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ARTÍCULO

The Impact of Investor Sentiment on Stock Returns in Developing Countries

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Abstract: This study investigates the behaviour of stock prices in developing countries, with a particular focus on the impact of investor sentiment on stock returns. The research demonstrates that the dynamics of global financial markets, combined with advanced information technology, render investor sentiment a critical factor in the performance of emerging stock markets. While traditional financial theories operate on the assumption of rational economic agents, the field of behavioural finance provides compelling evidence of the influence of investor sentiment on stock returns. This effect is likely to be more pronounced in emerging markets, where levels of investor irrationality tend to be heightened. Employing concepts from behavioural finance, the efficient market hypothesis, and theories of emotional contagion, this paper develops a theoretical model and formulates key research hypotheses to explore the role of investor sentiment in determining stock returns within the context of developing nations. The analysis of empirical data from the BRICS nations supports these hypotheses, revealing a positive correlation between investor sentiment and future stock returns in several of these countries. This research extends the existing literature on behavioural finance by addressing the phenomenon of speculative bubble bursts in emerging markets. Furthermore, it offers insights that may be of significant relevance to policymakers, contributing to the development of effective interventions aimed at stabilising various markets, protecting investors, and promoting the healthy growth of financial markets.

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Background

As globalization accelerates, the integration of financial markets intensifies, and advancements in information technology facilitate the rapid dissemination of information, the significance of investor psychology and corporate governance becomes increasingly prominent in emerging economies, particularly in the developing world. This importance has been explicitly highlighted in relation to its effects on stock markets and corporate R&D investment decisions. Traditional financial theories, which assume rational investor behaviour, have largely overlooked the influence of investor emotions on performance (Oprea & Brad, 2014). However, breakthroughs in behavioural finance have challenged this perspective, demonstrating that investor sentiment plays a notably significant and sometimes disruptive role in determining stock market returns. This effect is particularly pronounced in emerging markets, where irrationality among investors tends to be higher. Therefore, understanding how sentiment influences structural changes and dynamics within the stock market, corporate governance, and investor behaviour in developing countries is essential for effective policy formulation and market stability.

Previous studies, such as those conducted by Li (2020), indicate that shifts in investor sentiment are directly correlated with market returns and inversely correlated with market risk. When investor sentiment turns negative, an increase in stock market volatility is observed. Despite the imperfections present in developed markets characterised by the participation of small investors alongside professional institutional investors with significant capital and a long-term investment horizon Gordon Kelly's value investing technique can help mitigate the overreaction to information exhibited by smaller investors (Cho et al., 2003; Fama & French, 2015). Conversely, developing countries have made remarkable strides on the global index at an accelerated pace. Nations such as India, Brazil, and Thailand have liberalised their economies, transforming their capital markets into new strategic centres for investment. It is crucial to recognise that in these emerging markets, institutional structures are evolving, issues of information asymmetry are prevalent, and corresponding derivative markets are in nascent stages.

Consequently, these markets are particularly susceptible to sentiment. In this context, investor decisions often prioritise short-term returns, resulting in greater volatility (Chung, Hung, & Yeh, 2012). Therefore, understanding how sentiment influences structural shifts and movements within the stock market, as well as the roles of corporate governance and investors, is vital for policy formulation and market strengthening. The relationship between investor sentiment and market returns in emerging markets is dynamic, influenced by the policy environment, market maturity, institutional quality, and investor behaviour. Consequently, it is imperative to advance our understanding of the characteristics and investment potentials that define emerging markets.

This study aims to address theoretical gaps in the existing literature, which predominantly concentrates on the effects of investor sentiment in developed markets, including its mechanisms, market response, and investor behaviour patterns. By investigating the impact of investor sentiment on stock returns and risks in emerging markets, this research will enhance behavioural finance theory and provide empirical evidence within the global market theory framework, offering insights that are specific to the contexts of emerging markets. The findings of this study will have practical implications for policy guidance. The results can directly inform policymaking regarding market stability, regulatory frameworks, and investment strategies. By elucidating how investor sentiment affects market stability, this research can assist policymakers in designing targeted measures aimed at stabilising markets, reducing excessive volatility, safeguarding investor interests, and promoting healthy market development. Additionally, this research contributes to policy formulation concerning transparency, market efficiency, the reduction of information asymmetry, and the enhancement of financial derivatives in developing countries.

Research Questions

1. Does investor sentiment affect stock returns?
2. Does investor sentiment affect stock risk?

Literature Review

Concept of Investor Sentiment

The concept of investor sentiment was introduced by Barberis, Shleifer, & Vishny (1998) during the formative stages of behavioural finance, characterising it as a collective cognitive bias. This bias arises when investors deviate from classical expected utility theory, resulting in systematic errors in judgment. This definition underscores the potential divergence of sentiment from rational decision-making frameworks. Building on this, Shleifer & Vishny (1997) elaborated on investor sentiment as the systematic deviation of investor expectations concerning risky future income relative to current asset values, highlighting its forward-looking nature amid uncertainty. Barberis et al. (1998) further examined the multifaceted roles of sentiment in investment decisions. They critiqued traditional expected utility theory, asserting its inadequacy in fully capturing investor behaviour due to the increasing influence of emotions on thinking and actions, thereby emphasising sentiment's significance in the decision-making process. Mehra & Sah (2002) defined investor sentiment in relation to volatility and risk preference, positing that shifts in sentiment reflect changes in investors' risk tolerance, which in turn affects investment decisions and asset pricing. Baker, Wurgler, & Yuan (2012) described sentiment as the collective beliefs of investors regarding specific stocks, whether positive or negative, aligning with the psychological frameworks that influence market behaviour and decision-making. Baker & Wurgler (2006) expanded this definition by linking sentiment to individual assets and preferences, asserting that sentiment encompasses feelings and anticipated outcomes based on investors' perceptions of cash flows and risk.

Measurement and Indicator Systems for Investor Sentiment

Quantifying investor sentiment, a fundamentally internal psychological state, presents significant challenges, particularly due to the absence of a unified assessment standard. Nonetheless, both academia and practice have developed three primary strategies to indirectly capture this phenomenon: direct indicators, indirect indicators, and composite indicators (Beer & Zouaoui, 2013). Direct indicators are derived from primary data, often collected through surveys or social media analyses. Surveys designed based on psychological theories solicit investors' views on

market prospects, with the feedback subsequently analysed to infer sentiment trends. Examples of direct indicators include optimism-pessimism indices, consumer confidence indices, and Behavioural Sentiment Indices (BSI). Indirect indicators rely on publicly available market data without directly querying investors. Typical examples include the activity levels of Initial Public Offerings (IPOs), discount rates of closed-end funds, trading turnover rates, and the number of new investment accounts. The volume of IPOs and first-day returns can reveal market acceptance of newly listed companies. Composite indicators amalgamate multiple basic indicators using statistical methods to enhance the accuracy and depth of sentiment assessment, thereby providing a more nuanced understanding of investor sentiment dynamics.

Research Methods and Sample Selection

To ensure the validity and reliability of the findings and effectively address the research questions of this investigation, the following methodological considerations have been applied. Countries and Markets focus on emerging market stock exchanges, specifically selecting the member nations of the BRICS group (Brazil, Russia, India, China, and South Africa) as representative samples. The selection criteria were based on their relevance to the global economy, the size of their stock markets, and the availability of data. Time Span utilises data spanning the last two decades, specifically from 2002 to 2022.

Table 1: Demonstrates the Variables and their Definitions.

Variable Type	Variable Name	Variable Symbol	Variable Definition
Dependent Variables	Stock Market Returns	Return	Stock return is a measure of the increase in stock price in a particular period over the previous one, scaled by the price at the start of the established period.
	Stock Market Volatility	Volatility	Stock market volatility is the standard deviation of quarterly stock returns, used to measure the degree of price fluctuations.
Independent Variables	Sentiment Index	VIX	The VIX measures the market's anticipated volatility over the next thirty days, as derived from options on the S&P 500 Index. A higher VIX level is expected when the expected price swings are high, which may be due to higher risk or fear, while a lower VIX level means that the market is less volatile and more certain.
Control Variables	GDP Growth Rate	GDP	Gross Domestic Product (GDP) determines the total value of the finished goods and services in a country or region over a certain time frame. It is an essential measure for determining the extent of an economy's size and dynamism concerning expenditures on personal and public consumption, the government, business investment, and net exports.
	Inflation Rate	CPI	CPI stands for consumer price index, which evaluates the rate of price changes in a fixed basket of goods and services. It is another measure of inflation, with higher levels of CPI pointing towards inflation and lower levels towards deflation.
	Market Benchmark Rate	Rate	Benchmark interest rates from different countries: China’s Loan Prime Rate (LPR), Brazil’s Selic Rate, Russia’s Key Rate, India’s Repo Rate, and South Africa’s Repo Rate.
	Exchange Rate Volatility	Exchange	Forex rates, also known as exchange rates, represent the ratio between one currency and another. This study utilizes indirect quotation techniques to analyze the fluctuation in the Currencies of the BRICS nations relative to the USD.
	Market Trading Volume	Volume	Turnover or trading activity is defined as the volume or total value of shares traded within a given period. This study employs the transaction value of the BRICS nations' stock markets.
	Global Stock Market Index	SP	The S&P 500 Index is one of the most well-known and widely tracked stock market indices globally. It represents the stock performance of 500 of the largest, most important, and most liquid publicly traded companies in the US. These companies span various sectors, including information technology, financial services, healthcare, consumer goods, industrials, materials, and energy. As a result, the S&P 500 is widely regarded as a barometer for the overall health of the US economy.
	Crude Oil Price Volatility	Oil	The WTI Crude Oil Price Index measures the price of West Texas Intermediate (WTI) crude oil futures. It is an important index that reflects global oil market dynamics and price trends. WTI crude oil, a benchmark in international oil trading, is influenced not only by actual supply and demand but also by factors such as geopolitical events, economic data, financial market speculation, inventory levels, production policies, and global economic growth expectations.
	Gold Price Volatility	Gold	The London Gold Fixing is a traditional mechanism for setting gold prices that began in 1919. It serves as a key benchmark in the global gold market. Initially, the price was determined through phone conferences among several major bullion banks. Over time, this process evolved into a more formal electronic auction system.
	Economic Cycle	Cycle	This is a dummy variable based on the manufacturing PMI indices of various countries. A PMI above 50 indicates an expansionary period (coded as 1), while a PMI below 50 indicates a contractionary period (coded as 0).

This time frame allows for the capture of various economic cycles and changes in market sentiment, which is crucial for understanding the impact of sentiment on the economy at different stages. Indices examines significant stock exchange indices, including the Shanghai Composite Index, the Mumbai SENSEX Index, the São Paulo IBOVESPA Index, the South Africa JSE Top 40 Index, and the MOEX Russia Index. These indices represent major companies listed in the BRICS stock markets and are widely used to gauge overall market average returns. Data collection is conducted from reputable stock exchanges in the respective countries the São Paulo Stock Exchange and the Moscow Exchange for Brazil, the Bombay Stock Exchange and the National Stock Exchange for India, the Shanghai Stock Exchange and the Shenzhen Stock Exchange for China, and the Johannesburg Stock Exchange for South Africa. Additionally, market information and analytical tools are sourced from leading global financial information providers, including Bloomberg, Refinitiv, WIND Information, and FactSet.

Dependent, Independent and Control Variables

Stock Market Returns is Stock return, a key indicator in financial analysis, is the increase in stock price from one month to the next month divided by the price at the beginning of the month. It provides crucial insights into the performance of a stock over a specific period:

$$Return_{i,m} = \frac{Price_{i,m} - Price_{i,m-1}}{Price_{i,m-1}} \quad (1)$$

$Return_{i,m}$, the stock return for an index in a developing country at time m based on $Price_{i,m}$ and $Price_{i,m-1}$, the index price at time m and m-1, respectively. Sentiment Index is the Chicago Board Options Exchange Volatility Index refers to the level of future volatility expected in the market by the use of S&P 500 Index options. Often referred to as the "Fear Index" or "Panic Index," the VIX reflects the market's forecast of volatility over the next 30 days derived from the implied volatilities of S&P 500 options. A rising VIX indicates that investors expect significant price fluctuations in the S&P 500 Index in the short term (either up or down), signalling increased market uncertainty or heightened fear. Let w_i be the weight of the i-th option (determined by its strike price relative to the current index level), σ_i be the implied volatility of that option, N be the total number of options considered, and C be an adjustment factor used to maintain the historical continuity and comparability of the VIX. The simplified formula for calculating the VIX can be expressed as:

$$\mathrm{VIX}^2 = \frac{1}{\Delta t}\left(C \cdot \sum_{i=1}^{N} \omega_i \cdot \delta_i^2\right)$$

Here, Δt represents the adjustment for the time interval. $\Delta t = \frac{30}{252}$, Δt is adjusted accordingly, assuming a year consists of 252 trading days. The following control variables are included from the research backgrounds and designs (Table 1). When studying stock price mechanisms in developing countries, particularly with evidence based on investor sentiment, selecting appropriate control variables is crucial for ensuring the accuracy and validity of the research results.

Model 1: The Impact of Investor Sentiment on Returns

A multiple linear regression model is used as the basic framework:

$$\mathrm{Return}_{t+1} = \alpha_0 + \alpha_1 * \mathrm{Vix}_t + \sum_{j=2}^{k} \alpha_j \mathrm{Control}_{j,it} + \varepsilon_{it}$$

Where Return_{t+1} represents the return for country i at time t+1, VIX is the investor sentiment indicator, $\sum_{j=2}^{k} \alpha_j \mathrm{Control}_{j,it}$ is a linear combination of control variables, and ε_{it} is the error term.

Model 2: The Impact of Investor Sentiment on Stock Market Risk

A multiple linear regression model is used as the basic framework:

$$\mathrm{Volatility}_{t+1} = \beta_0 + \beta_1 \cdot Vix_t + \sum_{j=2}^{k} \alpha_j \mathrm{Control}_{j,it} + \varepsilon_{it}$$

Where $\mathrm{Volatility}_t$ represents the stock market risk volatility at period t, defined here as the quarterly standard deviation of daily stock returns. VIX is the investor sentiment indicator, $\sum_{j=2}^{k} \alpha_j \mathrm{Control}_{j,it}$ is a linear combination of control variables, and ε_{it} is the error term.

Results and Discussion

The VIX Fear Index demonstrates a significant negative impact on stock market returns across most models in various countries, suggesting that increased market uncertainty typically leads to lower stock market returns. The effect of GDP shows variability among countries; specifically, in the models for Russia and South Africa, GDP has a notably positive influence, indicating that economic growth tends to support stock market performance (Table 2). Conversely, international oil prices have a significant negative effect on the models for China and South Africa, implying that rising energy costs may adversely impact stock market performance in these nations. In Brazil, a negative correlation is observed between stock market risk volatility, investor sentiment (as measured by the VIX index), and changes in Gross Domestic Product (GDP). This finding suggests that the risk associated with equity trading in Brazil is influenced by both internal and external factors, including the stability of the macroeconomic environment, cross-border capital flows, and other market behaviours. The analysis of Russian data also yields intuitive results, indicating a positive relationship between the VIX index and stock market risk volatility, which aligns with general expectations. In examining the performance of the Indian Stock Exchange in relation to the Consumer Price Index (CPI), a positive relationship is observed between the CPI and stock market volatility, reinforcing the notion that inflation contributes to market instability. Furthermore, fluctuations in the foreign exchange market significantly impact market risk, as India remains susceptible to external economic shocks. When assessing volatility in the Chinese stock market, distinct characteristics emerge, revealing high market complexity and increasing internationalisation (Chang et al., 2012). The negative and significant coefficient of the VIX index indicates that elevated investor concerns correlate with increased stock market risk volatility. Notably, the analysis of stock market risk volatility in South Africa indicates that it is not an isolated phenomenon; rather, it is interconnected with various factors. The influence of the VIX index on stock market price movements is direct,

reflecting strong investor sentiment within the South African market (Table 3). The stability of the South African market appears to be anchored in domestic economic activity, trading volume, and price dynamics in international energy markets, highlighting its complex relationship with the global economy. Given that Baker & Wurgler (2006) primarily utilise principal component analysis to establish a specific sentiment index for emerging markets, this study aims to develop such an index while qualitatively and quantitatively assessing its validity and effectiveness in identifying shifts in investor sentiment. This research investigates the effects of investor sentiment on stock returns and risk in emerging markets through financial econometric tools. It seeks to determine the extent to which sentiment influences asset purchase and sale prices, challenging traditional notions of rationality and illuminating the irrational aspects of market behaviour (Abreu & Brunnermeier, 2002).

Table 2: Regression Analysis of Investor Sentiment on Returns.

Variable	$Return^{B}_{t+1}$	$Return^{R}_{t+1}$	$Return^{I}_{t+1}$	$Return^{C}_{t+1}$	$Return^{S}_{t+1}$
VIX	-0.380272*	-.371805***	0.444119*	-0.002291	-0.096176
	-1.896311	-2.733455	1.776736	-0.017151	-0.172769
GDP	1.305962**	-0.92784**	0.055419	-0.649767	2.573367**
	2.164436	-2.056219	0.288663	-1.582403	2.22353
CPI	-0.448908*	-0.074254	-0.18227	-3.82031	-0.876024*
	-1.85358	-0.190976	-0.268477	-1.962683	-1.868506
Rate	-0.460518	0.926437*	0.427104	5.639303**	-3.782525
	-0.832182	1.747128	0.321639	2.308956	-1.132405
Exchange	-0.051821	-0.820044*	-0.664777**	-0.469502	-0.081504
	-0.202942	-6.275173	-2.176411	-0.645028	-0.105614
Volume	-2.45E-08	4.64E-09	-1.00E-07	-1.00E-08*	6.24E-5***
	-1.055775	1.123734	-0.322966	-1.653303	7.333287
Gold	0.038243	0.162381	0.111393	0.081251	0.334975
	0.144053	1.059356	0.655602	0.3377	0.521114
SP	-0.511448*	0.408104*	0.517334***	0.871566***	0.66062
	-1.828569	1.803775	3.08825	4.056297	0.979722
Oil	0.00559	-0.029365	0.004914	-0.108678*	-0.626567***
	0.063832	-0.410157	0.06366	-1.71557	-2.826607
Constant	26.61895**	4.343084	-5.506459	-23.57162***	95.12832
	2.029487	0.877836	-0.434343	-2.879813	1.271133
Year	Control	Control	Control	Control	Control
N	48	48	48	48	48
Adjusted R^2	0.3080	0.7985	0.142678	0.267667	0.707849

Note: *** p<0.01, ** p<0.05, * p<0.1

Table 3: Regression Analysis of Impact of Investor Sentiment on Stock Market Risk.

Variable	$Volatility^{B}_{t+1}$	$Volatility^{R}_{t+1}$	$Volatility^{I}_{t+1}$	$Volatility^{C}_{t+1}$	$Volatility^{S}_{t+1}$
VIX	-13.69604**	1.398758*	-30.85255*	1.95829**	0.030774*
	-2.155979	1.817458	-1.832424	2.431591	1.807376
GDP	-72.89218	5.983745**	6.926224	0.477446	-0.022554
	-0.460796	2.085753	0.38171	0.192639	-0.637216
CPI	11.44613	1.712125	134.7872**	9.149326	0.023022
	0.053178	0.69261	2.100605	0.778757	1.260982
Rate	-283.5461	-2.422446	-404.0667***	12.76762	-0.016909
	-1.912594	-0.636294	-3.219517	0.713479	-0.170109
Exchange	-53.68883	-1.070591	-5.624956	-4.545564	-0.006152
	-0.798713	-1.288564	-0.140967	-1.034641	-0.260782
Volume	-1.51E-06	4.56E-09	-1.21E-06	3.02E-10***	7.62E-7***
	-0.246525	0.173402	-0.04131	4.393113	2.942627
Gold	-4.239064	-0.666949	5.908166	-0.966885	0.009959
	-0.0586	-0.684374	0.367908	-0.665787	0.508038
SP	-29.10637	2.930623**	-13.86251	-0.343644	-0.009779
	-0.384818	2.037345	-0.624023	-0.212979	-0.491865
Oil	-10.69349	-0.454154	-3.444992	-0.600904	-0.020074***
	-0.453809	-0.997738	-0.472176	-1.232748	-3.028234
Constant	6837.584**	7.209598	3491.616***	-18.49309	-1.918181
	1.962658	0.229203	2.914003	-0.300072	-0.838685
Year	Control	Control	Control	Control	Control
N	48	48	48	48	48
Adjusted R^2	0.356253	0.45632	0.529765	0.589298	0.469498

Note: *** p<0.01, ** p<0.05, * p<0.1

Conclusion

The findings of this study illustrate that investor sentiment is a primary determinant of stock market behaviour, exerting nonlinear and multifaceted impacts on returns. In developed countries, where markets are more structured, the influence of investor sentiment is typically more regulated and limited. These markets benefit from robust legal frameworks, a higher number of institutional investors, and a broader range of security products, which

mitigate the effects of herd behaviour to some extent. A particularly intriguing and significant relationship exists between investor sentiment and stock returns: higher sentiment correlates with increased returns, as optimistic investors demonstrate greater confidence in their investments. However, in developing countries, the relationship is more complex. Varied economic environments, less developed capital structures, and other factors complicate the identification of standard patterns in stock returns.

Recommendation

There exists a close and intricate relationship between policy and investor sentiment, particularly in the stock markets of developing nations. Adjustments in macroeconomic policies such as fiscal stimuli, changes in monetary policy, or sector-specific support initiatives directly influence business environments and profitability, while also swiftly impacting market sentiment through expectations management channels. To enhance the measurement of investor sentiment, future research should explore more precise methodologies, leveraging big data, social media analysis, and machine learning technologies to improve the accuracy of sentiment capture and quantification. Furthermore, it is essential to conduct in-depth studies on the effects of government policies on sentiment regulation under various market conditions; optimising policy tools can facilitate more effective stabilisation of market sentiment and reduction of excessive volatility. Additionally, research should aim to enhance public awareness of market sentiment through investor education, promoting rational investment behaviour and long-term thinking to mitigate irrational fluctuations and foster market maturity and stability. Finally, conducting cross-country comparative studies that select nations at different stages of development and employing varied development models can yield valuable insights into the differences in investor sentiment and market mechanisms, thereby deepening our understanding of the integration and differentiation within global financial markets.

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