Sentiments and Spillover effects: An analysis on the MENA Region

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Abstract:

The purpose of this paper is to investigate how shocks in bullish and bearish sentiment markets in the USA affect the returns of markets in the MENA region, as well as the sentiments of MENA investors. The study utilizes a thorough theoretical framework to analyze the structural shocks in the sentiment market and their spillover effects. To examine the spillover effect, various methodologies are applied as constructing sentiment indices using principal component analysis and Structural Vector Autoregression model and finally using Markov switching model.

Findings indicate that shocks in the USA sentiment market have significant impact on MENA region returns and sentiment markets. Bullish sentiment shocks in the USA markets trigger capital outflows from MENA markets and hence have a significant negative impact on MENA markets returns and Positive impact on MENA sentiment Markets. Conversely, bearish sentiment shocks in the USA results in increased capital inflows into MENA markets and hence have significant positive impact on MENA markets returns and Sentiment markets. The findings revealed significant but differing impacts of bearish and bullish sentiment shocks from the USA on sentiment in MENA markets. The study emphasizes the importance of coordinated policy responses from MENA policymakers and regulators to mitigate the adverse effects of these external shocks. It also provides valuable insights into how market sentiment from the USA influences the MENA region, serving as a foundation for policymakers and researchers to explore and address this significant issue further.

Keywords: Behavioral Finance, Investor Sentiment index, Shocks Spillover, MENA

Introduction

Stock markets' development is crucial for the prosperity of economies, as they offer valuable investment opportunities. For the past decades, researchers have examined the impact of stock market returns, in helping facilitate capital flow and the exchange of securities, that eventually contribute to the economic development of countries (Sharma & Kumar, 2019). Understanding the determinants and factors that influence stock markets is of utmost importance, with studies focusing on return volatility and the characteristics, disclosures, and actions of firms. The emergence of behavioral finance urged investors and scholars to become more alert of how their investment strategies influenced by behavioral biases and individual heuristics, can affect stock market returns (Wong & Zhang, 2022). Global financial crises shed light that these behavioral biases exist among investors (Kashif & Palwishah, 2020), emphasizing the significance of market sentiment in forecasting shocks and crashes. Investors' sentiment to market status is dynamic and can greatly impact resilience or decline during market disruptions or market shocks (Berger, 2022). Moreover, the interconnectedness of global financial markets has established a network of capital markets that are influenced by worldwide events, such as the financial crisis in the USA Covid-19 pandemic in China, and the Russian-Ukrainian war (García & Rambaud, 2023). Financial markets operate in a dependent manner, and with the rise of

financial technologies and with the increase of investor awareness it is vital to analyze global market sentiment shocks and their effects on the developing and emerging markets (Mensi, et al., 2021) . In this study, we examine the USA market as an independent variable and the MENA region as a dependent variable to analyze market returns and sentiment. USA market is used as a proxy for global developed markets, since it possesses vast number of investors and efficient trading mechanisms (Kräussl & Tugnetti, 2024). On the other hand, the MENA region represents an emerging market characterized by diverse markets and significant growth potential (Mensi, et al., 2021).

MENA region countries that will be analyzed in this study are 7 countries: Egypt, UAE, KSA, Qatar, Lebanon, Oman, Bahrain. Moreover, for each MENA region country and for USA a sentiment index will be constructed to quantify each country's investors and market sentiment, afterward those sentiment indices will be examined to observe if any spillover effect is present during bearish and bullish sentiment shocks in USA. In addition to that, the constructed sentiment indices will be constructed using technical indicators as: Advance-to decline ratio, High minus low ratio, relative strength ratio, trading volume in each country from the period 2008 till 2024 to accounting for all sentiment shocks that occurred in this period.

Efficient stock and capital markets are essential for market development and attracting investors (García & Rambaud , 2023). The importance of this study stems from the necessity to understand the factors that influence stock market movements and volatility, especially in light of globalization and the interdependence of capital markets. As the relationship between local emerging markets and developed markets is becoming increasingly significant due to global economic and political event, this paper attempts to examine the following questions:

1- Do shocks in the sentiment market in developed markets (proxied by USA market) spillover to the MENA region and impact local investors' sentiments?
2- Do shocks in the sentiment market in developed markets (proxied by USA market) spillover to the MENA region and impact local market returns?
3- Do Bearish sentiment shocks in the developed Markets (proxied by USA market), have more profound impact on MENA region market returns and sentiment markets, than the Bullish sentiment shocks?
4- Is the Constructed Composite Sentiment Index Shocks have a significant impact on MENA returns and Sentiment Markets, compared to the Bullish and Bearish Shocks?

The rest of the paper is organized as follows: Section 2 reviews the literature and highlights the main gaps. Section 3 follows

with the data and methodology, Section 4 presents results and analysis of findings. Lastly, Section 5 is the conclusion, contribution and areas for future research.

Literature Review

Investor's Sentiment:

Behavioral finance, introduced in 1979, combines elements of finance and psychology to examine how psychological factors impact investors and contribute to stock market volatility (Sattar, Toseef, & Sattar, 2020). It assumes irrationality of investors, with different behavioral biases influencing their decision-making processes (Wong & Zhang, 2022). This field can be viewed from two perspectives: the financial perspective, which assumes that markets are inefficient, and investors are irrational, and the psychological perspective, which focuses on behavior traits of investors (Sharma & Kumar, 2019). Moreover, behavioral biases are typically categorized into cognitive and emotional types. Cognitive biases pertain to how we interpret information and make decisions (Sattar, Toseef, & Sattar, 2020), while emotional biases are feelings and emotions (Dervishaj, 2021). These biases can lead investors to make poor decisions which might lead to irrational behavior, causing either overreactions or insufficient responses to market events, resulting in inefficiencies and a loss of confidence in markets (Raut, 2020).

2.2 Investor Sentiment Proxies and Stock Returns

Investor sentiment is one of the main determinants that impact stock returns. Previous literature shows that bearish sentiments can significantly reduce stock returns and increase volatility. This was evidenced in the South African market over a 16-year period (Rupande, 2019), in Egypt (Sobhy, 2024), and in Indian market (Yadav & Chakraborty, 2022). In the United States, investors who closely monitor news and market changes tend to have a more bullish sentiment, which improves market efficiency (Loang, 2022). Generally, investor sentiments are labeled as market sentiments as these sentiments reflect the aggregate overall market sentiment and represent the perception of investors in a market (Yadav & Chakraborty, 2022). Long-term sentiments are negatively correlated with stock market returns, where these long-term sentiment are the prolonged long-term sentiment of investors in a market after the occurrence of a certain effect. While short-term sentiments have a positive relationship with stock market returns, short-term sentiments refer to the investors sentiment in a market after a market event but the effect of those sentiments do not last for long and can only be observed on the short-term (Ding & Mazouz, 2019). Previous scholars found that fear has the strongest impact on predicting stock returns, whereas joy have a lesser impact (Cheema, Man, & Szulczyk, 2020). A study in China after the 2007-2008 market crisis found that investor sentiments were highly predictive of stock returns during major market events, such as bubbles fueled by extreme

optimism or pessimism (Cheema, Man, & Szulczyk, 2020). Yet, in this area of research a major challenge exists in quantifying the sentiment in markets. Previous studies have used various proxies and measures to evaluate how investor sentiments influence stock market returns (Hudson, Yan, & Zhang, 2020). Several single proxies were used to quantify the sentiment of investors yet showed imperfect results in analyzing the market sentiment. In attempt to overcome these limitation, Baker and Wurgler (2006) suggested using composite indices that include multiple variables, such as the closed-end fund discount (Hudson, Yan, & Zhang, 2020), NYSE share turnover, first-day returns on IPOs, equity share in new issues (Li & Liu, 2021), and dividend premium. The composite index proved strong reliability in explaining the volatility of stock returns in the USA (Li & Liu, 2021), as well as in Euronext (Loang, 2022), in China and in India context (Haritha & Rishad, 2020). Modifications to the composite index were implemented to adapt it to developing markets and improve its relevance in various situations. However, the suggested models for assessing investor sentiments lack generalizability and are not suitable for application across different regions, making them insufficient for analyzing investor sentiments in diverse contexts (Bouteska, 2020).

2.3 Global sentiment Shocks and Its Impact on Stock Market Returns:

Stock markets usually show a degree of stability, with changes reflecting new information and price adjustments (Demirer, Ferrer, & Shahzad, 2020). However, during market shocks and unusual circumstances, they can experience disruptions from market shocks and increased volatility, resulting in greater fluctuations and notable changes in investor sentiment (Demirer, Ferrer, & Shahzad, 2020). Sentiment shocks refer to abrupt changes in investor sentiment. These shocks can influence asset allocation decisions and investment strategies, prompting investors to adjust their portfolios to mitigate risk or seize new opportunities (López-Martín, 2023). Analyzing shocks can assist investors in reallocating assets or seeking exposure to more resilient market segments in response to these events. The interplay between sentiment shock spillover and stock market returns has been explored through various theories. The adaptive market theory posits that market efficiency and rationality fluctuate over different time periods (López-Martín, 2023), indicating that markets cannot be strictly classified as efficient or inefficient over the long term.
This theory remains relevant during market shocks and calendar anomalies, as markets exhibit time-varying behavior influenced by overall market sentiments. Another theory that helps explain this relationship is the Fractal Markets Hypothesis (FMH), which

posits that security prices undergo fractal Brownian motion, with yields following a fractal distribution marked by self-similarity and long-term memory (Blackledge & Lamphiere, 2022). Additionally, the financial contagion theory explores how financial shocks can swiftly spread across markets, regions, or even globally (Wang, Yuan, Li, & Wang, 2021). However, there are debates about the degree of this spillover, with some researchers suggesting it occurs between developed and emerging markets (Rezazadeh, Pesyan, & Karami, 2024), while others contend that its impact is minimal and does not significantly influence developing and emerging markets (Rezazadeh, Pesyan, & Karami, 2024).

2.4 Global Sentiment Shocks spillover

Investor sentiment shocks have become increasingly common due to rising irrationality and the interconnectedness of financial markets (Vasileiou, 2021). Research in India has indicated that mutual fund investments closely correlate with investor sentiments, especially feelings of regret. Some researchers have sought to incorporate sentiment into traditional asset pricing models to assess its effect on stock returns (Li & Liu, 2021). In China, a study revealed a notable negative correlation between stocks with low sentiment and their returns, which contributed to periods of crisis in the Asian region and economic uncertainty (Bouteska & Mefteh-Wali, 2022).

Sentiment indexes have been developed to assess their ability to predict stock returns. A study conducted in China indicated that the investors' sentiment index had a notable positive correlation with cryptocurrency returns during the Covid-19 pandemic (Li & Huang, 2021). However, researchers are still investigating the long-term implications of these findings (Vasileiou, 2021). In the MENA region, research has focused on how investors' sentiments influence stock market returns (Gabbori & Virk, 2022). In Saudi Arabia, Islamic events such as Ramadan and Eid-Eladha have been shown to trigger herding behavior among investors, significantly affecting stock market returns. Additionally, international factors contribute to this herding behavior among Saudi investors, particularly on non-event days (Gabbori & Virk, 2022). In Egypt, investors tend to overreact or underreact to investment decisions, and the number of years of experience does not significantly influence this behavior. In Tunisia, a sentiment index was created using principal component analysis, but it requires further testing within asset pricing models (Bouteska, 2020).

A study covering 18 emerging markets found an increasing trend in the spillover effects of geopolitical risks and shocks on gold prices. It was observed that greater geopolitical shocks and crises led to a more pronounced spillover effect on gold prices (Li & Huang, 2021). While oil shocks did not show any correlation or spillover among the stock returns of G7 countries, some significant spillover effects were noted when the oil shock

originated from the supply side (Li & Huang, 2021). During periods of economic and political instability, the corruption sentiment index had a considerable impact across various regions in the MENA area. Developed markets like the USA and China exhibit a strong co-movement and market cycle correlation with the MENA region, resulting in frequent spillover of investor sentiment (Rezazadeh, Pesyan, & Karami, 2024).Numerous studies emphasized the role of investor sentiment in influencing stock market returns and how shocks can spill over from one country to another (Bouteska & Mefteh-Wali, 2022). However, what is evident is that there is a noticeable gap in research focusing on the connection between investor sentiment and shock spillover specifically in the MENA region, which has the potential to be a significant player in global financial markets. A main problem witnessed is the difficulty in constructing investor sentiment indices in the MENA region, as most of the existing research in developed countries depend on credible associations and entities that publish data that help in constructing sentient indices (Bouteska, 2020). In addition, there is a scarcity of comparative studies that investigate how global sentiments affect the MENA stock market and the controversies in findings of spillover effects from developed markets to MENA region. This research aims to examine the spillover effect through the following hypothesis.

H1: USA investor Bullish Sentiment Shocks impacts MENA investor Sentiment

H2: USA investor Bearish Sentiment Shocks impacts MENA investor Sentiment

H3: USA investor Composite index Sentiment Shocks impacts MENA investor Sentiment

H4: USA investor Bullish Sentiment Shocks impacts MENA stock market returns

H5: USA investor Bearish Sentiment Shocks impacts MENA stock market returns

H6: USA investor Composite index Sentiment Shocks impacts MENA stock market returns

H7: Bearish Sentiment Shocks in USA has more significance impact on MENA region Returns and Sentiment markets than the Bullish Sentiment Shocks.

The Following section will tackle the Research theoretical model and research design and methodology.

3. Methodology and Research Model

PCA Index for USA and Local Markets

The starting point of this methodology is to develop a sentiment index for the USA and individual sentiment indices for each country in the MENA region. Previous research has followed

Baker and Wurgler (2006) constructed index approach, that includes 6 main indicators of sentiment: the discount of closed-end funds, NYSE share turnover, first-day returns on IPOs, equity share in new issues, and the dividend premium (Rehman & Apergis, 2020). Yet, the variables in the Baker and Wurgler index have been found to be more applicable in developed countries and are challenging to use in emerging markets contexts (Rehman & Apergis, 2020). Researchers propose that a more tailored approach could be beneficial in the MENA region, given the availability of relevant data. The suggested composite index includes variables such as index returns, the Advance-Decline Ratio (AVDC), the high minus low ratio, trading volume (VOL), and the relative strength index (RSI) (Soltani & Abbes, 2023). In the light of this, Principal Component Analysis (PCA) was utilized on these five proxies to create a single aggregate sentiment index that encompasses all these elements. PCA is a statistical method used to analyze multiple quantitative dependent variables, aiding the construction of a comprehensive sentiment index. It reduces data size and complexity while emphasizing key information. PCA is frequently used to construct an index from various proxies, as demonstrated in equation (1).

$$Pc1 = w_{11}\, x_1 + w_{12}\, x_2 + \cdots w_{1p}\, x_p \qquad \boldsymbol{Eq(1)}$$

Where we are the loadings, X are the variables which allows the variance of the subjects' pc1 score as large as possible.

SVAR Model

A structural vector autoregressive model (SVAR) is employed to generate sentiment index shocks for the markets in the USA and the MENA region. Investor sentiment shocks are identified through a two-stage model that identify "bear," "bull," and "sentiment" shocks using the SVAR model. By Adding constraints in this model ensures the identification of causal effects. As noted by Rehman and Apergis (2020), it breaks down variables into reduced-form residuals and structural shocks. Where in Equation (2) the structural shocks are presented as follows: ε1t for shocks in bearish markets, ε2t for shocks in bullish markets, and ε3t for the investor sentiment index shock.

$$et = \begin{bmatrix} e1\ bear \\ e2\ bull \\ e3\ sentiment \end{bmatrix} = \begin{bmatrix} a11 & 0 & 0 \\ a21 & a22 & 0 \\ a31 & a32 & a33 \end{bmatrix} \begin{bmatrix} \varepsilon\ bear\ shock \\ \varepsilon\ bull\ shock \\ \varepsilon\ sentiment\ shock \end{bmatrix} \quad \boldsymbol{Eq(2)}$$

The model identifies that significant changes in bullish sentiment shocks do not have an immediate effect and similarly, bearish sentiment shocks take time to influence the market. This delay means that both bullish and bearish sentiment shocks gradually

affect investor sentiment and returns in the MENA region. Such lag contributes to the inefficiency of MENA markets, making it challenging for equities to swiftly absorb and react to global shocks (Rehman & Apergis, 2020). The model effectively accounts for major exogenous events that influence investor sentiment, like intraday highs or lows in global markets. However, unit root tests and cointegration are not included in this study (Esmaeili & Rafei, 2021). Based on the identified constraints, the model shows that significant changes in bullish sentiment shocks do not have an immediate impact, and bearish sentiment shocks also have delayed impact on the market. This delay indicates that both bullish and bearish sentiment shocks gradually influence investor sentiment and returns in the MENA region. Such a lag contributes to the inefficiency of MENA markets, making it difficult for equities to quickly absorb and respond to global shocks in real time (Rehman & Apergis, 2020). The model effectively considers major external events that affect investor sentiment, such as intraday highs or lows in global markets (Esmaeili & Rafei, 2021).

Based on the stated restriction the SVAR model that is used is as follows in equation (3):

$$A_0\, y_t = A(L) y_{t-1} + \varepsilon_t \qquad \boldsymbol{Eq(3)}$$

where yt includes bearish/bullish market investor sentiments, and investor sentiment index for the USA market, εt denotes the

vector of serially and mutually uncorrelated structural innovations with an economic interpretation. Structural innovations are derived by imposing exclusion restrictions on A^{-1} (Rehman & Apergis, 2020).

$$y_t = A_0^{-1} A(L) y_{t-1} + A_0^{-1} \varepsilon_t \quad \boldsymbol{Eq(4)}$$

where et is a vector of errors in the SVAR framework.

Markov Switching Model

The second stage of analysis involves the Markov Switching model regime, which is based on various research studies to examine the spillover effect. Several methods have been previously employed, including VAR, GARCH, ARCH models, and even Granger causality tests (Yadav, Sharif, Ashok, Dhingra, & Abedin, 2023). However, among the most notable approaches, the Markov switching regime model stands out as particularly suitable for testing spillover in the context of investor sentiment (Rehman & Apergis, 2020). The Markov switching model was first introduced by Hamilton in 1994 as an effective way to capture nonlinearity in time series data (Adebayo, Akadiri, & Joub, 2022). The model includes several structures representing time-series behavior across different regimes. Moreover, the model allows transition between different structures to capture complex dynamic patterns. The switching process is driven by a first-order Markov chain of uncontrollable variables. Thus,

Markovian property dictates that the current value of a variable depends on its most recent value. In this manner, a structure can override a system. After a random interval, when a switch between structures occurs, a new structure is introduced. This characteristic is what differs the Markov regime switching model from random switching models, as Quandt's (1972) model, where switching events remain independent over time (García & Rambaud, 2023). The Markov regime switching model differs from structural change models in that it allows for multiple changes at unpredictable intervals, while structural change models only account for exogenous and structural changes. This makes the Markov regime switching model particularly useful for analyzing correlated data that shows dynamic patterns over time. Unlike traditional linear models with fixed parameters, Markov switching models enable the exploration of time-varying causality across different regimes. To avoid the need for estimating separate linear models for each regime, the Markov switching model utilizes regime switching probabilities. Furthermore, it can capture potential nonlinearity or asymmetries in how attitudes respond to shocks in the stock market. The Markov switching approach has proven valuable, especially when adjustments seem to be largely influenced by external events (Adebayo, Akadiri, & Joub, 2022).

Markov Switching Model Regression Equation

The Markov model will be as follows in equation(5) (Rehman & Apergis, 2020)

$$Px = \beta 0 + \beta 1\varepsilon\, bear + \beta 2\, \varepsilon\, Bull + \beta 3\varepsilon\, Sentiment + \epsilon rror \quad \boldsymbol{Eq}(\mathbf{5})$$

Where the bear, bull and sentiment variables will be derived from the structural VAR mentioned earlier. Afterwards regression analysis will be done to examine the impact of global sentiment on stock returns and steps will be repeated for running the same regression however with the local sentiment component instead of the stock market returns. Based on the significance from the regression analysis, Conesus regarding whether global sentiment shocks have a significant impact on stock market returns in MENA region or on MENA sentiment market will be analyzed.

Data Used in Methodology and Sample Selection.

This study examines the markets in the MENA region as a representation of local investor sentiment, while the USA market serves as a benchmark for developed global investor sentiment. The MENA markets are rapidly growing and still evolving in their structure. In contrast, the USA market is viewed as the primary indicator of developed and global market sentiment, thanks to its large number of participants, market efficiency, and the chain reactions that lead to spillover effects (Kräussl &

Tugnetti, 2024). Countries in the MENA region, including Egypt, KSA, UAE, Qatar, Bahrain, Lebanon, and Oman, are used as indicators of local investor sentiment. The sample period in this study is from 28/11/2008, to 26/4/2024, to include majority of the significant global events, as the USA financial crisis, the Covid-19 pandemic, the Russian-Ukrainian war, and various trade wars. The data used is composed of technical indicators and market variables, as the Advance–Decline Ratio (AVDC), the difference between the highest and lowest trading prices, Trading Volume (VOL), and the Relative Strength Index (RSI). Moreover, monthly data from the Bull and Bear Survey Results, conducted by the American Association of Individual Investors (AAII) in the USA, that reflect the overall investor sentiment in the market whether bullish or bearish views. All data utilized in this research was obtained from Refinitiv Eikon DataStream, accessed through the Financial Lab at The British University in Egypt (BUE).

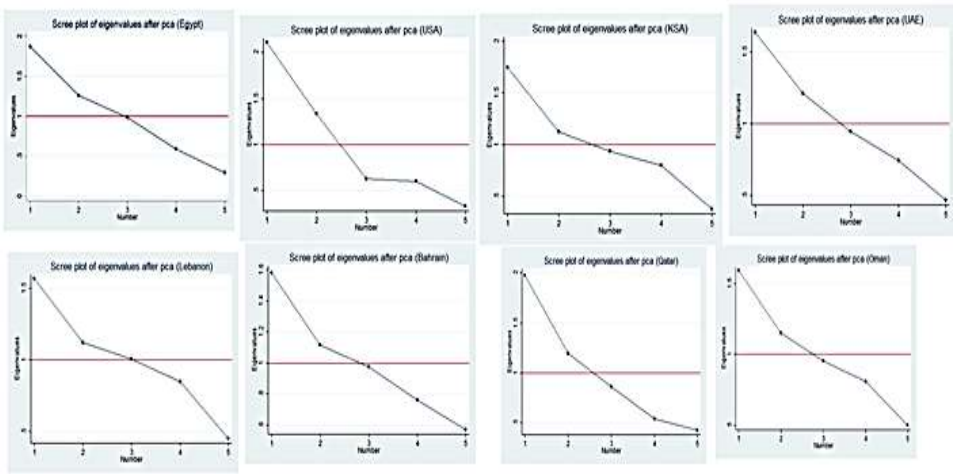
4. Empirical Results and Discussion

4.1 PCA Constructed Sentiment Indices

Sentiment indices for various countries will be created through the PCA method. The proxies utilized include NASDAQ (USA index), EGX30 (Egypt), TASI (KSA), DFMG (UAE), QSI (Qatar), BAX (Bahrain), BLSI (Lebanon), and MSX30 (Oman). To prevent any single variable from skewing the results due to its scale, the indices are standardized using Eigenvalues and

Eigenvectors. In all countries, except Lebanon, the first two principal components exceed a value of 1, indicating their significance for the composite index. The Kaiser-Meyer-Olkin measure of sampling adequacy test shows an accuracy above 50%, validating the composite index for each country. Yet, in Lebanon, the scatter plot reveals three principal components with a cumulative proportion of 73% and an accuracy of 50%. Sentiment indices are developed and constructed based on these findings and the weights assigned to each component.

Figure 1: Screen plot for PCA constructed Sentiment Indices



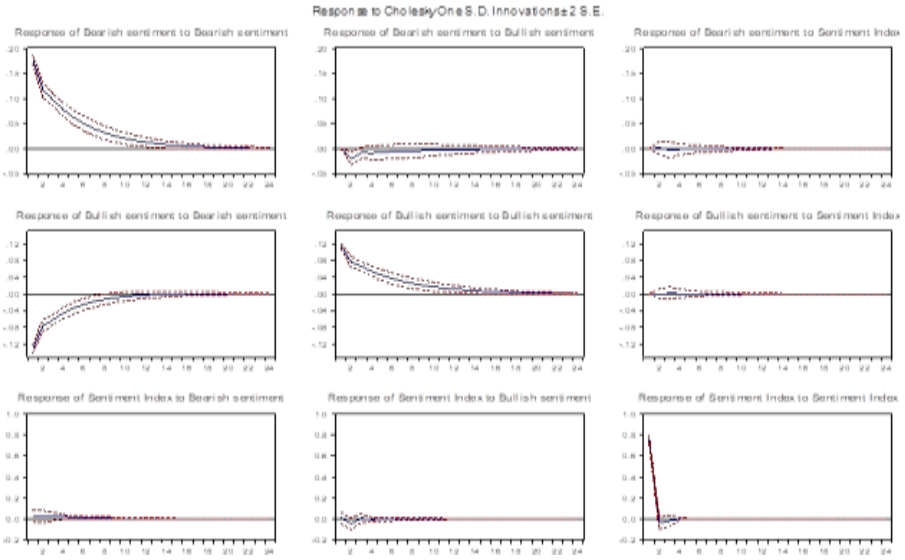
4.2 SVAR Model to Identify Shocks in the investor sentiment market.

The second stage focuses on identifying the bullish, bearish, and sentiment index shocks that have occurred in the USA. To

identify these shocks, the SVAR methodology is used to highlight the structural shocks in investor sentiment that spillover to MENA region. Following the work of Rehman & Apergis (2020) in identifying restrictions on the SVAR model, bearish sentiment shocks are influenced by fluctuations in the bearish sentiment market and are not affected by other structural shocks. Conversely, structural shocks in the bullish sentiment market are influenced by shocks in both the bullish sentiment market and the bearish sentiment shocks. Additionally, the composite sentiment index shocks are affected by shocks within the sentiment index itself, as well as shocks in the bearish and bullish sentiment markets. The appropriate lag length for the variables is determined using the Akaike information criterion, Schwartz, and Hannan Quinn information. The SVAR model is considered adequate due to its capacity to explain 56% of the variability in shocks. The impulse response results indicate that imposing three shocks for each variable significantly impacts the market. Bearish sentiment shows a strong impact of 18% in the first period, which decreases to 0.2% by the 24th period. Bullish sentiment exhibits a lagged impact of -1.9% in the second period and 0.2% in the 24th period. Sentiment index shocks have a -1.8% impact in the first period and 0.2% in the 24th period. The variance decomposition analysis indicates that shocks in the bearish sentiment market are primarily driven by changes in the

bearish market, with less than 1% attributed to shocks in the bullish market and sentiment index.

Figure 2: Impulse restrictions responses



4.3 Descriptive Statistics

Upon conducting of the PCA sentiment indices and identifying the structural shocks in the sentiment proxies of the USA, analysis of this study model can be initiated. As **Table 5** indicates below the descriptive statistics of the variables in our model:

Table 5: Descriptive Statistics

	NASDAQ	EGX30	TASI	DFGM	QSI	BAX	BLSI
Mean	0.003547	0.003231	0.001586	0.001349	0.001154	0.000445	0.000598
Median	0.010000	0.003101	0.000000	0.000000	0.000000	0.000000	0.000000
Maximum	0.100000	0.167921	0.110000	0.150000	0.130000	0.050000	0.430000
Minimum	-0.130000	-0.177641	-0.150000	-0.170000	-0.150000	-0.110000	-0.160000
Std. Dev.	0.026877	0.036723	0.024845	0.031179	0.027157	0.013521	0.028832
Skewness	-0.273326	-0.215397	-0.506479	-0.330508	-0.223784	-0.960447	5.314283
Kurtosis	4.679807	5.890402	6.464041	7.297695	7.049281	10.18354	79.14011
Jarque-Bera	93.48739	255.8444	390.2271	566.4258	497.2183	1656.490	177062.2
Probability	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000

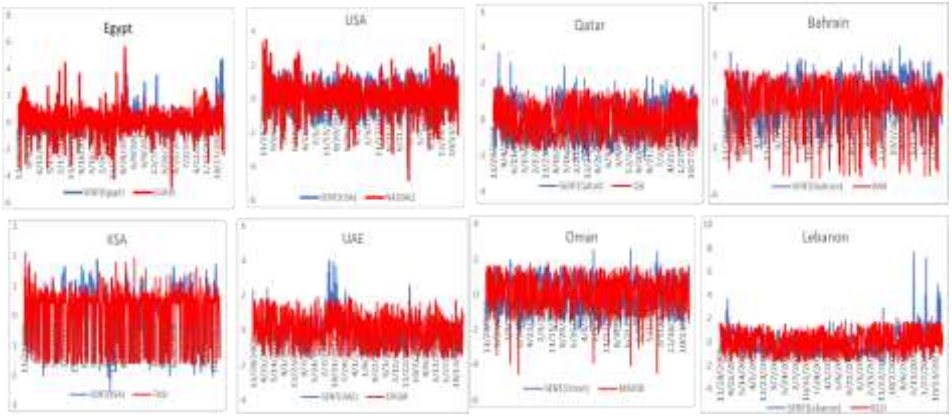
	MSX30	SENT_EGYPT_	SENT_KSA_	SENT_UAE_	SENT_BAHRAIN	SENT_LEBANON	SENT_OMAN_
Mean	-0.000153	-0.000609	-0.010669	-0.013429	0.007143	-0.001813	0.001157
Median	0.000000	-0.163518	0.072129	-0.119271	-0.022552	-0.135161	0.038952
Maximum	0.130000	4.707382	1.886901	4.043739	2.367285	7.608570	2.557689
Minimum	-0.180000	-1.782528	-2.542186	-1.767417	-2.057607	-1.892292	-2.239686
Std. Dev.	0.020348	0.920604	0.908945	0.862693	0.858490	0.949753	0.856088
Skewness	-0.925165	1.480669	-0.245694	1.035001	0.136096	2.263354	-0.200395
Kurtosis	18.19949	6.771956	2.201587	5.146369	2.280324	14.72387	2.780553
Jarque-Bera	7023.679	688.9571	26.33110	266.3836	17.73600	4731.624	6.255003
Probability	0.000000	0.000000	0.000002	0.000000	0.000141	0.000000	0.043827

	SENT_QATAR_	SENT_INDEX_SHOCK	BEARISH_SHOCK	BULLISH_SHOCK
Mean	0.006618	0.001559	0.000592	0.000902
Median	0.065257	0.238382	-0.000566	0.018037
Maximum	3.727534	1.122111	0.616038	0.574274
Minimum	-2.350231	-5.714370	-0.542353	-0.605888
Std. Dev.	0.971529	0.756163	0.177505	0.173882
Skewness	0.082220	-2.811707	0.093995	-0.271026
Kurtosis	2.738842	14.03221	3.165451	3.381413
Jarque-Bera	2.853347	4593.583	1.878809	13.16058
Probability	0.240106	0.000000	0.390861	0.001387

Descriptive Statistics for the constructed indices show that the USA market has the highest returns at 0.35%, followed by Egypt at 0.32%, followed by KSA and UAE. The lowest returns are attributed to Oman. The sentiment indices show negative values, indicating bearish sentiment. The volatility of equity market returns in the MENA region from 2011-2014 was mainly due to

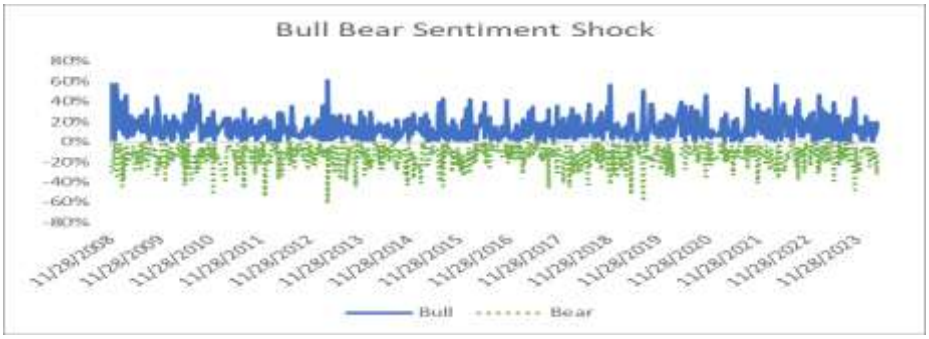
political instability and the Covid-19 pandemic from 2019-2022 **(Figure 3)**. Despite political and economic stability in some

Figure 3 Equity Markets Returns:



countries, investor sentiment in USA remains volatile due to regional and global turbulence (**Figure 4)**.

Figure 4: Bull and Bear USA sentiment



4.4 Markov Switching Model

To provide some baseline results before conducting the Markov switching model, linear equation(6) below will be applied for each stock index and market sentiment in the MENA region.

$$PX_{i,t} = \beta_0 + \beta_{1i}\varepsilon_{i,t}^{bear} + \beta_{2i}\varepsilon_{i,t}^{bull} + +\beta_{3i}\varepsilon_{i,t}^{Sent} + PX_{i,t-1} + \upsilon_{i,t} \quad \boldsymbol{Eq(6)}$$

The Markov switching model is utilized for each stock index and market sentiment in the MENA region, employing a straightforward linear regression model. This approach takes into account the lagged effects of sentiment shocks from the USA on the markets in the MENA region, building on the findings of Rehman & Apergis (2020). The results indicate that bear market shocks are positively correlated with the QSI index, UAE sentiment, and Lebanon's market sentiment. Conversely, bear shocks show a negative correlation in the contexts of Egypt, KSA, Bahrain, and Oman, as well as on the UAE market index, Qatar sentiment, and Lebanon's market sentiment. Notably, sentiment index shocks have a positive and significant effect only on the Egyptian and UAE markets, implying the presence of a nonlinear regression framework. From this, the results of the Markov switching models reveal that bearish market shocks significantly boost market indices across all MENA region countries, as foreign investors shift their focus from the USA's bearish shocks to investing more in MENA markets.

Additionally, bearish sentiment shocks positively influence all MENA sentiment markets, driven by local investors' views on the potential for diversification in developed markets. On the other hand, bullish sentiment shocks in the USA negatively affect stock returns, with the exception of negligible impacts on Qatar, Oman, and Bahrain. This trend is attributed to increased foreign investment in these markets, which may lead to a greater diversion of investment towards the USA market. However, bullish shocks in the USA positively affect all MENA sentiment markets, apart from the insignificant effects observed in Kuwait and Oman. The composite sentiment index shocks from the USA do not significantly influence market returns or sentiments in the MENA region, except for a positive effect on Lebanon's market returns and investor sentiment in Qatar.

The Markov switching model is utilized to analyze stock indexes and market sentiment in the MENA region, employing a linear regression approach. This model takes into account the delayed effects of sentiment shocks from the USA on markets in the MENA area. The findings indicate that bear market shocks positively correlate with the QSI index, sentiment in the UAE, and market sentiment in Lebanon. Conversely, negative correlations are observed in Egypt, KSA, Bahrain, Oman, the UAE market index, Qatar sentiment, and Lebanon market sentiment. Shocks to the sentiment index significantly and positively affect only the Egyptian and UAE markets, suggesting

a nonlinear regression framework. Additionally, bearish market shocks have a notable positive effect on market indices across all MENA countries, as foreign investors tend to shift their investments from the USA to MENA markets during bearish conditions. On the other hand, bullish sentiment shocks in the USA negatively impact stock returns, with the exception of minimal effects seen in Qatar, Oman, and Bahrain.

Reflecting on these results this study hypotheses can be

Hypothesis	Validity (Accept or Reject)
H1: USA investor Bullish Sentiment shocks Impacts MENA investor Sentiment	Partially Accepted (Except KSA and Oman)
H2: USA investor Bearish Sentiment shocks Impacts MENA investor Sentiment	Accepted for all
H3: USA investor Composite index Sentiment shocks Impacts MENA investor Sentiment	Partially Rejected (Except for Qatar and Oman)
H4: USA investor Bullish Sentiment shocks Impacts MENA stock market returns	Partially Accepted (Except Qatar, Bahrain and Oman)
H5: USA investor Bearish Sentiment shocks Impacts MENA stock market returns	Accepted for all
H6: USA investor Composite index Sentiment shocks Impacts MENA stock market returns	Partially Rejected (Except Lebanon)
H7: Bearish Sentiment shocks in USA has more significance in its impact on MENA region Returns and Sentiment markets than the Bullish Sentiment Shocks.	Accepted for all

summarized as follows:

The study indicates that bearish sentiment shocks in the USA significantly affect stock returns and sentiment markets across the MENA region. Conversely, bullish sentiment shocks in the USA notably influence the returns of Oman, Bahrain, and Qatar, as well as MENA investor sentiment, with the exception of the KSA and Oman markets. These results align with previous research suggesting that shocks from developed Western countries negatively impact MENA countries, particularly those in the GCC. In Egypt, the UAE, and Lebanon, bullish sentiment shocks have a significant negative effect, while bearish shocks from the USA positively influence their sentiment markets (Istiak & Alam, 2020). This is attributed to the strong ties these markets have with global financial systems, where the effects of both bearish and bullish shocks are felt. In the KSA and Qatar markets, the situation mirrors that of Egypt, the UAE, and Lebanon, but they are not significantly affected by bullish shocks. The findings further corroborate existing literature on the substantial influence of sentiments, especially bearish shocks, on local MENA markets, leading to a spillover effect (Mandaci & Cagli, 2021). The constructed composite sentiment index shocks from the USA market do not significantly impact MENA market returns, except for those in Lebanon, Qatar, and Oman. This finding contradicts earlier studies that indicated a significant effect of the USA's composite sentiment index on other markets

and regions (Istiak & Alam, 2020). The study reaffirms the spillover effect from the sentiment markets of developed countries into the returns and sentiment markets of the MENA region. Bullish sentiment shocks negatively affect MENA markets due to investors' perceptions that the USA market will attract foreign investment and regain momentum soon.

For robustness check, the study repeated the methodology applied to four other developed markets: the UK, Canada, Germany, and France. This was done using principal component analysis and Markov switching models. The UK exerts the most substantial influence on all MENA countries and sentiment markets, whereas France and Canada have a lesser impact, attributed to their distinct market structures and lower economic co-integration with MENA nations. The influence of these countries on the MENA region tends to last longer and has a more pronounced spillover effect.

5. Implications, Limitations, and Conclusion

Various studies in existing literature explore the spillover effects, there is a scarcity of research focusing on investor sentiment and the spillover of sentiment shocks from developed countries into the MENA region. Additionally, as evidenced in literature, stock market volatility is influenced by more factors than those highlighted by fundamental analysis, suggesting that market sentiment plays a significant role in driving such volatility. As

the MENA region consists of developing markets, it is crucial to investigate whether global sentiment shocks from developed markets, such as the USA, affect these emerging MENA countries, especially as investments continue to grow within the MENA ecosystem. To explore this relationship, this study employed a variety of methodologies to capture sentiment shocks in the global market and analyze their spillover effects on MENA markets. Initially, sentiment indices for both the USA and MENA markets were created using principal component analysis. Subsequently, a structural VAR model was applied to identify the structural shocks occurring in the bullish, bearish, and sentiment indices of the USA market, helping to understand how these shocks influence the developed markets' transitions between bullish and bearish states.

The results from the SVAR model were then tested using a Markov switching model, which examined the impact of shocks across different regimes on the returns and sentiment of each MENA country market. The analysis revealed that both bullish and bearish shocks from the USA do spill over into the returns and sentiment of the MENA region. However, the composite USA sentiment index was found to have an insignificant effect on MENA market returns and sentiment. Furthermore, the spillover effects on the MENA region were shown to have a lasting impact, varying from one week to as long as 11 weeks.

The findings support the idea that bearish shocks in developed markets, such as the USA, lead investors to become more risk-averse regarding investments in those markets. As a result, they are more likely to diversify their portfolios by investing in developing or emerging markets like those in the MENA region. This shift results in increased cash inflow into the MENA region and positively influences investor sentiment, as local investors perceive MENA markets as more appealing to foreign investors looking to move away from developed markets during downturns. Conversely, bullish sentiment shocks in the USA can lead to greater cash flow moving from the MENA region into the USA, potentially signaling a bullish trend that could extend to the MENA region as well. Additionally, varying results were observed across different countries due to the unique market structures within the MENA region. The outcomes of this study align with previous research on emerging and frontier markets, providing valuable insights for policymakers and market regulators. It emphasizes the importance of mitigating spillover effects to prevent disruptions in the MENA market, thereby fostering the development and growth of capital and financial markets in the region. The practical implications suggest that MENA markets may experience increased volatility post developed markets' shocks, due to correlated sentiment, creating uncertainty for investors and leading to potential capital inflows or outflows. Policymakers in the MENA region might need to

work together to lessen the impact of USA market shocks by implementing stabilizing measures, adjusting monetary and fiscal policies, and enhancing regional financial integration. Policymakers could also improve market surveillance, risk management frameworks, and investor protection mechanisms to bolster market resilience. Country specific implications include providing more incentives for investors in countries and regions that are impacted positively from bearish shocks and promote foreign investment in these countries, this is also in line with previous research that suggested the same country specific implications as in GCC (Soltani & Abbes, 2023), and in china as well (Chen & Haga, 2021)

Limitations of this study are to be considered, along with suggestions for future research. One major limitation was the lack of access to comprehensive and reliable data on market sentiments, investor behavior, and asset price movements in both the USA and MENA region markets. Variations in data reporting standards and methodologies across different countries resulted in the exclusion of some data samples and restricted data periods. Although this limitation was overcome by standardizing the data used to account for differences in reporting standards, as well as narrowing the data sample to include data from 2008 to 2024 where all data and proxies used were available. Additionally, accurately capturing the dynamic and time-varying nature of spillover effects necessitates advanced econometric techniques

and sophisticated modeling approaches, which contributed to the complexity of the models used in this study. Furthermore, the MENA region consists of a diverse array of countries with differing economic structures and levels of financial market development, which can influence the magnitude and nature of spillover impacts. These differences and their implications for spillover effects limit the generalizability of findings.

This study recommends replicating the methodology in other developed and emerging markets, to determine whether the spillover effect originates solely from the USA market. It also suggests further investigation into the reasons behind the contradictory findings in some MENA countries, incorporating a control variable, and classifying results by industries and sectors. Additionally, it advocates for the use of advanced methodologies like neural networks and machine learning for a deeper analysis of investor sentiment.

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