FOMC), sets the policy rates. It meets regularly eight times a year and announces their rate decision after the meeting (FED, 2024). If necessary, the FOMC may also adjust the interest rates outside of this schedule to maintain economic stability (Funke & Matsuda, 2006).

3 Theoretical Framework

This chapter introduces finance theories that form the basis for understanding how macroeconomic indicator releases may affect stock prices. Despite the indicators examined in this thesis are categorized as lagging and reflect past economic performance, they may still be relevant for stock prices. This is because these indicators are accompanied by forecasts, which provide benchmarks for expected economic performance. Thus, deviations between forecasts and the actual indicator values reveal new information about economic fundamentals, which can influence stock prices. This dynamic is analyzed in the following sections through the Efficient Market Hypothesis, fundamental valuation model, and the alternative perspective provided by behavioral finance.

3.1 Efficient Market Hypothesis and investor rationality

Fama's (1970) Efficient Market Hypothesis (EMH) proposes that markets are efficient, meaning that asset prices fully reflect all available information and thus they are constructed based on all information investors have at any given time.

Fama (1970) defines three forms of market efficiency. First is the "weak form" in which prices incorporate all information relating to the past. In the second, "semi-strong form", prices reflect not only past information but also any information that is publicly available at the time. Hence, when the "semi-strong form" of market efficiency exists, stock prices absorb, for example, information from the already published macroeconomic indicators and their forecasts. This illustrates the EMH's core assumption that most investors act rationally and implies that in efficient markets, prices reflect information from past and current events, but also from future events expected to occur (Fama, 1995). The third form of market efficiency is the "strong form" in which asset prices include also insider information related to them (Knüpfer & Puttonen, 2018).

In the EMH, the assumption of rational investors is justified by an analogy that investors are competing to predict future market values of stocks by continually using all available information to maximize their returns (Fama, 1995). Hence, stock prices would react to information only when it is unexpected, and such information is incorporated into prices without delay and correctly, as soon as it arises (Malkiel, 2003; Knüpfer & Puttonen, 2018). Within the scope of this thesis, macroeconomic forecasts represent the *expected component* of information, whereas the realized indicator figures from official announcements capture the *actual component*. The difference between these two constructs the *unexpected component* (aka: *surprise* or *news*) which brings new information to the market. Under the EMH, only this unexpected component of economic indicator releases will impact stock prices as the expectations are already priced in through forecasts (Pearce & Roley, 1985). Consequently, releases of the lagging indicators examined in this thesis shouldn't affect stock prices if their values align with forecasts. But when the released indicator statistic deviates from the forecast, it constitutes new information about economic fundamentals which could impact stock prices as investors adjust this information into stock valuations. (Funke & Matsuda, 2006; Boyd et al., 2005).

The assumption of rational investors also ties stock prices to the idea that they are determined based on the economic fundamentals reflected by macroeconomic indicators. For example, Ross's (1976) Arbitrage Pricing Theory suggests that if a stock is mispriced, rational investors adjust their portfolios and exploit arbitrage opportunities, which eventually corrects the price to equilibrium level that reflects the broader economic conditions. Additionally, while the EMH itself doesn't take a stance on the direction or magnitude of asset price movements, under this assumption of rational investors, similar macroeconomic surprises can be expected to impact stock prices in a consistent and intuitive manner – both in magnitude and direction – regardless of the timing or other circumstances of new information. That is, for instance, a positive surprise — such as greater-than-expected GDP growth or lower- than-expected unemployment rate — signals improved economic conditions and may therefore consistently lead to an upward reaction in stocks (Funke & Matsuda, 2006; Boyd et al., 2005). Respectively, a negative surprise,

such as lower-than-expected growth in IP indicator, suggests weaker economic conditions and may systematically lead to a decrease in equity markets.

EMH has, however, been criticized by economists who argue that investor behavior isn't always completely rational but also influenced by psychological and behavioral factors. This can distort stock-price determination and cause temporary mispricing when reacting to new information (Malkiel, 2003). However, Fama (1995) defends the EMH, stating that while market prices may temporarily deviate from fundamental-based intrinsic value, due to investors' differing expectations, they eventually tend to wander towards fundamental value as rational investors dominate in the long run.

3.2 Determining the Stock Price – Discounted Cash Flow Model

Stock prices can be determined by using absolute valuation methods such as the Discounted cash flow (DCF) model. Like the EMH, this approach relies on investor rationality and values a stock based on its fundamentals – also known as intrinsic value (Damodaran, 2012). The fundamentals for stock valuation are the cash flows expected to be received in the future from the stock — such as dividends— and the discount rate. The discount rate reflects the riskiness of receiving the cash flows and thus determines the required return for a stock. The intrinsic value is calculated by summing the present value of expected cash flows discounted at an appropriate rate (Bodie et al., 2023; Damodaran, 2012). Hence, the stock price is expressed as follows:

$$P_0 = \sum_{t=1}^{t-n} \frac{CF_t}{(1+r)^t} \qquad (1)$$

Where:

P_0 = stock price

CF = expected cash flow at time t

n = holding period

r = Discount rate

3.2.1 Discount rate component

The risk-reflecting discount rate can further be decomposed into two main components: risk free-rate and equity risk premium (Funke & Matsuda, 2006). The risk-free rate represents the return of riskless investment and serves as a baseline for determining the required return. In practice, yield on short-term government bonds, such as Treasury Bills (T-Bill) is commonly used as the risk-free rate (Mukherji, 2011). According to Ioannidis & Kontonikas (2008) correlation with T-Bill yields and policy rates is close to one in OECD countries. This strong correlation allows linking policy rate surprises directly to stock pricing: as an unanticipated hike in policy rates seems to increase the T-bill and thus the risk-free rate, this raises the discount rate, ultimately reducing the present value of future cash flows and stock prices. Respectively, an unexpected policy rate cut lowers the T-bill, reduces the discount rate and thereby increases stock prices (Bernanke & Kuttner, 2005). In addition to this, policy rate surprises can indirectly affect stocks by shaping investors' expectations of future economic activity as discussed in chapter 2. For example, rate cuts are expected to increase economic activity and firms' profitability which increases cash flow expectations, ultimately raising stock prices (Ioannidis & Kontonikas, 2008).

The discount rate can be determined by asset pricing models, such as Sharpe's (1964) Capital Asset Pricing Model (CAPM), or its extension Arbitrage Pricing Theory (APT) (Ross, 1976). Both models determine the discount rate by considering the risk-free rate and equity risk premium. Also, both assume investors to be rational agents, leading to efficient markets and ultimately to market equilibrium. As a result, these models establish a linear relationship between risk and return, meaning higher risk requires higher returns. Consequently, changes in risks will impact on the required return, and through the DCF model, on stock prices.

The CAPM (1964) doesn't link economic indicators and stock prices together directly. This is because it identifies only one risk factor influencing the discount rate: beta-measured sensitivity to systematic risk, which is typically caused by macroeconomic changes. However, in CAPM macroeconomic effects are considered indirectly as they impact the discount rate through an all- assets including market portfolio (Bodie et al., 2023). This limits the effectiveness of CAPM in explaining how changes in certain macroeconomic indicators affect stock valuations.

In contrast, APT (1976) links macroeconomic indicators themselves and stock prices together by incorporating multiple beta-quantified macroeconomic risk factors into determination of the discount rate (Roll & Ross, 1980). Hence, APT provides a more effective framework for explaining the connection between stock market and economic data releases by considering stock's sensitivity directly to several macroeconomic factors (Fromentin, 2022). Although in Ross (1976) these factors aren't explicitly specified, Chen et al. (1986) apply the APT framework and manage to demonstrate a significant effect of unexpected changes in few key macroeconomic indicators on the discount rate. Therefore, taken together both CAPM and APT suggest that surprises in economic indicators can impact on the discount rate component, which in turn affects directly stock prices.

3.2.2 Cash flow component

As the DCF formula indicates, surprising information from macroeconomic indicators can, however, affect stock prices through multiple channels. Specifically, macroeconomic news can impact equity prices not only through revisions of the discount rate but also via adjustments in expected cash flows. Or often the impact may occur as a combination of both these two components if they are revised simultaneously (Chen et al., 1986). And in fact, since the discount rate consists of two components, macro indicators can impact stock prices through three channels: 1) fluctuations in the risk-free rate, which directly affect the discount rate component. 2) Changes in the equity risk premium, also affecting the discount rate. 3) Revisions in cash flow expectations, influencing the cash

flow component (Boyd et al., 2005; Bernanke & Kuttner, 2005). Thereby, the DCF provides insights into understanding the potential direction of stock market movements in response to macroeconomic news: If new information from an indicator release increases the cash flow component, the stock price should increase as well. On the other hand, if new information increases the discount rate component, the stock price should decrease.

Fama's Proxy hypothesis (1981) implicitly reinforces the theoretical link between equity markets and aggregate economic activity and offers insights into the direction of stock price movements. Proxy hypothesis suggests that stock prices and real economic activity are positively linked (Lee, 1992). Fama (1981) argues that indicators which measure economic activity from the view of output and employment also serve as proxies for expected cash flows, as they reflect broader economic conditions that influence corporate profitability. Consequently, these indicators should have a positive correlation with stock returns as prices are based on expectations of future economic performance.

Fama (1990) further extends the Proxy hypothesis into practice. He shows that when using future growth rate of industrial production as a proxy for changes in cash flow component, IP has explanatory power of 43% on annual fluctuations in stock prices. Chen et al. (1986) suggest the same on monthly basis as well: growing IP can have a notable positive impact on stocks, based on their analysis of monthly IP changes and returns of 20 equally weighted portfolios. Hence, given the proxy hypothesis and coarse empirical support, positive surprises in economic activity indicators raise revisions in cash flow component and stock prices in theory. Vice versa, negative surprises would lower the expected cash flows and decrease stock prices.

However, Chen (1991) illustrates that growth in lagged industrial production has forecasting power over future risk premium, implying that IP affects stock prices not only through cash flow expectations but also via discount rate revisions. Chen (1991) argues that, since IP reflects the current health of the economy, on a yearly basis IP has a

negative relationship with expected future returns. For example, this is because growth in IP indicates a stronger economy, which braces investors' expectations of the future, decreasing required returns and the discount rate factor.

3.2.3 Summary and limitations of the DCF

In theory, since stock prices are determined as discounted present value of future cash flows made by corporations, these expected cash flows must eventually reflect and be connected to economic activity. Respectively, fluctuations in stock prices should depend on the volatility of the expected cash flows and discount rates. As macroeconomic indicators convey information about economic activity, unexpected changes in these indicators are likely to influence stock prices. Furthermore, since stock prices are tied to the level of economic activity, uncertainty regarding macroeconomic conditions may cause fluctuations in equities in the form of discount rate changes. That is, stock prices may react to shifts in economic data. Thus, economic indicators not only reflect real economic activity, but also provide essential information about the broader business environment in which firms operate, reinforcing their potential to influence stock prices. (Zakaria, 2012; Binswanger, 2000).

Although the DCF model is commonly used for stock valuation it has its limitations. Firstly, it relies heavily on forecasts of future cash flows, which can be inaccurate. Secondly, choosing an appropriate discount rate can be hard, due to difficulty in correctly estimating risk-free rate, risk factor betas and risk premiums. These limit the accuracy of the model (Begović et al., 2013). Since it's difficult to estimate the cash flows and discount rates, investors' views about these components may differ. As a result, stock prices can rarely be accurately determined and discrepancies between market prices and intrinsic values can occur (Fama, 1995). But as mentioned, over time rational investors are assumed to base decisions on economic fundamentals, causing market prices to eventually converge towards intrinsic values. This makes the intrinsic value still a good estimate of

a stock's market price (Fama, 1995) and hence, evaluating price reactions to economic indicators through the DCF remains justified.

3.3 Behavioral Finance – Challenging the Idea of Rational Investors

While the EMH assumes investors to act rationally and stock prices to mirror all available information regarding economic fundamentals, behavioral finance provides a contrasting view by emphasizing the role of psychological and emotional factors.

3.3.1 Prospect theory and overreaction bias

According to Prospect Theory by Kahneman & Tversky (1979), investors make decisions based on how they feel about potential winnings or losses, rather than by fully rationally evaluating only the absolute outcome. Their key finding is that investors tend to perceive losses more painful than equivalent winnings are perceived as pleasurable. This leads investors to favor decisions with lower risk under uncertainty, a phenomenon known as risk aversion (Kahneman & Tversky, 1979). Thus, this theory suggests macroeconomic indicators can impact stock markets in varying ways, particularly in terms of magnitude, if negative surprises are experienced more strongly than positive ones and stock pricing components are revised unequally. Furthermore, it indicates that price reactions may differ depending on the context in which the macroeconomic information is received.

One notable manifestation of the behavioral tendencies described in Prospect Theory is the overreaction bias. It refers to investors' tendency to react disproportionately to new information, relative to what might be considered a rational reaction, especially when the news contradicts prior expectations or evokes strong emotions. In particular, investors tend to overweight recent signals while underweighting prior data, which may lead to excessive or irrational adjustments in stock prices (De Bondt & Thaler, 1985).

For example, Shiller (1981) observes that stock price volatility is often disproportionately high relative to the nature of new information. In particular, he suggests that investors seem to overreact to news concerning economic fundamentals. This implies that macroeconomic indicator releases may cause excessive and sometimes irrational revisions in stock pricing components. Therefore, Shiller (1981) in practice indicates that psychological factors, such as emotions, influence investors decision-making, contradicting the EMH and its assumption of investor rationality. Hence, it seems that stock prices may occasionally respond to unexpected macroeconomic figures in an inconsistent or exaggerated manner. These behavioral factors may also concern both the direction and magnitude of the reaction, deviating from what would be expected under rational pricing.

3.3.2 Investor Sentiment

Another concept of behavioral finance which can be linked to the stock market effect of macroeconomic indicators is investor sentiment. It can be defined as investors' beliefs and emotions about future cash flows and risks that are not justified based on economic fundamentals (Baker & Wurgler, 2007). That is, investor sentiment reflects the optimism and overall attitude towards the market among investors (Bodie et al., 2023; Zakamulin, 2024).

Baker and Wurgler (2007) construct an investor sentiment index for quantifying the sentiment. They define high sentiment as a situation where stock prices appear to rise substantially above intrinsic values, optimism prevails, and investors' attitude for the future market outlook is positive. Respectively, when sentiment is low, prices decline below intrinsic value, investors are pessimistic, and the market outlook turns negative.

Another indicator of investor sentiment is the Market Volatility Index (VIX), also known as the "investor fear gauge", which measures the implied volatility of S&P 100 stock

options. Higher VIX levels are often associated with declining stock prices due to increased uncertainty (Connolly, et al., 2005). The VIX and BW sentiment index have an inverse relation: when the VIX stays low, investor sentiment seems to be high and vice versa (Chen & Lien, 2017). Additionally, investor sentiment is closely linked to stock market cycles: bull market refers to a market phase of rising stock prices and is typically associated with high sentiment. In turn, bear market refers to a phase of declining prices and sentiment tends to be low (Baker & Wurgler, 2007).

In another paper Baker and Wurgler (2006) demonstrate that investor sentiment affects stock prices significantly. They find investor sentiment can cause substantial deviations from rational investor behavior and lead to irrational movements in stock prices, such as overpricing during high sentiment and undervaluation during low sentiment. This implies asymmetry, and that high investor sentiment may buffer the magnitude of equity market reactions to unexpected macroeconomic indicator figures, as optimistic investors might underreact to negative surprises (Gu et al., 2021). Conversely, low sentiment may magnify price reaction to identical macroeconomic data release, as pessimistic investors may overreact to negative news. In addition to this, investor sentiment and the market cycle can significantly affect how macroeconomic information is interpreted and thereby shape the direction of stock price reactions, potentially resulting in varying price responses (Chen & Lien, 2017). These observations highlight that investor sentiment may influence both the magnitude and direction of stock price reactions to macroeconomic indicators. Thus, investor sentiment also complements the Prospect theory's idea of psychological and emotional factors influencing investors' decision making.

Altogether, these behavioral finance views offer a contrasting perspective to EMH and investor rationality, by suggesting the stock market effect of macroeconomic data can at times be inconsistent. Similar surprises can trigger differing price reactions depending on the contextual and behavioral factors. These insights also complement the traditional DCF framework by explaining why price responses can deviate from theoretical predictions.

4 Impact of Macroeconomic Indicators on Stock Prices: Baseline Empirical Evidence

4.1 Impact of output indicators

As said, indicators of economic output, such as GDP and industrial production index, appear to be connected to equity prices in the long run. According to Cutler et al. (1988), a 1% surprise increase in IP raises stock prices by about 0,4% during the same month. This result is based on their broad, but old, analysis of how unexpected macroeconomic data can explain monthly stock returns. More recent studies also report a positive long-term relationship, and causality, between IP and monthly equity returns (Ratanapakorn & Sharma, 2007; Humpe & Macmillan, 2009). Chen et al. (2009) further confirm the positive link at monthly level, showing that decreasing IP is associated with upcoming bear markets. In contrast, on quarterly basis, the most recent data suggests a negative connection with GDP and the performance of S&P 500 during 2010-2020 (Danso, 2020). This highlights that the relationship between output indicators and stock market may vary over time. However, when focusing on monthly stock returns, during a month other significant information may also arise and affect the market. For instance, in the sample of Cutler et al. (1988), the largest changes in monthly stock prices were often triggered by non-economic news. This suggests that news unrelated directly to macro indicators may actually be the main driver of monthly return fluctuations. As a result, the observed long-term connection between IP, GDP and stock prices should be interpreted with caution when analyzing the impact of their data releases on the stock market.

Thus, to better understand the immediate impact of macro news, Pearce and Roley (1985) analyze daily stock index changes instead of monthly movements. They define surprise components as the difference between an indicator's actual value and expected value, the latter derived from survey-based market expectations. This is useful as surveys

may reflect market expectations more accurately than analysts' forecasts based on econometric models (Flannery & Protopapadakis, 2002).

Pearce and Roley (1985) find that surprises in monthly industrial production do not trigger notable reactions in stock prices on the release day. But interestingly, they observe IP surprises occasionally do influence equities on the second day after the release, with positive surprises increasing and negative surprises decreasing prices. But this occurs only a few times, leading to the conclusion that IP surprises do not impact stock prices. Even when narrowing the time frame further and examining hourly S&P 500 returns after indicator releases, IP surprises still remain unrelated to stock prices (Jain, 1988).
Later findings confirm this pattern too: neither IP nor GNP surprises significantly move daily stock prices. In fact, stock return volatility appears to be even lower on the IP or GNP release days than on other days (Flannery & Protopapadakis, 2002). This highlights that output indicators may be insignificant for the stock market – unlike employment indicators, which are associated with clearly higher volatility on release days.

One explanation for the weak stock market response to IP surprises may be the timing of releases. For instance, employment indicators are typically published earlier in the month and may already reflect similar economic information as the mid-month IP figures. Investors may therefore emphasize more these employment statistics – often referred to as the "king" of announcements – and view IP surprises as less relevant for updating expectations about future cash flows or risks (Flannery & Protopapadakis, 2002; Andersen et al., 2007).

Bartolini et al. (2008) slightly contradict previous findings by showing that GDP surprises significantly and positively affect S&P 500 stock prices within 30 minutes of their release during 1998-2007. This suggests that with more recent data, unexpected GDP growth leads to higher stock prices. However, to evaluate the significance and speed of the reaction they analyze prices later in the same afternoon. By then, the impact of GDP surprises vanishes. This indicates a positive connection between GDP and equities, but the

reaction happens right after the release and remains limited at daily level. This is likely due to other information occurring during the trading day, which dilutes the effect on daily level (Bartolini et al., 2008).

Bartolini et al. (2008) also examine the impact of indicator surprises on bond yields and show that GDP surprises have a stronger and more consistent effect on bonds than stocks. Similar results report Kerssenfischer and Schemling (2024). Additionally, Bartolini et al. (2008) observe a prominent stock market response to GDP surprises only once. Hence, this rarity may still imply the output indicators do not have a notable impact on equity markets despite their clear and consistent effect on bonds.

While previous studies suggest IP releases do not have a notable stock market effect Andersen et al. (2005) however, identifies some kind of positive relationship through changes in systematic risk. They construct several equity portfolios sorted by firm size (market capitalization) and value (B/M ratio). Then they examine how monthly IP growth affects stock returns via equity betas, using 15-minute intervals to capture the immediate impact.

Their results reveal a negative relationship with the betas of large value stocks, with 1% increase in monthly IP lowering the beta of large value stock portfolios by 0,06. This indicates that improving output reduces systematic risk, which in turn lowers the CAPM calculated discount rate, and increases stock valuations. The effect is similar for the betas of mixed portfolio containing both growth and value stocks, although a bit smaller. For growth stocks, the connection is insignificant.

Hence, Andersen et al., (2005) suggest that IP growth may have a positive effect on stock prices. That is, prices increase when IP indicator reflects growth especially in the case of value stocks. Respectively falling IP, particularly around recessions, appears to raise the betas of many portfolios, leading to lower valuations. Notably, while on average, growth stocks show no reaction, in economic downturns also their betas are affected. Additionally, betas of value portfolios seem to fluctuate more in downturns compared to other

portfolios and their average movement (Andersen et al., 2005). This already suggest a bit, that change in industrial production index could have a varying impact on stock prices in terms of magnitude, depending on the timing of the macroeconomic information.

4.2 Impact of labor market indicators

On both monthly and longer-term basis there appears to be the intuitive, negative relationship between unemployment and stock prices. Atanasov (2021) uses the deviation of actual unemployment figures from their estimated trend to examine the link between unemployment rate surprises and monthly stock returns. The study shows that higher-than-expected unemployment is positively associated with future required returns. This suggests that rising unemployment increases risk premiums and the discount rate which after all lowers stock prices. This results in a negative relationship between UR and stock prices. Similarly, Chen (2009) indicates that rising unemployment predicts bear markets in the S&P 500 within the following six months. This implies that higher unemployment rate is followed by a decline in stock returns on a monthly basis, supporting the notion of a long-term negative relationship.

However, despite the apparent negative relationship on a monthly level, baseline studies seem to find no significant short-term impact of unemployment rate surprises on stock prices. Pearce and Roley (1985) report no notable reaction on a daily level, and Jain (1988) similarly finds no effect within one hour after the release. Even with more recent data, Flannery and Protopapadakis (2002) conclude that unemployment and simultaneously released NFP surprises increase return volatility but have no substantial influence on stock returns themselves.

But in contrast to these early short-term studies, most recently Chi (2021) analyses the period from 2000 to 2020 and finds a negative connection between unemployment rate surprises and daily S&P 500 returns. Specifically, it appears that 1% surprise increase in

unemployment leads to a decline of 0,49% in daily returns. As in the previous papers, unemployment rate remains positively associated with return volatility. That is, a lower-than-expected unemployment rate tends to reduce the uncertainty in the market. Also, when focusing on an even shorter timeframe after the release, unemployment figures seem to cause notable reactions in stock prices (Bartolini et al., 2008). Bartolini et al. (2008) observe that UR surprises do have a negative connection to stocks, indicating that a lower-than-expected unemployment announcement is followed by increase in the S&P 500. Interestingly, they find that later in the afternoon the price reaction is still visible but its direction reverses. Thus, the initial market response may be reassessed later in the day as new information arises.

Bartolini et al. (2008) also examine the impact of NFP figures, which are published in the same report. It is shown that a positive surprise in NFP causes a substantial positive reaction in equities within 30 minutes of the announcement. This means when the indicator says that job growth has exceeded expectations, stock prices quickly rise in response to signals about stronger economy. Conversely, negative NFP surprises lead to a decline in stock prices. Furthermore, with NFP, the magnitude of price reaction is categorized as "large" as it is greater than half of a standard deviation of the asset price (Bartolini et al., 2008). Unlike unemployment surprises, the impact of NFP releases doesn't persist anymore later in the afternoon, suggesting a quick and efficient market response.

This suggests that labor market announcements affect stock prices, but the reaction is quick, and visible right after the release rather than later during the day. As stated, this is likely because other news coming later in the day may drive overall daily price movements, overshadowing the immediate market reaction (Bartolini et al., 2008). Moreover, like with GDP surprises, Bartolini et al. (2008) find a robust stock price response to unemployment and NFP data surprises only once in their sample. This raises questions about the generalizability of their findings. Chi (2021) provides further evidence to this skepticism when re-examining the relationship with intraday data over the period 2015-2020. While unemployment rate surprises are still related to return volatility

immediately after the announcement, the initial daily-level finding of the negative connection disappears entirely when focusing on price changes within 30 minutes after the announcement. This may imply that either investors process the unemployment data gradually, or other concurrent news are responsible for driving changes in daily returns rather than labor market indicator releases. Altogether, the rarity of consistent and robust effects suggests that it is possible that neither UR or NFP surprises cause systematic impact nor have a notable connection with stock prices after all.

4.3 Impact of interest rate announcements

Compared to output and labor market indicator releases, policy rate announcements show a clearer, more significant and consistent connection to stock prices. On a monthly level, Ioannidis and Kontonikas (2008) show that in several developed OECD economies, policy rate hikes are associated with stock market declines within the same month. This indicates a negative relationship between interest rate changes and equities. It goes in line with the theoretical expectation, derived from the logic of asset pricing formulas and the DCF model, that higher interest rates will lower equity valuations. Moreover, it appears that central bank policy rate changes can explain a relatively large portion of monthly stock price movements, reinforcing the view that interest changes are in negative relation to stock markets (Ioannidis & Kontonikas, 2008). However, as is known by now, a wide range of other information occurs during a month, which may affect equities as well. This can distort the observed monthly connection and therefore too strong conclusions shouldn't be drawn from it.

To overcome the limitations of monthly-level analysis, Bernanke and Kuttner (2005) study the impact of policy rate announcements on stock prices using daily returns from 1989 to 2002. They focus specifically on the surprise component of FOMC decisions, defined as the difference between the actual policy rate announced and the expected rate. The expectations are derived from price changes in Federal funds futures.

To note, a policy rate decision can surprise markets, not only when the rate is hiked or cut unexpectedly lot, but also when the change is smaller than anticipated. (Bernanke & Kuttner, 2005; Birru & Figlewski, 2010). For instance, in December 2007 the Fed cut rates by 25 basis points (bp) instead of the expected 50, which triggered a 2,93% drop in the S&P 500 within 2 hours from the announcement (Birru & Figlewski, 2010). Also, consistent with the EMH, Bernanke and Kuttner (2005) show that interest rate decisions aligning with market expectations don't affect stock prices, as this information is already priced in. Interestingly however, they find that when the Fed unexpectedly leaves the rate unchanged, markets tend to show no reaction despite the surprise. This can reflect that markets still anticipate a rate change in the near future and thus this "no change" surprise is less impactful.

Nonetheless, Bernanke and Kuttner (2005) main finding aligns with monthly-level observations: unexpected policy rate changes are negatively associated with stocks. In other words, unexpected rate cuts increase stock prices, whereas unexpected rate hike are followed by declines. Specifically, a 1% surprise rate cut is estimated to lead to a 4,68% rise in one-day stock returns (Bernanke & Kuttner, 2005).

However, before 1994, FOMC decisions weren't officially announced. Instead, markets had to infer interest rate changes from the Fed's actions. Furthermore, until 1994 employment reports were released earlier on the same day as FOMC meetings, making it difficult to assess whether stock markets react to the interest rate announcement or to labor market indicators. To address this, Bernanke and Kuttner (2005) divide their sample into pre- and post- 1994 and use a dummy variable to help. By isolating the effect of employment reports, they find no notable stock price reactions around FOMC meetings prior to 1994. This suggests before 1994, market reactions in daily returns on FOMC announcement days were mainly driven by employment data rather than policy rate changes. Nevertheless, after 1994, when policy rate decisions became officially announced on separate days from employment reports, the inverse impact of unexpected rate changes on stock prices becomes more visible and pronounced. This likely reflects

improved transparency in monetary policy brought by official announcements, enhancing market's ability to respond to interest changes and making their effects on equities clearer to observe. Hence, Bernanke and Kuttner (2005) conclude that, on average, a surprising 0,25% cut in interest rates is associated with a 1% increase in stock indexes, confirming the negative relationship with stock markets.

Still one can argue that policy rates are adjusted in response to stock market movements. Yet, Bernanke and Kuttner (2005) find no evidence of this on a daily basis, suggesting that the causality primarily runs from policy rate changes to stock price reactions rather than other way around. This is supported by Birru and Figlewski (2010), as they analyze equity price responses not only on daily level but also within a narrower time window – the first 10 minutes right after FOMC announcements. This approach also allows to analyze the efficiency of the price adjustment.

Their data from 2005-2008 shows that a surprising interest rate hike of 25 basis points led to approximately 6,6 basis point drop in the S&P 500 that day (-0,43% at that time). Focusing on the first 10 minutes after the announcement reveals an even stronger negative relationship. On average, within 10 minutes of the FOCM announcement the S&P 500 moves 7,5 basis points in the opposite direction of the policy rate change.

Interestingly, although the EMH proposes that prices should adjust to unanticipated rate changes immediately, this may not fully hold according to Birru and Figlewski (2010). This is because, as expected, volatility peaks right after the announcement, but instead of setting back, it remains elevated through the day — staying over twice as high as before the announcement. This suggests that price adjustment continues beyond the initial reaction, indicating that markets fail to efficiently absorb this new information at once., Especially to positive surprises (rate cuts), market reaction appears to be delayed: 49% of the total upward stock price movement occurs only after the first 10-minute time window. For instance, while the immediate reaction averages 7,5 basis points, the total daily level adjustment reaches 18 bp (Birru &Figlewski, 2010). This indicates the price

reaction to a surprising interest rate cut is *slow* on a daily basis, as equities continue to adjust after the initial shock and highlights a possible inefficiency in market response. However, this pattern is less evident for negative surprises (rate hikes). They are typically nearly fully priced in within the first 10 minutes, with no notable adjustment observed later in the day (Birru & Figlewski, 2010).
This suggests that while policy rate changes have a clear impact on equities, the speed of price adjustment is asymmetric: negative surprises are absorbed rapidly, whereas positive surprises trigger a slower, more prolonged response (Birru & Figlewski, 2010). This may also imply that negative shocks could trigger smaller daily price fluctuations than positive ones as the latter continue to drive prices beyond the initial reaction.

Gürkaynak et al. (2005) also study the impact of FOMC policy rate changes on equities, using nearly the same sample period as Bernanke and Kuttner (2005). But in addition to daily returns, they also focus on a narrower time window which covers 10 minutes before, and 20 minutes after the announcement. Although daily and intraday price responses are mainly congruent, the few discrepancies before 1994 may stem from the timing of employment report releases as discussed. This highlights the advantage of using the intraday data. As expected, Gürkaynak, et al. (2005) findings confirm the inverse relationship between interest rates and stocks. Roughly 0,25% unexpected rate hike leads to a decline of just over 1% in S&P 500, while surprising rate hike of 1% causes a 4,3% drop.

Moreover, whereas Bernanke and Kuttner (2005) argue that 'no change' decision, even if it would be a surprise for the market, doesn’t affect stock prices, later studies challenge this view. Both Birru and Figlewski (2010) and Gürkaynak, et al. (2005), show that even fully expected ‘no change' decisions can occasionally have notable impact on the stock market. One clear example is from January 2004. At that time the policy rate was left unchanged as expected, meaning the numerical surprise is zero. Despite this, that FOMC decision triggered a substantial reaction in asset prices (Gürkaynak, et al., 2005). This suggests asset prices can fluctuate a lot even in the absence of a numerical surprise in

interest rates decisions. Additionally, since the FOMC decides on the policy rate in scheduled meetings only about 8 times a year, the average interest rate change per announcement is only 0,03% (Swanson & Vishuddhi, 2024). This further highlights that the impact may not only limit to the actual rate changes itself. Also, since 1994, FOMC decisions have been accompanied by statements explaining the rationale behind the announced rate change and possibly offering hints about future decisions. Hence, Gürkaynak, et al. (2005) extend the analysis beyond numerical policy rate surprises and also examine how this accompanying FOMC communication – such as statements about future monetary policy and economic outlook – affects equities.

With this extension it appears that this forward guidance plays a key role in shaping market reactions not only in bond markets but also in the stock market. Specifically, when the FOMC includes unexpected forward-looking statements about potential upcoming decisions, such as a 1% surprise related to future rate hikes, the S&P500 may fall by about 1% even without an actual rate change (Gürkaynak, et al., 2005). In addition, while equity markets tend to react almost immediately to actual interest rate changes, forward guidance information takes longer to digest and be incorporated into stock prices (Gürkaynak, et al., 2005). This slower adjustment to statements may explain the occasional delayed stock price reactions to policy rate announcements, continuing beyond the first 10 minutes as noted by Birru and Figlewski (2010). Thus, while unexpected changes in actual interest rates remain as main driver of stock price movements, FOMC statements can also influence the reaction or even alone move markets. That is, numerical rate surprises tend to trigger the strongest inverse reactions, but the accompanying communication plays an important role too. This is also confirmed with more recent intraday data extending up to 2023 (Swanson & Vishuddhi, 2024).

But in addition to the statements in official announcements, individual FOMC members, such as the Chair of the FED, frequently give public speeches to share their views on the economy. Also, since 2011, policy rate decisions have been followed by a press conference where the Committee answers media questioning about its views on the economy

and future monetary policy. Thus, these additional communication channels are closely monitored by market participants seeking signals of future rate moves. Accordingly, Swanson and Vishuddhi (2024) consider also this broader communication of the FOMC.

They find that, as single events, the impact of surprises from FOMC press conferences on the stock market has grown significantly and approaches the importance of numerical interest rate surprises. When measured by the absolute mean change in stock prices per announcement, press conferences appear to trigger fluctuations as large, if not larger, than the those caused by the official policy rate decisions. Moreover, forward guidance delivered during press conference, in fact, appears to have a stronger influence than the guidance in the official decision statements (Swanson & Vishuddhi, 2024). Chair speeches, while as a single event are less impactful, are still shown to trigger an average 0,11% drop in stocks, if they contain unexpected hints of tightening monetary policy.

Cumulatively, the importance of FOMC communication about the policy rate is even more pronounced. The Chairman speeches generate the greatest effect on cumulative stock returns, being approximately 50% more important than the second biggest effect having FOMC announcements. Though, this dominance stems mainly from their frequency, as Chair speeches occur way more often than scheduled policy meetings. Accordingly, FOMC press conferences surprises have a relatively small cumulative role in stock market fluctuations, because they were only introduced in 2011. However, as mentioned, their importance has grown substantially, and by 2023, press conferences occasionally move the markets even more than either official announcements or Chair speeches (Swanson & Vishuddhi, 2024).

Swanson and Vishuddhi (2024) further point that the significance of central bank communication has evolved over time. Before the 21st century, surprises in the numeral policy rate had a bit stronger market impact, partly due to less transparent forward guidance. After turn of the millennium, the Fed has become more transparent, informing more about the near-term outlook for the policy rate. This has increased the

predictability of interest rate changes in advance, and it reduces the element of surprise in policy rate announcements. Especially clear this shift became after the 2008 financial crisis, and during the COVID-19 pandemic in 2020, when interest rates were cut near zero. In both cases the FOMC began focusing entirely on forward guidance. As a result, market attention shifted towards communication, making asset price responses driven more by FOMC press conferences and statements rather than the interest rate decision itself. Also, in recent years 2020-2023 even when FOMC press conferences and Chairman speeches have potentially been less informative about rate changes, they have still been moving markets substantially. (Swanson & Vishuddhi, 2024). This further underlines the grown importance of central bank communication.

Together, these findings demonstrate that while numerical surprises in policy rates remain the primary driver of stock price movements, FOMC communication plays a crucial complementary role. As many studies focus only on numerical surprises, they overlook the role of communication in market reactions, particularly when the rate decision is well anticipated due to earlier guidance. In such cases, market reactions may be tenuous and reflect prior communication rather than the announcement itself. Moreover, since forward guidance can reduce the element of surprise in interest rate decisions, it may also dampen the impact of other macroeconomic releases - such as unexpected employment or output figures. This is because such indicators are closely tied to interest rate expectations and their information may already be priced in the stock market if the Fed has communicated its economic outlook in advance. This highlights the need to consider not only numerical surprises themselves, but also the broader contextual aspects when analyzing how of economic indicators impact the equity markets.

5 Considering the Contextual aspects in stock market reactions

As chapter 4 indicates, among the key economic indicators, the policy rate seems to be the salient, as it is the only one with a clear consistent effect on stock prices. Of course, this may stem from its slightly forward-looking nature, unlike traditional activity or output indicators, which typically provide lagging information. Still, the finding is intriguing when viewed through the lens of the rational investor assumption and proxy hypothesis, which implicitly suggest a link between macroeconomic activity and asset prices. In fact, when comparing average excess stock returns on announcement days to average excess returns of all the other days, contradicting evidence appears. In this comparison, excess returns are clearly higher on the days when economic indicators are released (Savor & Wilson, 2013). This implies, in contrast to the previous studies, that other macroeconomic announcements as well do affect stock prices. It raises the question: why have previous studies failed to capture consistent effects?

One reason may lie in the methodology. In the earlier reviewed baseline studies, price reactions are typically analyzed in aggregate, without accounting for time-varying factors such as the economic cycle or prevailing investor sentiment. This chapter addresses that gap by examining how macroeconomic indicator releases influence equities when these contextual factors are considered.

5.1 The role of economic cycle

When accounting for the state of the economy stock market responses to macroeconomic data surprises differ from baseline findings, becoming more evident and systematic. McQueen and Roley (1993) divide their sample period based on the business cycle phases and study the impact of economic indicators on daily changes in the S&P 500 index. They reveal that particularly during expansions “good news” related to economic activity – such as unemployment rates below expectations or output exceeding them –

is actually “bad news” for equities. For example, in a high economic state, an unanticipated 1% increase in industrial production is on average followed by a 0,84% drop in stock prices. Likewise, a surprising 1% decline in unemployment rate leads to a 2,2% fall in the index. Respectively, during contractions the signs of the price changes reverses: stronger than expected IP growth and surprisingly low unemployment increase stock prices, although the effect is less pronounced in the low state in their sample. (McQueen & Roley, 1993). Nevertheless, this pattern indicates that positive economic surprises depress equities during booms.

Boyd et al. (2005) confirm the state-dependent nature of stock market reactions to unemployment rate surprises with a longer study period. But, in contrast to McQueen and Roley (1993), according to Boyd et al. (2005) the effect is considerably more pronounced in contractions than in expansions. Defining “bad news” as a higher-than-expected unemployment rate and “good news” as a lower one, they find UR releases cause robust, but asymmetric effects on stock returns. During contractions, the impact is roughly similar in magnitude but opposite in direction: bad news leads on average to a fall of -0,24%, and good news to a 0,36% climb in two-day cumulative S&P 500 returns covering the days around the announcement. However, in expansions the pattern reverses: bad news lifts returns by 0,41%, while good news causes a marginal -0,01% decline (Boyd, et al., 2005). Naturally, most of the reaction occurs on the announcement day. These results highlight the asymmetric pattern: stock prices respond negatively to UR surprises in contractions, but positively in expansions.

Supporting evidence with shorter, but slightly more recent, period is also providing Funke and Matsuda (2006). In their full sample, only policy rates systematically affect stock prices. However, when the business cycle and market conditions are considered, the results reveal that GDP and unemployment surprises also impacts daily stock returns. Though, the direction of these effects varies between booms and recessions. In boom periods, positive GDP growth and employment news tends to dampen equities, whereas during recessions those same news have a positive effect (Funke & Matsuda, 2006).

With high-frequency return data Andersen et al. (2007) also come to aligning results. Across the full sample there aren't any significant immediate responses in S&P 500 returns to macroeconomic indicator surprises. However, when separating expansion and contractions, not only the asymmetrical, but also immediate impact emerges. During contractions bad news, such as lower-than-expected GDP or higher unemployment has the traditionally-expected negative effect on equities. In expansions, however, the same surprises tend to boost stock prices. Similarly, good news seems to decline stock prices in expansions, but raise them in contractions (Andersen et al., 2007). Most recently, this pattern occurs during the Covid -19 crisis too. When treating the pandemic as a recessionary phase, the stock market responded with increases to good macroeconomic news and with declines to bad news. This indicates the positive connection between economic indicators and equity returns during periods of economic weakness (Bouzgarrou et al., 2023).

To explain these asymmetric reactions to activity indicators, stock price responses can be decomposed into changes in expected cash flows and the discount rate component. McQueen and Roley (1993) argue that the variation is not due to equity discount rate changes, which tend to respond similarly regardless of the business cycle. Instead, they attribute the asymmetry to differences in revisions of the cash flow component across economic states: in expansions, positive news cause downward revision in cash flows, while in contractions, positive news lead to upward revisions in the CFs (McQueen & Roley, 1993).

However, later studies provide a bit different and more nuanced explanation from their stock price decomposition. Based on stock-bond correlation, Andersen et al. (2007) suggest that the asymmetry in stock price responses arises from a systematically shifting dominance between the cash flow and discount rate components across the economic cycle. In expansions, reactions to macroeconomic indicators are primarily caused by changes in the discount rate, whereas in contractions, cash flow revisions become the primary driver of stock price responses.

Supporting this, Boyd et al. (2005) suggests that across business cycles the expected cash flow (CF) component moves positively with the "nature" of macroeconomic surprise – good news increase the CF, bad news decreases it. Meanwhile, the relationship between the equity risk premium and the nature of news is inverse – good news lower it; bad news raise it – but this happens only during expansions (Boyd et al., 2005). They also demonstrate that when pricing in macroeconomic information during contractions, the effect of CF revisions is 50% stronger compared to expansions. Conversely at the same time, revisions in the equity risk premium and the discount rate are negligible. Thus, in downturns stock price responses are primarily driven by revisions in the CF component. Also, given the positive correlation between cash flow revisions and macroeconomic indicator surprises, this explains why in downturns, stock prices tend to move in the same direction as the surprise – rising on positive news and falling with negative ones.

Conversely, during expansions, the influence of cash flow revisions weakens substantially. And instead, changes in the equity risk premium and discount rate become more dominant in stock price fluctuations. Boyd et al. (2005) show that in economic expansions, bad unemployment news tends to particularly increase the risk premium and thus the discount rate, which would typically lower stock valuations. Yet paradoxically, as said, Boyd et al. (2005) observe that equities still rise following weak unemployment figures in expansions. This is explained by the overriding role of interest rate expectations. While both CF and the risk premium are affected by macroeconomic indicators, during upturns, bad news tend to lower the interest rate expectations, reducing the discount rate overall. This decline in interest rate expectations is often so large that it outweighs the adverse effects of bad news on both the CF and risk premium, which ultimately leads to higher stock valuations despite the negative macroeconomic signals (Boyd et al., 2005).

In short: during expansions stock price responses to macroeconomic indicator surprises are dominantly driven by changes in the discount rate, while cash flow expectations remain relatively stable. As a result, "good news" in expansions is often interpreted as a sign of overheating economy, leading to expectations of the central bank interest rate

hikes in order to control the economy. This raises the discount rate which after all lowers stock prices even when the news itself are positive. Conversely, in this pattern, bad news during expansions generate expectations of the monetary easing, which lowers the discount rate and boosts valuations, even though the indicator signals weakening economy. In contractions, this mechanism reverses. The discount rate factor remains largely untouched, and price movements are mainly driven by revisions in expected cash flows. As a result, “bad news” depresses equities, while “good news” raises them in downturns.

Consequently, this economic cycle-dependent asymmetry in stock price responses is likely one reason why baseline studies often fail to detect significant effects. The dominant driver of market reactions shifts with the business cycle, which may stem from a varying investor focus on central bank actions. During expansions investors place greater emphasis on monetary policy, making the discount rate the key driver. In downturns, however, attention turns toward earnings prospects and cash flow revisions, reducing the role of central bank actions. This cyclical variation in investor focus can lead to opposite price movements to the same macroeconomic surprise. As a result, studies ignoring economic conditions may observe that stock price reactions cancel each other out, making the average impact seem minor or nonexistent. Sure, it is also possible that macroeconomic releases would shift both the cash flows and interest rate expectations in the same direction, offsetting each other’s effects on equities (Patatoukas, 2021). This could also explain the insignificant connection in the baseline evidence.

Moreover, the timing and duration of stock price reactions may also explain the mixed findings in the earlier research. To capture the immediate responses, Andersen et al. (2007) analyze stock market movements starting from 10 minutes before macroeconomic announcement and continue in 5-minute intervals for 90 minutes after the release. They find that stock price reactions are near instantaneous. Any notable movements happen within the first five minutes following the announcement and then tend to “drown” in the day-to-day price fluctuations. For example, during expansions positive surprises from employment indicators caused an immediate 0,2% drop in stocks, which

then begins to reverse back within just a few minutes. Additionally, some evidence points to a pre-announcement drift, which means that the prices begin to respond even before the official release time of macroeconomic data. Kurov et al. (2016) show that for economic activity indicators like GDP and industrial production, a substantial portion of the total price adjustment occurs within 30 minutes before the announcement, already moving in the "correct" direction relative to the upcoming surprise. And by the time the data is released, 56% of the total stock price reaction to GDP surprises and 60% to IP surprises has already materialized. A similar pattern is found with FOMC announcements too (Lucca & Moench, 2015).

Hence, this immediate occurrence and transience of price reactions may be another reason why many studies using daily or lower-frequency return data fail to reveal any systematic stock market effect of macroeconomic indicator releases. Also, because many studies focus solely on price fluctuations after the official announcements, they overlook potential pre-announcement drift. This implies that both the speed and timing of stock price responses contribute to the seemingly weak or nonexistent effects documented in baseline literature.

Unlike with real economy indicators, the direction of stock market reactions to policy rate surprises generally doesn't' exhibit similar business cycle-dependent asymmetry (Basistha & Kurov, 2008). Instead, equities tend to respond in the same direction after a similar surprise across economic phases: declining after unexpected rate hikes and rising after cuts, as shown in chapter 4. However, a few exceptions exist. According to Funke and Masuda (2006), during economic expansions rising policy rates directly lowers stock prices by raising the discount rate. Nevertheless, in downturns they find a positive relationship, meaning unexpected interest rate cuts decrease stocks while rate hikes can lead to increases. Similarly, Kontonikas et al. (2013) report that while in normal periods policy rate changes generally have an inverse effect on stock market, this pattern shifts substantially during severe economic downturns. Analysis of S&P 500 daily returns during the 2007-2009 financial crisis reveals that a 1% unexpected rate cut leads to

approximately 2% drop in stock prices (Kontonikas et al., 2013). This suggests an asymmetry: the usual negative effect of rate hikes and positive effect of rate cuts may reverse in deep economic downturns.

According to Funke and Matsuda (2006) this asymmetry stems from how markets interpret interest changes during downturns. In downturns interest rate hikes may be seen as a signal of central bank confidence in future economic growth, triggering such strong upward revisions in earnings expectations that outweigh the negative discount rate effect – especially as the cash flow expectations dominate. Respectively, during crisis periods, unexpected rate cuts may be interpreted as an indication that the central bank holds deteriorating view on future economic conditions. This may weaken investor sentiment and cash flow expectations and thus depress stock valuations despite the rate cut.

Further support for this reasoning behind asymmetric stock market reactions to interest rate changes comes from Andersen et al. (2007), whose findings on stock-bond correlations indicate that equities and bonds move in the same direction during expansions, but in opposite direction during contractions. Hence, in downturns rising interest rates, while depressing bond prices, may simultaneously lift stock prices due to the inverse relationship between stocks and bonds in such economic conditions. Kontonikas et al. (2013) complement this explanation through a flight-to-safety mechanism. In severe downturns, as interest rate cuts may signal deteriorating economic outlook, they may decrease bond yields sharply, as investors shift from equities to safe-haven assets like bonds (Kontonikas et al., 2013). This shift in demand raises bond prices even more but weakens demand for equities, ultimately causing stock prices to fall despite the rate cut.

Notably, although the cyclical asymmetry in the direction of stock market responses to policy rate surprises is rare, the magnitude of price reactions appears to be more clearly business cycle dependent. As with the economic activity and output indicators, the impact of interest rate changes is also remarkably larger in downturns: at least twice as large as during expansion (Basistha & Kurov, 2008).

To summarize this subchapter, it appears that the key macroeconomic data releases do impact stock prices, but the effects may remain hidden unless certain factors are accounted for. First, stock market reactions to macroeconomic indicators vary across the economic cycle due to shifting investor focus between earnings expectations and monetary policy. This asymmetry can lead to opposite reactions to similar news, cancelling each other out in average-based analyses. Second, price reactions tend to occur within very short timeframes, often within minutes after the release, making it difficult to detect them when using daily or coarser return data. Third, a substantial portion — sometimes even more than 50% of the total price reaction — may take place even before the official data release due to pre-announcement drift. Therefore, when focusing solely on post-announcement returns the true market impact might be underestimated or missed.

However, beyond the economic cycle, these asymmetries in stock price reactions may also be shaped by prevailing investor sentiment and the state of the equity market (bull vs bear). This is because both the phase of the economic cycle and market sentiment influence how markets interpret and react to macroeconomic surprises at the time of their release. Because sentiment and market tone can shift within a single phase of the economic cycle, relying solely on economic conditions may not fully capture the time-varying nature of stock price responses (Heinlen & Lepori, 2022). The role of investor sentiment will therefore be discussed in the next subchapter.

5.2 The role of prevailing investor sentiment in market reactions

Heinlen and Lepori (2022) examine daily stock prices in the UK from 1998 to 2017 and find that GDP and IP announcements have a state-dependent impact on not only across the business cycle but also between bull and bear markets. Consistent with the earlier chapter, they confirm that in expansions alone the better-than-expected economic growth figures tend to lower stock prices, while weaker figures lift them. This counterintuitive pattern remains visible in expansions that coincide with bear markets: bad news seems to raise equities – likely due to expectations of monetary easing. However, an

asymmetry also emerges between these stock market regimes: although economic growth surprises typically have negative connection to equities in expansions alone, this reverses in bullish markets. In expansions combined with strong market sentiment, positive surprises increase stock prices, while negative surprises trigger declines.

One possible explanation for this stock market regime dependent asymmetry is the investor sentiment. According to Heinlen and Lepori (2022) varying strength of two sentiment-related phenomena – overconfidence and disposition effect – shape how news are interpreted and cause stocks to respond differently in various market conditions. Overconfidence, the investors' tendency to overestimate both their ability to value securities and strength of the economy, tends to be stronger during bull markets when sentiment is high. This may lead to overreactions to positive news. In turn, disposition effect, the tendency to sell winners and hold losers, is also stronger during certain market phases (Heinlen & Lepori, 2022).

Moreover, Heinlen and Lepori (2022) reason that asymmetry in stock price reactions across market regimes stems from how sentiment shapes investors' attention and reliance on central bank actions. In bear markets, investors seem to rely more on monetary policy responses, particularly after negative surprises, expecting that weak data will trigger interest rate cuts. In contrast, during bull markets with high sentiment, central bank actions seem to attract less attention, and price movements are driven more directly by growth expectations. Thus, even within the same phase of the economic cycle, the prevailing market sentiment can alter the direction of stock price responses to macroeconomic indicator releases.

While Heinlen and Lepori (2022) demonstrate that investor sentiment and stock market conditions shape price reactions to economic indicators, Birz and Lott (2011) provide complementary evidence. They argue that market reactions depend not only on whether an indicator figure exceeds or falls short of forecasts but also on how the economic data surprise is presented in the media and interpreted by investors at the time of release.

Specifically, the same numerical surprise can be interpreted differently depending on the prevailing phase of the economic cycle and market sentiment. For example, a GDP surprise of 1,2% above expectations, was in one case reported with the headline “U.S economy grew at a slower pace”, leading to a negative reaction. But in another case, the same surprise was under the headline “U.S economy raises strong” and was perceived as positive news (Birz & Lott, 2011). This underlines that the economic context and market sentiment can affect how macroeconomic data is perceived and how it moves markets.

To incorporate the role of interpretation in how macroeconomic indicator releases impact daily S&P 500 returns, Birz and Lott (2011) construct a news index based on the number and tone of newspaper headlines related to GDP and unemployment rate. This news index serves as a proxy for measuring how investors perceive the data at the time of release, allowing also analysis of market reactions beyond the raw numerical surprise.

First, although accounting for the economic cycle, they find no significant effect from the surprise component alone on the stock returns. However, when considering the way macroeconomic data is framed in the news, notable connections emerge. They find that increase in news coverage which report the GDP in a positive tone is associated with rising stock prices, while negative framing leads to declines. A similar pattern holds for unemployment data: when change in unemployment is presented positively in the media stock returns increase, while negatively framed releases depress equities. On average, a one standard deviation increase in GDP-related news coverage raises S&P 500 returns by 0,36%, while a similar increase in unemployment- related coverage yields a 0,31% rise.

Therefore, Birz and Lott (2011) confirm that stock market reactions to macroeconomic indicators are not solely driven by the data itself but also by investor sentiment and the way the announcements are interpreted and contextualized at the time of release. This complements Heinlen and Lepori (2022): while stock market conditions influence

investor sentiment, media framing can shape how investors respond to economic figures and potentially modify the price reactions.

In addition to influencing the direction of stock market reactions asymmetrically, investor sentiment may also shape the magnitude of price movements driven by economic data. Chen and Lien (2017) examine this by comparing daily excess stock returns on macroeconomic announcement days to other trading days, using data up to 2010. So instead of focusing on the surprise component, they analyze the return difference between these two groups. Aggregating daily excess returns within each month, the average excess return on announcement days is 1,46%, compared to just 0,28% on other days.

While Savor and Wilson (2013) attribute the higher returns on release days to a risk-return trade off, Chen and Lien (2017) suggest that investor sentiment might, in fact, also be in a key role. They use the Baker-Wurgler index to measure sentiment on days when key macroeconomic indicators, unemployment rate and FOMC interest rate decisions, are released. Their findings indicate that the impact of these releases on stock prices is stronger during periods of high sentiment. Respectively, the price reaction is weaker when sentiment is low. Interestingly, this sentiment effect is stronger during expansions than during recessions. (Chen & Lien, 2017). That is, when the economy is doing well, investor sentiment plays a greater role in how macroeconomic data is interpreted and how intensively is their impact.

Chen and Lien (2017) propose that this asymmetry in price reaction intensity across market sentiment periods may stem from increased presence of “noise traders” during high sentiment. These traders may overreact to economic data and amplify the market impact of announcements. Additionally, when the sentiment is high, good macroeconomic figures can trigger substantial increases in equities due to overconfidence, optimism and investors who get overly excited about positive releases (Chen & Lien, 2017). Respectively, weak macro statistics may not cause equivalent declines, as overconfident and irrational market participants trust market to recover despite negative signals.

In contrast, low sentiment periods are characterized by more pessimistic and risk-averse investors, with typically fewer noise traders in the market. As a result, positive macroeconomic figures may not trigger such notable upward movements in equities than in high sentiment. And meanwhile, weak figures may still lead to declines, but the stock price changes may be less intensive. This is because in low sentiment periods pessimistic investors may already be prepared for negative news and thus less prone to overreaction.

When focusing purely on the surprise component of macroeconomic indicator releases and investor sentiment, the asymmetry in stock price reaction intensity is found as well. But interestingly, the intensity is reversed. The impact of macroeconomic data appears to be stronger during low sentiment periods and weaker when sentiment is high (Kurov, 2010, Gu et al., 2021).

Kurov (2010) studies how unexpected changes in FOMC interest rate decisions affect equities under varying sentiment, using the BW index to measure sentiment. He also uses a survey-based bullish/bearish ratio as an alternative measure. Building on daily changes in the S&P 500, his findings show that stock prices respond significantly more strongly to interest rate surprises when market sentiment is low at the time of the announcement. A hypothetical, unexpected 1% interest rate cut leads to a modest 0,68% increase in stocks during bull market, but triggers a remarkable jump of 11,85% during bear market (Kurov, 2010). Moreover, this effect is more pronounced for stocks with high beta to credit market conditions, because interest rate changes more heavily affect financially constrained firms' ability to service debt in bear markets (Kurov, 2010).

Gu et al. (2021) observe similar results regarding economic activity indicators. Using intraday S&P 500 return data from 1998 to 2016 they analyze how investor sentiment influences the immediate stock price reaction to indicator surprises. Based on price changes from 5 minutes before to 5 minutes after the release, they find that the impact of macroeconomic indicator surprises is approximately 50% stronger during low

sentiment compared to high sentiment periods. That is, during bullish sentiment the effect of economic data dampens notably. This asymmetry is especially evident for labor market indicators like nonfarm payrolls and the unemployment rate. It is also observed with output indicators such as GDP and industrial production, but not as significant. A similar pattern emerged during the COVID-19 pandemic too, when rising uncertainty and weakening sentiment increased the attention paid to macroeconomic indicators and amplified their effect on equities (Bouzgarrou, 2023).

An explanation for this asymmetry in the magnitude of stock price responses is provided through two behavioral mechanisms. The first relates to investor inattention. During bear markets investors are likely to direct more of their limited information-processing capacity and attention to fundamental signals, such as economic indicator releases and monetary policy decisions. This heightened attention may be due to intensified media coverage of macroeconomic conditions, and a stronger reliance on the central bank which is often seen as a “savior” or stabilizer that sets a “floor” for stock prices in bear markets (Kurov, 2010). As a result, markets tend to be more alert to macroeconomic data releases, which amplifies their impact on equity markets during low sentiment.

The second mechanism is grounded in behavioral finance. In high and optimistic sentiment, the traditional risk -return tradeoff may be undermined and instead investors may more likely rely on irrational heuristics in information processing (Gu et al., 2021). As a result, markets become less sensitive and attentive to fundamental information, leading macroeconomic data to have muted impact when sentiment is high. In contrast, when sentiment is low, investors are more likely to process information in a more rational and systematic manner, making markets more attentive and responsive to macroeconomic fundamentals and causing stronger price reactions during bear markets.

So, these mechanisms help explain why stock price adjustments to macroeconomic data releases are asymmetric in intensity. They also shed light on why earlier studies that

ignore market sentiment, and assume uniform investors behavior, often fail to find consistent relationship between macroeconomic indicators and equity returns.

5.3 Stock market responses to Good vs. Bad Macroeconomic news

According to Gu et al. (2021), the amplifying effect of low investor sentiment applies to both good and bad news similarly. In other words, stock price reactions to macro announcements would be stronger during bear markets, regardless of whether the surprise in the data is positive or negative.

However, Veronesi (1999) based on theoretical arguments, indicates that stock markets respond more strongly to negative surprises than positive, particularly during good times. He argues that during such periods, bad news leads to sharper stock declines because investors overreact, interpreting the news as a sign of increasing uncertainty and therefore demanding higher risk premium. Conversely, good news during bad times don't trigger equally strong response. This is because while good news may reduce uncertainty, they do not increase investors' risk appetite in the same extent. In other words, bad news hits harder as investors panic, risk premium increases and investors quickly become risk-averse. And in contrast, good news have smaller effect, since investors possibly won't become risk-seeking as quickly. Bozgarrou et al. (2023) empirically confirm this phenomenon during the COVID-19 pandemic.

Consistent with Veronesi (1999), Medovikov (2016) also finds that stock prices react more sharply to negative than positive macroeconomic news. Nevertheless, his study differs slightly by providing empirical evidence and demonstrating that this asymmetry can be exploited in practice.

Medovikov (2016) reinforces the idea of Birz and Lott (2011) that market reaction to macroeconomic data depends not only on the numbers, but also on how that

information is interpreted. He follows a similar approach to Birz and Lott (2011), but instead of focusing just on headlines, Medovikov (2016) constructs a more comprehensive macroeconomic news index based on full textual review of newswires related to employment, output and monetary policy for example. This improves the interpretation and enable more accurate classification of the economic releases as "good, bad, or neutral". Additionally, this news index captures not only quantitative, numerical surprises, but also incorporates qualitative, non-data-driven, content such as comments from policy officials. Thus, the index provides a broader measure of how markets perceive the macroeconomic data. Since most indicators are published monthly, the news index is constructed on a monthly level, summarizing whether the month's view of the economy is positive or negative.

Analyzing the performance of the S&P 500 from 1999 to 2014 Medovikov (2016) finds that negatively framed macroeconomic news have a stronger impact on stock prices than positively framed news, regardless of the economic cycle. In months when the index signals bad news, equities decline significantly, whereas equally good news months trigger only modest increases in the S&P 500. Importantly, it appears that only when indicators signal particularly weak macroeconomic development, does the stock market really react (Medovikov, 2016). This is because the stock market effect of macroeconomic indicators is skewed heavily toward the most unfavorable releases. That is, the most negative announcements are, in fact, the ones which tend to systematically lead to meaningful declines in equity markets. Notably, this asymmetry remains even when eliminating the role of business cycle and numerical surprises, indicating that markets respond particularly to the negative tone and media framing of economic data (Medovikov, 2016). Thus, these findings also align with behavioral finance concepts, such as the prospect theory and loss aversion, as investors appear to be more sensitive to negative news.

Building on this pattern Medovikov (2016) develops two simple trading strategies that exploit his macroeconomic news index. The first strategy holds a long position in the S&P 500, but switches to short position if the news index signals negative interpretation of

the macroeconomy for the past month. The second strategy follows the same logic but applies a stricter rule: a short position is taken only when the news index indicates strongly unfavorable macroeconomic news. Naturally, both strategies are rebalanced at end of each month when the latest news index value becomes available.

Despite relying only on past month's public information, both strategies clearly outperform the benchmark S&P 500 in terms of annualized net return and risk-adjusted metrics, such as the Sharpe ratio and Jensen's alpha (see Appendix 2.). In particular, the second strategy yields over 4% annualized risk-adjusted excess return relative to the benchmark, suggesting that markets systematically fail to fully price negative macroeconomic news in timely manner (Medovikov, 2016). Also, for both strategies, the largest excess returns are gained during periods of economic downturns due to effective loss avoidance through short positions. These short positions help both strategies to profit from and avoid the most severe losses in the benchmark, which may result from investor loss aversion and underreaction to negative macroeconomic news.

Altogether Medovikov (2016) reveals a delayed price drift in response to certain macroeconomic information, challenging both the weak and semi-strong forms of market efficiency. It is because this anomaly around macroeconomic data releases suggests that excess returns can be systematically earned through straightforward strategies based on lagging, publicly available information. The delayed price drift may stem from the investor inattention: intensified media coverage of extremely negative macroeconomic news may cause markets to process their full implications gradually, leading to continued stock price declines. But additionally, other behavioral mechanisms - such as overreaction, or underreaction to bad news and loss aversion – may also contribute to both the price drift anomaly and the stronger, asymmetrical reactions to negative macroeconomic indicator releases.

6 Conclusions

Based on existing literature, this thesis explores the stock market impact of macroeconomic indicator releases. The primarily focus is on, widely followed, key indicators – GDP, the unemployment rate and central bank interest rate decisions – and their impact on equity prices. The relationship is analyzed through common finance theories and compared with empirical evidence. The objective is to shed light on whether these announcements systematically impact stocks. If so, whether the effects are consistent in direction and magnitude, and whether they occur immediately and efficiently, as suggested by traditional asset pricing theory.

From the baseline analysis it seems that only interest rate decisions systematically move stock prices: unexpected rate cuts lead to increases, while hikes cause declines. In contrast, GDP and unemployment figures do not show notable or systematic impact on stock prices on their own. However, when the broader economic context, in the form of economic cycle and investor sentiment, is accounted for, the picture changes. In this light, all three indicators exhibit a more systematic effect on equity markets, supporting the first hypothesis of the thesis.

Nonetheless, the results challenge the second hypothesis. Similar unexpected information from macroeconomic data doesn't consistently lead to stock price reactions of the same direction or magnitude. Instead, the impact is asymmetrical and varies depending on the phase of the economic cycle and prevailing market sentiment, as they both influence how data is interpreted. During economic expansions, data on weakening macroeconomy often raises stock prices, while strong data tends to cause declines. In downturns, however, the traditional idea of good news driving equity markets up and bad news depresses them tends to hold.

This directional asymmetry is attributed to the shifting investor focus across the economic cycle. In economic upturns investors seem to focus more on potential central bank

responses to macroeconomic data, while in downturns monetary policy actions receive less emphasis. This is evident from the DCF model: during downturns indicator surprises primarily affect stock prices through revisions in cash flow expectations. But, in upturns the same news is priced in mainly through changes in the discount rate, driven by anticipated changes in policy rates. Thus, central bank expectations dominate in booms, while earnings expectations matter more in downturns, causing the directional asymmetry in stock market responses.

The findings in this thesis also reveal asymmetries in the magnitude stock market reactions. Notably, investor sentiment plays a key role in this. Macroeconomic indicator releases tend to cause even 50% stronger price movements at the times when market sentiment is low, as investors rely likely more on fundamental data and potential policy responses. Conversely, in bull market periods, they likely rely more on heuristics and emotions, partially ignoring fundamental information. Moreover, weak economic data seems to cause larger reactions than good, indicating asymmetry driven by behavioral factors such as loss aversion. These patterns further challenge the assumption of fully rational investors in traditional finance theories and contradict this paper's second hypothesis.

It is shown that media framing can also shape the interpretation of macroeconomic data releases. The same figures can be presented either positively or negatively depending on prevailing market sentiment and broader economic context, as their perceived meaning shifts relative to recent performance and expectations. Thus, the presence of asymmetric, context-dependent reactions of the stock market makes it harder to identify systematic pricing patterns, especially in studies that rely on averaged results and assume that macroeconomic releases affect stock prices in a vacuum. Furthermore, price reactions can be transient or even begin before the official release, which further complicates empirical identification.

The findings partly call into question the third hypothesis on market efficiency. While some of the literature reports immediate stock price adjustments, others document

delayed reactions, and post-announcement drift – particularly after weak macroeconomic releases. In fact, there is evidence indicating that investors can systematically earn abnormal returns by trading on delayed stock price reactions to weak macroeconomic data. This suggests an anomaly and challenges the assumption of market efficiency. So, with respect to macroeconomic data, markets appear to be so-called efficiently inefficient and therefore hypothesis 3 is partly rejected.

6.1 Practical relevance and future research

Taken together, the findings challenge the assumption of investor rationality underlying traditional finance theories. For investors, this means that market reactions to macroeconomic data releases cannot be taken as straightforward or intuitive. Strong economic data does not automatically lead to rising equity prices, nor do weak figures always trigger declines. Instead, the effects are asymmetric shaped by prevailing business conditions and investor sentiment. Recognizing this context-dependence is essential for understanding short-term market dynamics and for exploiting possible inefficiencies around macroeconomic data releases when seeking excess returns. Respectively, for academics, this paper's findings serve as a reminder to consider prevailing economic conditions and market sentiment when analyzing stock price reactions to scheduled events, such as macroeconomic data releases, to avoid misleading conclusions.

As shown, the impact of macroeconomic data on stock market is time-varying, and depends on economic conditions and market sentiment. Currently, it seems that U.S market sentiment could be weakening due to political uncertainty and recession risks (Krauskopf & Ahmed, 2025). Future research could therefore examine whether the findings of this thesis still apply in the current and near-future market environment, particularly during the current presidential term. For instance, whether stock investors monitor macroeconomic data more closely in low sentiment by amplifying their effects on the stock market. Or whether the traditional, intuitive price effect is realized in a possible economic slowdown or recession.

References

Andersen, T. G., Bollerslev, T., Diebold, F. X. & Jin (Ginger) Wu. (2005). A Framework for Exploring the Macroeconomic Determinants of Systematic Risk. *The American Economic Review*, 95(2), 398–404. http://www.jstor.org/stable/4132855

Andersen, T. G., Bollerslev, T., Diebold, F. X. & Vega, C. (2007). Real-time price discovery in global stock, bond and foreign exchange markets. *Journal of International Economics*, 73(2). https://doi.org/10.1016/j.jinteco.2007.02.004

Atanasov, V. (2021). Unemployment and aggregate stock returns. *Journal of Banking & Finance*, 129. https://doi.org/10.1016/j.jbankfin.2021.106159

Baker, M. & Wurgler, J (2006). Investor Sentiment and the Cross-section of Stock Returns. *The Journal of Finance*, 61, 1645-1680. https://doi.org/10.1111/j.1540-6261.2006.00885.x

Baker, M. & Wurgler, J. (2007). Investor Sentiment and the Cross-Section of Stock Returns. *The Journal of Finance*, 61(4), 1645-1680. https://doi.org/10.1111/j.1540-6261.2006.00885.x

Baker, M. & Wurgler, J. (2007). Investor Sentiment in the Stock Market. *The Journal of Economic Perspectives*, 21(2), 129–151. https://doi.org/10.1257/jep.21.2.129

Bartolini, L., Goldberg, L. S. & Sacarny, A. (2008). How Economic News Moves Markets. *Current Issues in Economics and Finance, 14(6)*. https://ssrn.com/abstract=1265074

Basistha, B. & Kurov, A. (2008). Macroeconomic cycles and the stock market's reaction to monetary policy. *Journal of Banking & Finance*, 32(12) 2606-2616. https://doi.org/10.1016/j.jbankfin.2008.05.012

Begovic, S., Momcilovic, M. & Jovin, S. (2013). Advantages and limitations of the discounted cash flow to firm valuation. *Skola biznisa*, (1), 38-47. Retrieved 4.1.2025 from https://www.researchgate.net/publication/269735859_Advantages_and_limitations_of_the_discounted_cash_flow_to_firm_valuation

Bernanke, B. S. & Kuttner, K. N. (2005). What Explains the Stock Market's Reaction to Federal Reserve Policy? *The Journal of Finance*, *60*(3), 1221–1257. https://doi.org/10.1111/j.1540-6261.2005.00760.x

Bernanke, B.S. & Blinder, A.S. (1992). The Federal Funds Rate and the Channels of Monetary Transmission. *The American Economic Review,* 82(4), 901-921. https://www.jstor.org/stable/2117350

Bhuiyan E.M. & Chowdhury, M. (2020). Macroeconomic variables and stock market indices: Asymmetric dynamics in the US and Canada. *The Quarterly Review of Economics and Finance,* 77, 62-74. https://doi.org/10.1016/j.qref.2019.10.005

Binswanger, M. (2000). Stock market booms and rea economic activity: Is this time different? *International Review of Economics & Finance*, 9(4), 387-415. https://doi.org/10.1016/S1059-0560(99)00056-8

Birru, J. & Figlewski, S. (2010). The impact of the Federal Reserve's Interest rate Target Announcement on Stock Prices: A Closer Look at how the Market Impounds New Information. *Working Paper*, New York University. http://dx.doi.org/10.2139/ssrn.1571938

Birz, G. & Lott J.R. (2011). The effect of macroeconomic news on stock returns: New evidence from newspaper coverage, *Journal of Banking & Finance, 35*(11), 2791-2800. https://doi.org/10.1016/j.jbankfin.2011.03.006

Blaine, C. (2025, 23. March). Economic Week Ahead: Reports will signal if slowdown is a real threat. *The Street*.

Bodie, Z., Kane, A. & Marcus, A.J. (2023). *Investments* (13th edition). McGraw-Hill Education.

Bouzgarrou, H., Ftiti, Z., Louhichi, W. & Yousfi, M. (2023). What can we learn about the market reaction to macroeconomic surprises? Evidence from the COVID-19 crisis. *Research in International Business and Finance*, 64, 101876. https://doi.org/10.1016/j.ribaf.2023.101876

Boyd, J. H., Hu, J. & Jagannathan, R. (2005). The Stock Market's Reaction to Unemployment News: Why Bad News Is Usually Good for Stocks. *The Journal of Finance*, *60*(2), 649–672. https://doi.org/10.1111/j.1540-6261.2005.00742.x

Bureau of Economic Analysis. (2023). *Gross Domestic Product*. Retrieved 27.12.2024 from https://www.bea.gov/resources/learning-center/what-to-know-gdp

Camilleri, S.J., Scicluna N. & Bai Y. (2019). Do stock markets lead or lag macroeconomic variables? Evidence from selected from select European countries. *The North American Journal of Economics and Finance,* 48, 170-186. https://doi.org/10.1016/j.najef.2019.01.019

Chen, H.K. & Lien, C.T. (2017), Market Reaction to Macroeconomic News: The Role of Investor Sentiment. *Asia-Pacific Journal of Financial Studies* 875. https://doi.org/10.1111/ajfs.12198

Chen, N.-F. (1991) Financial Investment Opportunities and the Macroeconomy. *The Journal of Finance,* 46(2), 529-554. https://doi.org/10.1111/j.1540-6261.1991.tb02673.x

Chen, N.-F., Roll, R. & Ross, S. A. (1986). Economic Forces and the Stock Market. *The Journal of Business*, *59*(3), 383–403. https://doi.org/10.1086/296344

Chen, S.S. (2009). Predicting the bar stock market: Macroeconomic variables as leading indicators. *Journal of Banking & Finance*, 33(2), 211-223. https://doi.org/10.1016/j.jbankfin.2008.07.013

Cherian, J.M., Gupta, S. & Mandl, C. (2025, 11. January). Wall Street ends lower as blow-out job data spooks traders. *Reuters*.

Chi, D. (2021). Unanticipated Unemployment Rate News o the Stock Market (Honors Thesis). University of California, Berkeley.

Connolly, R., Stivers, C. & Sun, L. (2005). Stock Market Uncertainty and the Stock-Bond Return Relation. *Journal of Financial and Quantitative Analysis*, 40(1), 161–194. https://doi.org/10.1017/S0022109000001782

Cutler, D.M., Poterba, J.M. & Summers, L.H. (1988). What moves Stock Prices? *NBER Working papers*, 2538. https://ssrn.com/abstract=227519

Damodaran, A. (2012). *Investment Valuation* (3rd edition). John Wiley & Sons.

Danso, E.I. (2020). Assessing the Impact of Macroeconomic Variables on the Performance of the U.S. Stock Market. *Research Journal of Finance and Accounting*, 11(14). https://doi.org/10.7176/RJFA/11-14-08

De Bondt, W.F.M. & Thaler, R. (1985). Does the Stock Market Overreact? *The Journal of Finance*, 40(3), 793–805. https://doi.org/10.2307/2327804

Dubrovsky, A., Friar, K. & Ferré, I. (2025, 8. March). Stock market today: S&P 500 posts worst week since September as Trump tariffs rattle markets. *Yahoo Finance*.

Fama, E. F. (1970). Efficient Capital Markets: A Review of Theory and Empirical Work. *The Journal of Finance*, *25*(2), 383–417. https://doi.org/10.2307/2325486

Fama, E. F. (1981). Stock Returns, Real Activity, Inflation, and Money. *The American Economic Review*, 71(4), 545–565. https://doi.org/10.2307/2328716

Fama, E. F. (1990). Stock Returns, Expected Returns, and Real Activity. *The Journal of Finance*, *45*(4), 1089–1108. https://doi.org/10.2307/2328716

Fama, E. F. (1995). Random Walks in Stock Market Prices. *Financial Analysts Journal*, 51(1), 75-80. https://doi.org/10.2469/faj.v51.n1.1861

Federal Reserve Board. (2024). *Economy at a Glance – Unemployment Rate*. Retrieved 29.12.2024 from https://www.federalreserve.gov/economy-at-a-glance-unemployment-rate.htm

Federal Reserve Board. (2025). *Economy at a Glance – Policy Rate*. Retrieved 3.1.2025 from https://www.federalreserve.gov/economy-at-a-glance-policy-rate.htm

Federal Reserve Board. (2025). *Industrial Production and Capacity Utilization*. Retrieved 2.1.2025 from https://www.federalreserve.gov/releases/g17/About.htm

Flannery, M. J. & Protopapadakis, A. A. (2002). Macroeconomic Factors Do Influence Aggregate Stock Returns. *The Review of Financial Studies*, *15*(3), 751–782. https://doi.org/10.1093/rfs/15.3.751

Fromentin, V. (2022). Time-varying causality between stock prices and macroeconomic fundamentals: Connection or disconnection? *Finance Research Letters*, 103073. https://doi.org/10.1016/j.frl.2022.103073

Funke, N. & Matsuda, A. (2006). Macroeconomic News and Stock Returns in the United States and Germany. *German Economic Review*, 7(2), 189-210. https://doi.org/10.1111/j.1468-0475.2006.00152.x

Gu, C., Chen, R. & Stan, R. (2021). Investor sentiment and the market reaction to macroeconomic news. *Journal of Futures Markets*, 41(9), 1412-1426. https://doi.org/10.1002/fut.22219

Gürkaynak, R. S., Sack, B. P. & Swanson, E. T. (2005). Do Actions Speak Louder than Words? The Response of Asset Prices to Monetary Policy Actions and Statements. *International Journal of Central Banking*, 1(1), 55-93. https://www.ijcb.org/journal/ijcb05q2a2.htm

Heinlen, R. & Lepori, G.M. (2022) Do financial markets respond to macroeconomic surprises? Evidence from the UK. *Empirical Economics, 62,* 2329-2371. https://doi.org/10.1007/s00181-021-02108-1

Humpe, A. & Macmillan, P. (2009). Can macroeconomic variables explain long-term stock market movements? A comparison of US and Japan. *Applied Financial Economics*, 19(2), 111-119. https://doi.org/10.1080/09603100701748956

Investopedia Team. (2023, 30. December). Lagging Indicator: Economic, Business and Technical. *Investopedia*. https://www.investopedia.com/terms/l/laggingindicator.asp

Ioannidis, C. & Kontonikas, A. (2008). The impact of monetary policy on stock prices. *Journal of Policy Modeling*, 30(1), 33-53. https://doi.org/10.1016/j.jpolmod.2007.06.015

Jain, P. C. (1988). Response of Hourly Stock Prices and Trading Volume to Economic News. *The Journal of Business*, 61(2), 219–231. http://dx.doi.org/10.1086/296429

Kahneman, D., & Tversky, A. (1979). Prospect Theory: An Analysis of Decision under Risk. *Econometrica*, 47(2), 263–291. https://doi.org/10.2307/1914185

Kerssenfischer, M. & Schmeling, M. (2024). What moves markets? *Journal of Monetary Economics*, 145, 103260. https://doi.org/10.1016/j.jmoneco.2024.103560

Knüper, S. & Puttonen, V. (2018). *Moderni rahoitus* (10. edition).

Kontonikas, A., MacDonald, R. & Saggu, A. (2013). Stock market reaction to fed funds rate surprises: State dependence ad the financial crisis. *Journal of Banking & Finance*, 37(11), 4205-2037. https://doi.org/10.1016/j.jbankfin.2013.06.010

Krauskopf, L. & Ahmed, S.I. (2025, 11. March). US stock market loses $4 trillion in value as Trump plows ahead on tariffs. *Reuters*.

Kurov, A. (2010). Investor sentiment and the stock market's reaction to monetary policy. *Journal of Banking & Finance*, 34(1) 139-149. https://doi.org/10.1016/j.jbankfin.2009.07.010

Kurov, A., Sancetta, A., Strasser, G. & Wolfe, M. (2016). Price Drift Before U.S. Macroeconomic news - Private Information About Public Announcements? *ECB Working Paper*, 1901. https://doi.org/10.2866/39257

Lee, B.-S. (1992). Causal Relations Among Stock Returns, Interest Rates, Real Activity, and Inflation. *The Journal of Finance*, 47(4), 1591–1603. https://doi.org/10.2307/2328955

Lucca, D. O., & Moench, E. (2015). The Pre-FOMC Announcement Drift. *The Journal of Finance*, *70*(1), 329–371. http://www.jstor.org/stable/43611030

Malkiel, B. G. (2003). The Efficient Market Hypothesis and Its Critics. *The Journal of Economic Perspectives*, 17(1), 59-82. https://doi.org/10.1257/089533003321164958

Mankiw, N.G. (2009). *Macroeconomics* (7th edition). Worth Publishers.

McQueen, G. & Roley, V. V. (1993). Stock Prices, News, and Business Conditions. *The Review of Financial Studies*, 6(3), 683–707. https://doi.org/10.1093/rfs/5.3.683

Medovikov, I. (2016). When does the stock market listen to economic news? New evidence from copulas and news wires. J*ournal of Banking & Finance*, 65, 27-40. https://doi.org/10.1016/j.jbankfin.2016.01.004

Medovikov, I. (2016). When does the stock market listen to economic news? New evidence from copulas and news wires. *Journal of Banking & Finance*, 65, 27-40. https://doi.org/10.1016/j.jbankfin.2016.01.004

Mukherji, S. (2011). The Capital Asset Pricing Model's Risk-Free Rate. *The International Journal of Business and Finance Research*, 5(2), 75-83. https://ssrn.com/abstract=1876117

Patatoukas, P.N. (2021). Stock Market Returns and GDP news. *Journal of Accounting, Auditing & Finance*, 36(4), 776-801. https://doi.org/10.1177/0148558X20913418

Pearce, D. K. & Roley, V. V. (1985). Stock Prices and Economic News. *The Journal of Business*, *58*(1), 49–67. https://doi.org/10.1086/296282

Prachowny, M.F.J. (1993). Okun's Law: Theoretical Foundations and Revised Estimates. *The review of Economic and Statistics,* 75(2), 331-336. https://doi.org/10.2307/2109440

Pylypenko, O. (2025, 20. March). Stocks Slip Before the open after FED-Fueled Rally, U.S. Economic Data and Earning in Focus. *The Globe and Mail*.

Ratnapakorn, O. & Sharma, S.C. (2007). Dynamic analysis between the US stock returns and the macroeconomic variables. *Applied Financial Economics*, 17(5), 369-377. https://doi.org/10.1080/09603100600638944

Roll, R. & Ross, S. A. (1980). An Empirical Investigation of the Arbitrage Pricing Theory. *The Journal of Finance*, 35(5), 1073-1103. https://doi.org/10.1111/j.1540-6261.1980.tb02197.x

Ross, S. A. (1976). The arbitrage theory of capital asset pricing. *Journal of Economic Theory*, 13(3), 341-360. https://doi.org/10.1016/0022-0531(76)90046-6

Savor, P. & Wilson, M. (2013). How Much Do Investors Care About Macroeconomic Risk? Evidence from Scheduled Economic Announcements. *Journal of Financial and Quantitative Analysis,* 48(2), 343-375. https://doi.org/10.1017/S002210901300015X

Schafer, J. (2025, 17. March). RBC lowers S&P 500 year-end target, citing economic growth concerns. *Yahoo Finance*.

Sharpe, W. F. (1964). Capital Asset Prices: A Theory of Market Equilibrium under Conditions of Risk. *The Journal of Finance*, 19(3), 425–442. https://doi.org/10.2307/2977928

Shiller, R. J. (1981). Do Stock Prices Move Too Much to be Justified by Subsequent Changes in Dividends? *The American Economic Review*, 71(3), 421–436. http://www.jstor.org/stable/1802789

Stanger, M. (2020). A monthly Indicator of Economic Growth for Low Income Countries. *IMF Working Papers*, 20(13). https://doi.org/10.5089/9781513525853.001

Swanson, E. & Vishuddhi, J. (2024). Speeches by the Fed Chair Are More Important than FOMC announcements: An Improved High-Frequency Measure of U.S. Monetary Policy Shocks. Unpublished manuscript, *University of California*, *Irvine*. Retrieved 21.1.2025 from https://sites.socsci.uci.edu/~swanson2/papers/hfdat.pdf

U.S. Bureau of Labor Statistics. (2015). *How the Government Measures Unemployment*. Retrieved 29.12.2024 from https://www.bls.gov/cps/cps_htgm.htm

Veronesi, P. (1999). Stock Market Overreaction to Bad News in Good Times: A Rational Expectations Equilibrium Model. *The Review of Financial Studies*, 12(5), 975–1007. http://www.jstor.org/stable/2645973

World Bank. (n.d.). *World Development Indicators: Economy*. Retrieved 29.12.2024 from https://datatopics.worldbank.org/world-development-indicators//themes/economy.html

Zakamulin, V. (2024). Stock price overreaction: evidence from bull and bear markets. *Review of Behavioral Finance*, 16(4), 998-1011. https://doi.org/10.1108/RBF-03-2024-0088

Zakaria, Z. (2012). Empirical evidence on the relationship between stock market volatility and macroeconomic volatility in Malaysia. *Journal of Business Studies Quarterly*, 4(2), 61-71. Retrieved 3.1.2025 from https://www.researchgate.net/publication/310613721_Empirical_evidence_on_the_relationship_between_stock_market_volatility_and_macroeconomic_volatility_in_Malaysia

Note: This thesis has utilized AI for grammatical error checking and language refining. All of the research content, analysis, critical thinking and overall responsibility of the work are made by the author. I, as the author, am fully accountable for the content and conclusions presented in this thesis.

Appendices

Appendix 1. Summary tables of the findings

Table 1: Stock market effect of Labor market and output indicators. Surprises are classified: Good news: lower-than expected unemployment (UR↓) or higher-than expected GDP / Industrial production (GDP/IP↓). Bad news are the opposites, respectively.

Economic cycle	**Macro Indicator surprise**	**Stock price reaction (↑/↓)**	**Mechanism (DCF)**	**low sentiment (reaction intensity)**	**high sentiment (reaction intensity)**
Expansion	**Good news** (UR ↓ or GDP /IP ↑)	↓	Discount rate	Stronger	Weaker
Expansion	**Bad news** (UR ↑ or GDP/IP ↓)	↑	Discount rate	Stronger	Weaker
Contraction	**Good news** (UR ↓ or GDP /IP ↑)	↑	Cash flows	Stronger	Weaker
Contraction	**Bad news** (UR ↑ or GDP/IP ↓)	↓	Cash flows	Stronger	Weaker

Table 2: Stock market effect of central bank policy rate surprises.

Economic cycle	**Policy rate surprise**	**Stock price reaction (↑/↓)**	**Mechanism (DCF)**	**low sentiment (reaction intensity)**	**high sentiment (reaction intensity)**
Expansion/mild contraction	**rate cut** (↓)	↑	Discount rate	Stronger	Moderate
Expansion/mild contraction	**Rate hike** (↑)	↓	Discount rate	Stronger	Moderate
Severe downturn	**rate cut** (↓)	↓	Cash flows	Stronger	Weaker
Severe downturn	**Rate hike** (↑)	↑	Cash flows	Stronger	Moderate

Appendix 2. Macroeconomic news strategies vs. S&P 500 performance

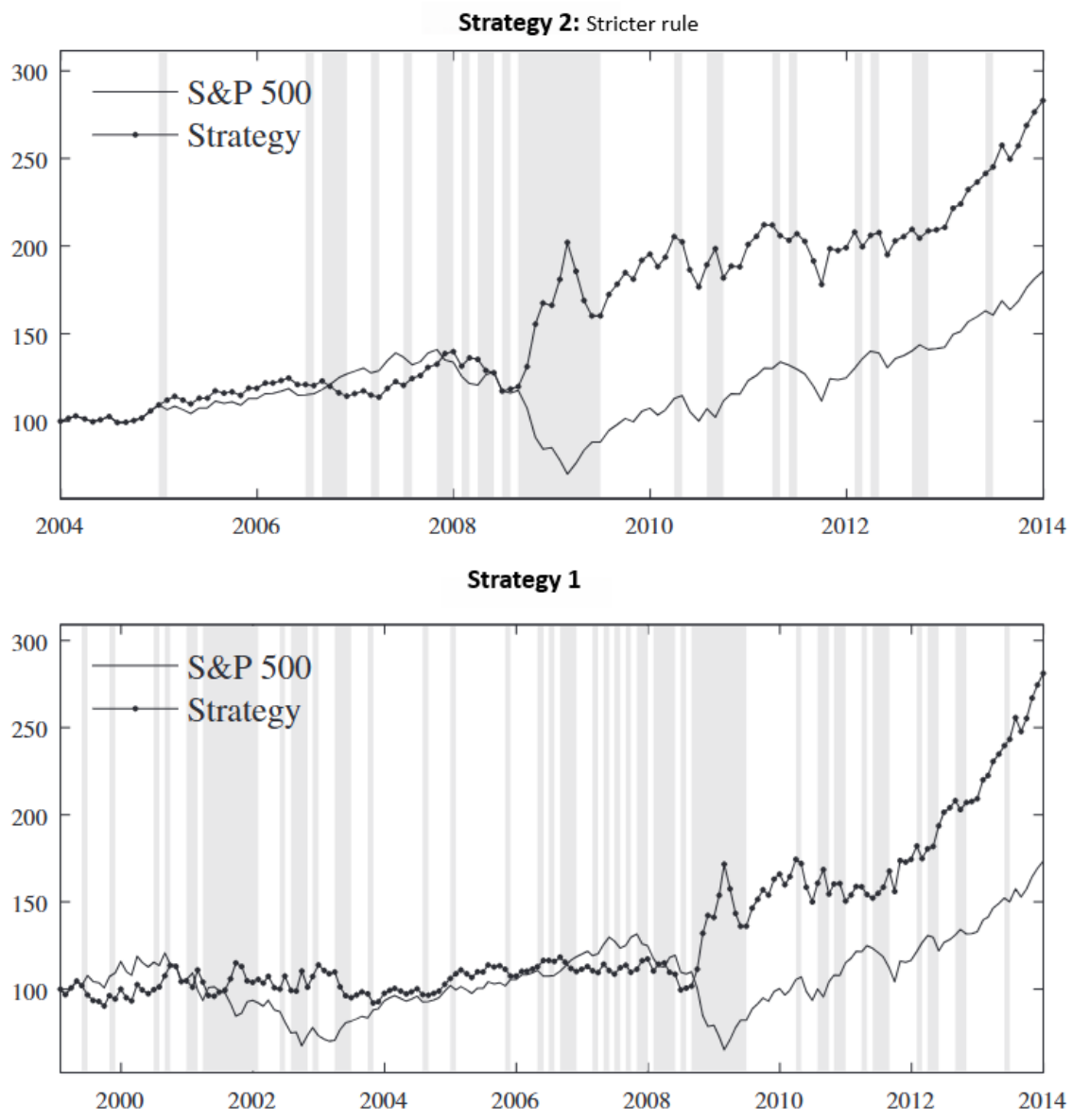

Figure 1. Monthly cumulative returns of macroeconomic news index-based strategies against the benchmark S&P 500. Gray bars indicates months during which short position in the S&P 500 occurred (Medovikov, 2016).