

Granger causality and impulse response analysis of economic sentiment changes : Evidence from European price indices and the banking sector

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Abstract

The present study analyzes how sentiment indicators affect the European banking sector through their influence on sector-specific price indices. Focusing on the STOXX Europe 600, we test whether sentiment changes exert stronger effects on banking stocks than on the broader market. Using a dataset of 24 STOXX sector indices and two sentiment measures—the EC Economic Sentiment Indicator (ESI) and the BCG M&A Sentiment Index—we first apply Granger causality tests. The results confirm that sentiment significantly drives stock price movements across industries, warranting further focus on banks. We then employ an Impulse Response Function (IRF) analysis, demonstrating that the STOXX Europe 600 Banks Index (.SX7P) reacts more strongly and immediately to sentiment shocks than the general STOXX Index (.STOXX). This heightened sensitivity reflects banks' leverage and regulatory exposure, which amplify sentiment-driven volatility. The findings highlight sentiment

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indices as predictive tools for market fluctuations, stressing their importance for investors, policymakers, and sector-specific risk management.

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Introduction

The banking system is central to global finance, linking savers and borrowers while providing capital, liquidity, and stability. As highly leveraged and heavily regulated institutions, banks are closely tied to market confidence and macroeconomic conditions. Investor sentiment plays a key role: optimism fosters credit growth, leverage, and asset price increases, whereas pessimism reduces credit supply, raises defaults, and heightens systemic risk. The present study addresses a gap in the literature by examining how sentiment indicators—the EC Economic Sentiment Indicator (ESI) and the BCG M&A Sentiment Index—affect European banking sector developments. These indices reflect macroeconomic expectations and investor confidence, making them relevant for financial stability and risk management. Banks are particularly sensitive to shifts in sentiment due to their reliance on confidence-driven funding sources. Tracking these dynamics improves understanding of financial cycles and supports macroprudential policy, as sentiment measures can serve as early warnings of stress. The research also contributes to behavioral finance, challenging the assumption of fully rational markets by demonstrating that psychological factors shape banking outcomes. Incorporating sentiment analysis enhances traditional asset pricing models, offering insights for investors, risk managers, and regulators navigating sentiment-driven fluctuations in the European banking sector.

Research questions

The empirical investigation is structured around three primary research questions. Firstly, the investigation seeks to answer the question whether economic sentiment indicators, namely the EC Economic Sentiment Indicator (ESI) and the BCG M&A Sentiment Index, have predictive power for stock price movements in European industrial sectors. This entails assessing if these sentiment measures Granger-cause changes in the STOXX Europe 600 sectoral indices. Secondly, the research will

examine whether the banking sector is more sensitive to sentiment shocks compared to the broader European market. By comparing the impulse response of the banking index (SX7P) with that of the general market index (STOXX), the study seeks to capture the extent and immediacy of sentiment-driven fluctuations in financial stocks. Finally, the analysis examines the broader implications of sentiment-driven volatility for investors and financial regulators. Specifically, it considers how sentiment indicators can be used as tools for portfolio risk management and for macroprudential surveillance aimed at enhancing financial system resilience.

Literature Review

Investor sentiment has become a central theme in modern financial research, especially in the fields of asset pricing, banking, and financial stability. Broadly defined, sentiment represents the collective beliefs and expectations of market participants regarding future asset prices and cash flows, often shaped more by psychological and behavioral biases than by strict fundamentals. Early theoretical work highlighted how “noise traders” and irrational behavior can drive asset prices away from their intrinsic values, leading to excess volatility and temporary mispricing [11]. These insights challenged the assumptions of efficient markets and paved the way for a rich empirical literature.

International evidence confirms similar patterns, with sentiment-driven cyclicity worsening financial cycles and creating vulnerabilities across banking systems [12]. The findings emphasize that banks, given their leverage and dependence on confidence-sensitive funding, are particularly exposed to swings in sentiment.

The role of sentiment extends beyond credit markets into asset pricing more broadly. In equity markets, empirical studies demonstrate that while fundamentals remain the main drivers of stock returns, sentiment exerts a significant and persistent influence. For instance, research on G7 stock markets demonstrates that sentiment contributes to return dynamics through behavioral heterogeneity [13], reinforcing Keynes’s “animal spirits” hypothesis that economic outcomes are shaped not only by rational expectations but also by collective psychology. The findings align with behavioral finance perspectives, which argue that investor biases, heuristics, and bounded rationality systematically affect prices.

Sentiment also plays a role in fixed-income markets. Studies have demonstrated that periods of high sentiment are associated with

compressed bond risk spreads and lower future returns, while low sentiment corresponds to higher yields and increased risk premia [14]. These effects are persistent and observable even across emerging markets, where sentiment is negatively correlated with subsequent bond yields [15]. Thus, sentiment emerges as a cross-asset determinant, shaping not only equity valuations but also fixed-income pricing and risk premia, thereby influencing capital allocation across markets.

Given its multi-dimensional importance, composite sentiment indicators have gained prominence in both academia and practice. The European Commission's Economic Sentiment Indicator (ESI) is widely used to track confidence across households, services, retail, construction, and industry. Standardized to a mean of 100, the ESI serves as a barometer of overall economic expectations, with values above 100 reflecting optimism and values below signaling pessimism [3], [16]. It is often employed by policymakers and analysts to monitor macroeconomic conditions and to anticipate short-term fluctuations in growth. Similarly, the Boston Consulting Group's M&A Sentiment Index provides insights into investor confidence in corporate transactions, deal-making activity, and market liquidity [4]. By capturing expectations surrounding consolidation and investment trends, this index is particularly relevant in assessing corporate financing conditions and strategic investment decisions.

In the banking literature, additional studies provide evidence of the destabilizing role of sentiment during periods of heightened uncertainty. Declining consumer and analyst confidence reduces loan supply, particularly among highly leveraged institutions [17].

Data and methodology

The dataset consists of monthly observations from May 2015 to December 2024, giving a total of 116 months. It covers 24 sectoral indices of the STOXX Europe 600, including Banks (.SX7P), the broad market (.STOXX), Technology, Oil & Gas, Basic Resources, Utilities, Construction & Materials, Automobiles & Parts, Health Care, Chemicals, Retail, Real Estate, Telecommunications, Financial Services, Insurance, Industrial Goods & Services, and several consumer-related indices. Together, these indices represent the performance of the major industries in Europe, allowing for both sector-specific and aggregate analysis. Alongside these market indices, two sentiment measures were included: the EC Economic Sentiment Indicator (ESI) and the BCG M&A Sentiment Index. Data were

obtained from Refinitiv and the BCG database, and returns were computed from monthly closing prices.

The two sentiment indicators serve as the core explanatory variables. The ESI, published by the European Commission, is a composite index that combines business and consumer confidence across industry, services, retail trade, construction, and households, standardized to a long-term mean of 100 [3], [16]. Values above 100 signal stronger economic sentiment, while lower values indicate weaker confidence. The BCG M&A Sentiment Index, developed by the Boston Consulting Group, reflects optimism or caution in corporate mergers and acquisitions based on market data, deal activity, and investor sentiment [4]. Higher values suggest favorable conditions for M&A activity, while lower values point to uncertainty or risk aversion.

Before the main econometric analysis, several diagnostic tests were applied to ensure valid inference. Augmented Dickey–Fuller tests confirmed that all series are stationary at the 5% significance level, which means no differencing was required and the variables could be used directly in time-series models [5]. Normality was examined with the Shapiro–Wilk test, and many variables—including ESI and several sectoral indices—demonstrated significant deviations from normal distribution. To address skewness and stabilize variance, Yeo–Johnson transformations were applied where necessary, making the data more suitable for parametric analysis [6]–[8]. Homoskedasticity was tested using the Breusch–Pagan procedure, which indicated that residual variance is constant across observations ($p = 0.126$). This result supports the use of standard regression methods without the need for robust corrections [9].

The empirical strategy combines correlation analysis, Granger causality, and impulse response functions. Pearson correlations were first applied to explore linear relationships between sentiment indices and sectoral returns. However, since correlation alone cannot establish predictive power, Granger causality tests were implemented within a VAR framework using up to three lags [10]. This approach allowed us to assess whether sentiment indicators contain forward-looking information about sectoral stock performance. Finally, impulse response functions (IRFs) were computed to trace how shocks in sentiment indices propagate over time into banking stocks and the broader market [1], [2].

Results

To assess the predictive role of sentiment, we first conducted Granger causality tests between the sentiment measures (ESI, BCG_ALL, BCG_EUROPE, BCG_Americas) and 24 sectoral indices. The results reveal a clear asymmetry. In most cases, sectoral price indices do not Granger-cause sentiment indicators, meaning that stock market fluctuations provide little predictive power for shifts in sentiment. However, the reverse holds strongly: both the ESI and BCG indices Granger-cause movements in many sectoral indices, suggesting that economic sentiment has substantial predictive content for financial markets [10].

The ESI demonstrates the strongest and broadest predictive power, significantly explaining changes in the majority of sectors, particularly financial services, retail, and industrial goods. The BCG indices also demonstrate sector-specific influence. BCG_ALL and BCG_EUROPE strongly affect financial, retail, and industrial stocks, while BCG_Americas is especially relevant for the automotive and financial sectors. In contrast, commodity-related industries such as Oil & Gas and Energy exhibit weak or insignificant causal links, indicating that they are driven more by global factors like commodity prices or supply-demand shocks than by sentiment. Similarly, sectors like Basic Resources and Health Care appear less sensitive, likely due to industry-specific dynamics.

The findings underscore the heterogeneous impact of sentiment across industries. Financial, retail, and consumer-related sectors are the most responsive to macroeconomic sentiment, while natural resource and energy sectors are comparatively insulated. This differentiation highlights the importance of sector-specific approaches in forecasting and investment decisions. For policymakers, it suggests that monitoring sentiment can improve early warning systems, but sectoral context must be considered.

Next, we examined the banking sector in greater detail. Pearson correlations between sentiment indicators and banking returns were statistically weak and insignificant, reflecting the limitations of simple linear association in financial time series. To capture dynamic effects, we employed Impulse Response Functions (IRFs).

The IRF analysis also demonstrates that SX7P (Banking Sector) is more sensitive to sentiment shocks than STOXX, that is, banking stocks are sensitive to macroeconomic changes. Furthermore, SX7P has higher volatility in response, which indicates that the banking sector is more sensitive to changes in economic sentiment than the overall market, perhaps because of the sector's specific features. Banks are highly complex

and risky financial entities that are prone to be influenced by changes in interest rate expectations, credit availability, and liquidity risk. With the decline in economic sentiment, credit risk increases, funding costs rise, and investors may become doubtful about financial services companies, which results in higher and faster stock price movements in the banking sector.

On the other hand, STOXX has a more gradual and less fluctuating response, which means that overall market has a smoother transition and lesser impact from sentiment changes. This is because, unlike banks, many companies in the general STOXX index appear less homogeneous and are engaged in various business activities that are not as susceptible to financial market risks and credit availability. In addition, while sentiment changes affect SX7P right after they occur, STOXX takes time to peak in terms of impact, which demonstrates that different sectors of the market react differently to macroeconomic shocks as they are incorporated into the market over time.

Overall, these results indicate that banking stocks appear more prone to sentiment-induced market movements than the overall market. This means that although the Pearson correlation test did not reveal any statistical significance, the IRF analysis has established that sentiment indices impact the price of assets in the market, especially in the banking sector.

Discussion

The empirical findings presented in this study emphasize the significance of economic sentiment indicators in influencing sectoral stock price movements within the European equity market. The Granger causality analysis confirmed that both the EC Economic Sentiment Indicator (ESI) and the BCG M&A Sentiment Index have statistically significant predictive power over several sectoral indices, particularly those related to financial services, retail, and industrial goods. This finding indicates that fluctuations in economic sentiment tend to precede significant price movements within key segments of the stock market, thereby underscoring the pivotal role of expectations and investor confidence in determining price trends. The present study investigates the sensitivity of the banking sector to changes in sentiment indicators, as measured by the IRF. The impulse response function (IRF) analysis revealed that the STOXX Europe 600 Banks Index (.SX7P) reacts more strongly and more immediately to sentiment shocks compared to the

broader STOXX Europe 600 Index (.STOXX). This phenomenon can be attributed, in part, to the inherent characteristics of banking institutions, including their substantial leveraging, exposure to market-based funding, and close interconnection with macroeconomic conditions. Consequently, banks exhibit a tendency to respond more rapidly and with greater volatility to shifts in sentiment in comparison to more diversified or less financially exposed sectors. Furthermore, the results emphasize the asymmetric nature of sentiment transmission across sectors. While sentiment indicators explain a significant portion of variance in financial and consumer-related industries, other sectors-such as energy, basic resources, or healthcare-appear to respond less directly. This may be due to the influence of global commodity cycles, regulatory frameworks, or idiosyncratic sectoral dynamics.

However, it is imperative to acknowledge certain methodological limitations. While Granger causality provides insights into predictive relationships, it does not establish structural causation. Furthermore, the linear correlation methods employed may not fully capture the complex and often non-linear dynamics of financial markets. It is recommended that future research explore the application of nonlinear models or regime-switching approaches to further explore these relationships. Furthermore, additional investigation into cross-country effects, sentiment spillovers, and the interaction between global and regional sentiment indicators could also provide a more comprehensive understanding of market behaviour.

Conclusion

The findings are significant for investors and policymakers and the implications of the findings are discussed below. Because the SX7P (Banking Sector) has stronger and more immediate responses to sentiment shocks, investors should watch sentiment indicators when making investment decisions in financial stocks. The increased importance of banking stocks on macroeconomic sentiment indicates that periods of declining business confidence or negative economic expectations may be characterized by higher volatility and more risks on the downside. However, improvements in sentiment may mean that financial stocks recover faster than the rest of the market and, thus, present opportunities for strategic positioning.

Overall, these results are significant for policymakers and financial regulators and indicate that sentiment indices can be used as early warning

indicators for financial stability risks. Since banks are highly indebted and depend on market confidence, large declines in sentiment may result in credit constraint, higher funding costs, and even systemic risks. Central banks and regulatory authorities should consider including sentiment indicators in their macroprudential surveillance frameworks and take preventive action when financial conditions begin to deteriorate.

In general, although broad market indices like STOXX incorporate sentiment changes more slowly, the banking sector is more sensitive and more immediate, thus supporting the need for tailored risk management approaches in sentiment-sensitive industries. Future work could also extend to investigating how these effects are either facilitated or hindered by various macroeconomic environments to enhance both investors' and policymakers' decision-making heuristics.

If sentiment indices are continuously tracked, investors may be able to predict short-term shifts in the market, and policymakers may be able to act quickly to mitigate macroprudential vulnerabilities through timely interventions.

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