Herding in Oil-Rich Markets: Evidence from Saudi Arabia and the UAE

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Abstract

This paper examines herding behaviour in the Saudi Arabian (Tadawul) and UAE (Dubai Financial Market) stock markets from January 2001 to December 2023, focusing on oil-rich economies vulnerable to commodity price fluctuations and investor sentiment. Using the State Space model, complemented by CSSD and CSAD models, the study confirms herding in both markets, particularly during market stress and financial crises. In Saudi Arabia, herding is stronger and more persistent, driven by retail investor dominance and limited foreign investment, while in the UAE, herding is less persistent, primarily triggered by crises and downward market movements. The State Space model's dynamic approach captures time-varying herding patterns, offering superior insights compared to the static CSSD and CSAD models. These findings highlight variations in herding intensity due to differences in market structures, regulatory frameworks, and investor composition. For Saudi Arabia, enhancing investor education can mitigate retail-driven herding, while the UAE's dual-exchange structure can promote diversified trading strategies during crises. The results urge investors, regulators, and policymakers to adopt robust risk management, country-specific regulatory responses, and greater market transparency. Integrating behavioral insights into forecasting models and policy frameworks can enhance market stability and investor confidence in these emerging financial markets.

Keywords: Herding behaviour; Saudi Arabia; UAE; stock markets; behavioural finance; oil-rich economies.

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1. Introduction

Herding behaviour in financial markets refers to the tendency of investors to mimic the actions of others instead of making decisions based on their own information or instincts (Komalasari et al., 2022; Barham, 2024). The reason behind this phenomenon is usually driven by social pressure or fear of losing out on potential profits, mostly at uncertain moments or fast-changing market parameters. The collective action of a large number of investors can be the cause of asset mispricing, unreasonable volatility, and instances of financial bubbles. As another example, historical market bubbles, like the Dot-com Bubble in 1995-2000 or the U.S. Housing Bubble in 2007-2008, are often referred to as the herding behaviour increased market risks and led to a financial crisis (Ooi, 2025).

In oil-based economies with separate financial and macroeconomic models that make them more susceptible to herding, already problematic by group investor action, the work on herding is particularly relevant. Their high dependence on oil exports, lack of diversification in their private sectors, as well as highly concentrated revenue bases, expose these economies to variations in commodity prices (Elgayar, 2021). Any kind of shock to the price of oil, be it the recent oil price fall from 2014 to 2016, which saw Brent crude drop to less than $30 per barrel, severely diminishes market liquidity and heightens sentiment-driven trading among investors (Ziadat & Maghyereh, 2024). These shocks disrupt economic stability leading to procyclical facilities that only increase the sentiment of investors. Investors often follow commodity trends instead of trying to make their own conclusions; therefore, spontaneous falls in income due to oil can trigger a panic sale or a speculative purchase (Matallah, 2024). This vibrancy is indicative of the need to examine how external commodity shocks and domestic policy reactions trigger and increase herding effects in oil-rich markets, which include market reforms or fiscal adjustments. In the GCC economies where oil revenues dominate market and fiscal affairs, the interplay between oil jolt and herding is essential.

For understanding the actions of oil-rich markets, Saudi Arabia and the United Arab Emirates are very important examples. They are both part of the Gulf Cooperation Council (GCC) and their economies depend much on selling hydrocarbons abroad. However, factors such as openness to international trade, institutional frameworks, and investor composition differ significantly between these two markets.

Tadawul, the Saudi stock market, is the largest in the Middle East and has made many changes to improve the way the market works and encourage foreign investment (Almutairi et al., 2024). Despite all these steps, Saudi Arabia's market is not as open as the UAE's. The financial markets of the UAE, ADX and DFM have opened up their markets to international investors and foreigners. This has enabled the diverse participation of investors, including numerous institutional investors, who potentially can influence the existence and characteristics of herding in the market (Vaidya, 2022). There are differences in how organisations are structured in each country. The

UAE's regulations, under the guidance of the Securities and Commodities Authority (SCA), are respected for being easy to understand and meeting global standards. Alternatively, Saudi Arabia's Capital Market Authority (CMA) is trying to achieve the same objectives but deals with issues such as high market concentration and many state-owned companies (Alomran, 2021).

This contrast results in a higher level of foreign and institutional investors in the UAE, potentially causing different effects on herding patterns than in Saudi Arabia. Alternatively, retail investors are more common in the Saudi market, and as such, more likely to follow others as they do not have the knowledge and resources to do otherwise.

Given these differences, this study seeks to address the following research questions:

1. Is there evidence of the presence of herding behaviour in the stock markets of Saudi Arabia and the UAE, particularly during periods of market stress, financial crises, or high volatility?
2. What are the similarities and differences in the nature of herding behaviour between these two markets?

2. Literature Review

2.1 Herding Behaviour

Herding behaviour emphasises the phenomenon in which individuals in a group adopt similar actions or opinions as those around them, without considering their own independent beliefs or preferences, or the rationality in their behaviour (Nerlekar et al., 2025). In investing, herding behaviour is an investment trend whereby a group of investors makes comparable investment decisions, without carrying out their own research or analysis. Herding behaviour has a few reasons why investors would participate (Chang et al., 2020). The first is information asymmetry, where investors, particularly retail investors, lack access to or the ability to analyze private information, leading them to rely on the actions of others as a signal of investment quality (Bikhchandani et al., 1992). Additionally, reputational herding occurs when investors mimic institutional or prominent market participants to avoid reputational risk, particularly in uncertain markets (Scharfstein & Stein, 1990).

Negative effects on investors can be a result of herding behaviour. Among the results is that it can make the investor have poor decisions on their investment (Suresh, 2024). Investors tend to invest in overpriced or risky investments when they take part in herding behaviour because they might be led by the behaviour of others rather than their own research (Komalasari et al., 2022). Investor herding behavior can increase the price of various assets and lead to a bubble that can cause investors to sustain huge losses (Kyriazis 2020). The situation is more vivid when a financial crisis occurs. It is particularly apparent when it is an extreme market condition, such as fear, uncertainty, and high volatility of asset values (Chatterjee & Nayyar, 2024). The collective

action of market players (herd behavior), which influences the stability of a market and thus the occurrence of financial crises, in most cases can bring significant changes as well. Herd behavior affects both mature and emerging markets but much more so the latter, owing to information asymmetry, scarcity of market participants, volatility and most importantly, speculation. In emerging markets, where investor sentiment is stronger and the publication of information can be hampered, the paradigm of herd behavior can have a huge influence on its price (Wang & Nuangjamnong, 2022). The shallow nature and low levels of liquidity of these markets can therefore compound the impacts of herding and thus lead to heightened levels of market volatility and a high risk of destabilizing markets.

2.2 Economic and Market Context

2.2.1 Saudi Arabia

The oil sector has long played a major role in Saudi Arabia's economy, making up a large portion of its GDP. To overcome the problems of depending so much on oil, the Kingdom launched Vision 2030 in 2016 to achieve economic diversification and a lower use of oil. In the framework of this program, Saudi Arabia is advancing its non-oil sectors. Especially, growth in the non-oil sector went up from 1.82% in 2016 to 4.93% in the first half of 2023, which reflects the country's movement toward diversifying its economy (Vision 2023, 2025). Even so, problems remain, as shown by a 1.8% drop in real GDP growth in the first quarter of 2024, mostly caused by a 10.6% decline in oil activities (Reuters, 2024).

Tadawul, the stock exchange in Saudi Arabia, was the biggest market in the Middle East by the end of 2024, with a total value of about $2.7 trillion (S&P Global, 2025). Both the laws and the basic structure of the market have been updated to draw in investors. In the same year, the Saudi Exchange released Large, Mid and Small Cap Indices, as well as an IPO Index, so that the market's dynamism could be better reflected and address the needs of all types of investors (Tadawul Group, 2023). Even with the progress mentioned above, the market is still mainly controlled by large government-connected firms, while foreign investments are still far lower than in other big equity markets (S&P Global, 2025).

Saudi Arabia is acting to connect its capital markets to the world's financial system. In June 2019, the MSCI Emerging Markets Index added the Saudi stock exchange to its index, after including a portion in May 2019 (King, 2019). This means international investors learn more about Saudi equities and it is part of a general effort to encourage foreign investment in the country's market. Since June 2015, Saudi Arabia has allowed foreigners to directly purchase and sell shares in its stock market (Marmore, 2018).

2.2.2 United Arab Emirates

Both oil and non-oil sectors are important sources of income for the UAE economy. The UAE's non-oil GDP grew by 4.5% in 2023 to AED 987 billion, which made up 74.6% of the total real GDP (FSCS, 2025). The growth in Abu Dhabi's non-oil economy by 9.1% contributed to real GDP growth of 3.1% in 2023 as calculated by SCAD (2024). The UAE has excelled in areas like finance, tourism and technology, which have made it a key economic center in the area.

Abu Dhabi Securities Exchange (ADX) and Dubai Financial Market (DFM) are the main financial markets in the UAE. Both exchanges have taken steps to increase the depth of the market and gain more investment. The UAE government has taken steps to put the main state assets on the ADX and DFM, widening opportunities for both institutional and retail investors (Chambers & Partners, 2024). Also, recent changes to laws on foreign ownership now allow certain businesses to work without needing a UAE citizen as a partner, making it possible for more foreign investment (DFM, 2023). These steps have helped make the market easier and interesting for more people.

Large amounts of foreign direct investment (FDI) are attracted to the UAE because it is recognised as a top investment spot worldwide. The policies, strategic location and outstanding infrastructure in the country attracted global investors to invest in the country (Invest UAE, 2025). According to Financial News (2025), the UAE's Dubai has evolved into a top wealth management centre, predicted to surpass places like the Channel Islands by 2028 with $1.5 trillion in assets. Because the UAE embraces economic diversification and welcomes outside investors, it now plays a stronger role in the worldwide financial system.

2.2.3 Comparative Analysis

Saudi Arabia and the UAE, while both oil-rich Gulf Cooperation Council (GCC) countries, exhibit notable differences in market openness, governance, market maturity, and foreign investor access. The UAE's diversified economy, advanced regulatory framework, and proactive reforms have fostered a more open and internationally integrated market environment (Crupi & Schiliro, 2023). Meanwhile, Saudi Arabia has made major progress through Vision 2030 but still faces issues with market concentration and a lower number of foreign investors (Crupi & Schiliro, 2023). The ways these markets are built can determine how much common behaviour investors exhibit and how it appears. Policymakers and investors need to consider these factors to increase the region's market stability and performance.

2.3 Limitations of Existing Studies

Earlier works on herding behavior, including Chang et al. (2000) and Christie and Huang (1995), are based on fixed models including CSSD and CSAD, which do not account well when

there are changes in the herding patterns especially in highly unpredictable markets such as those in the GCC. The models are not as useful in capturing dynamic responses to both external and internal shocks, such as oil price movements or changes in regulations, which are important in oil-based economies (Mbengue et al., 2024). Moreover, the current studies do not recognize the fine mechanics of herding, such as information cascade or reputational herding, which are more prominent in the markets where a lot of retail investors participate or there is little transparency.

2.4 Gap in the Literature

There is a lot of research on herding behaviour all over the world, but not much that compares Saudi Arabia and the United Arab Emirates. The primary distinctions between these economies are not highlighted by the numerous researchers who concentrate on one or a few large areas (Danila & Aggarwal, 2025). The comparison of how herding occurs in the Saudi Arabian and United Arab Emirates markets had not been adequately studied, even though the degree of market openness, group of investors, and financial regulation are diverse. Still, cross-sectional standard deviation (CSSD) and absolute deviation (CSAD) are statistics traditionally used to examine herding (Chang et al., 2000; Hwang & Salmon, 2004). Although such models are useful, they do not necessarily reflect how herding transforms and adapts to gradual alterations in the market or regulations. In its advanced forms, like the State Space model, hidden behaviours can be measured and analysed without being affected directly (Mbengue et al., 2024). Currently, these methods are not much exploited in the economic sectors of the GCC. This paper fills this gap by performing a comparative analysis of herding in Saudi Arabia and UAE stock markets, using the State Space model to infer latent time-varying herding dynamics.

3. Methodology

3.1 Conceptual Framework

Traditional finance believes investors use logic alone, but behavioural finance suggests that in uncertain times, emotions such as fear and greed cause them to follow the crowd (Chang et al., 2000). In the context of oil-rich and emerging markets such as Saudi Arabia and the UAE, these emotional responses may be amplified due to structural factors like high retail investor participation, limited market depth, and strong exposure to external shocks. The conceptual framework focuses on answering the existence of herd behaviour in the stock markets of Saudi Arabia and the UAE during periods of extreme market movements, financial crises, and market volatility.

Figure 1: Conceptual Framework for Identifying Herding Behaviour in Oil-Rich GCC Markets

Extreme market movements describe unusually significant changes in prices in the stock market over a small amount of time (Siegel, 2021). These are major, uncommon and surprising movements. These excessive movements cause market dysfunction and create greater uncertainty over future price direction. In the traditional finance theory, rational investors do not react to short-term price movements and make decisions based on the fundamental analysis of stocks (Hasan et al., 2020). However, behavioural finance argues that investors' greed and fear are extreme when stock prices are moving sharply up or down. This elevated state of fear and uncertainty causes investors to ignore their own privately held information and go with the herd (Chang et al., 2000). These dynamics are especially relevant in the Tadawul and UAE markets, where investor education and institutional participation differ in scale and impact.

Financial crises are identified as instances when there is a general collapse of the financial system or financial markets of a specific country, leading to the malfunctioning of the financial institutions of the country or failure to conduct financial and economic operations (Alexandridis & Hasan, 2020). A financial crisis is marked by a time of high uncertainty, loss of potential, and chaos in the regular market situation. Traditional finance suggests that rational investors would consider crises to be a time to purchase under-priced stocks. Nevertheless, behavioural biases lead to irrational behaviour in response to crises. Research indicates that herd behaviour is more prevalent during a financial crisis. As Saudi Arabia is an oil-dependent economy, and the UAE has a diversified investor base across the globe, herding behaviour caused by a crisis could likely differ across these markets, which is why a comparative study is vital.

Market volatility is a measure of how much a security or market price or market fluctuates (Chen et al., 2022). Market volatility gauges the variations in price about the mean. The implication of increased volatility is increased uncertainty about the future direction of the price. According to conventional financial frameworks, rational investors are not influenced by market volatility and base their investment decisions primarily on expected returns and associated risks. However, behavioral theories contend that volatility often triggers loss aversion and induces overreactions among investors.Research demonstrates that higher volatility is coupled with higher ambiguity,

which leads to investors copying the choices of others (Chang et al., 2000). Herd behaviour in volatile markets is also empirically proven. In oil-exporting countries such as Saudi Arabia and the UAE, volatility is commonly associated with commodity price shocks, political conflicts, and regulatory changes, which may serve as triggers of herding behaviour.

3.2 Econometric Models

The study conducts analysis by applying three models, among which the main focus is on the State Space model developed by Hwang and Salmon (2004) while using Christie and Huang CSSD model (1995) and Chang et al. CSAD model (2000) to increase the robustness of the results. Each model gives a unique view of how investors react under different market situations, with State Space modelling changes over time, while CSSD and CSAD check the validity of results by being static.

3.2.1 State Space Model

The State Space model allows us to monitor the evolution of behaviour over time, most notably during stress periods in the market, as the risk profile of individual stocks (betas) moves toward the overall risk profile of the market. Compared to static models, it is able to capture changes in investor behaviour that can be dynamic, so it is appropriate in oil-based market where volatility due to oil price movement or regulation can cause herding. According to Hwang and Salmon (2004), under the effect of herding, investors will gradually denounce incidences of body, which leads to convergence of their individual asset-beta levels to that of the market. This transition reflects behavioural synchronisation, especially during periods of market stress. The model consists of a measurement equation and a transition equation:

$$\text{Log}(\text{std}(\beta_{imt})) = \mu_t + H_{mt} + C_{m1} \log \varphi_{mt} + C_{m2}\, r_{mt} + v_{mt}$$

$$H_{mt} = \varphi \text{t H}(_{mt-1}) + n_{mt}$$

Where: $\log \varphi_{mt}$ represents the log of market volatility.
r_{mt} is the return at time t

In this model, β_{imt} represents the beta of asset iii at time t, while std(β_{imt}) is the cross-sectional standard deviation of these betas. The unobservable variable H_{mt} is the herding parameter, which captures time-varying behavioural convergence. Market volatility is captured through logφ_{mt} and r_{mt} is the market return at time t. The error terms v_{mt} and n_{mt} are white-noise disturbances with zero mean and constant variance.

A statistically significant and negative coefficient on r_{mt} or φ_{mt} suggests that herding increases as the market moves or becomes more volatile. The coefficient φ_t in the transition

equation indicates the persistence of herding: a value significantly less than 1 implies herding is present but not indefinitely persistent. If *σmn2 = 0*, the herding parameter H_{mt} has no effect, implying no herding; conversely, a significant and time-varying H_{mt} indicates the presence of herding behaviour over time.

*3.2.2 **CSSD Model** (Christie & Huang, 1995)*

The CSSD model focuses on herding during extreme market movements, such as sharp rises or falls in stock prices, by measuring how tightly stock returns cluster around the market average. It is a straightforward approach to detect whether investors abandon individual strategies during market extremes. The CSSD model measures the cross-sectional standard deviation of returns as:

$$CSSD = \sqrt{\frac{\sum_{i=1}^{N}(R_{it} - R_{mt})^2}{N_t - 1}}$$

Here, R_{it} is the return on stock *i* at time *t*, and R_{mt} is the market return. The regression form includes dummy variables to isolate extreme market days:

$$\text{CSSD} = \alpha + \beta^{L} D^{L} + \beta^{\mu} D^{\mu} + \epsilon_t$$

Where $D^{L} = 1$ if the market return lies in the lower tail of its distribution, and $D^{\mu} = 1$ if in the upper tail. Herding is detected when both β^{L} and β^{μ} are negative and statistically significant, indicating a contraction of dispersion during extreme conditions.

*3.2.3 **CSAD Model** (Chang et al., 2000)*

The CSAD model examines whether herding occurs when market returns are large, capturing non-linear patterns in investor behaviour. It is particularly useful for identifying herding in both rising and falling markets, where investors may overreact to market trends. The model measures the cross-sectional absolute deviation of returns as:

$$CSAD = \frac{1}{N_t}\sum_{i=1}^{N_t}\left|R_{i,t} - R_{m,t}\right|$$

The following regression is applied:

$$CSAD_t = c + \gamma_1\left|r_{m,t}\right| + \gamma_2 r_{m,t}^2 + \epsilon_t$$

Here, a negative and statistically significant γ_2 coefficient indicates non-linear herding behaviour, especially when market returns are large (positive or negative), while a positive γ_2 implies dispersion increases, suggesting no herding.

Extended forms of the CSAD model further differentiate between upward and downward markets, introducing conditional terms:

$$CSAD_t^{UP} = c + \gamma_1{}^{UP}\left|r_{m,t}{}^{UP}\right| + \gamma_2{}^{UP}(r_{m,t}{}^{UP} - r_m{}^{UP\overline{\quad\quad}})^2 + CSAD_{t-1}^{UP} + \epsilon_t$$

$$CSAD_t^{DOWN} = c + \gamma_1{}^{DOWN}\left|r_{m,t}{}^{DOWN}\right| + \gamma_2{}^{DOWN}(r_{m,t}{}^{DOWN} - r_m{}^{DOWN\overline{\quad\quad}})^2 + CSAD_{t-1}^{DOWN} + \epsilon_t$$

Negative and significant $\gamma_2{}^{UP}$ or $\gamma_2{}^{DOWN}$ coefficients signal herding during bullish or bearish markets respectively.

Using the State Space model alongside CSSD and CSAD allows us to find both short-term and long-term herding behaviours in the two nations, even in regular times and during crises. The use of triangulation provides more detail and makes the behavioural findings more credible.

3.3 Hypotheses

This study tests the following hypotheses:

H1: Herding behaviour exists in the stock markets of both Saudi Arabia and the UAE.
H2: The herding behaviour differs between the two markets due to institutional, regulatory, and structural differences.

3.4 Interpretation Strategy

Herding behaviour analysis is primarily based on the State Space model, which is also tested using the assistance of the CSSD and CSAD models to check the robustness of results. The models offer a complimentary view and represent dynamic and static components of herding behaviour in various market contexts in Saudi Arabia and the UAE. The state space model detects the time-varying existence of herding by noting the condensation of individual asset betas around market beta in times of stress. It allows for identifying the behavioural convergence that evolves over time, especially in volatile or crisis circumstances. The CSSD model estimates the dispersion of stock returns in extreme market situations, which is useful in detecting herding in extreme market situations. The CSAD model is able to capture non-linear associations between market return and return dispersion, which proves useful in the evaluation of both symmetric and asymmetric herding patterns.

Collectively, these models provide a multidimensional perspective on herding behavior and offer empirical evidence of how investor convergence in the Saudi and UAE stock markets varies across different market regimes.

3.5 Data and Sample

The present study relies on daily stock market returns data of Saudi Arabia and the United Arab Emirates (UAE), including the time range between January 2001 and December 2023. The information was sourced through the reputable financial database Refinitiv. The 23-year horizon covers some notable financial and geopolitical episodes, including the global financial crisis of 2008, the COVID-19 pandemic, as well as significant oil price shocks, which make it very attractive in terms of testing investor behaviour in stressful market conditions. The sample allows actively traded stocks in both markets to represent the market and ensure consistency in time series analysis. The long-term high-frequency series data allows the use of robust econometric methods to identify herding behaviour persistence across time and market regimes in these oil-based economies. For data cleansing purposes, missing values were identified and addressed through imputation techniques, such as linear interpolation or forward/backward filling, while stocks with excessive missing data were removed. Outliers were detected using statistical methods like Z-scores and replacing outliers with the nearest valid data point. To handle non-normality, normalization and log transformations were applied where necessary. The final dataset underwent consistency checks to remove duplicates and correct data format issues. This rigorous data cleaning process ensured the dataset's quality and suitability for robust econometric modelling.

4. Results and Discussion

The analysis is based on daily stock market returns data from January 2001 to December 2023, sourced from Refinitiv, covering actively traded stocks in the Saudi Arabia (Tadawul) and UAE (DFM) markets.

Table 1
Descrioptive Statistics

	UAE			KSA		
Ri		**Rm**	**Ri-Rm**	**Ri**	**Rm**	**Ri-Rm**
Mean	0.41	0.00	0.00	0.04	0.00	0.00
Std. Dev.	0.03	0.01	0.03	39.09	0.01	0.03
Variance	0.00	0.00	0.00	1527.87	0.00	0.00
Skewness	29.61	0.10	27.61	1014.02	0.79	16.54
Kurtosis	4302.56	15.08	3909.86	103669.00	16.73	1919.23
Min	-0.81	-0.09	-0.80	-1.00	-0.07	-0.07
Max	4.85	0.12	4.85	4.23	0.09	4.23
Observations	364771	512028	355200	1057833	829848	617711

Table 1 shows notable differences in return characteristics between UAE and Saudi Arabia. The UAE has higher average daily returns (0.41%) with low volatility, while Saudi Arabia shows extreme variability (Std. Dev. = 39.09), possibly due to scaling or structural differences. UAE returns exhibit high skewness (29.61) and kurtosis (4302.56), suggesting infrequent but sharp market movements. In contrast, Saudi Arabia's extreme skewness (1014.02) and kurtosis (103,669.00) point to highly erratic behaviour and frequent outliers. Despite similar return ranges, Saudi data reflects more instability. These differences provide a strong rationale for modelling investor behaviour and herding asymmetries across both markets.

4.1 Saudi Arabia

Table 2
State Space Model Output

UAE	**Coef**	**Std err**	**t.stats**	**P Value**
Const	1.0667	0.0030	364.9520	0.0000
market_return	-1.7567	0.0990	-17.7390	0.0000
market_volatility	38.6561	0.1620	238.1650	0.0000
H_mt_lag	0.4132	0.2080	1.9910	0.0460
R-squared:	**0.283**			
KSA				
const	1.7567	0.0020	861.4080	0.0000
market_return	-1.7252	0.0890	-19.2850	0.0000
market_volatility	52.0701	0.1580	328.5570	0.0000
H_mt_lag	2.0624	0.1950	10.5730	0.0000
R-squared:	**0.287**			

Table 2 shows a clear presence of herding behaviour, particularly under conditions of market stress. The State Space Model provides the strongest evidence for this, with the market return coefficient (−1.7252*) being negative and statistically significant, indicating that investors tend to follow the market consensus during broad market movements, consistent with strong time-varying herding behaviour. This finding is further reinforced by the lagged herding term H_mt (2.0624*), suggesting rising dispersion, and confirms that herding is not constant but varies across time, with sharp clustering of investor behaviour particularly during high-stress periods. These results are evident in the KSA section of Table 2, where both market_return and H_mt_lag are significant. This supports the conclusion that herding behaviour in Saudi Arabia is dynamic and episodic, aligning with our analytical strategy that prioritises the State Space model as the central tool for detecting latent behavioural shifts.

Table 3
CSAD Model Output

VARIABLES	(1) Herding Csad	(2) Herding fe csad	(3) Herding re csad	(4) Herdingferobust csad	(5) Herdingrerobust Csad
absrm (UAE)	0.645***	0.645***	0.645***	0.645***	0.645***
	(0.00742)	(0.00742)	(0.00742)	(0.0341)	(0.0341)
absrm (KSA)	0.726***	0.726***	0.726***	0.726***	0.726***
	(0.00656)	(0.00656)	(0.00656)	(0.0172)	(0.0172)
rm2 (UAE)	-0.191	-0.191	-0.191	-0.191	-0.191
	(0.123)	(0.123)	(0.123)	(0.225)	(0.225)
rm2 (KSA)	2.740***	2.740***	2.740***	2.740***	2.740***
	(0.143)	(0.143)	(0.143)	(0.282)	(0.282)
Constant (UAE)	0.00967***	0.00979***	0.00967***	0.00979***	0.00967***
	(0.000422)	(5.60e-05)	(0.000422)	(0.000234)	(0.000511)
Constant (KSA)	0.00787***	0.00759***	0.00787***	0.00759***	0.00787***
	(0.000363)	(3.92e-05)	(0.000363)	(7.49e-05)	(0.000435)
Observations (UAE)	132	132	132	132	132
Observations (KSA)	340	340	340	340	340
R-squared (UAE)	0.071				
R-squared (KSA)	0.073				

UAE	(1)	(2)	(3)	(1)	(2)	(3)
VARIABLES	upherd CSAD	Upherdre CSAD	upherdrerobust CSAD	downherd csad	downherdre csad	Downherdrerobust Csad
d1rm	0.437***	0.437***	0.437***	-0.315***	-0.315***	-0.315***
	(0.00851)	(0.00851)	(0.0198)	(0.0101)	(0.0101)	(0.0233)
	2.531*	2.531*		3.443**		

Table to be continued...

d1rm2	**	**	2.531***	*	3.443***	3.443***
	(0.144)	(0.144)	(0.257)	(0.198)	(0.198)	(0.273)
Constant	0.012**	0.012**	0.012***	0.013**	0.013***	0.013***
	(0.000417)	(0.000417)	(0.00042)	(0.000418)	(0.000418)	(0.000422)
KSA						
d1rm	0.445***	0.445***	0.445***	-0.362***	-0.362***	-0.362***
	(0.0075)	(0.0075)	(0.0148)	(0.0103)	(0.0103)	(0.0126)
d1rm2	6.296***	6.296***	6.296***	10.13***	10.13***	10.13***

Table 3: CSAD Model Output provides asymmetric insights into herding. In downward markets, the negative drm coefficient (−0.362*) indicates mild linear herding, which often arises during falling prices when investors react to fear or uncertainty. This aligns with the behavioural finance perspective that negative shocks trigger convergence in behaviour as investors seek safety in numbers. The absence of herding evidence under the CSSD model aligns with existing critiques regarding its limited sensitivity. Prior literature suggests that CSSD often fails to capture dynamic, time-varying manifestations of herding.

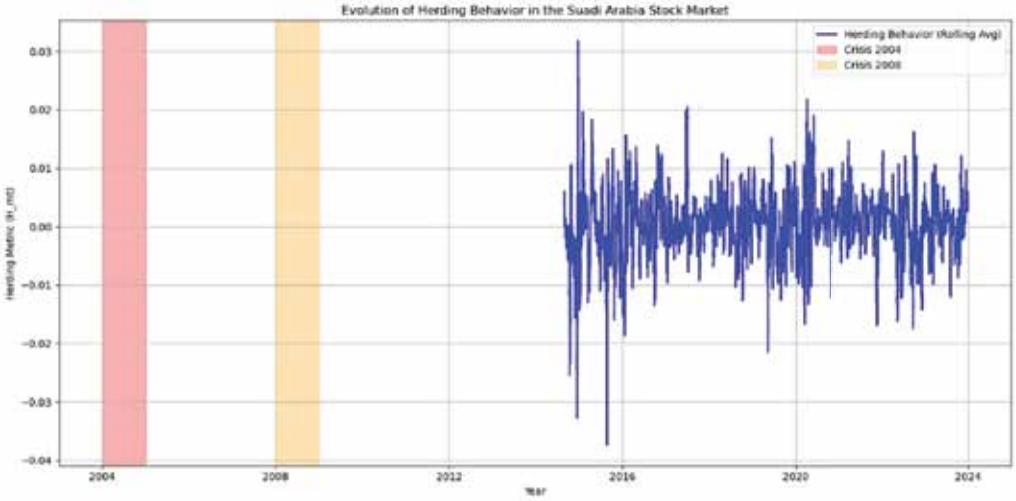

Figure 2: Evolution of Herding Behavior in the Saudi Arabia Stock Market

Figure 2 ("Evolution of Herding Behavior in the Saudi Arabia Stock Market") clearly visualises the time-series pattern of the herding metric (H_mt). While early years before 2015 show limited variation, post-2015 the fluctuations intensify, especially around global events like the COVID-19 pandemic, highlighting how market stress can provoke significant behavioural

responses. Notably, the shaded regions representing the 2004 and 2008 financial crises coincide with relative calm and absence of herding. It also suggests that herding effects became more pronounced after structural reforms and liberalisation rather than during financial crisis.

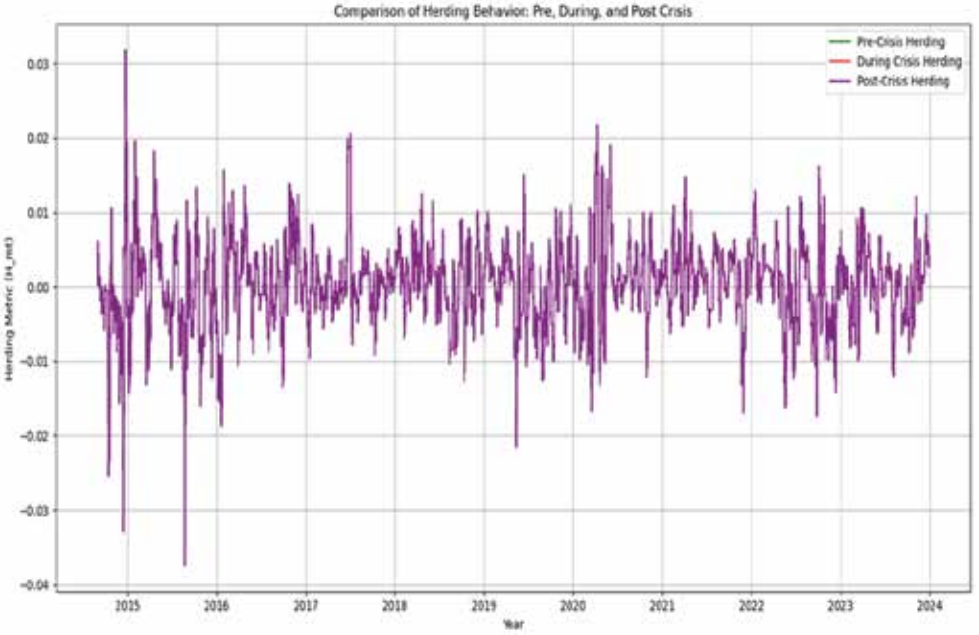

Figure 3: Comparison of Saudi Arabia Herding Behavior: Pre, During, and Post-Crisis

Figure 3, titled "Comparison of Herding Behavior: Pre, During, and Post Crisis", shows minimal differences in herding strength across phases, with a consistent level of noise and spikes throughout the 2015–2023 period. This supports the idea that herding in Saudi Arabia is not systematically tied to crisis phases, but rather emerges episodically due to contextual triggers such as regulatory changes, oil price shocks, or speculative bubbles. Overall, the evidence shows that herding in the Saudi market is more observable through dynamic modelling than traditional static models.

The analysis of the data revealed distinct "spikes" in the herding behaviour during crisis periods, as shown in Figures 2 and 3. These spikes are indicative of increased herding activity, where investor behavior becomes more correlated, reflecting the collective reaction to market uncertainty.

4.2 United Arab Emirates

The analysis of the UAE stock market confirms the presence of herding behaviour, particularly during periods of significant market disruption. Table 2 shows that the market return

coefficient (−1.7567*) is negative and statistically significant, confirming that herding intensifies during broad market movements. This result indicates that investors in the UAE stock market tend to imitate market trends when price swings are substantial, especially during uncertain or volatile times. Additional support for herding comes from the asymmetric CSAD model, where the drm coefficient (−0.315*) in downward markets is negative and significant, signalling mild linear herding under downward market movements. Such behaviour is consistent with behavioural finance theories that suggest fear-induced herding is more prominent during falling markets. The asymmetric terms for upward movements indicate that herding is not a dominant feature in bullish conditions. The CSSD model exhibits a similar pattern of results for the UAE as observed for Saudi Arabia, reaffirming its limited ability to detect herding behavior. Table 4 shows that both the UAE and KSA display significant DL and DU values, but as the values are positive, this provides weak evidence of the presence of herding behavior.

Table 4
CSSD Model Output

CSSD	**UAE**	**KSA**
Variables	CSSD	CSSD
DL	0.0160***	0.0221***
	(4.31e-05)	(4.00e-05)
DU	0.0173***	0.0213***
	(4.90e-05)	(3.41e-05)
Constant	0.011***	0.001***
	(2.24e-05)	(7.29e-06)
R-squared	0.168	0.286
Number of Companies	132	340

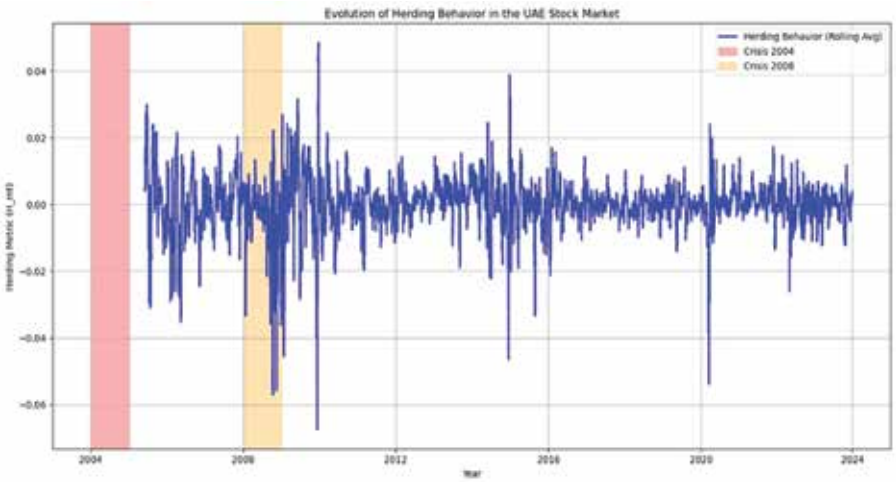

Figure 4: Evolution of Herding Behavior in the UAE Stock Market

Figure 1 ("Evolution of Herding Behavior in the UAE Stock Market") illustrates the time-varying pattern of herding, with sharp spikes in the herding metric (H_mt) around the 2008 financial crisis. The 2004 crisis shows a smaller increase in herding, while post-2008, volatility in the herding metric decreased but remains persistent, with notable surges around 2016 and 2020—likely linked to oil market instability and the COVID-19 pandemic. These findings align with the literature suggesting that market stress amplifies collective behavioural responses (Mand & Sifat, 2021; Cumming et al., 2021).

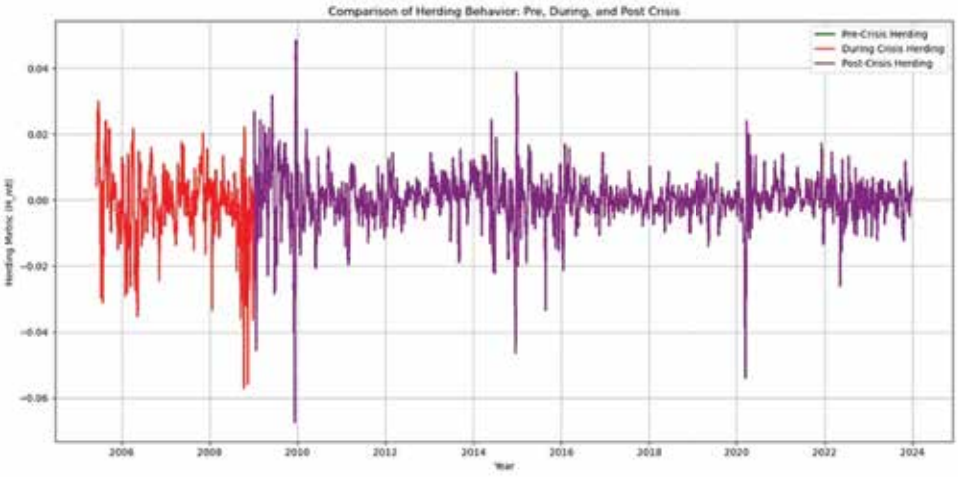

Figure 5: Comparison of UAE Herding Behavior: Pre, During, and Post-Crisis

Figure 2 ("Comparison of Herding Behavior: Pre, During, and Post Crisis") isolates herding dynamics across crisis phases. The red line representing the crisis period shows the highest volatility and most extreme values, suggesting intensified herding during periods of economic distress. The post-crisis period (purple line) shows a reduction in the magnitude and frequency of herding, indicating a return to more rational or independent investor behaviour.

4.3 Comparative Analysis

The occurrence of herding behaviour in Saudi Arabia and UAE highlights the wider behaviour dynamics that influence the way investors make their decisions in oil-rich emerging markets. There exists a general tendency of collective behaviour to be imitated when there is severe uncertainty or volatility by the investors in both markets irrespective of the two markets' structure and settings in terms of regulations.

Herding appears to be more episodic in the case of Saudi Arabia and appears to be found to be still reliant on structural characteristics of high retail investor participation and low foreign institutional holdings. This is the reason such situations act as a breeding ground of sentiment-oriented behaviour particularly in a critical market shock. The evidence shows that during stressful

situations in the market, Saudi investors pay no attention to their own information but follow the stock trend, which represents the psychological and social motivations depicted in the sources of behavioural finance (Cumming et al., 2021). This agrees with the view that the retail-based markets are more exposed to herding due to information asymmetries and ineffective analysis capabilities (Barham, 2024).

On the contrary, the existence of a more liberalised and institutionally mixed financial environment in UAE can result in a more diverse pattern of herding. The presence of herding also exists but it is limited and tends to be short-term during crisis times. The UAE's openness to foreign investors, clearer regulatory frameworks, and stronger institutional presence offer partial buffers against indiscriminate herd behaviour. However, even in this context, investor psychology remains influential during turbulent periods, with herding surfacing notably in downward markets. This supports findings that even mature or diversified markets are not immune to the emotional and social impulses that fuel collective decision-making during crises (Komalasari et al., 2022).

The comparative analysis reveals that although herding exists in both markets, its intensity, persistence, and triggers differ. In Saudi Arabia, herding appears more embedded and likely to persist due to internal market characteristics, whereas in the UAE, it is more reactive and tied to external shocks. These distinctions are critical for policymakers and regulators aiming to stabilise markets and improve investor education. The GCC Context might not require a one-size-fits-all approach; however, specific interventions should be designed considering the market-specific behavioural drivers.

5. Implications

The empirical evidence of herding behaviour, especially during the market stress period, highlights the fact that in Saudi Arabia and the UAE, investor decision making is both psychological and societal as well as fundamental. To investors, this emphasizes the importance of effective risk management instruments in taking control of behavioural biases and market sentiment during times of crisis. Since retail-dominated Saudi Arabia is a market where participation in herding is more pronounced and because of information asymmetries, regulators are encouraged to expand Tadawul investor education programs, which can equip retail investors with analyses to enable them to conduct their research. In the UAE, the more crisis-contingent character of herding can be utilized with the help of the ADX-DFM two-exchange model to stimulate a less predictable trading strategy when the market is downward, and limit the effects of herding. These country-lambda capture structural variations and serve to strengthen market stability.

Regulators should also make information more transparent by either reporting alerts in a timely manner or by improving disclosure procedures to prevent crowd-following mentality. This is crucial because, in Saudi Arabia, a retail-intensive market exacerbates herding, whereas in the UAE, the institution prevalence creates partial inoculation. To accurately predict the future

and limit downside volatility, financial institutions should incorporate behavioural indicators into forecasting models and trading algorithms. Analyzing the causes of herding, like oil price shocks, enables institutions to foresee the activities of the market more successfully. It is crucial to be able to recognise that market activity is based on behaviour in order to increase stability and investor confidence in these emerging markets.

6. Conclusion

This paper evaluated the existence and characteristics of herding behaviour in Saudi Arabia and UAE stock markets by employing dynamic and Static econometrics models. The findings point to the fact that herding can be traced in both markets, but it appears differently because of differences in market structure, investor composition, and regulation. In Saudi Arabia, herding behavior appears more entrenched, perhaps fuelled by the significant role of retail investors and the lack of diversification within the market. Conversely, the UAE depicts the lack of episodic herding and it is heavily dependent on the external shocks and crisis seasons.

These results play a role in expanding the body of knowledge about behavioural finance, particularly in emerging, oil-based markets. The study highlights the significance of incorporating behavioural insights in the analysis and policymaking on financial perspectives. The dynamics of herding are important not only in the context of academic research but also development of regulatory frameworks that foster efficiency and stability in the market. A possible future study may focus on investigating herding by sector or analyze other GCC countries to better understand herding in the region.

References

Alexandridis, A. K., & Hasan, M. S. (2020). Global financial crisis and multiscale systematic risk: Evidence from selected European stock markets. *International Journal of Finance & Economics, 25*(4),518-546. https://onlinelibrary.wiley.com/doi/abs/10.1002/ijfe.1764

Almutairi, S., Azizan, N. A., & Abidin, S. Z. (2024). Impact of Different Exchange Rate Policies on Stock Market Performance: Kuwait vs Saudi Arabia. *Saudi J Econ Fin, 8*(3), 74-90. https://saudijournals.com/media/articles/SJEF_83_74-90_FT.pdf

Alomran, A. A. (2021). Assessing the Liability Exposure of Public Joint-Stock Companies' Directors Under the Liability Rules in Saudi Arabia.

Barham, L. H. (2024). Behavioural Economics:" Herd Behavior". *Calitatea, 25*(203), 94-101. https://search.proquest.com/openview/a1510ff43e21b05d0d7a95bd4e0b8c45/1?pq-origsite=gscholar&cbl=1046413

Bikhchandani, S., Hirshleifer, D., & Welch, I. (1992). A theory of fads, fashion, custom, and cultural change as informational cascades. *Journal of Political Economy, 100*(5), 992–1026. https://doi.org/10.1086/261849

Chambers & Partners (2024) Equity Finance 2024 Retrieved from https://practiceguides.chambers.com/practice-guides/equity-finance-2024/uae/trends-and-developments

Chang, C.L., McAleer, M. & Wang, Y.A., (2020). Herding behaviour in energy stock exchanges during the Global Financial Crisis, SARS, and ongoing COVID-19. *Renewable and Sustainable Energy Reviews, 134*, p.110349. https://www.sciencedirect.com/science/article/pii/S1364032120306377.

Chang, E. C., Cheng, J. W., & Khorana, A. (2000). An examination of herd behavior in equity markets: An international perspective. *Journal of Banking & Finance, 24*(10), 1651–1679. https://www.sciencedirect.com/science/article/pii/S0378426699000965

Chatterjee, D., & Nayyar, K. (2024). Investor sentiments and market volatility: A psychological perspective. Available at SSRN 4846006. https://www.researchgate.net/profile/Deshna-Chatterjee/publication/381128326_Investor_Sentiments_and_Marketvolatility_A_Psychological_Perspective/links/665ef36bd59c846ad4302e5e/Investor-Sentiments-and-Marketvolatility-A-Psychological-Perspective.pdf

Chen, M., Li, N., Zheng, L., Huang, D., & Wu, B. (2022). Dynamic correlation of market connectivity, risk spillover and abnormal volatility in stock price. Physica A: *Statistical Mechanics and Its Applications, 587*, 126506. https://www.sciencedirect.com/science/article/pii/S0378437121007792

Christie, W. G., & Huang, R. D. (1995). Following the pied piper: do individual returns herd around the market? *Financial Analysts Journal, 51*(4), 31-37. https://www.tandfonline.com/doi/abs/10.2469/faj.v51.n4.1918

Crupi, A., & Schiliro, D. (2023). The UAE economy and the path to diversification and innovation. *International Journal of Business Management and Economic Research, 14*(5), 2286-2300. https://ijbmer.com/docs/volumes/vol14issue5/ijbmer2023140507.pdf

Cumming, D., Meoli, M. & Vismara, S., (2021). Does equity crowdfunding democratize entrepreneurial finance? *Small Business Economics, 56*(2),533-552. https://link.springer.com/article/10.1007/s11187-019-00188-z

Danila, N., & Aggarwal, P. (2025). Foreign exchange market herd behaviour: empirical study in ASEAN-5 countries. *Asian Journal of Accounting Research, 10*(1), 63-75. https://www.emerald.com/insight/content/doi/10.1108/ajar-11-2023-0381/full/html

DFM (2023) Dubai Financial Market Retrieved from https://assets.dfm.ae/docs/default-source/dfm-ir/dfm-investor-presentation-q3-2023.pdf?sfvrsn=fd6cca81_4.

Elgayar, A. H. (2021). The impact of investor sentiment and herding behaviour on stock market liquidity.

Financial News (2025). Why wealth managers are flocking to Dubai Retrieved from https://www.fnlondon.com/articles/why-wealth-managers-are-flocking-to-dubai-4cf23779.

FSCS (2025) Data for a Better Future Retrieved from https://fcsc.gov.ae/

Hasan, M. M., Popp, J., & Oláh, J. (2020). Current landscape and influence of big data on finance. *Journal of Big Data, 7*(1), 21. https://link.springer.com/article/10.1186/S40537-020-00291-Z .

Hwang, S., & Salmon, M. (2004). Market stress and herding. *Journal of Empirical Finance, 11*(4), 585–616. https://www.sciencedirect.com/science/article/pii/S0927539804000507.

Invest UAE (2025) UAE Ministry of Investment: Invest in UAE: A Global Investment Hub. Retrieved from https://www.investuae.gov.ae/.

King, J. (2019). Saudi Arabia celebrates MSCI index inclusion. Retrieved from https://www.thebanker.com/content/45a36532-54ac-5078-addc-34a79c731338.

Komalasari, P. T., Asri, M., Purwanto, B. M., & Setiyono, B. (2022). Herding behaviour in the capital market: what do we know and what is next? *Management Review Quarterly, 72*(3), 745-787.

Kyriazis, N. A. (2020). Herding behaviour in digital currency markets: An integrated survey and empirical estimation. *Heliyon, 6*(8). https://www.cell.com/heliyon/fulltext/S2405-8440(20)31595-4 .

Mand, A. A., & Sifat, I. (2021). Static and regime-dependent herding behaviour: An emerging market case study. *Journal of Behavioural and Experimental Finance, 29*, 100466. https://www.sciencedirect.com/science/article/pii/S2214635021000101 .

Marmore (2018) Does Index Inclusion in FTSE, MSCI answer Kuwait, Saudi liquidity needs? Marmore MENA Insights. (n.d.). Retrieved from https://www.marmoremena.com/en/insights/does-index-inclusion-in-ftse-msci-answer-kuwait-saudi-liquidity-needs/.

Matallah, S. (2024). MENA oil exporters need a renewable energy transition before the oil wells run dry: A special focus on innovation, financial development, and governance. *Geological Journal, 59*(3), 838-853. https://onlinelibrary.wiley.com/doi/abs/10.1002/gj.4894 .

Mbengue, M. L., Assoe, K., & Sy, O. (2024) Herding Behavior in African Stock Markets: A State-Space Assessment During Times of Crisis. Oumar, Herding Behavior in African Stock Markets: A State-Space Assessment During Times of Crisis. https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4998703 .

Nerlekar, V. S., Sane, A., Gadekar, M., Gupta, S. K., & Waghulkar, S. (2025). The Herd Mentality: Understanding the Theories and Models of Herding Behavior in Financial Markets. In *Psychological Drivers of Herding and Market Overreaction* (pp. 255-290). IGI Global Scientific Publishing. https://www.igi-global.com/chapter/the-herd-mentality/363250 .

Ooi, K. L. (2025). Behavioural Anomalies and Market Inefficiencies. In Demystifying Behavioral Finance: *Foundational Theories to Contemporary Applications and Future Directions* (pp.23-38). Singapore: Springer Nature Singapore. https://link.springer.com/chapter/10.1007/978-981-96-2690-8_2 .

Reuters (2024). Saudi Arabia's Q1 GDP shrinks by estimated 1.8% y/y as oil sector weighs Retrieved from https://www.reuters.com/world/middle-east/saudi-arabias-q1-gdp-shrinks-by-estimated-18-yy-oil-sector-weighs-2024-05-01/.

S&P Global (2025) Tadawul on the Rise: Saudi Arabia's Investment Plans Fuel Growth. Retrieved from https://www.spglobal.com/ratings/en/research/articles/250506-tadawul-on-the-rise-saudi-arabia-s-investment-plans-fuel-growth-13484510.

SCAD (2024) Abu Dhabi's non-oil economy expands 9.1%, drives real GDP to grow 3.1% in 2023. Retrieved from https://scad.gov.ae/web/guest/w/abu-dhabi-s-non-oil-economy-expands-9-1-drives-real-gdp-to-grow-3-1-in-2023.

Scharfstein, D. S., & Stein, J. C. (1990). Herd behavior and investment. *American Economic Review, 80*(3), 465–479. https://www.jstor.org/stable/2006678.

Siegel, J. J. (2021). Stocks for the long run: The definitive guide to financial market returns & long-term investment strategies. McGraw-Hill Education. https://cir.nii.ac.jp/crid/1130282269885828480 .

Suresh, G. (2024). Impact of financial literacy and behavioural biases on investment decision-making. *FIIB Business Review, 13*(1), 72-86. https://journals.sagepub.com/doi/abs/10.1177/23197145211035481

Tadawul Group (2023) Saudi Tadawul Group Annual Report Retrieved from https://annualreport.tadawulgroup.sa/Resources/AnnualReport2023/assets/img/pdfs/Saudi%20Exchange.pdf.

Vaidya, C. N. (2022). Analysis of Laws Relating to Capital Markets in USA and UAE. Part 2 Indian J. Integrated Rsch. L., 2, 1. https://heinonline.org/hol-cgi-bin/get_pdf.cgi?handle=hein.journals/injloitd3&section=89 .

Vision 2023 (2025). A Thriving Economy Retrieved from: https://www.vision2030.gov.sa/en/overview/pillars/a-thriving-economy.

Wang, P. & Nuangjamnong, C., (2022). Determinant Factors of Overconfidence, Herding Behaviour, and Investor Elements on Investment Decision Making in China. Universal *Journal of Financial Economics*, 23-42. https://pdfs.semanticscholar.org/e558/356e77eac9aa3ae1ca3a622ca610a1f1c54c.pdf

Ziadat, S. A., & Maghyereh, A. (2024). Energy profile and oil shocks: a dynamic analysis of their impact on stock markets. *Eurasian Economic Review, 14*(3),757-780. https://link.springer.com/article/10.1007/s40822-024-00277-9 .