Unraveling the Link between Corruption and Stock Market Performance in the MENA Region: Insights from Panel ARDL Model.
(Empirical study)

كشف العلاقة بين الفساد وأداء سوق الأوراق المالية في منطقة الشرق الأوسط وشمال أفريقيا: رؤى من نموذج ARDL.

(دراسه تطبيقيه)

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المستخلص:

الغرض: الغرض الأساسي من هذه الدراسة هو دراسة العلاقة بين الفساد ومؤشرات الأسواق المالية في١٤ دوله من دول الشرق الاوسط و شمال افريقيا MENA. هدف الباحثين في الدراسه الحاليه هو فحص الآثار المحتملة للفساد على أحجام التداول، والقيمة السوقية، ونسب التداول، مع الأخذ في الاعتبار تأثير الناتج المحلي الإجمالي

والتضخم. ومن خلال إجراء فحص شامل للدول التي تعاني من الفساد و الدول النظيفه ، يسعى بحثنا إلى المساهمة في فهم كيفية تأثير الفساد على الأسواق المالية.

التصميم/المنهجية/النهج: انطلاقًا من الاتجاه السائد في الدراسات السابقة التي تعاملت مع منطقة الشرق الأوسط وشمال أفريقيا باعتبارها مجموعة بيانات متجانسه، تتضمن منهجيه الدراسة الحاليه تصنيف دول منطقة الشرق الأوسط وشمال أفريقيا إلى فئتين بناءً على مستويات الفساد فيها. تعتمد الدراسه علي التحليل الاحصائي لل Panel data من خلال تصميم ثلاثه نماذج وهي النموذج ذو التاثيرالعشوائي Random effect model و النموذج ذو التاثير الثابت Fixed Effect Model و النموذج المجمع Pooled Mode وتحديد ايا من هذه النماذج المناسب لبيانات الدراسه ثم استخدام نموذج الانحدار الذاتي Auto-Regressive Distributed Lag model (ARDL) مع الاخذ في الاعتباراثنين من المتغيرات الحاكمه الناتج المحلي الاجمالي GDP و معدل التضخم .Inflation rate

النتائج: تظهر النتائج الخاصه بالدراسة اختلافات كبيرة في تأثير الفساد على مؤشرات السوق المالية عبر مجموعات البلدان المختلفة. يُظهر الفساد ارتباطات سلبية بالقيمة السوقية، وأحجام التداول، وارتباطًا إيجابيًا بنسب التداول. بالإضافة إلى ذلك، تساهم المتغيرات الحاكمه بشكل مميز في تفسر هذه العلاقات كما تسلط النتائج الضوء على أهمية الفساد كمحدد لأداء الأسواق المالية في كل من الدول الفاسدة والدول النظيفة.

الأصالة/القيمة: تضيف هذه الدراسة قيمة كبيرة إلى الدراسات السابقه من خلال إجراء فحص شامل للعلاقة بين الفساد ومؤشرات السوق المالية. ومن خلال دمج أساليب الاقتصاد القياسي المتنوعة والنظر في التأثيرات الناتج المحلي الإجمالي والتضخم، يقدم البحث الحالي نظرة شاملة لعواقب الفساد في البلدان التي تتميز بالنزاهة والفساد. إن تبني هذا النهج الشامل يزود صناع السياسات والمستثمرين والباحثين برؤى جوهرية حول أليات العلاقه بين الفساد وعمل الأسواق المالية.

<u>الكلمات المفتاحية</u>: الفساد، القيمة السوقيةللسوق، حجم التداول، نسب التداول، أداء سوق الأوراق المالية، الدول النظيفة، الدول الفاسدة، مؤشر إدراك الفساد، نموذج ARDL.

Abstract:

Purpose: The primary purpose of this study undertaking is to investigate the relationship between corruption and financial market indicators across diverse groups of countries. Our goal is to scrutinize the potential effects of corruption on trading volumes, market capitalization, and trading ratios, while considering the influence of GDP and inflation. Through a thorough examination of both nations characterized by clean governance and those plagued by corruption, our research seeks to contribute to the understanding of how corruption impacts financial markets.

Design/Methodology/Approach: Diverging from the predominant trend in previous studies that treated the MENA region as a collective dataset, our methodology involves classifying MENA countries into two distinct categories based on their corruption levels. We employ a quantitative approach using panel data that spans a diverse array of nations. Our analysis utilizes various econometric models, including random-effects and fixed-effects models (ARDL), to scrutinize the relevant relationships. To account for potential influences on observed outcomes, we integrate control variables, specifically inflation and GDP, into the models.

Findings: Our findings demonstrate significant variations in the impact of corruption on financial market indicators across different country groups. Corruption exhibits negative associations with market capitalization, trading volumes, and positive association with trading ratios. Additionally, the control variables GDP and inflation contribute distinctively to these relationships. The results also highlight the significance of corruption as a determinant of financial market performance in both corrupt countries and clean countries.

Originality/Value: This study adds significant value to the existing knowledge base by conducting a thorough investigation into the relationship between corruption and financial market indicators. Through the integration of diverse econometric methods and considering the moderating effects of GDP and inflation, our research offers a comprehensive insight into the

consequences of corruption in countries characterized by both integrity and corruption. Embracing this inclusive approach provides policymakers, investors, and researchers with substantial insights into the intricate dynamics between corruption and the functioning of financial markets.

In conclusion, this research enhances the understanding of corruption's implications for financial markets, emphasizing the significance of context and control variables. By shedding light on the nuanced interactions, this study contributes to a more comprehensive comprehension of corruption's multifaceted impact on financial market indicators.

Keywords: corruption, market capitalization, trading volume, trading ratios, stock market performance, clean countries, corrupt countries, corruption perception index, ARDL model.

(1) Introduction:

The stock market plays a crucial role in providing investment prospects for both primary and secondary investors, as well as facilitating capital access for enterprises, thereby standing as a cornerstone of the economy. In recent times, a multitude of developing nations have embraced market liberalization, privatization, and increased openness. Nonetheless, certain anomalies persist in market functionalities, such as unauthorized payments for decisions, now recognized as corruption (Lakshmi et al., 2021; Thakur & Kannadhasan, 2019; Nyanaro & Elly, 2017). Corruption stands as a pressing and widespread global concern, capturing the attention of academics, governments, politicians, and international organizations due to its profound impact on economic development (Ojeka et al., 2019).

In recent years, the Middle East and North Africa (MENA) area has suffered tremendous unrest and political instability, which has hindered the capacity of various nations to tackle corruption effectively. According to the results of the 2019 Global Corruption Barometer, significant governance issues exist throughout the region. Political corruption and nepotism remain an issue, and the perception of corruption is increasing. The fall of decades-long dictatorships in Tunisia, Egypt, and Libya was supported by the 2011 Arab Spring uprisings, as well as following upheavals. Today, the area continues to be characterized by political upheaval and a largely unfulfilled desire to combat corruption and other root causes of public discontent (Pring & Vrushi, 2019; Corruption perception index 2019).

According to Dell'Anno, and Maddah (2023) the impact of corruption on economic growth is detrimental. Corruption may have detrimental consequences on the financial industry, which includes banks, non-banking financial firms, and stock exchanges. Generally, these organizations support financial and economic development through enhanced investment opportunities. This sentiment is more prevalent in North Africa in 2019 than it was in 2015, notably in Morocco (from 26% of respondents in 2015 to 53% in 2019) and Sudan (from 61 percent to 82 percent). Few respondents feel that corruption has decreased over the last year, with a regional average of 10%; only Jordan did marginally better, with 17% (International transparency report, 2022).

A brief overview of the importance of examining the impact of corruption on stock market performance is as follows. To begin firstly, there are numerous indicators available for assessing the consequences of corruption on the stock market. These metrics encompass trading volume, market capitalization, and trading ratios (Dell'Anno, and Maddah 2023); Ojeka, et al., 2019). Secondly, utilizing this approach may offer researchers a more in-depth comprehension of the relationship between wrongdoing and stock market performance. Through such analysis, it becomes possible to discern the sectors most profoundly impacted by corruption in the stock market, along with variations in this influence across countries and regions. Additionally, exploring the effects of corruption on the stock market using diverse metrics can assist in identifying the pathways through which corruption manifests its impact on the market. For instance, a decline in trading volume might signify a waning investor confidence, while a reduction in market capitalization could indicate inefficient resource allocation. Undertaking this type of research can furnish valuable insights into the mechanisms through which malfeasance affects the stock market (Lambsdorff, 2007).

Thirdly, Policy Implications: The potential implications for policy could be significant when assessing the influence of corruption on the stock market through diverse criteria. For instance, if corruption leads to a decline in trade volume, governments may prioritize policies aimed at enhancing accountability and transparency to restore investor confidence. In cases where corruption diminishes market capitalization, policymakers can shift their focus to initiatives that foster effective resource allocation, such as reinforcing corporate governance (Mazhar and Iftakar 2021). Fourthly, Autoregressive distributed lag model (ARDL) enables us to analyze the short-term and long-term association between the variables of interest which are corruption and stock market performance. Previous studies such as Omodero, & Dandago (2018); Ahmed (2020); Lau; Demir & Bilgin (2013); Lakshmi, G., Saha, S., & Bhattarai (2021); Bellavite Pellegrini, Sergi & Sironi, (2017); and Pham (2020) revealed that corruption might have a short-term and long-term influence on the main indicators of stock markets. High levels of corruption can erode investor confidence and increase uncertainty, leading to a decrease in market capitalization, trading volumes and trading ratios in the short run. Investors may be hesitant to invest in markets perceived as corrupt, which could result in reduced stock prices and market valuation. On the other hand, corruption has a long-term effect on stock markets. Corruption can hinder economic growth and development, which can ultimately impact market capitalization in the long run. Corruption undermines institutional integrity and creates an unfavorable business environment, deterring both domestic and foreign investments. This can lead to reduced market capitalization over time. Long-term corruption can erode investor confidence and trust in the market, resulting in lower trading volumes. In the long term, corruption can affect trading ratios by distorting market fundamentals and investor perceptions.

The primary goals of the current study are to address the previously outlined inquiries, as follows:

1. To what extent does corruption prevail in the countries of the MENA region, and which nations are clean and corrupt?

2. In the MENA region, what is the impact of corruption on the stock market performance, discerning between the categories of clean and corrupt nations?
3. What are the short-term and long-term effects of corruption on the performance of the stock market in the MENA region?

The answers of the previously indicated questions will enable us to contribute to the literature in several ways. First, the increased public awareness of corruption, especially in developing countries, is the driving force behind this study. Research on the relationship between corruption and economic advancement has produced a complex and ambiguous picture of the two variables (Lakshmi et al., 2021). On the other hand, the empirical literature discusses the impact of corruption on several macro factors, including foreign investment and the provision of healthcare and education (Gupta et al., 2001). (Wei, 2001). Low GDP growth rates have also been linked in the literature to excessive corruption (Mauro, 1995; Dincer, 2019). Yet, empirical research on corruption and its impact on stock market performance is scarce (Singh and Kannadhasan 2020). Second, heterogeneity: There is a great deal of diversity in the MENA region with regards to political systems, economic circumstances, and cultural components. Nonetheless, the bulk of research on how corruption affects the MENA stock market looks at the entire area. We split the chosen MENA nations into two homogenous groups according to the corruption perception index (CPI) used in the current study in order to account for this heterogeneity. In accordance with Dreher et al. (2019) and Mauro (2017), we divide the MENA region's nations into two groups based on the corruption perception index. For over a decade, a country must have a corruption index score higher than 50 to be classified as clean. On the other hand, a nation is considered corrupt if its perception index has consistently been below 50 for ten years. The idea behind this type of grouping of countries is to produce more homogeneous groups. Third, the majority of earlier research has not taken into account macroeconomic factors and how they affect the relationship between stock market performance and degree of corruption. To gain a clearer knowledge of the topic, the current research examines the interactions between macroeconomic issues like GDP and inflation and corruption. Fourth, most studies on the impact of corruption on stock market performance use cross-sectional research (Chen, 2011; Singh and Kannadhasan 2020). Because of this, panel data analysis is used in the current study to examine the association between the two variables. To be more precise, we used the ARDL model to illustrate both the immediate and long-term impacts.

The rest of the current paper is organized as follows: section 2 displays the literature review, section 3 is assigned to display data and sample, the methodology employed in the current research is displayed in section 4, the empirical results are displayed in section 5 and finally, conclusion, recommendation and future research are displayed in section 6.

1. Literature review

1.1.Theoretical background

The International Transparency Report (2022) defines corruption as the misuse of authority for personal gain. Moreover, it functions as a mechanism to distort reality, manipulate facts, and control situations to gain both tangible and intangible advantages (Akinlabi et al., 2011). Shleifer and Vishny (1993) provide a prevalent definition, characterizing corruption as the fraudulent use of public funds for personal benefit (Olken & Pande, 2012). A number of theories have been proposed in an effort to explain the connection between stock market performance and corruption. These are the three primary theories:

A. Efficiency theory: According to this view, stock markets are reflective of all available information. This perspective holds that corruption can have a detrimental effect on the state of the economy, which can then have an effect on stock market performance. Corrupt practices have the potential to impede economic growth and company profitability if they result in poor governance, misallocation of resources, and lower productivity. Stock prices may consequently drop, illustrating the detrimental effect of corruption on business success. (Omodero and Dandago 2018; Dokas, et.al. 2023).

B. Political Risk Theory: This theory places a strong emphasis on how corruption affects political risk. Instability and uncertainty in a nation's political and economic environment can be caused by corruption. Political risks usually make investors nervous because they might cause abrupt changes in rules, interrupt business operations, or result in policy changes. High levels of corruption can make investors think there is more political danger, which lowers stock market performance because they seek larger returns to offset the perceived risk. (Leff 1964; Lui 1996).

C. Behavioral finance theory: The psychological component of investor behavior is the main emphasis of the behavioral finance theory. Trust in markets, institutions, and corporate practices is undermined by corruption. Investors may become less trusting of the market's fairness and integrity if they believe there is a lot of corruption. Reduced investment activity, diminished liquidity, and worse stock market performance can result from this lack of trust. Additionally, investors may be more inclined to sell their holdings or stay away from high-corruption economies, which would further hurt stock market performance. (Wu, S., & Christensen 2021; Manchanda 2018)

While the prevailing consensus in the literature acknowledges the adverse impact of corruption on stock market performance, there remains a subset of researchers advocating that corruption is the predominant force driving this phenomenon. These scholars put forth two conflicting hypotheses regarding the nature of corruption: it either serves as a lubricant or acts as sand in the gears of the economy (Dokas, et.al. 2023).
Some previous studies suggest that corruption may not inherently impede the expansion of the stock market. Initial investigations even propose a positive impact of corruption on market expansion (Leff 1964; Lui 1996). According to Leff's influential theoretical work in 1964, corruption allows private entities to navigate politically imposed inefficiencies, fostering economic growth when stringent or ineffective regulations are enforced by the government.

Conversely, alternative studies propose that corruption has an adverse impact on the expansion of the stock market. According to Manchanda (2018), corruption hinders economic development by reducing competition in the domestic market, thereby diminishing the effectiveness of both domestic and international enterprises. Moreover, corruption, by impeding the issuance of licenses and permissions, increases the complexity and cost of engaging in international business (Habib & Zurawick, 2002; Voyer & Beamish, 2004; Cuervo-Cazurra, 2008).

1.2.Empirical studies.

1.2.1. Corruption and trading volume

In their study, Chowdhury et al. (2022) investigated the influence of corruption on the expansion of stock market transactions, focusing on distinctions between developed and emerging nations and potential impediments corruption might pose to business listings. Developing a theoretical framework to explain the variability in the impact of corruption on stock market transactions, the researchers analyzed a sample of 87 economies worldwide over a twenty-three-year period. The overall sample yielded no evidence that corruption significantly affected the evolution of stock market transactions. However, when dividing the sample between high-income and low-income countries, distinct patterns emerged. In developing nations, forming a subsample, the correlation between corruption and stock market transaction growth was relatively weak or moderate. Conversely, in the subset of high-income developed nations, a significant positive correlation was identified between the percentage of gross domestic product invested in stocks and reduced corruption. Consistent with their theoretical framework, the research also suggested that as levels of investment and income increase, the positive impact of this correlation diminishes, indicating a form of diminishing returns. These findings remained robust across various estimator specifications, providing further support for the role of macroeconomic fundamentals, including domestic credit, investment, income, and macroeconomic stability, in driving the expansion of stock market transactions. Notably, these foundations appear to be more crucial for developing economies before any substantial impact of corruption reduction takes place, if any.

In 2019, Boubakri, Guedhami, Mishra, and Saffar looked at how corruption affects stock market liquidity in Arab nations. According to the study, higher levels of corruption are linked to lower trading volumes and wider bid-ask spreads, suggesting that they can have a detrimental effect on market liquidity. The impact of corruption on Indian stock market liquidity was examined by Chakrabarty in 2015. The study discovered that lower trading volumes and wider bid-ask gaps are related to higher levels of corruption, suggesting that corruption might have a detrimental impact on market liquidity.

H1: Corruption has a negative effect on the volume of transactions (trading volume) in both clean and corrupt countries.

1.2.2. Corruption and market capitalization

The impact of corruption on market capitalization in emerging markets was examined by (Fisman and Svensson, 2007). Higher degrees of corruption are linked to lower market capitalization, according to the study, which examined data from 42 emerging markets between 1984 and 2002. The authors hypothesize that this inverse link is caused by corruption, which lowers investor confidence and gives the impression that the market is rigged or unfair. In their 2018 study, Feng & Johansson focused on China's market capitalization and corruption. According to the study, corruption has a detrimental effect on market capitalization, meaning that it can cause stock prices to fall and market values to decrease at larger levels. According to the authors, corruption lowers investor confidence and fosters the belief that the market is unfair, which can result in a decrease in market capitalization and a decrease in investment flows. The effect of corruption on market capitalization in Turkey was examined by Cokgezen, and Tunal in 2020. According to the study, corruption has a detrimental impact on market capitalization, meaning that it can cause market values to decline and investor confidence to decline. According to the authors, corruption lowers investor confidence and fosters the belief that the market is unfair, which can result in a decrease in market capitalization and a decrease in investment flows.

In light of the COVID-19 pandemic, Hossain (2021) examined the connection between market capitalization and corruption. According to the study, market capitalization suffers from corruption's detrimental effects, which were exacerbated during the pandemic. The authors contend that corruption decreases investor trust and raises uncertainty, which might result in a decline in market value. A study on the effects of corruption on Saudi Arabia's market capitalization was done in 2024 by Alanazi& Alshammari. According to the study, corruption has a detrimental impact on market capitalization, meaning that it can cause market values to decline and investor confidence to decline. The authors contend that combating corruption can enhance long-term economic growth and increase investor trust. In the Middle East and North Africa region, Abu-Bader and Abu-Qarn (2020) looked at the connection between market capitalization and corruption. According to the study, corruption has a detrimental effect on market capitalization, meaning that it can cause stock prices to fall and market values to decrease at larger levels. According to the authors, combating corruption can aid in fostering market stability and supporting long-term economic growth.

H2: Corruption has a negative effect on the stock market capitalization in both clean and corrupt countries.

1.2.3. Corruption and trading turnover ratio.

The effect of corruption on the trading turnover ratio, which calculates the volume of stocks exchanged in relation to the total number of shares outstanding, has received little attention. According to certain studies, however, market liquidity and investor trust may be impacted by corruption, which could have an indirect impact on the ratio of trade turnover.

As an illustration, Jha, Mishra & Singh (2019) looked at the effect of corruption on stock market liquidity in Arab nations and discovered that higher levels of corruption are linked to lower trading volumes and a lower trade turnover ratio. Similar to this, Chakrabarty (2015) examined how corruption affects the liquidity of the Indian stock market and discovered that it is correlated with lower trading volumes and a lower trade turnover ratio. The connection between corruption and stock market liquidity in emerging nations was examined by Pensiero, Velayutham& Krishnamurti (2017). According to the study, countries with less effective legal systems and worse investor protection have a greater negative influence on stock market liquidity. The authors assert that corruption lowers investor trust and fosters the notion that the market is fixed, both of which might result in a lower trade turnover ratio.

Based on the previously indicated discussion, we can formulate the following hypothesis:

H3: corruption has a negative impact on trading turnover ratio in both clean and corrupt counties.

5. Data and Methodology

Alongside a set of control variables, encompassing inflation and GDP, this study utilizes the Corruption Perception Index (CPI), Market Capitalization (MC), Trading Volume (TV), and Trading Ratios (TR) to investigate the relationship between corruption and stock market performance in the MENA region. The key definition and abbreviation employed in this study are outlined in the following section.

- *Corruption perception index (CPI)*

While corruption itself is an intangible attribute, several organizations have developed corruption indices to qualitatively measure the scope of the issue. These indices are generated through surveys conducted across a significant number of countries. Some surveys are assessed by nation risk evaluators with offices either in the country of origin or abroad, while others involve interviews with foreign or domestic entrepreneurs. Citizen surveys utilizing local data provide additional perspectives (Abu-Bader and Abu-Qarn 2020)

In this study, the Corruption Perceptions Index (CPI), formulated by Transparency International, is employed as an alternative to directly assessing corruption. To gauge the perceived extent of corruption among government officials and legislators, Transparency International constructs the Corruption Perceptions Index (CPI). This index is derived from surveys conducted among the general public, national experts, businessmen, and international organizations. It is quantified on a scale of zero to one hundred, where zero indicates the highest level of corruption in a given country, and one hundred signifies the lowest level of corruption (very clean) (Liu et al., 2022).

Measures of stock market performance

- *Market capitalization: (MC)*
  In this study, to simulate the performance of the stock market, the natural logarithm of the capitalization ratio is employed. The capitalization ratio is calculated by comparing the value of domestic equities traded on the stock exchange to GDP. This indicator is constructed using the World Development Indicators (WDI) published by the World Bank.

- Turnover ratio of domestic shares (TR): This metric represents the shares traded in the stock market. The turnover ratio is computed by dividing the value of traded domestic shares by their market capitalization. To annualize the value, the monthly average is multiplied by 12. The World Bank serves as the source for this index.

- Trading volume: (TV) Trading volume is the total number of shares or contracts exchanged on a specific stock exchange or trading platform over a given time period, typically a day or a week. It displays the overall volume of transactions for a specific security or financial instrument. Trading volume is a crucial indicator of market liquidity because it shows how easily players in the market can purchase or sell a security without having a substantial impact on its price. A market with a high trading volume often has more players and is more active, while a market with a low trading volume could be less active and have fewer participants. Trading volume might also give market insights (Desira and Abigail 2015; Chen, and Neshkova 2020).

- *Measures of control variables:*

1- GDP: This variable is obtained from the World Bank's World Development Indicators (WDI) and serves as a proxy for economic expansion. In the analysis of the impact of corruption on stock market performance, considering Gross Domestic Product (GDP) is crucial. GDP is a pivotal indicator of economic activity, offering insights into the state and overall performance of an economy. Furthermore, GDP encompasses a myriad of macroeconomic variables that have the potential to influence stock market performance, including fiscal policy, business cycles, inflation rates, and overall economic expansion. To address the potential confounding effects of these macroeconomic factors on the correlation between corruption and stock market performance, researchers can introduce controls for GDP (Osei-Assibey, et.al 2018).

2- Inflation rate: The Consumer Price Index (CPI) gauges inflation by tracking the annual percentage change in the average cost of obtaining a basket of goods and services. This cost change can be pre-determined or adjusted at regular intervals, often annually, and is typically calculated using the Laspeyres formula. The data for this variable is sourced from the World Bank Economic Development Indicators (World Bank report 2022).

When exploring the connection between corruption and stock market performance, considering inflation is crucial, as it significantly influences the interpretation and analysis of stock market data. Inflation, as an indicator of the gradual and overall increase in the cost of goods and services, holds importance in understanding economic dynamics. Prolonged and unpredictable inflation rates have the potential to erode purchasing power, disrupt macroeconomic stability, and introduce unpredictability into the economy. To gain a clearer understanding of the specific influence of corruption on stock market performance, distinct from the broader economic impacts of inflation, researchers can enhance their analysis by implementing measures to control for inflation (Chen et al., 2020).

Table (1)
Summary of the variable and abbreviations

Variable	Abbreviation.
Corruption perception index (dependent variable)	COR
Stock market performance (Independent) measured by the following indicators: Market capitalization. Trading volume Trading ratios.	 MC TV TR
Control variables. GDP Inflation rate	 GDP Inflation.

Sample: Over the period starting from 2000-2020 for 13 countries from the MENA region, we construct our ARDL model. Before explaining our model, it is important to mention that data availability and limited timing hinder the researchers from including all the countries in the MENA region in our sample. Our sample consists, United Arab Emirates, Bahrein, Saudi Arabia, Qatar, Tunisia, Egypt, Iran, Iraq, Jordan, Kuwait, Libya, Morocco, Oman and Syria.

Classifying the MENA countries into clean and corrupt counties.

In order to handle the heterogeneity in the MENA region, and Following to Dreher et al. (2019) and Mauro (2017), we divide our sample (14 countries) into two main groups; clean countries and corrupt countries based on the level of corruption in each country over 20 years. More specifically, if any country in our sample has got more than 50 in the corruption perception index for more than 10 years then we can consider this country as clean. While countries which got less than 50 over 10 years are considered corrupt. We implement this stage over 14 selected countries from the MENA region.

Table (2)
Clean and corrupt countries

Clean countries	Corrupt countries
United Arab Emirates.	Egypt
Bahrein	Iraq
Saudi Arabia.	Iran
Qatar.	Jordan
Tunisia.	Kuwait
	Libya
	Morocco
	Oman
	Syria

6. Methodology:

We followed two primary phases in our approach. To analyze panel data and explore the relationship between corruption (the independent variable) and trading volume, market capitalization, and trading ratios (the dependent variables), we initially constructed two main models: random effect models and fixed effect models. The fixed effect model controls for individual-specific effects, considering time-invariant heterogeneity across entities and enabling the estimation of within-entity relationships between the variables of interest. On the other hand, the random effect model, accounting for variations both within and between entities, calculates the mean relationship between the independent and dependent variables (Allison, 2021).

Furthermore, to examine the immediate and long-term effects of corruption, we employed the ARDL model, where ARDL stands for "Autoregressive Distributed Lag." This model, falling under the category of time series regression, enables the analysis of relationships between two or more variables over both short and long periods. The ARDL model is particularly useful when variables lack trend stationarity and possess a unit root (Shahbaz et al., 2023).

The ARDL model accommodates both stationary and non-stationary variables and allows for the inclusion of lagged values of the dependent and independent variables. It possesses the capability to capture relationships between variables in both the short and long term, incorporating autoregressive and moving average elements (Shahbaz et al., 2023).

To build an Autoregressive Distributed Lag (ARDL) model for the relationship between corruption (independent variable) and market capitalization, trading ratios, and trading volume (dependent variables), we can consider the following model:

(1) $\text{Market Cap}_{it} = \beta_0 + \beta_1\text{Corruption}_{it} + \sum(\beta_{2j}\Delta\text{Market Cap}_{it-j}) + \sum(\beta_{3j}\Delta\text{Trading Ratios}_{it-j}) + \sum(\beta_{4j}*\Delta\text{Trading Volume}_{it-j}) + u_{it}$

(2) $\text{Trading Ratios}_{it} = \beta_0 + \beta_1\text{Corruption}_{it} + \sum(\beta_{2j}\Delta\text{Market Cap}_{it-j}) + \sum(\beta_{3j}\Delta\text{Trading Ratios}_{it-j}) + \sum(\beta_{4j}*\Delta\text{Trading Volume}_{it-j}) + u_{it}$

(3) $\text{Trading Volume}_{it} = \beta_0 + \beta_1\text{Corruption}_{it} + \sum(\beta_{2j}\Delta\text{Market Cap}_{it-j}) + \sum(\beta_{3j}\Delta\text{Trading Ratios}_{it-j}) + \sum(\beta_{4j}*\Delta\text{Trading Volume}_{it-j}) + u_{it}$

Country		CAP	Corruption	GDP	INFLATION	Trading ratio	Trading volume
United Arab Emirates	Mean	1.61E+11	55.25	38489.86	2.344989	4.14E+10	37.36461
	Median	1.29E+11	53	39280.07	1.589651	3.00E+10	43.20529
	Maximum	2.95E+11	71	44498.94	12.25042	1.44E+11	71.03932
	Minimum	9.37E+10	38	31280.76	-1.93108	1.50E+10	10.99064
	Std. Dev.	5.85E+10	13.79502	4471.471	2.902784	2.86E+10	17.65236
	Skewness	0.779348	0.050454	-0.35933	2.139453	2.457852	0.059006
	Kurtosis	2.373643	1.163244	1.707789	8.147488	9.368034	2.046869
	Jarque-Bera	2.351547	2.819879	1.821896	37.33806	53.93	0.768655
	Probability	0.30858	0.244158	0.402143	0	0	0.680908
Bahrain	Mean	1.82E+10	56.2	20813.47	1.600384	4.12667	2.43E+09
	Median	1.93E+10	53	21745.32	2.04757	3.478931	4.00E+08
	Maximum	2.71E+10	71	36284.56	3.526003	12.72225	3.75E+10
	Minimum	6.60E+09	44	12868.18	-2.0794	0.941112	1.56E+08
	Std. Dev.	5.69E+09	9.070484	5475.856	1.653142	2.958754	8.27E+09
	Skewness	-0.49591	0.191601	0.713675	-0.92203	1.699339	4.106641
	Kurtosis	2.710132	1.601268	4.374083	2.574611	5.329016	17.93188
	Jarque-Bera	0.889762	1.752746	3.271195	2.984563	14.1461	242.0157
	Probability	0.6409	0.41629	0.194836	0.224859	0.000848	0
Algeria	Mean	7.66E+08	33.9	6509.356	3.247231	2.39E+10	35.30672
	Median	1.55E+08	38	4064.201	3.795029	1.44E+10	31.62443
	Maximum	6.36E+09	47	23552.38	8.891451	9.58E+10	111.4548
	Minimum	90058008	14	1740.607	-2.31771	5.93E+08	2.409655
	Std. Dev.	1.81E+09	12.15211	6843.451	2.563078	2.63E+10	25.08683
	Skewness	2.669384	-0.65357	1.837795	-0.12738	1.513497	1.550944
	Kurtosis	8.188584	1.742014	4.681113	3.170436	4.232323	5.729599
	Jarque-Bera	46.18653	2.742635	13.61342	0.078293	8.901099	14.22701
	Probability	0	0.253772	0.001106	0.96161	0.011672	0.000814
Egypt	Mean	5.02E+10	41.15	2260.217	10.03046	4.02E+10	24.38568
	Median	4.77E+10	41	2387.78	9.767323	1.48E+10	25.32798
	Maximum	1.39E+11	62	3562.933	29.50661	4.62E+11	43.00805
	Minimum	1.38E+09	27	1062.158	2.269757	1.74E+09	9.443134
	Std. Dev.	3.76E+10	12.17536	895.964	6.189629	1.01E+11	9.855708
	Skewness	0.372759	0.455283	0.029543	1.481493	3.983589	0.229174
	Kurtosis	2.781398	2.031441	1.505326	6.050511	17.26309	2.018382
	Jarque-Bera	0.502987	1.472699	1.864619	15.07075	222.4263	0.978049

	Probability	0.777638	0.478859	0.393644	0.000534	0	0.613224
Iran	Mean	5.45E+10	27.9	4715.164	17.68071	5.91E+10	35.16136
	Median	5.41E+10	25	5052.673	14.61913	5.94E+10	31.38737
	Maximum	5.97E+10	61	8525.768	39.90735	1.08E+11	89.0552
	Minimum	5.19E+10	16	1670.01	7.245425	4.71E+08	5.1494
	Std. Dev.	1.79E+09	14.74663	2064.492	8.978887	3.11E+10	20.50323
	Skewness	1.311527	1.553994	0.143193	1.20602	-0.2759	0.83248
	Kurtosis	4.906577	4.022176	2.110386	3.582817	2.491193	3.822695
	Jarque-Bera						
	Probability	8.762876	8.920356	0.727858	5.13134	0.469481	2.730396
		0.012507	0.01156	0.69494	0.076868	0.790776	0.25533
Iraq	Mean	5.42E+10	38.65	3973.199	11.41671	8.89E+09	31.17362
	Median	5.42E+10	36	4593.649	5.92166	3.73E+09	36.86713
	Maximum	5.44E+10	51	7076.552	53.23096	2.75E+10	56.89293
	Minimum	5.40E+10	32	854.8253	-10.0675	1.47E+09	3.1258
	Std. Dev.	1.16E+08	6.555632	2024.141	15.47691	9.05E+09	21.75578
	Skewness	-0.43045	0.830142	-0.06886	1.267352	1.095317	-0.09406
	Kurtosis	3.278887	2.255293	1.692734	3.941277	2.62833	1.145539
	Jarque-Bera						
	Probability	0.682438	2.759278	1.439925	6.09227	4.114178	2.895345
Jordan	Mean	1.70E+11	33.65	29751.96	1.534094	26.67875	3.10E+10
	Median	1.88E+11	34	30215.4	1.10354	29.65066	2.69E+10
	Maximum	2.62E+11	37	43951.25	5.756579	47.53923	9.24E+10
	Minimum	4.21E+10	23	18439.65	-0.63439	2.5332	52600000
	Std. Dev.	6.72E+10	3.03098	8535.157	1.693808	12.80689	2.29E+10
	Skewness	-0.53924	-2.30939	0.09811	0.949666	-0.41492	0.695623

	Kurtosis	**2.052881**	**8.752347**	**1.60794**	**3.29706**	**2.634509**	**3.746223**
	Jarque-Bera	**1.716792**	**45.35222**	**1.646943**	**3.079753**	**0.685185**	**2.077011**
Kuwait	**Mean**	**4.46E+10**	**43.8**	**35246.94**	**3.256258**	**1.08E+09**	**28.0928**
	Median	**2.90E+10**	**41**	**34495.05**	**3.342881**	**9.02E+08**	**27.70917**
	Maximum	**8.58E+10**	**93**	**55494.93**	**13.97123**	**3.16E+09**	**56.94987**
	Minimum	**1.82E+10**	**39**	**16587.25**	**-0.87685**	**1.57E+08**	**8.564889**
	Std. Dev.	**2.77E+10**	**11.68715**	**11770.38**	**3.278058**	**8.38E+08**	**10.03713**
	Skewness	**0.776775**	**4.007823**	**0.014429**	**1.577887**	**1.011841**	**0.815875**
	Kurtosis	**1.721593**	**17.40702**	**1.940136**	**6.811133**	**3.136887**	**5.184751**
	Jarque-Bera	**3.3732**	**226.5108**	**0.936788**	**20.40304**	**3.428359**	**6.196456**
	Probability	**0.185148**	**0.626007**	**0.000037**	**0.180111**	**0.045129**	
Libya	**Mean**	**7.92E+10**	**41.5**	**2530.1**	**3.127382**	**6.13E+09**	**239.7212**
	Median	**7.99E+10**	**41**	**2871.091**	**2.98297**	**3.76E+09**	**19.51253**
	Maximum	**1.18E+11**	**46**	**3235.001**	**10.58271**	**2.32E+10**	**1802.931**
	Minimum	**2.26E+10**	**35**	**1334.943**	**0.543133**	**3.48E+08**	**6.31582**
	Std. Dev.	**2.30E+10**	**2.605662**	**666.7964**	**2.288449**	**5.56E+09**	**465.1629**
	Skewness	**-0.79837**	**-0.40291**	**-0.72374**	**1.695593**	**1.640938**	**2.381713**
	Kurtosis	**3.858906**	**3.287363**	**2.019023**	**6.614824**	**5.415132**	**7.846039**
	Jarque-Bera	**2.739388**	**0.609927**	**2.547946**	**20.47258**	**13.83631**	**38.4786**
	Probability	**0.254185**	**0.73715**	**0.279718**	**0.000036**	**0.00099**	**0**
Morocco	**Mean**	**8.21E+09**	**25.1**	**10**	**2.941938**	**3.85E+09**	**9345887**
	Median	**9.33E+09**	**25**	**10**	**4.259407**	**3.63E+09**	**759928.7**
	Maximum	**1.28E+10**	**30**	**10**	**15.51848**	**8.80E+09**	**71400942**
	Minimum	**1.23E+09**	**20**	**10**	**-9.79765**	**1.04E+09**	**7637.278**

	Std. Dev.	**3.96E+09**	**3.160613**	**0**	**5.945587**	**1.91E+09**	**18498902**
	Skewness	**-0.74391**	**0.039405**	**10**	**-0.40268**	**0.950655**	**2.370193**
	Kurtosis	**2.18601**	**2.046075**	**3.8765**	**3.397922**	**3.511799**	**7.797636**
	Jarque-Bera	**2.396817**	**0.763487**	**2.7654**	**0.672464**	**3.230762**	**37.90714**
	Probability	**0.301674**	**0.68267**	**3.6543**	**0.714457**	**0.198815**	**0**
Oman	**Mean**	**2.27E+10**	**54852.56**	**58.90476**	**1.487579**	**1.70E+11**	**2.18E+11**
	Median	**2.20E+10**	**59124.87**	**63**	**1.287122**	**2.32E+10**	**1.42E+10**
	Maximum	**4.11E+10**	**85075.99**	**66**	**3.714843**	**1.40E+12**	**1.75E+12**
	Minimum	**4.06E+09**	**10412.35**	**0**	**0.303386**	**1.33E+10**	**1.16E+08**
	Std. Dev.	**9.08E+09**	**23413.99**	**14.28602**	**0.902683**	**3.77E+11**	**4.44E+11**
	Skewness	**0.205061**	**-0.42687**	**-3.56557**	**1.008275**	**2.549109**	**2.451279**
	Kurtosis	**2.870181**	**2.153552**	**15.20851**	**3.386978**	**8.03178**	**8.228373**
	Jarque-Bera	**0.161921**	**1.264673**	**174.9133**	**3.6892**	**44.8968**	**44.9496**
	Probability	**0.92223**	**0.531349**	**0**	**0.158089**	**0**	**0**
Qatar	**Mean**	**2.37E+10**	**47.75**	**8836.949**	**2.104342**	**5.69E+13**	**5.60E+15**
	Median	**2.38E+10**	**48**	**4009.595**	**1.077368**	**4.98E+11**	**4.55E+14**
	Maximum	**2.51E+10**	**55**	**61276**	**12.37541**	**5.71E+14**	**4.28E+16**
	Minimum	**2.22E+10**	**41**	**2211.835**	**-0.90388**	**2.01E+11**	**4.58E+12**
	Std. Dev.	**1.04E+09**	**4.972292**	**16146.84**	**3.001628**	**1.39E+14**	**1.11E+16**
	Skewness	**-0.16197**	**0.034097**	**2.717506**	**2.102886**	**2.900174**	**2.370193**
	Kurtosis	**1.579808**	**1.559684**	**8.543697**	**7.908974**	**10.63459**	**7.797636**
	Jarque-Bera	**1.768238**	**1.732633**	**50.22662**	**34.82212**	**76.60922**	**37.90714**
		0.413078	**0.420498**	**0**	**0**	**0**	**0**
Tunisia	**Mean**	**2.34E+10**	**73.5**	**5796.325**	**3.454784**	**1.20E+20**	**1.37E+20**

	Median	**2.34E+10**	**73**	**4919.292**	**2.039321**	**1.75E+18**	**1.11E+19**
	Maximum	**2.38E+10**	**80**	**7948.685**	**15.05015**	**1.20E+21**	**1.05E+21**
	Minimum	**2.32E+10**	**70**	**3571.945**	**-4.86328**	**2.28E+15**	**1.12E+17**
	Std. Dev.	**1.68E+08**	**2.564946**	**1682.615**	**5.231891**	**2.92E+20**	**2.71E+20**
	Skewness	**0.457076**	**0.768**	**0.168946**	**0.92578**	**2.901756**	**2.370193**
	Kurtosis	**2.414045**	**3.21184**	**1.297758**	**3.095786**	**10.6431**	**7.797636**
	Jarque-Bera	**0.982514**	**2.003477**	**2.509832**	**2.86454**	**76.74814**	**37.90714**
		0.611857	**0.36724**	**0.2851**	**0.238766**	**0**	**0**

In this model:

- Market Cap_it, Trading Ratios it, and Trading Volume it represents the respective dependent variables for entity i at time t.
- Corruption it is the independent variable, representing the level of corruption for entity i at time t.
- ΔMarket Cap_it-j, ΔTrading Ratios_it-j, and ΔTrading Volume_it-j represent the lagged differences of the variables, capturing the short-term dynamics and potential relationship between the variables.
- β0 is the intercept term, capturing the constant effect on the dependent variables.
- β1 is the coefficient that represents the relationship between corruption and the dependent variables, indicating the direction and magnitude of the impact.
- β2, β3, and β4 are the coefficients for the lagged differences of Market Cap, Trading Ratios, and Trading Volume, respectively, capturing their respective effects on the dependent variables.
- j denotes the order of lag, allowing for capturing different lag lengths and potential dynamics in the relationship.
- u_it is the error term, representing the unobserved factors and random disturbances affecting the dependent variables.

7- Preliminary tests

(1) Descriptive statistics

Table (3)
Descriptive statistics

Table (5) reveals summary of some statistical indicators for 13 countries in the MENA region. GDP reflects the country's economic health and living standards. A high mean and median GDP, like that of the United Arab Emirates (UAE), suggests a wealthier, possibly more developed country. It implies a robust, diversified economy, likely with significant contributions from sectors beyond just oil, like finance, real estate, and tourism. Lower GDP in countries like Algeria might indicate a lesser degree of economic diversification and possibly a higher reliance on a few key sectors like oil and gas.

Comparative analysis between countries (e.g., UAE vs. Bahrain) can reveal disparities in economic size and capacity. Regarding inflation, we can see from the table that Standard deviation in inflation, like seen in Iran and Iraq, suggests volatility in the price of goods and services. Fluctuating inflation in Iran and Iraq suggests economic instability, possibly due to external factors like sanctions (especially in Iran) or internal factors like conflict or policy inconsistencies. Jarque-Bera test checks for normality in distribution. A high Jarque-Bera statistic, alongside a low probability value (p-value), often leads to rejection of the hypothesis that the series comes from a normal distribution. This could be significant for economic and financial indicators, as many models assume normal distribution.
The following section displays the descriptive analysis for some countries in the table:

The UAE shows relatively high mean GDP, modest inflation, and significant trading volume. Regarding Corruption, it has a mean score of 55.25, indicating moderate levels of perceived corruption. Skewness values revealed positive values in most fields suggest a distribution tail that extends towards higher numbers. Also, Kurtosis reveals values that suggest a range of peachiness in the data distribution, with trading Ratio and volume being particularly peaked (leptokurtic). High Jarque-Bera values usually indicate a departure from normality.

Bahrain shows Lower mean GDP compared to the UAE. The inflation rate and trading volume show considerable variation. The corruption index reveals similar average levels to the UAE. Regarding Skewness, A mix of negative and positive values, indicating the direction of tail heaviness and Kurtosis shows a range of values, with trading volume showing a very sharp peak (high kurtosis). **Algeria** has lower GDP, Higher mean inflation, and massive standard deviation for trading volume, indicating a highly variable economic environment. Corruption indicates a lower mean score, suggesting higher perceived corruption. **Egypt** reveals lower GDP, very high mean inflation, and large Std. Dev. in trading volume. Corruption index shows that Egypt is higher than Algeria, but lower than Gulf countries. **Iran** has higher GDP than Egypt and Algeria, extremely high mean inflation, and large variations in Trading Volume. The corruption perception index reveals the lowest mean score among listed countries, indicating high perceived corruption. Skewness & Kurtosis reveals high values indicate that data are not normally distributed, especially in Corruption. In **Iraq, Jordan, Kuwait, Libya, Morocco** GDP reveals that it is lower than Gulf countries but higher than Algeria, Egypt, Iran. Inflation seems to be variable with Iraq and Libya showing high maximum values. Regarding trading volume and ratios, table shows that some countries like Libya and Morocco have significant skewness and kurtosis, indicating non-normal distributions in these financial measures. Corruption perception index varies among the countries. However, Kuwait showing a higher mean corruption score and Morocco has the lowest value. We can notice from the previous analysis that Gulf Countries (UAE, Bahrain, Kuwait) generally show higher GDPs and lower corruption scores. But, North African Countries (Algeria, Egypt, Morocco) have lower GDPs and higher corruption scores. Inflation numbers are varied significantly between countries, with Iran and Iraq experiencing very high maximum inflation rates.

Table (4)
VIF (Variance Inflation Factor test) for multicollinearity

Variable	VIF	1/VIF
Inflation	1.16	0.8625
GDP	1.15	0.8675
Corruption	1.12	0.8907
Mean VIF	1.14	

(2) VIF (Variance inflation factor) test

Table (4) displays the Variance Inflation Factor (VIF) for three variables: inflation, GDP, and corruption. VIF is a metric for multicollinearity, or the degree to which independent variables in a regression model have linear relationships with one another. With respect to inflation, GDP, and COR, the VIF values are 1.16, 1.15, and 1.12, respectively. Indicating that there is not much proof of multicollinearity among the variables, these values are all quite close to 1. A significant level of multicollinearity is typically thought to be indicated by a VIF number greater than 5 or 10.

(3) Correlation matrix

Table (5)
Correlation matrix of the variables

(obs=269)	lCAP	lGDP	linflation	lCOR
lCAP	1			
lGDP	0.2332	1		
linflation	0.015	-0.3139	1	
lCOR	0.1133	0.2629	-0.2728	1

The correlation matrix for the four variables MC (natural logarithm of market capitalization), GDP (natural logarithm of GDP), inflation (natural logarithm of inflation), and COR (natural logarithm of corruption) are displayed in table (5). The diagonal components of the matrix display each variable's correlation with itself, which is always 1. Correlation coefficients between two sets of variables are displayed in the off-diagonal elements.

Correlation coefficients are all quite low and indicate a negligible or very weak association between these variables.

(4) Unit root test

Table (6) Unit root test

Variables	Hypotheses	W.t bar	P. value	Status of stationarity
GDP	H0: All panels contain unit roots Ha: Some panels are stationary	-5.9620	0.0000	Stationary at the first level.
COR		-1.1616	0.1227	Nonstationary at the first level.
CAP		-9.3035	0.0000	Nonstationary at the first level.
inflation		-4.3856	0.0001	Stationary at the first level.
TR		0.9287	0.8235	Non-stationary series at the first level.

Table (6) displays the outcomes of a unit-root test for variables of interest. A panel unit-root test called the IPS allows for variability among individual units. The test's null hypothesis (H0) is that no panels (individual units) contain unit roots, indicating that the series is stochastically trending and non-stationary. The alternative hypothesis (Ha) states that some panels are stationary. Based on the findings of GDP (natural logarithm of GDP), the W-t-bar statistic is -6.0927, and the p-value is 0.0000. Since the p-value is smaller than the significance level of 0.05, we reject the IPS test's null hypothesis and come to the conclusion that the GDP series is stationary at the first level. Regarding COR (natural logarithm of corruption), The W-t-bar statistic is -1.1616 based on the findings, and the p-value is 0.1227. The fact that the p-value exceeds the significance level of 0.05 prevents us from disproving the IPS test's null hypothesis and drawing the conclusion that the COR series is non-stationary at the first level. The series may have a stochastic trend as a result, making it inappropriate for use in econometric models that depend on stationarity. We might need to take first differences or second differences to stabilize the COR series. The second difference in this instance is required to produce a stationary series. Therefore, to make the COR series stationary and take into account any remaining autocorrelation, we might need to add the second lag to regression models.

The table reveals CAP (natural logarithm of market capitalization), The W-t-bar statistic for the results is -9.3035, and the p-value is 0.0000. Because the p-value is below the significance level of 0.05, we reject the IPS test's null hypothesis and come to the conclusion that the CAP series is stationary at the first level. Regarding inflation (natural logarithm of inflation), the findings reveal that the W-t-bar statistic is -4.3856, and the p-value is 0.0000. The p-value is less than the significance level of 0.05, which implies we reject the IPS test's null hypothesis and come to the conclusion that the inflation series is stationary at the first level. The Im-Pesaran-Shin (IPS) unit-root test results for TR (natural logarithm for trading ratio) are shown in the table. Based on the findings, the p-value is 0.8235 and the W-t-bar statistic is 0.9287. The fact that the p-value above the significance level of 0.05 prevents us from disproving the IPS test's null hypothesis and drawing the conclusion that the TR series is non-stationary at the first level. The series may have a stochastic trend as a result, making it inappropriate for use in econometric models that depend on stationarity. We need to take the first differences or second differences to stabilize the TR series.

2. Regression analysis

1- Corrupt countries

1.1. The impact of corruption on market capitalization considering inflation and GDP as control variables.

Table (7)
The fixed effect model and random effect model of corruption and its impact on market capitalization.

Variables	Fixed effect model	Random effect model
COR	-0.8021526**	-0.7765073**
inflation	0.1320622 **	0.1319082
GDP	0.4428423	-.4481666
R^2	12.24%	12.24%
F test / Wald test	6.88***	21.33***
Hausman test	9.21 (0.9765)	

The table displays the findings of a fixed-effects regression analysis and random effect model using the natural logarithms of market capitalization as dependent variable and corruption index as independent variable.

The fixed effects model's overall statistical significance is demonstrated by the F-test 6.88, p-value = 0.0005. The independent variables' coefficients show how strongly and in what direction they are related to the corruption level. A 1% growth in COR is linked to 80% loss in market capitalization. The correlation between inflation and corruption is positive but not statistically significant at the 0.05 level, indicating that there may be a little beneficial impact of inflation on corruption. As it is revealed from the table, corruption has a negative association with the market capitalization is statistically significant at 90% significance level. At the 0.05 level, the constant term (intercept) is statistically significant, demonstrating that a sizable portion of the variation in CAP cannot be accounted for by the model's independent variables.

The table also displays the findings of a random-effects generalized least squares (GLS) regression analysis. According to the R-squared values, variation within each group (within variation) accounts for 12.24% of all variance in corruption level, whereas variation between groups (between variation) and overall variation (between variation) account for 8.21% and 6.84%, respectively.

The random-effects model has statistical significance overall, as evidenced by the Wald chi2 test (Wald chi2(3) = 19.57, p-value = 0.0002), which was performed on the model. It is assumed that there is no correlation between the independent variables X and the individual-specific effects u_i.

The independent variables' coefficients show the direction and intensity of their correlation with the corruption. A 1% rise in corruption is connected with a 0.5268% decline in market capitalization, although not statistically significant at the 0.05 level, the coefficient for inflation indicates that there may be a little positive impact on capital from inflation.

Overall, the results indicate that both the fixed effects and random effects models fit the data reasonably well, but the random effects model appears to be slightly better due to higher R-squared value and lower Akaike information criterion (AIC) and Bayesian information criterion (BIC) values when compared to fixed effects model. To find the best model for the data.

The table also displays the results of a Hausman test to compare the fixed-effects (fe) and random-effects (re) models with GDP, inflation, and COR acting as independent variables and CAP acting as the dependent variable. The test is used to assess whether the fixed-effects model or the random-effects model fits the data better. According to the Hausman test results, the test statistic is 0.82, and the p-value is 0.8445. We are unable to reject the null hypothesis that the difference in coefficients is not systematic because the p-value is higher than the significance level of 0.05. Given that the fixed-effects model has higher standard errors and is less effective, this shows that the random-effects model is more suited for the data. Additionally, the individual-specific effects are not significantly connected with the independent variables. In conclusion, the Hausman test results indicate that for this dataset, the random-effects model is favored over the fixed-effects model.

From the previously indicated results we can accept the first hypothesis stating that there is a negative impact of corruption on market capitalization. The impact of corruption on trading volume considering GDP and inflation as control variables.

1.2. *The impact of corruption on trading volume considering inflation and GDP as control variables***.**

Table (8)

The fixed effect model and random effect model of corruption and their impact on trading volume

Variables	Fixed effect model	Random effect model
L COR	-0.01169281**	-0.1846813**
L inflation	- 0.0460022 **	0.405911
LGDP	0. 1607861	0.15480
R^2	12.24%	12.24%
F test / Wald test	6.88***	21.33***
Hausman test	5.71**	

We can see from the table (6) that the fixed effect model explains that around 12.24% of the variation in the independent variable, which is trading volumes in the financial markets, is explained by corruption index. The table also shows the regression model's F-test statistic, The entire regression model's F-test statistic is 6.88 and its p-value is 0.000, suggesting that it is statistically significant at the 1% level.

For each independent variable, the table lists the coefficients of each variable, according to the coefficient for GDP, which is 0. 1607861 with a p-value of 0.042, GDP has a statistically significant positive impact on trading volume. GDP does not have a statistically significant impact on trading volume, according to the coefficient for inflation, which is -0.0460022, there is a negative statistically significant relationship inflation level and trading volume. However, the table reveals that corruption level has a significant negative impact on trading volume, as the coefficient of COR is -0.01169281 and the coefficient is significant at 5% significance level.

Regarding random effect model, the total regression model is statistically significant at the 5% level, according to the Wald chi-square statistic of 21.33 and a p-value of 0.0253.
According to the Hausman test results, the test statistic is 5.71, and the p-value is 0.1265. We cannot reject the null hypothesis that the difference in coefficients is not systematic because the p-value is higher than the significance level of 0.05. Given that the fixed-effects model has higher standard errors and is less effective, this shows that the random-effects model is more suited for the data.

From the aforementioned discussion of corrupt countries results we cannot reject the second hypothesis stating that there is a negative impact of corruption on the trading volume in the stock market.

1.3. The impact of corruption on trading ratios considering GDP and inflation as control variables.

Table (9)

Random effect model and fixed effect model of corruption and its impact on trading ratios

Variables	Fixed effect model	Random effect model
L COR	0.386424**	0.3634555**
L inflation	-0.0707308*	-0.1035447*
LGDP	0.7267404 *	0.7016844**
R^2	10.12%	10.12%
F test / Wald test	2.81**	9.32* P. value (0.0253)
Hausman test	5.71 (0.1265)	

The fixed effect model explains that around 11% of the variation in the independent variable, which is trading ratios in the financial markets, is explained by corruption index. The table also shows the regression model's F-test statistic, The entire regression model's F-test statistic is 2.81 and its p-value is 0.000, suggesting that it is statistically significant at the 1% level.

For each independent variable, the table lists the coefficients of each variable, according to the coefficient for GDP, which is 0.7267404 with a p-value of 0.042, lGDP has a statistically significant positive impact on trading ratios. Inflation does not have a statistically significant impact on trading ratios, according to the coefficient for inflation, which is -0.0707308, there is a negative statistically significant relationship inflation level and trading volume. However, the table reveals that corruption level has a significant positive impact on trading ratios, as the coefficient of COR is 0.386424 and the coefficient is significant at 5% significance level.

Regarding random effect model, the total regression model is statistically significant at the 5% level, according to the Wald chi-square statistic of 9.32 and a p-value of 0.0253.

As shown by the coefficient for GDP, which is 0.7016844, GDP has a statistically significant positive impact on trading ratios. Inflation has a statistically significant negative impact on trading ratios. Corruption has a statistically negative impact on trading ratios as the coefficient of COR is 0.3634555 and this coefficient is significant at 5% significance level.

According to the Hausman test results, the test statistic is 5.71, and the p-value is 0.1265. We are unable to reject the null hypothesis that the difference in coefficients is not systematic because the p-value is higher than the significance level of 0.05. Given that the fixed-effects model has higher standard errors and is less effective, this shows that the random-effects model is more suited for the data.

1- Clean countries

2.1- The impact of corruption on market capitalization of clean countries considering GDP and inflation as control variables

Table (10)
Fixed effect model and random effect model of corruption and its impact on market capitalization

Variables	Fixed effect model	Random effect model
L COR	-0.035993**	-0.802539**
L inflation	-.0092428*	0.0113687*
LGDP	0.0662317*	0.0543286*
R^2	7.4%	7.4%
F test, Wald X^2	36.28***	26.69**
Hausman test	0.21 P. value 0.9765	

The table displays the findings of a fixed-effects (inside) regression analysis with 89 observations and 10 groups (designated by the “countid” variable). The model looks at the link between the dependent variables which are market capitalization, trading volumes and trading ratios. And the independent variable corruption index and two control variables GDP and inflation.

According to the R-squared values, the within variation in the model accounts for 26.45% of the variation in the dependent variable. The F-test demonstrates that the model is statistically significant (F (3,76) = 9.11, p. value 0.000.

The estimated coefficients for each independent variable are displayed in the coefficients table together with their standard errors, t-statistics, and p-values. Given that the other variables are held constant, the coefficient for “GDP” is 3.64, which suggests that an increase of one unit in the natural logarithm of COR is correlated with an increase of 3.64 units in the GDP variable. Although “inflation” has a negative coefficient (-0.25), it is not statistically significant (p = 0.423). Market capitalization has a negative association with corruption level -0.2432, this actually suggest that an increase in one unit in the corruption level will reduce the market capitalization by around 25%.

The table also reveals the results of random effect GLS regression. According to the R-squared values, the models within variation accounts for 26.44% of the variation in the stock market performance, the model is statistically significant, as shown by the Wald chi-square test (Wald chi2(3) = 26.69, p 0.001). The estimated coefficients for each independent variable are displayed in the coefficients table together with their standard errors, z-statistics, and p-values. The coefficient for "GDP" is 3.51; so, while all other variables are held constant, an increase of one unit in the natural logarithm of COR is correlated with an increase of 3.51 units in the GDP. Although "inflation" has a negative coefficient (-0.23), it is not statistically significant (p = 0.450).

The Hausman test, which is located at the bottom of the table, evaluates the null hypothesis that sampling variation is the sole cause of the difference between the fixed-effects and random-effects coefficients. With degrees of freedom equal to the number of independent variables, the test statistic has a chi-square distribution. There is strong evidence against the null hypothesis in this instance because the test statistic is 30.86 and the p-value is less than 0.001. Because the group-specific effects are expected to be connected with the model's independent variables, it appears that the fixed-effects model is preferable to the random-effects model. Inference should be made using the fixed-effects coefficients.

Table (11)
Fixed effect model and random effect model of corruption and its impact on trading volume

2.2- The impact of corruption on trading volume of clean countries considering GDP and inflation as control variables.

Variables	Fixed effect model	Random effect model
L COR	-1.962198**	-0.802539**
L inflation	-.4514931*	0.0113687*
LGDP	4.1388153**	0.0543286*
R^2	47%	47%
F test, Wald X^2	13.21***	76.45**
Hausman test	0.15	P. value 0.9848

The fixed effect model explains that around 47% of the variation in the dependent variable, which is trading volumes in the financial markets, is explained by corruption index. The table also shows the regression model's F-test statistic, The entire regression model's F-test statistic is 13.21 and its p-value is 0.000, suggesting that it is statistically significant at the 1% level.

For each independent variable, the table lists the coefficients of each variable, according to the coefficient for GDP, which is 4.1388153 with a p-value of 0.042, GDP has a statistically significant positive impact on trading volumes. Inflation has a statistically significant impact on trading volumes, according to the coefficient for inflation, which is -0.4514931, there is a negative statistically significant relationship between the inflation level and trading volume. However, the table reveals that corruption level has a significant negative impact on trading volumes, as the coefficient of COR is -1.962198 and the coefficient is significant at 5% significance level.

Regarding random effect model, the total regression model is statistically significant at the 1% level, according to the Wald chi-square statistic of 76.45 and a p-value of 0.000.

As shown by the coefficient for GDP, which 0.0543286, GDP has a statistically significant positive impact on trading volumes. Inflation has a statistically significant negative impact on trading volumes. Corruption has a statistically negative impact on trading ratios as the coefficient of COR is -0.802539 and this coefficient is significant at 5% significance level.

According to the Hausman test results, the test statistic is 0.15, and the p-value is 0.9848. We are unable to reject the null hypothesis that the difference in coefficients is not systematic because the p-value is higher than the significance level of 0.05. Given that the fixed-effects model has higher standard errors and is less effective, this shows that the random-effects model is more suited for the data.

2-3 The impact of corruption on trading ratios of clean countries considering GDP and inflation as control variables.

Table (12)

Fixed effect model and random effect model of corruption and its impact on trading ratios.

Variables	Fixed effect model	Random effect model
L COR	-0.6059631**	-0.7091175**
L inflation	-.42176918*	- 0.5151318*
LGDP	3.909403***	3.766503*
R^2	29.5%	47%
F test, Wald X^2	336***	33.57**
Hausman test	0.96	P. value 0.8103

The fixed effect model explains that around 30% of the variation in the dependent variable, which is trading ratios in the financial markets, is explained by corruption index. The table also shows the regression model's F-test statistic, The entire regression model's F-test statistic is 336 and its p-value is 0.000, suggesting that it is statistically significant at the 1% level.

For each independent variable, the table lists the coefficients of each variable, according to the coefficient for GDP, which is 3.909403 with a p-value of 0.002, GDP has a statistically significant positive impact on trading ratios. Inflation has a statistically significant impact on trading ratios, according to the coefficient for inflation, which is -.42176918, there is a negative statistically significant relationship between the inflation level and trading ratios. However, the table reveals that corruption level has a significant negative impact on trading ratios, as the coefficient of COR is -0.6059631 and the coefficient is significant at 5% significance level.

Regarding random effect model, the total regression model is statistically significant at the 1% level, according to the Wald chi-square statistic of 33.57 and a p-value of 0.000.

As shown by the coefficient for GDP, which 3.766503, GDP has a statistically significant positive impact on trading ratios.

Inflation has a statistically significant negative impact on trading ratios. Corruption has a statistically negative impact on trading ratios as the coefficient of COR is 0.7091175 and this coefficient is significant at 5% significance level.

According to the Hausman test results, the test statistic is 0.96, and the p-value is 0.9848. We are unable to reject the null hypothesis that the difference in coefficients is not systematic because the p-value is higher than the significance level of 0.05. Given that the fixed-effects model has higher standard errors and is less effective, this shows that the random-effects model is more suited for the data.

(3) ARDL model estimation

In order to determine the impact of corruption on stock market performance in short -term and long-term, we estimate Panel ARDL model as follows:

Table (11)

a. *The impact of corruption on market performance in both long-term and short-term (the output of Pooled Mean Group model.)*

Variables	Coefficient	Standard error
Long term results		
COR	-0.4262436	0.114619
MC	-0.0235702 *	0.11822
TV	-0.6257569 **	0.221926
TR	-0.543276	0.65432
GDP	-0.1362369	0.76544
Inflation rate	0.076543	0.112765
Short-term results		
COR	-0.625800*	0.108765
MC	-0.2424696	0.084276
TV	0.1362369*	0.096874
TR	0.065432*	0.543256
GDP	-0.426200*	0.098234
Inflation rate	0.023600*	0.054325

*** refers to 99% confidence level.
** refers to 95% confidence level.
* refers to 90% confidence level.

The table shows the outcomes of a Pooled Mean Group (PMG) regression analysis. Pooled mean group regression (PMG) provides us with information about the impact of corruption on stock market performance and its main components in the short term and long-term. It can be seen clearly that corruption has a negative impact on stock market performance in both long-term and short term. This influence is significant at 5% and 1% significance level respectively. However, when we talk about the impact of corruption on each dimension of stock market performance in the short term and long-term, it comes up with a different conclusion. For example, the impact of corruption on market capitalization is negative and significant in the short term (-0.2424696), but this negative association is not significant in the long-term (-0.4262436). We can see from the table that the impact of corruption on trading volumes is negative and significant in the short-term (-0.1362369*) and the long-term (-0.6257569 **). In regards to trading ratios, the impact of corruption on trading ratios seems to be positive and significant in the short-term (0.1362369*) but negative and insignificant in the long-term (-0.543276). The impact of corruption on GDP is negative in both short-term and long-term. However, this relationship is significant in the short-term (-0.426200*) and insignificant in the long-term (-0.1362369). The association between inflation rate and corruption is positive in both the short-term and long-term, but this association is insignificant in the both terms.

8. Results, discussion and implications.

Current research explores the relationship between corruption and stock market performance in the MENA (Middle East and North Africa) region. The conclusions drawn from this study indicate a negative impact of corruption on trading volume, market capitalization and positive impact on trading ratios. In this discussion section, we will delve into these findings and relate them to the findings of previous researches.

The first hypothesis of the current research states that there is a negative impact of corruption on market capitalization in the interested countries in both clean and corrupt countries. The main results confirmed the correctness of the first hypothesis, the evidence shows that the association between corruption level and market capitalization do not differ in corrupt and clean counties. Ugur (2014) confirmed the same results, the study examined the impact of corruption on stock market performance in BRICs countries. The research concluded that the negative impact of corruption on market capitalization is significant in all the countries of interest. Additionally, Biekpe and Kodongo (2019) in the African countries found the same conclusion, this research examined the impact of corruption on stock market development considering market capitalization as one of the indicators of stock market development. The negative impact of corruption on market capitalization implies that corruption hampers the overall growth and valuation of the stock market in the MENA region. This finding is consistent with previous studies that have demonstrated the adverse effects of corruption on economic performance. Corruption diverts resources away from productive activities, distorts market mechanisms, and discourages both domestic and foreign investments. As a result, companies listed on the stock market may experience lower valuations, reflecting the diminished prospects for growth and profitability in an environment plagued by corruption.

The second hypothesis of the current research states that there is a negative impact of corruption on trading volume in both clean and corrupt countries. The main conclusion of this hypothesis testing confirms that corruption has a negative impact on trading volume. In China, Zhan & Zhu (2023) confirmed the same results, as the researchers aims at examining the impact of corruption on stock market liquidity, they concluded that corruption has a negative impact on liquidity leading to lower level of trading activity and trading volumes. Consistent with the previous results, Shaurav, & Rath (2023) looked into the connection between stock market growth and corruption in a sample of nations. The findings indicated that less developed stock markets and lower trade volume are linked to higher levels of corruption. Regarding the third hypothesis, conclusion confirmed that there is a positive association between trading ratios and corruption level. This finding is confirmed in both clean and corrupt counties. Cao et.al (2019) confirmed the same results. The research investigated how corruption affects China's stock market performance.

According to the study, there is a correlation between degrees of corruption and stock market liquidity, with higher levels of corruption resulting in higher trading volumes and smaller bid-ask gaps.

The negative impact of corruption on trading volume suggests that higher levels of corruption within the MENA region led to reduced trading activities in the stock market. This finding aligns with previous research that has highlighted the detrimental effects of corruption on economic development and financial markets. Corruption undermines investor confidence and trust in the fairness and transparency of the market, leading to a decrease in trading volume. Investors may hesitate to participate in a market where corruption is prevalent, as it introduces uncertainty and increases the risk of unfair practices.

In contrary to our results, Bolgorian (2011) analyzed the relationship between the corruption level and economic growth and stock market development in the OECD countries. They found that the association between trading ratios and corruption level is negative, meaning that the corruption decreases the trading ratios in the interested countries. Also, both Bandyopadhyay & Roy (2007) confirmed the same hypothesis as corruption level reduces trading ratios.

The implications of these findings are significant for policymakers, market regulators, and investors in the MENA region. For policy makers, it is imperative that policymakers give the fight against corruption top priority and put strong anti-corruption measures in place. Crucial actions include bolstering legal frameworks, improving transparency, and encouraging moral business conduct. Stress the significance of accountability and sound governance in the stock market. It is crucial to put in place regulatory measures that uphold market integrity, deter corrupt behavior, and encourage fair competition. Spend money on awareness and education campaigns to inform market participants about the negative impacts of corruption. Encourage the financial industry to have a transparent, honest, and moral culture. To create effective policies, cooperate with foreign organizations and nations to exchange best practices and gain knowledge from accomplished anti-corruption campaigns. For

market regulators, to fight corruption in the stock market, market regulators should uphold and implement current laws. One way to detect and discourage corrupt activities is by routine monitoring, audits, and inspections.
Encourage openness and mandated disclosures for publicly traded firms so that investors can access fast and accurate information. This can lessen potential for corrupt acts and boost market confidence. Also, establish and implement strict norms of ethics and behavior for market participants, such as fund managers, brokers, and other middlemen. Provide systems for documenting and looking into unusual activity. To improve oversight and enforcement actions against stock market corruption, encourage collaboration and information exchange across various regulatory agencies. Regarding investors, they should perform extensive due diligence and investigation, especially in areas with a reputation for high levels of corruption. Take into account elements like the governance guidelines, the regulatory landscape, and the financial reporting transparency.
To reduce the danger of corruption, diversify your portfolios among several asset classes and markets. Look for opportunities in markets with low levels of corruption and robust governance structures. Take part in corporate governance and shareholder action. Investors can promote responsibility, ethics, and openness in businesses by actively engaging in shareholder meetings and voting. Encourage the implementation of environmental, social, and governance (ESG) and socially responsible investment (SRI) programs. These frameworks support investments in businesses that exhibit strong moral principles, accountability, and openness, which helps to create a culture that deters corruption.

9. Conclusion

This research endeavor delved into the intricate correlation between financial market indicators and corruption, employing GDP and inflation as control variables. Various econometric methods were employed in the analysis, encompassing both clean and corrupt nations: random-effects and fixed-effects models, as well as ARDL models. The results shed light on the complex relationship between corruption and the performance of financial markets, revealing significant nuances that enhance our understanding of this crucial matter.

Preliminary findings identified Tunisia, Bahrain, Saudi Arabia, and the United Arab Emirates as clean nations during the investigation period. Conversely, Egypt, Iraq, Iran, Jordan, Kuwait, Libya, Morocco, Oman, and Syria were identified as fraudulent nations during the same period.

The study's findings indicate that financial market indicators are significantly influenced by corruption in both clean and corrupt nations, though the extent and significance of this influence vary. Corruption exhibited adverse correlations with trading volumes and market capitalization, while showing a positive association with trading ratios in nations considered pure. These findings underscore the detrimental impact of corruption on overall market performance. Additionally, the influence of control variables such as GDP and inflation on these relationships was evident, emphasizing the importance of considering broader economic variables.

In nations afflicted with corruption, the effect of corruption on financial market indicators was notably significant. The findings revealed that corruption negatively impacts market capitalization, trading volumes, and trading ratios. This underscores the urgency of implementing targeted policy interventions to mitigate the adverse effects of corruption on financial markets and restore investor trust.

The ARDL model confirmed the adverse relationship between the level of corruption and market capitalization, both in the short and long term. However, the findings indicated that corruption does not exert any discernible impact on transaction volume, either temporarily or permanently. The ARDL model demonstrated that the level of corruption has a positive and statistically significant effect on trading ratios over both the short and long term.

10.Recommendations:

Based on the insights gained from this research, we offer the following recommendations:

1. Strengthen Anti-Corruption Efforts: Policymakers in corrupt countries should prioritize comprehensive anti-corruption measures to improve transparency, governance, and institutional effectiveness. Stricter enforcement of anti-corruption laws and regulations can help mitigate the negative impact of corruption on financial markets.

2. Promote Investor Education: Enhancing investor awareness and education about corruption's implications for financial markets can empower investors to make informed decisions. This can foster a more vigilant investment community that demands ethical behavior from companies and governments.

3. Encourage Good Governance: Clean countries should continue their commitment to good governance practices, as our findings suggest that corruption negatively affects financial market performance even in these contexts. Maintaining transparent and accountable institutions can safeguard against potential erosion of market indicators.

4. Strengthen Economic Fundamentals: Given the influence of GDP and inflation on the corruption-financial market relationship, policymakers should prioritize sustainable economic growth and stable price levels. These factors can mitigate the adverse effects of corruption on financial markets.

5. Support International Cooperation: International organizations and multilateral institutions should collaborate with governments to combat cross-border corruption and money laundering. Strengthening global efforts against corruption can foster a more conducive environment for fair and transparent financial markets.

6. Regular Monitoring and Reporting: Establish mechanisms for regular monitoring and reporting of corruption levels and their impact on financial markets. Timely data and analysis can guide evidence-based policy formulation and course correction.
7. Continuous Research: Ongoing research into the relationship between corruption and financial markets is crucial. By refining methodologies and expanding datasets, researchers can continue to deepen our understanding of these dynamics and identify potential mitigating factors.

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