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| **STUDY OF IMPACTS OF STOCK MARKET RUMORS ON**  **STOCK PRICES IN VIETNAMESE BANKING INDUSTRY USING AI/ML**  ***The 13th International Conference on Emerging Challenges: Business Dynamics in Disruptive Economy***  Thai Minh Hanh1, Le Hai Ha2, Bui Anh Van3\*, Hoang Ha Linh3  1 Faculty of Business, School of Economics and Management, Hanoi University of Science and Technology, Hanoi, Vietnam  2 Faculty of Mathematics and Informatics, Hanoi University of Science and Technology, Hanoi, Vietnam  3 Faculty of Business, School of Economics and Management, Hanoi University of Science and Technology, Hanoi, Vietnam  \*Corresponding author: [buianhvan17@gmail.com](mailto:buianhvan17@gmail.com) |
| **Abstract**  **Research purpose:**  *This study examines the impact of unconfirmed information in the form of corporate rumors on the stock price performance of Vietnamese commercial banks. Focusing on the banking sector, which is systemically important and highly sensitive to market sentiment, this study seeks to determine whether rumors distort the incorporation of information into stock prices and thus reduce market efficiency.*  **Research motivation:**  *Banking plays a pivotal role in both financial markets and national macroeconomic stability, yet its high market capitalization, liquidity, and systemic influence make banking stocks especially vulnerable to rumors that can distort investor behavior and market dynamics. In Vietnam’s transitional stock market, weak regulatory enforcement and the rapid spread of unverified information via social media amplify speculative trading and volatility, underscoring the need to research how rumors shape investor decisions and market efficiency.*  **Research design, approach, and method:**  *The study covers 19 Vietnamese banks listed between 2017 and 2023. Rumors are collected from financial news, classified using PhoBERT-based sentiment analysis, and grouped into positive, negative, and neutral groups. Stock price synchronization, constructed based on annual daily returns, serves as an efficiency measure, with regression models including firm-level and year-level controls to examine the rumor–efficiency relationship.*  **Main findings:**  *Rumors show no significant effect on the synchronicity of Vietnamese bank stock prices. Stock co-movement is mainly driven by firm fundamentals, particularly size, while rumors contribute more to firm-level noise and idiosyncratic volatility than to market-wide behavior.*  **Practical/managerial implications:**  *Rumors are not a systemic threat to efficiency but can destabilize individual stocks through added idiosyncratic risk. Regulators should strengthen monitoring of unverified information, and managers and investors should focus on fundamentals while remaining alert to short-term rumor-driven disruptions.*  **Keywords**: stock price synchronicity, banking rumors, AI/ML, sentiment analysis, Vietnamese banking industry, price efficiency |

**1. INTRODUCTION**

Banking represents one of the most critical elements in both financial markets and a nation’s macroeconomic framework. Banks coordinate as financial intermediaries, stimulating investment and production while stabilizing inflation, exchange rates, and interest rates to support sustainable economic development. When it comes to the stock market, banks act as credit intermediaries and issuers of listed securities. Banking stocks form a significant portion of market capitalization, often blue-chip, influencing indices and serving as a barometer for investors and economists to assess the health of the banking system and the broader economy. In 2025, three out of the top five stocks contributing the most to the VN-Index were from the banking sector, underscoring the industry’s weight as it accounted for 31.5% of total market capitalization – the largest share of the market. However, this central role has also exposed vulnerabilities: the sector was recently shaken by one of Vietnam’s largest financial fraud cases, when Van Thinh Phat Group, led by Truong My Lan, was accused of siphoning billions of USD through its links with Saigon Commercial Bank (SCB) according to Government Electronic Newspaper – Policy and Law Development (2024). The scandal not only eroded public trust but also highlighted structural weaknesses in Vietnam’s banking system and financial sector more broadly.

The Efficient Market Hypothesis (EMH) – a foundational financial theory suggesting that the ideal market, in which prices provide accurate signals for resource allocation: that is, a market in which firms can make production-investment decisions, and investors can choose among the securities that represent ownership of firms’ activities under the assumption that security prices at any time ‘fully reflect’ all available information. A market in which prices always ‘fully reflect’ available information is called "efficient". (Fama., 1970). Compared to other sectors, banking demonstrates a higher sensitivity to rumors due to high capitalization, immediate liquidity, and control over capital circulation. Banks operate on fractional reserves, meaning they keep only a small portion of deposits on hand. If depositors lose confidence – even due to unverified rumors, they may rush to withdraw funds, causing a bank run and threatening the bank’s solvency, regardless of its actual financial health (He, Z., & Manela, A., 2012; Tadmon, C., & Njike-Tchaptchet, E., 2022). Especially, since individual financial market participants cannot directly access and evaluate a bank's real financial health, their anxiety and herd behavior are generally heightened in banking, where the fear of being last to withdraw can drive even rational depositors to act on rumors (Kimmel, A., 2004). Consequently, the influence of banking-related rumors can directly affect both corporate operations and investors' financial positions.

Information appears under various forms and is categorized by verified and unverified information. Official communications are verified statements from credible sources, such as corporate announcements or regulatory filings. provide reliable data (Liu et al., 2022; Yang & Luo, 2014). News can sometimes be biased as it refers to information reported by media outlets, which may or may not be verified and potentially influence public perception and market behavior (DiFonzo, N., & Bordia, P., 1997; Jia et al., 2017). Meanwhile, rumors are unverified statements that can spread rapidly, especially on social media, influencing public opinion and market decisions despite their lack of credibility (Kimmel, A., 2004; Akhtar, M., Ekbal, A., Narayan, S., & Singh, V., 2018; Bondielli, A., & Marcelloni, F., 2019). Rumors can lead to significant market movements and decision-making errors, as they often fill information voids during uncertain situations (DiFonzo, N., & Bordia, P., 1997; Kimmel, A., 2004). This has profound implications for financial markets, where information – whether accurate or speculative – can quickly influence investor behavior and market dynamics.

With the rapid advancement of media and communication technologies, the dissemination of information in Vietnam has accelerated dramatically through the Internet and various digital platforms. The Vietnamese stock market remains in a transitional phase, experiencing both significant growth and persistent structural limitations. Although a legal framework for securities activities exists, regulatory enforcement has not yet reached the level seen in more mature markets, allowing some enterprises to delay, withhold, or inconsistently disclose information. This environment creates heightened vulnerability to misinformation, particularly unverified rumors. As a result, a short-term, speculative investment culture has emerged, where investor decisions are often driven by rumors rather than fundamental analysis, amplifying market inefficiencies and volatility. According to the State Securities Commission (SSC, 2024), rumor propagation has become increasingly complex and impactful on investor psychology. These rumors frequently originate and spread rapidly via social media platforms, investor forums, and private messaging applications such as Facebook, Zalo, and Telegram.

Several banks have faced rumor-driven scares in recent years, prompting swift regulatory or legal response. As recorded by Mai (2024) on Tien Phong electronic newspaper, a major Vietnamese digital news channel covering politics, economics and society, in 2024, a false report circulated online claiming Sacombank’s chairman was barred from leaving the country in connection with a major economic scandal. The bank immediately issued a statement denying the baseless news and call authorities to involve in pursuing those responsible. Later in the same year, PGBank's executives and SBV's Hanoi officials personally met with depositors to assure them that all deposits were safe and guaranteed after the spreading of unfounded gossip claiming that PGBank branch manager had defaulted and been arrested. Such unregulated channels intensify herd behavior, fear of missing out (FOMO), and panic selling, posing systemic risks to market stability, which can generate significant consequences, including potential bank runs. This might accelerate heterogeneous behavior of the investors such as hastily withdraw funds which might destabilizing even solvent banks and posing systemic risks to the broader financial system (He & Manela, 2012; Tadmon & Njike-Tchaptchet, 2022). Additionally, Vietnam's stock market, in which 95% of investors are individuals, dominated by a vibrant but highly speculative retail investor culture. Economists and market observers have highlighted analysis that many Vietnamese investors treat the market like a short-term game, where investment decisions are frequently influenced by rumors, word of mouth, or short-term speculation rather than well-informed decision-making" tailored to one's risk profile (Cao, M. M., Nguyen, N.-T., & Tran, T.-T., 2021). More than ever, Vietnam's regulators and banks have become increasingly proactive in issuing warnings and investigations whenever rumors threaten public confidence in the banking sector.

In macroeconomy, the cross-sectional factors contain a variety of data that could affect market stability and its operation. This research enriches studies on the economic impact of informational data in the banking sector by applying AI and machine learning models to classify rumors and analyze their effects on stock performance. Unlike previous work by Nguyen (2023), which focused on social media sentiment (mainly Facebook) and stock market fluctuations, this study examines the emergence of rumors across social media and internet platforms and their relation to stock price behaviors through stock price synchronicity building upon approaches by Zhang and Wang (2024).

Our papers contribute to the literature in several ways. First, it adds knowledge to the current literature on stock rumours, which become increasingly important given the rapid development of social media and advanced technology. Second, it provides. empirical evidence in an emerging market, which has a unique setting with high growth rate of development, population that use internet and social media a lot and a one-party political mechanism that may affect the information demand and supply. Third, it provides practical implications for banking industry, which is a sensitive industry with rumours.

Rumors were systematically gathered through web scraping, using CafeF – a prominent Vietnamese financial information platform – as the primary data source, owing to its comprehensive, timely, and structured coverage of stock market developments. Subsequently, artificial intelligence and natural language processing techniques were applied to perform sentiment analysis, categorizing the rumors as positive, negative, or neutral.

Empirical results indicate no statistically significant effect of rumors on stock price synchronicity in the banking sector. This suggests that the observed rumors, in both volume and nature, exhibit limited correlation with synchronicity, potentially due to sample constraints and sector-specific informational dynamics. Banking stocks typically demonstrate high synchronicity driven by market-wide factors, which may overshadow rumor-induced fluctuations. These findings contribute to understanding information diffusion in Vietnam's banking market and suggest that more pronounced effects may emerge with expanded datasets and increased rumor prevalence.

The paper continues as follows. Section 2 reviews the literature before section 3 develops the hypothesis. After that, we describe our research design and present empirical findings in section 4 and 5, and make the final conclusion for section 6.

**2. LITERATURE REVIEW**

In financial markets, rumors are defined as unverified pieces of information that spread rapidly, especially in contexts marked by uncertainty or emotional intensity (Peterson & Gist, 1951; Buckner, 1965). They often emerge as collective attempts to interpret ambiguous events, particularly when public interest is heightened. Unlike fake news, which is intentionally fabricated to manipulate public perception and investor behavior (Allcott & Gentzkow, 2017), rumors are characterized by their uncertain truth value at the time of circulation. They can eventually prove to be true or false, and even when later disproven, they often arise without any clearly malicious intent (Q. Shi et al., 2023). The origin and perceived credibility of a rumor often matter more than its factual content. In financial markets, rumors serves as informal information channel that can significantly affect investor sentiment and market behavior. They are typically classified by sentiment (positive, negative, or neutral), scope (firm-level, industry-level, or macroeconomic), popularity, propagation speed, and response from formal institutions (Wirama et al., 2017; Q. Shi et al., 2023). For instance, Kiymaz (2001), documented that rumors in an emerging market related to increase in earnings expectations or attracting foreign investor purchase especially impactful on stock price. Especially, one important characteristic is veracity where it indicates that the market often occur well before the rumor is known, whether it would be proved to be true or false. Rumors create informational asymmetry and uncertainty, often compelling investors to make speculative decisions. During crises, heightened stakeholder tensions create fertile ground for misinformation, which can spread to other banks via a “guilt by association” mechanism, causing reputational damage and financial strain across the sector (Greve, 2016; Yuliia, 2017).

The emergence era of digital communication platforms and social media has amplified the spread of rumors, providing unmoderated channels through which unverified content can gain rapid traction and influence public perception. Rumors propagate through complex networks, shaped by factors such as group cohesion, shared interests, emotional salience, and ideological alignment (Zubiaga et al., 2015; Zubiaga et al., 2017; Alkhodair et al., 2019; Zhu et al., 2024). There are several characteristics of social platform rumors exacerbate their impact. First, social media regulations still not too strict which facilitates people spread false information anonymously without taking responsibility and make it easier for rumors to grow. Second, investors often tend to follow the people sharing the same mind. Emotional tone and personal involvement further affect trust in and willingness to share rumors (Chua & Banerjee, 2018). This creates “echo chambers”, where a rumor is repeated multiple times that it started to gain investors’ believe. Consequently, social media both perpetuates longstanding misconceptions and facilitates the rapid emergence of new, event-driven rumors (Zubiaga et al., 2015; Zubiaga et al., 2017). Users frequently share unverified claims before confirmation, and even reputable institutions can inadvertently contribute to misinformation, complicating the distinction between truth and falsehood in the digital age.

The dynamics of rumor formation and amplication on social media are not only theoretical concerns but also carry tangible consequences for the market. Once embedded in investor networks, these rumors can distort decision-making and directly affect the firm price. Studies have demonstrated that rumors can reduce price efficiency by increasing mispricing, volatility, and irrational trading behaviors, especially in markets with high retail investor participation and low transparency (Kiymaz, 2001; Kosfeld, 2005; Herzing & Muck, 2024). In particular, banking stocks rumors have been shown to disrupt stock price synchronicity (SPS) and also increase volatility while amplifying short-term inefficiency in financial markets (Zhang et al., 2022; Meteb, 2024; Feng, 2004). Since lower SPS indicates greater incorporation of firm-specific information while higher SPS can reflect noise trading or slower integration of information (Li et al., 2020; Qiu et al., 2019; Hu et al., 2019) the distortion caused by rumors manifests in abnormal returns. These events capture the stock price deviations from their fundamental values in a short time, representing the mispricing rumor-induced and temporary inefficiencies.

International studies provide observed evidence of the rumors’ disruptive effects. In China, machine learning and econometric analysis reveal that social media rumors generate abnormal stock fluctuations and lagged negative effects on stock prices, undermining financial stability (Zhang et al., 2022; Meteb, 2024). In the U.S., takeover rumors increased target bank stock prices, often resulting in inflated acquisition premiums and market inefficiency (Feng, 2004). These findings underscore the necessity for effective detection, timely response mechanisms, and regulatory oversight to mitigate rumor-induced risks.

Vietnam’s stock market, characterized by high individual investor participation, is increasingly influenced by social media and online sentiment. Research analyzing Facebook posts has shown a positive correlation between optimistic sentiment and rising stock prices, highlighting the sensitivity of Vietnamese investors to online information (Nguyen, 2023; Dao, 2015). The proliferation of social media has also increased the spread of unverified rumors, which may significantly impact stock performance, investor behavior, and market stability.

To address this, machine learning (ML) techniques have been applied to classify and verify rumors. Common classifiers include Naive Bayes, Random Forest, K-Nearest Neighbor, Decision Tree or Support Vector Classifier often combined with Natural Language Processing (NLP) to detect sentiment shifts and recurring themes in textual content (Zayno & Radhi, 2022; Gidwani & Rao, 2023). These tools enable investors and regulators to monitor rumor propagation and improve decision-making, contributing to a more resilient financial market.

Building on prior studies, this research identifies a critical gap in the Vietnamese context. Despite rapid market growth, information flow remains imperfect, regulatory enforcement is evolving, and transparency is limited. These conditions create an environment where rumors can disproportionately influence banking stock prices, affecting price efficiency, volatility, and systemic risk. By applying AI and ML for rumor detection and impact analysis, this study contributes both methodologically and empirically, providing insights into rumor-driven market inefficiencies and informing strategies to enhance investor protection and market stability.

**3. HYPOTHESIS DEVELOPMENT**

Financial markets can be analyzed at three levels – market, industry, and firm – which also provide a framework for assessing the impact of rumors. For market participants, beyond quantitative indicators such as revenue and stock prices, related information is essential for forming a comprehensive basis for investment decisions. According to the Efficient Market Hypothesis, prices should reflect the financial health of the firm, industry, or market. In practice, however, factors such as policies, external shocks, competition, and analyst reports influence market outcomes, making perfect efficiency difficult to achieve. Empirical evidence shows that markets – particularly emerging markets and newer asset classes such as cryptocurrencies – frequently deviate from EMH, exhibiting predictable price patterns, delayed information incorporation, and opportunities for abnormal returns (García-Figal et al., 2024; Mahyudin & Lamsah, 2024). These inefficiencies are further shaped by investor behavior, market structure, and information asymmetry (Lin, 2023).

In this study, stock price synchronicity (SPS) is used as a measure of price efficiency in the banking sector. SPS quantifies the extent to which an individual stock’s price movements are driven by broader market or industry trends. Prior research indicates an inverse relationship between SPS and price informativeness: lower synchronicity generally reflects a greater incorporation of firm-specific information, signaling higher price efficiency (Li et al., 2020; Qiu et al., 2019). Nonetheless, this relationship is complex, as low SPS may also indicate poor information environments, heightened noise trading, or slower integration of market-wide information, potentially reducing short-term price efficiency (Hu et al., 2019; Gassen et al. 2019).

In the context of Vietnam’s emerging financial market, the flow and credibility of both formal disclosures and informal signals – such as rumors – interact with institutional quality and investor behavior to shape stock price synchronicity. This interplay is particularly relevant when considering the broader range of informational and structural factors that influence synchronicity. Stock price synchronicity refers to the degree that the stock prices co-move in tandem with the overall market or a specific index, rather than reflecting firm-specific information. One such factor is the timing of macroeconomic news releases; synchronicity tends to be higher on days with fewer competing news events, such as Mondays, particularly among large and stable firms, as these announcements dominate market attention (Dang et al., 2019). Media coverage also plays a critical role: greater media attention helps incorporate more firm-specific information into stock prices, thereby reducing synchronicity, a pattern especially evident in countries with weaker institutional infrastructures (Dang et al., 2019). Social trust further affects synchronicity levels, as regions with higher trust enable the dissemination and assimilation of firm-level information more effectively – most notably in state-owned enterprises (SOEs) compared to non-SOEs (Qiu et al., 2020). Finally, corporate ownership and governance characteristics such as ownership concentration, foreign shareholding, and audit quality have been found to negatively correlate with synchronicity. Specifically, lower levels of ownership concentration and foreign shareholding, along with weaker audit quality, are associated with greater stock price synchronicity, suggesting less efficient incorporation of idiosyncratic information (Düzakın & Isleem, 2021).

H1: Rumors have a significant impact on the stock price synchronization of the banking industry.

In the Vietnamese stock market, individual investors account for the majority of trading activities. Their investment decisions are typically based on two sources of information: internal and external. Internal data – such as financial statements, annual reports, insider trading disclosures, and third-party analyses – carry higher credibility as they reflect the firm’s fundamental values. In contrast, external information, while more accessible and faster to spread, often consists of a mix of verified and unverified content. Since individual investors dominate the market, uninformed participants are particularly prone to reacting quickly to such external signals. Consequently, trading decisions based on these noisy inputs may lead to significant fluctuations in bank stock prices, thereby amplifying the deviation from their fundamental values.

H2: Rumors have positive relations to the deviation between bank stock price and their fundamental values.

**4. METHODOLOGY**

**4.1 Sample selection and Data source**

This study investigates all 19 commercial banks listed on the Hanoi Stock Exchange (HNX) and the Ho Chi Minh Stock Exchange (HOSE), thereby encompassing the full population of publicly traded Vietnamese banks. The dataset was constructed by systematically collecting financial news articles from CafeF, Vietnam’s largest licensed financial news portal (licensed by the Hanoi Department of Information and Communications since 2019), using a web-crawling approach with search terms consisting of each bank’s full name, ticker symbol, and abbreviation. Rumor-related content was identified through a secondary filtering process based on Vietnamese lexical markers commonly employed to denote unverified information, including “tin đồn” (rumor), “khẳng định thông tin lan truyền” (confirmation of circulated information), and “đính chính tin đồn” (refutation of rumor). Identified rumor texts were subsequently subjected to sentiment analysis to classify them into positive, negative, or neutral categories. The final dataset comprises 30 distinct rumor events, including 22 positive, 2 negative, and 6 neutral cases, each annotated with the affected bank and the date of dissemination.

**4.2 Rumor variables**

To classify each rumor, we employ a sentiment analysis pipeline based on PhoBERT, a state-of-the-art pre-trained transformer model for Vietnamese language processing. The textual content of each rumor is first pre-processed (e.g., tokenization and vectorization) and transformed into numerical representations, which are then analyzed by PhoBERT to generate sentiment scores and classify the rumor into one of three categories: positive, negative, or neutral. Following the classification framework of Zhang & Wang (2024), a favorable or a positive rumor implies a potential positive impact on a firm’s value or operations, such as announcements of growth, expansion, or high dividends, whereas a rumor is categorized as unfavorable if it implies negative consequences, including performance declines, share reductions, or legal disputes; rumors that do not strongly align with either direction are considered neutral. Accordingly, this research defines three dependent variables: representing the overall count of rumors concerning firm i in year y; denotes the count of favorable (positive) rumors for firm i in year y; while represents the count of unfavorable (negative) rumors for firm i in year y. After preprocessing and vectorization, the Vietnamese texts are processed by PhoBERT and classified into three output neurons corresponding to these sentiment categories. In the Appendix 1, we provide 10 samples of positive and negative rumors to clarify their sentiment.

**4.3 Stock price synchronicity**

Model (1) on the regression of stock returns based on the market returns and industry returns is derived from the study of Durnev et al. (2003). From this regression result, the coefficient of determination is used to applied in developing the stock price synchronicity index ( whole year. This approach helps increase the number of observations for each bank, thereby expecting to improve the accuracy of the model.

(1)

where : stock return of bank on day of the year ; : market return on day of the year ; : return of banking industry on day of the year (excluding bank).

Model (2) applies the logit transformation to , converting its value from the interval into an index on the real number line, which facilitates comparison across firms and across years.

(2)

The interpretation of the SYN index is straightforward: a high indicates that stock fluctuations are largely explained by market and industry factors, implying little firm-specific information and thus a high ; conversely, a low reflects a greater role of firm-specific information, resulting in a lower .

**4.4 Mispricing**

Mispricing measures the difference between the market price of shares and the underlying value of the bank based on the financial statements. In this paper, two indices and are constructed as additional measures for Price Inefficiency in Model (6).

The first method is based on Model (3) and Model (4). Specifically, regression (3) is performed year by year for the entire banking industry, following the approach of Hertzel & Li (2010) and Zhang & Wang (2024), to estimate the “typical” coefficients. From there, the fundamental value of each bank is predicted and used as input to calculate the index according to Model (4).

(3)

(4)

where is market capitalization, is book value (total assets), represents the absolute value of net profit, is a binary variable that equals to 1 when profit is negative and 0 otherwise, and is financial leverage, calculated as total debt over total assets.

The second method uses the standardized residuals from regression Model (5) to create the index. In this model, (representing market value over replacement cost of assets) is regressed on control variables including firm size (), financial leverage () and profitability (). The error term reflects the difference between the market value and the intrinsic value, thus forming .

(5)

For both measures, a value greater than zero indicates that the stock of bank is overvalued, while a less than zero indicates undervalued.

**4.5 Model**

To conduct a deeper examination of the relationship between bank-related rumors and stock price inefficiency, the study uses the following regression model (6):

(6)

Model (6) is regressed with both proxies, stock price synchronicity and mispricing, to investigate the impact of rumors on different dimensions. The model is specified with the dependent variable , an inverse index of price efficiency for company in year , where a larger value indicates that the market reflects information less efficiently. The main explanatory variable is representing the total number of rumors related to company in year , including the number of positive rumors and negative rumors , which serves as the central factor for assessing whether rumors diminish the efficiency of information reflection in stock prices. Control variables capture firm characteristics such as size , financial leverage , growth , and profitability . A year control effect is also included to eliminate the inherent impact of each time period. This model enables direct testing of the influence of rumors on stock valuation efficiency while ensuring that results are not confounded by firm-specific attributes or temporal factors.

**5. RESULTS AND DISCUSSION**

Table 1 descriptive statistics reveal notable patterns in market information and financial characteristics. The analysis of rumors indicates a relatively low frequency, with an average of 0.235 rumors per firm-year. Favorable rumors () dominate this landscape, constituting approximately 71% of all rumors with a mean of 0.168. This finding of a market predominantly influenced by positive speculation is consistent with existing literature (e.g., Zhao et al., 2010). Furthermore, the synchronicity measure () exhibits a negative mean (-0.874) with a considerable standard deviation (1.403), indicating significant cross-sectional variation among listed banks. On average, bank stock prices do not move in tandem with the market; however, the high dispersion suggests a spectrum of information environments. Banks with high synchronicity suggest that investors should heed industry-wide information, while those with low synchronicity are inundated with firm-specific noise, reflecting an unevenly efficient market where information incorporation varies substantially. Both mispricing measures ( and ) show moderate mean values ​​(0.095 and 0.000, respectively), with high volatility, reinforcing the mixed pricing environment in the industry.

Financially, the variables accurately reflect the inherent nature of the banking sector. Leverage is characteristically high, averaging 91.5% with minimal variation, underscoring the sector's reliance on debt financing. Conversely, return on assets is low (mean of 1.3%), which can be attributed to the burden of risk provisioning costs and the impact of non-performing loans. Growth rates, however, demonstrate significant disparity with a standard deviation of 11.6%, highlighting the pronounced performance difference between larger and smaller banks in the Vietnamese market. Finally, the index averaged 1.058, close to parity, suggesting that market valuations are only slightly higher than book value.

**Table 1.** Descriptive Statistics

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | *N* | *Mean* | *Std. Dev.* | *Min* | *Max* |
| *SYN* | 119 | (0.874) | 1,403 | (4,726) | 0.772 |
| *MISP1* | 115 | 0.095 | 1.615 | (1.334) | 12.475 |
| *MISP2* | 115 | 0.000 | 1.004 | (2.065) | 3.010 |
| *Rumor* | 119 | 0.235 | 0.482 | 0.000 | 2,000 |
| *Rpos* | 119 | 0.168 | 0.376 | 0.000 | 1,000 |
| *Rneg* | 119 | 0.014 | 0.106 | 0.000 | 0.820 |
| *Size* | 119 | 33,541 | 0.864 | 31,917 | 35,283 |
| *Lev* | 119 | 0.915 | 0.031 | 0.831 | 0.958 |
| *ROA* | 119 | 0.013 | 0.007 | 0.000 | 0.029 |
| *Growth* | 119 | 0.189 | 0.116 | (0.108) | 0.484 |
| *TobinQ* | 115 | 1.058 | 0.138 | 0.866 | 2.064 |

**Table 2.** Correlations

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | *SYN* | *Rumor* | *Rpos* | *Rneg* | *Size* | *Lev* | *ROA* | *Growth* |
| *SYN* | 1.00 | 0.08 | 0.10 | 0.08 | 0.68\*\*\* | -0.18\*\* | 0.44\*\*\* | 0.09 |
| *Rumor* | 0.08 | 1.00 | 0.91\*\*\* | 0.17\* | -0.03 | -0.05 | -0.02 | -0.20\*\* |
| *Rpos* | 0.10 | 0.91\*\*\* | 1.00 | -0.05 | -0.06 | -0.13 | 0.05 | -0.22\*\* |
| *Rneg* | 0.08 | 0.17\* | -0.05 | 1.00 | 0.19\*\* | 0.19\*\* | -0.12 | 0.01 |
| *Size* | 0.68\*\*\* | -0.03 | -0.06 | 0.19\*\* | 1.00 | 0.03 | 0.23\*\* | 0.06 |
| *Lev* | -0.18\*\* | -0.05 | -0.13 | 0.19\*\* | 0.03 | 1.00 | -0.74\*\*\* | -0.09 |
| *ROA* | 0.44\*\*\* | -0.02 | 0.05 | -0.12 | 0.23\*\* | -0.74\*\*\* | 1.00 | 0.28\*\*\* |
| *Growth* | 0.09 | -0.20\*\* | -0.22\*\* | 0.01 | 0.06 | -0.09 | 0.28\*\*\* | 1.00 |

Contrary to the findings of Zhang and Wang (2024) and the proposed H1, our baseline regression results, presented in Table 2, do not find statistically significant evidence that the bank related rumors increase its stock price synchronicity. The coefficients on the overall volume of rumors () and the number of positively framed rumors () are positive but statistically insignificant (coefficient = 0.222, = 1.51; and coefficient = 0.251, = 1.57, respectively). Interestingly, and in direct contrast to the established literature, the coefficient on unfavorable rumors () is also positive, albeit small and statistically insignificant (coefficient = 0.185, = 0.59). This suggests that, in our sample, unfavorable rumors do not lead to the explainable incorporation of more firm-specific information into stock prices but may instead contribute to market-wide noise.

The most plausible explanation for the divergence of our results from prior studies lies in the limited sample size (N=119) and the omission of key control variables that influence price efficiency. The high explanatory power of the model ( ≈ 0.65) is primarily driven by firm-specific characteristics rather than rumor variables. Specifically, firm size () exhibits a strong positive and highly significant correlation with synchronicity (coefficient ≈ 0.94, > 8.9), which is consistent with the literature indicating that larger firms' returns co-move more with the market (Roll, 1988). Surprisingly, profitability () shows an unusually large, positive, and highly significant relationship with (coefficient ≈ 60, > 3.5), a finding that lacks a clear theoretical foundation and may indicate a model specification issue or a unique feature of the current sample. The coefficient on leverage () is positive but insignificant, contrary to typical findings, further hinting at sample-specific peculiarities.

**Table 3.** Bank Rumors and Stock Price Synchronicity

|  |  |  |  |
| --- | --- | --- | --- |
|  | *SYN (1)* | *SYN (2)* | *SYN (3)* |
| *Rumor* | 0.222 (1.51) |  |  |
| *Rpos* |  | 0.251 (1.57) |  |
| *Rneg* |  |  | 0.185 (0.59) |
| *Size* | 0.934\*\*\* (8.98) | 0.942\*\*\* (8.96) | 0.932\*\*\* (8.17) |
| *Lev* | 4.793 (1.38) | 4.710 (1.35) | 4.434 (1.25) |
| *ROA* | 60.744\*\*\* (3.75) | 59.454\*\*\* (3.62) | 59.797\*\*\* (3.54) |
| *Growth* | 0.206 (0.28) | 0.188 (0.24) | 0.162 (0.22) |
| *Observations* | 119 | 119 | 119 |
| *R2* | 0.659 | 0.658 | 0.654 |

The regression results in Table 4 show that the effect of rumors on mispricing depends on the measurement approach. With (accounting-based), the coefficient for total rumors is 0.162 (t = 0.87) and insignificant, while (0.285, t = 1.02) and (0.487, t = 1.10) are also insignificant. This indicates that rumors do not explain price deviations from fundamentals under accounting-based measures. By contrast, with (market-based, residuals), total rumors have a positive and significant effect (0.366, t = 2.86, at the 1% level). However, (0.247, t = 1.21) and (0.241, t = 0.49) remain insignificant. This suggests that the presence of rumors, regardless of tone, increases valuation deviations under market-based measures. Overall, rumors do not affect mispricing in accounting-based models but significantly influence market-based mispricing, implying that in Vietnam’s banking sector, rumors amplify sentiment-driven noise rather than fundamentals.

**Table 4.** Bank Rumors and Mispricing

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | *Misp1 (1)* | *Misp1 (2)* | *Misp1 (3)* | *Misp2 (1)* | *Misp2 (2)* | *Misp2 (3)* |
| *Rumor* | 0.162 (0.87) |  |  | 0.366\*\*\* (2.86) |  |  |
| *Rpos* |  | 0.285 (1.02) |  |  | 0.247 (1.21) |  |
| *Rneg* |  |  | 0.487 (1.10) |  |  | 0.241 (0.49) |
| *Size* | -0.475 (-1.17) | -0.468 (-1.16) | -0.496 (-1.19) | -0.053 (-0.26) | -0.047 (-0.23) | -0.064 (-0.29) |
| *Lev* | 7.165 (0.62) | 7.438 (0.64) | 6.730 (0.59) | 4.759 (0.61) | 4.453 (0.55) | 3.857 (0.45) |
| *ROA* | -46.296 (-1.57) | -46.167 (-1.56) | -46.099 (-1.56) | 26.778 (0.77) | 25.562 (0.72) | 25.191 (0.69) |
| *Growth* | -6.927 (-1.43) | -6.917 (-1.45) | -7.020 (-1.44) | -1.967 (-1.12) | -2.058 (-1.17) | -2.140 (-1.21) |
| *Observations* | 115 | 115 | 115 | 115 | 115 | 115 |
| *R2* | 0.411 | 0.413 | 0.410 | 0.055 | 0.031 | 0.023 |

*Note: Table 3 and 4 report the results of the regression model (6). Stock price synchronicity and mispricing indices denoted as SYN and Misp1, Misp2 are the dependent variables. T-statistics are reported in parentheses \*, \*\*, and \*\*\* indicate significance at the 10%, 5%, and 1% levels, respectively.*

**6. CONCLUSION AND FUTURE RESEARCH**

**6.1 Conclusion**

This study investigates the impacts of rumors on the information-reflecting efficiency of Vietnamese bank stock prices, focusing on two aspects: the degree of synchronivity and mispricing. The regression results in Table 3 demonstrate that the coefficients for both total rumors () and their sub-categories (, ) are positive but statistically insignificant. This suggests that rumors do not significantly change the level of synchronous fluctuations of bank stock prices with the market and industry. Synchronicity in the sample is primarily determined by fundamental characteristics, particularly bank size (), with a coefficient of approximately 0.93-0.94 and high statistical significance at the 1% level. This reflects that industry-level stock prices are still more determined by fundamentals and systematic information than by rumors.

However, from the perspective of pricing errors, the results reveal a different effect. Table 4 shows that the rumor coefficient for the accounting-based pricing error index () is not statistically significant. In contrast, for the market-based measure (), rumors have a positive and statistically significant effect at the 1% level. This suggests that rumors, regardless of their positive or negative implications, tend to amplify pricing errors between market prices and fundamentals, reflecting amplified sentiment and increased volatility at the firm level. In other words, even if rumors are not remarkable enough to create artificial synchronicity across the sector, they nevertheless contribute to deviations of individual stock prices from their intrinsic value.

Overall, the results show that, although rumors in the Vietnamese banking market do not create industry synchronization, they reduce firm-level price efficiency by amplifying pricing errors. Furthermore, the positive but non-significant coefficients in the synchronicity model, combined with descriptive statistics showing that rumors remain a persistent feature of the information landscape (an average of 0.235 rumors per bank per year), suggest that rumors can contribute to short-term volatility and increase the volatility of individual stock returns, even if they are not strong enough to alter the correlation with the overall market. This suggests that rumors are more of a source of idiosyncratic risk than a driver of market or sector trends. The banking stock market is still generally dominated by systemic factors and the fundamental performance of individual companies, while rumors play only a secondary disruptive role, increasing short-term volatility without altering the main drivers of price fluctuations.

**6.2 Future Research**

The limitations of this study and its findings offer several promising avenues for future research. First, extending the model beyond the banking sector to include non-financial listed companies, particularly those in the technology, real estate, or consumer goods sectors - which are more susceptible to speculative rumors and "hot concepts" - could provide a clearer picture of the impact of rumors on synchronization and mispricing. Future research should also shift its focus to alternative outcome measures, such as earnings volatility to capture idiosyncratic risk, mispricing to assess deviation from fundamentals, and stock crash risk to examine whether the accumulation of unrealized rumors, especially negative rumors, increases the likelihood of sharp downward corrections.

Methodologically, an event study design with a timeframe of a few days around the announcement date could more precisely assess the timing of abnormal and dynamic returns, while addressing the limitations of small-sample bootstrapping procedures. However, the window length criteria need to be carefully studied and adjusted to balance sensitivity to the reaction period and minimize noise. Furthermore, adding parsimonious variables, such as analyst coverage, institutional ownership, or media attention, along with corporate governance factors (foreign ownership, state ownership, governance characteristics, and quality control), would help elucidate the specific role of co-governance, synergies, and mispricing. This is particularly important in Vietnam, given its potentially unique ownership and regulatory structure. Another approach, leveraging quantitative analysis of survey or interview data, could also provide insights into investor behavior and explain why coverage of Vietnam does not improve synchronization - whether due to hesitancy, reliance on alternative information, or differences in information transmission mechanisms.

Furthermore, comparing Vietnam with other emerging markets such as China, Thailand, or Indonesia would highlight the unique characteristics of the relationship between synchronization, synergies, and mispricing, thus enhancing the contribution of this paper to the international literature. Finally, future research could apply advanced AI/NLP methods - particularly deep learning models and transformer architectures (such as BERT or PhoBERT) - to more accurately classify and assess the nuances of news reports, thereby improving the effectiveness of measuring rumor activity in the financial markets.

**Appendix 1.** Rumor Verification Sample

The following texts are representative excerpts from the original rumor verification sample, with 22 positive cases, 2 negative cases, and 6 neutral cases.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| *No* | *Keyword* | *Year* | *Sentiment* | *Title* |
| 1 | ACB | 2017 | Neutral | Ai đã bán ra 74 triệu cổ phiếu ACB trong cú tr... |
| 2 | BID | 2017 | Negative | Những “tội đồ” nào đã khiến VnIndex có phiên g... |
| 3 | MBB | 2017 | Positive | Cổ phiếu "họ MB" nổi sóng |
| 4 | SHB | 2017 | Positive | Điều gì đang xảy ra với cổ phiếu SHB? |
| 5 | STB | 2017 | Neutral | Đại gia Trầm Bê và bức boong-ke bị vỡ |
| 6 | ACB | 2018 | Positive | Những “điểm nóng” của mùa đại hội ngân hàng 2018 |
| 7 | BID | 2018 | Negative | Cổ phiếu BIDV tăng điểm sau khi cựu Chủ tịch T... |
| 8 | VIB | 2018 | Positive | Những “điểm nóng” của mùa đại hội ngân hàng 2018 |
| 9 | STB | 2020 | Positive | 10 cổ phiếu tăng/giảm mạnh nhất tuần: STB và O... |
| 10 | STB | 2020 | Neutral | Thaco phủ nhận tin đồn mua cổ phần Sacombank |

**Appendix 2.** Variable Definition

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| *Variable* | *Symbol* | *Type* | *Measurement / Indicator* | *Scale* | *Data Source* | *Notes* |
| Stock Price Synchronicity | SYN | Dependent | Calculated as R² from the regression of the stock’s log return on the market log return | Ratio | HOSE | Log transformation applied; measures the degree of stock price co-movement |
| Mispricing 1 | Misp1 | Dependent | Log ratio of market cap to estimated fundamental value (Ln(M/V)) | Ratio | Bank financial statements | A value greater than zero indicates overvaluation; a value less than zero indicates undervaluation |
| Mispricing 2 | Misp2 | Dependent | Standardized residual from Tobin's Q regression model | Ratio | Bank financial statements | A value greater than zero indicates overvaluation; a value less than zero indicates undervaluation |
| Number of Rumors | Rumor | Independent | Total number of rumors related to the bank in a given year | Count | Crawled from social media and online news | Includes both positive and negative unverified rumors |
| Number of Positive Rumors | Rpos | Independent | Count of rumors with positive sentiment | Count | Crawled from social media and online news | Classified using AI-based sentiment analysis |
| Number of Negative Rumors | Rneg | Independent | Count of rumors with negative sentiment | Count | Crawled from social media and online news | Classified using AI-based sentiment analysis |
| Bank Size | Size | Control | Log of total assets | Logarithmic scale | Bank financial statements | Controls for differences in bank size |
| Leverage | Lev | Control | Total debt / Total assets | Ratio | Bank financial statements | Reflects financial risk level |
| Return on Assets | ROA | Control | Net income / Total assets | Ratio | Bank financial statements | Measures operational efficiency |
| Revenue Growth | Growth | Control | ( – ) / | Ratio | Bank financial statements | Reflects the bank’s growth rate |

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