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## Article

The moderating effect of audit quality on the relationship between financial inclusion and corporate investment: new evidence from the Middle East and North Africa region

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# The moderating effect of audit quality on the relationship between financial inclusion and corporate investment: new evidence from the Middle East and North Africa region

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## ABSTRACT

The purpose of this paper is to examine the impact of financial inclusion on corporate investment. More specifically, this paper investigates the possibility of a nonlinear relationship between financial inclusion and corporate investment, as well as the moderating effect of audit quality in this relationship. To do so, we selected a group of 400 listed non-financial firms in the Middle East and North Africa (MENA) region (Egypt, Jordan, Kuwait, Morocco, Oman, Qatar, Saudi Arabia, Tunisia, and the United Arab Emirates) over a period from 2007 to 2020. The results show an inverted U-shaped link between financial inclusion and corporate investment, applying the system generalized method of moments (SGMM) method. They also found that audit quality is identified as a moderating factor in the relationship between financial inclusion and corporate investment. Our results show that the interaction of financial inclusion and audit quality improves investment efficiency, but that underinvestment scenario could result from spending free cash-flows on risky projects. The findings of this study could be a valuable contribution to the development of financial inclusion policies and to improving access to credit for policymakers and managers in the MENA region. The combination of financial inclusion and audit quality (internal and external) is indispensable for reducing agency costs and optimizing financial inclusion levels.

## IMPACT STATEMENT

This paper analyzes the impact of financial inclusion on corporate investment, emphasizing the importance of audit quality. The result reveals an inverted U-shaped relationship between financial inclusion and corporate investment and highlight that audit quality significantly moderates this relationship. The findings have implications for policymakers and managers in the MENA region, emphasizing the need for effective audit practices to reduce costs and improve credit access.

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## 1. Introduction

The investment decision represents one of the most important financial decisions for managers of a firm since they require significant amounts of money. This decision is essential to the implementation of the firm's strategy, to create value and is perceived as a key determinant of its performance (Mykhayliv & Zauner, 2017; Khémiri & Noubbigh, 2021). However, a bad decision in this matter jeopardizes sustainable

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growth. This threat is mainly due to a lack of external financing (in particular, access to credit). That's why it's imperative that managers carefully evaluate each investment choice to avoid inefficiency, mainly resulting from information asymmetry problems and financing constraints (Shahid & Abbas, 2019; Ahmad et al., 2023).

The debate in modern finance literature on the relationship between access to credit and investment efficiency was sparked by the questioning of the Modigliani and Miller theorem (1958). This relationship is primarily based on information asymmetry and agency theories. Under information asymmetry, firms with positive investment opportunities may struggle to obtain loans due to lack of transparency, which can result in underinvestment (Myers, 1977; Myers & Majluf, 1984). Under agency theory, the optimal capital structure for a firm involves balancing the benefits of using debt to reduce agency costs associated to equity, against the enhance in agency costs related to debt (Jensen & Meckling, 1976; Jensen, 1986). This approach avoids the problem of overinvestment and helps firms to grow.

In practice, the corporate finance literature focuses on several determinants of corporate investment (CI), primarily leverage. The researchers have differing opinions on the impact of leverage on CI. Some studies supported the predictions of agency theory, asserting that debt reduces the scenario of overinvestment (e.g., Aivazian et al., 2005; Khémiri & Noubbigh, 2020b; Pellicani & Kalatzis, 2019), and vice versa (e.g., Firth et al., 2012; Ismail & Yunus, 2015). Supporters of information asymmetry theory suggested that leverage generates a scenario of underinvestment (Aivazian et al., 2005). However, other researchers have concluded that the relationship between leverage and CI is nonlinear (e.g., Gebauer et al., 2018; Ismail & Yunus, 2015).

Promoting financial inclusion (FI) reduces the constraints associated with external financing, particularly for small firms, by giving them better opportunities to access finance for their investments (Beck et al., 2012; Nizam et al., 2021). This helps enterprises (particularly, SMEs) to obtain credit, increase their productivity, stimulate their growth, and enhance their investment. However, the impact of FI on financial intermediation is mainly associated with facilitating firms' access to borrowing, rather than households' access to such financing (Beck et al., 2012). However, some firms encounter difficulties in obtaining credit due to high transaction costs (Peprah et al., 2020). In this case, the FI could be a key determinant for CI.

However, most studies focused on analyzing the impact of FI on firm finances, in particular on sales growth (e.g., Lee et al., 2020; Nizam et al., 2021), sustainable growth (e.g., Babajide et al., 2021; Khan et al., 2022; Khémiri et al., 2023) or corporate performance (e.g., Chauvet & Jacolin, 2017). The purpose of this study is to fill a gap in the literature. We examine the possible association between FI and CI. More precisely, we hypothesize that the relationship between FI and CI may follow an inverted U-shaped trajectory. This configuration highlights two categories of firms: those whose CI increases due to the need for greater FI, but only up to a threshold (inflexion point) where lenders start to impose sanctions by restricting lending due to perceived insufficient levels of FI. Some firms continue to invest beyond the optimal level, causing them to become inefficient. Our findings suggest that FI does not automatically lead to improvements in investment efficiency, and it is imperative that non-financials are involved in the process. Therefore, in the MENA region, non-financial firms need to achieve a certain threshold of FI to optimize their investments.

Hence, this study intends to contribute to fill this research gap by investigating whether such a FI-CI nexus. More specifically, this paper hypothesis that the relationship between FI and CI may follow an inverted U-shaped trend. This research runs counter to much of the current literature, which systematically assumes that increases in FI always lead to increases in investment efficiency and vice versa. It highlights the need to consider nuances and specific contextual factors for a deeper understanding of the impact of FI on CI.

In this case, it is essential to assess the impact of FI on the CI, considering the significant effects that other variables may have on this correlation. In particular, audit quality, an approach linked to stakeholder satisfaction that has much in common with FI, can play an important role in regulating the impact of FI on CI. More specifically, it should be noted that improving AQ, whether conducted internally or externally, can help reduce poor investment strategies (Ahmad et al., 2023; Ling & Wu, 2022; Shahid & Abbas, 2019). Under agency theory, debt can create agency problems between shareholders and lenders because managers may have incentives to misreport financial statements to meet their own

objectives, which can lead to lower AQ (Jensen & Meckling, 1976). As a result, lenders may require higher AQ to mitigate the risk of financial statement misrepresentation, and this demand for higher AQ is expected to increase as debt increases (Becker et al., 1998; Watts & Zimmerman, 1983). While there is some research indicating the influence of FI and AQ on CI, there is a gap in existing research regarding the potential tensions between FI and AQ. In fact, these two approaches may conflict with each other, even though they pursue similar objectives. These include reducing vertical alliances between stakeholders and managerial discretion. This means that it is needed to investigate how these two determinants interact, considering their moderating effect. Despite several studies on the impact of FI (especially access to finance) and AQ on CI in other national contexts, research in emerging markets, especially in the MENA region, remains limited.

During the last decade, socio-political transitions (e.g., Arab Spring etc...) have significantly influenced the business environment, regulatory framework, and risk perception in the region, shaping the landscape for investment initiatives. The region has relatively low levels of CI compared to other regions, underlining the importance of understanding the factors influencing CI (AlShammari et al., 2023). In addition, improving investment decisions in MENA countries is a complex issue involving several challenges. The need for a sound institutional framework is one of the main challenges. While financial development indices generally have a positive effect on the current account, the interaction with institutional quality is significantly negative. This suggests that high levels of corruption can increase the current account deficit, indicating that the benefits of financial development depend on strong institutions. Another challenge is external macroeconomic vulnerability due to current account imbalances, which can be a major constraint to economic growth. The MENA region has seen significant fluctuations in its current account balance, with some countries such as Tunisia and Jordan experiencing deficits more than 10% of GDP in some years (Bousnina & Gabsi, 2022). In addition, the impact of country risk on foreign direct investment (FDI) is another crucial aspect, as political and national risks can affect the attractiveness of FDI in the MENA region (i.e., Bagheri & Chitsazan, 2018; Ben Ali, 2022).

FI in the MENA region is a major challenge, with many countries lagging global averages and other regions, such as sub-Saharan Africa. As a result, FI in the region is below global averages, and some high-income countries, such as Kuwait and Qatar, are also underperforming. For example, the average share of SMEs in total bank lending in MENA countries is only around 9% (Ndoye & Barajas, 2022). In terms of level of FI, MENA countries are divided into two groups: Gulf Cooperation Council (GCC) countries (high-income) and non-GCC countries. High-income countries have the lowest share of bank loans to SMEs as a proportion of total bank loans in the MENA region (Ndoye & Barajas, 2022). In recent years, some MENA countries, such as Jordan, Tunisia, Egypt, and Morocco, have implemented FI strategies (Khémiri et al., 2023; World Bank, 2021). In this context, the World Bank has also provided support to these countries to improve FI and support policy reforms (World Bank, 2021). In summary, FI in the MENA region is a significant challenge, with many countries underperforming against their structural benchmarks. However, efforts are being made to address this issue through policy reforms and FI strategies. Despite the adoption of several key FI reforms in this region, levels of FI are still relatively modest, particularly for women, young people, rural areas, and SMEs (e.g., Emara & Mohieldin, 2020; Khémiri et al., 2023, Khémiri et al., 2024; 2024). This also highlights the importance of understanding its impact on investment decisions.

Finally, despite efforts by the region's regulatory authorities to improve governance practices, these remain at an embryonic phase. More specifically, the audit market, characterized by a high concentration of large audit firms, low AQ and a lack of transparency, requires in-depth investigation to ensure the reliability of financial information and thus optimize investment decisions. More precisely, despite efforts by regulatory authorities in the MENA region to improve governance practices, progress is still in its infancy. Initiatives to improve these practices are crucial to establishing a sound economic framework that promotes transparency and accountability. However, these reforms have not yet reached maturity, indicating the need for further development and implementation of governance standards capable of meeting the demands of a dynamic global economy (Alzoubi, 2018). In addition, the audit market in the MENA region is characterized by a high concentration of large audit firms. This domination by large players often raises concerns about AQ and transparency. The need for a thorough investigation of the audit market to ensure that the financial information provided by firms is reliable (Ben-Hassoun et al., 2018).

Such a review is essential to maintain investor confidence and facilitate sound investment decisions. Subsequently, reliable financial information helps optimize investment decisions. The current state of the audit market, with its low AQ and lack of transparency, undermines the reliability of financial information. Tackling these issues is imperative to ensure the integrity of financial markets and the economic well-being of the region. Ensuring the accuracy and reliability of financial information is a key step to attracting and retaining investment in MENA countries (Sarhan et al., 2019).

For this purpose, this study has the primary objectives as outlined below. First, to investigate the effect of FI on CI in MENA region. Second, to examine the nonlinear relationship between FI and CI. Finally, to explore the moderating effect of AQ on the FI-CI nexus. In order to achieve these objectives, this paper addresses the following research questions: (i) what is the nature of the non-linear relationship between FI and CI? (ii) how does AQ moderate the FI-CI nexus?

This research investigates the non-linear relationship between FI and CI using a two-step System Generalized Method of Moments (SGMM). This method considers the dynamic nature of investment and addresses the endogeneity problem (e.g., Gebauer et al., 2018; Khémiri & Noubbigh, 2020a). It is applied to a sample of listed companies in the MENA region. It considers the possibility that shareholder-manager (and/or lender-manager) may respond positively to high levels of FI and vice versa. For the first time, this paper sheds light on the influence of AQ on the curvilinear effect of FI on CI through the manager-shareholder (and/or manager-lender) approach. The study shows that the benefits of FI on CI are mitigated by integrating these different practices with similar objectives. More specifically, to assess whether or not FI is conducive to CI efficiency, internal and external AQ are integrated.

## 2. Theoretical background and hypotheses

### 2.1. Financial inclusion and corporate investment

FI has been the subject of extensive research regarding its impact on CI. It involves making financial services affordable and accessible to individuals and groups that are underserved and unbanked. Based on several theoretical studies, several theories have been put forward to explain the association between FI and CI. First, the link between leverage and CI is complex, as proposed by agency theory. On one side, leverage can offer incentives to managers to invest in projects that have a positive net present value, as they have a greater interest in the firm's profitability (Jensen, 1986). However, excessive leverage can raise the risk of bankruptcy, which could result in overinvestment as managers invest in projects that may not generate a positive net present value. Optimal capital structure theory proposes that there is an ideal amount of debt financing that balances the advantages of leverage with the drawbacks of cost of financing and bankruptcy risk. This optimal level of leverage can vary depending on various factors, such as the industry, the firm's growth prospects, and the volatility of its cash-flows (Jensen & Meckling, 1976). Information asymmetry theory suggests that when one party in a transaction has more information than the other party, it can lead to suboptimal outcomes and underinvestment risk. In corporate finance, information asymmetry can arise between a firm's managers and its investors. When a firm takes on leverage, it increases its financial risk and may be less likely to invest in profitable projects due to the fear of financial distress (Stiglitz & Weiss, 1981). This relationship between leverage and CI has been extensively studied in the literature, with some research concluding that leverage has a negative effect on CI, particularly in companies with high levels of information asymmetry (Fazzari et al., 1988; Myers & Majluf, 1984; Stiglitz & Weiss, 1981). Finally, pecking order theory suggests that companies choose to apply internal funds to finance investment, followed by leverage, and then equity. FI can bridge the gap between internal resources and debt, lowering the capital costs of firms and decreasing the need for equity financing, leading to more investment (Myers & Majluf, 1984).

In practice, several studies have explored the linear correlation between access to credit and the CI of listed firms, using different theoretical approaches. In the case of developed countries, it is necessary to note that the empirical studies access to credit negatively affects CI (Lang et al., 1996; Aivazian et al., 2005), which is consistent with the predictions of agency theory (Aivazian et al., 2005) and confirms the absence of over-investment risk. However, other several studies showed evidence of a positive linear association between credit access and CI (e.g., Fazzari et al., 1988; Guariglia & Yang, 2016; Hoshi et al., 1991;



Kadapakkam et al., 1998; Kaplan & Zingales, 1997). The studies suggest that this relationship is consistent with the predictions of asymmetry information and agency theories. They indicated the presence of under-investment risk. In a similar vein, other studies investigated the link between debt and CI in developing countries and found evidence of a negative correlation between external finance (debt) and CI (e.g., Ahmad et al., 2023; Firth et al., 2012; Ismail & Yunus, 2015; Ling & Wu, 2022; Ma & Jiang, 2024; Xu et al., 2024). More specifically, leverage is key driver of investment efficiency reducing the risks of overinvestment and underinvestment (Ling & Wu, 2022). In addition, information asymmetry can cause firms to either over- or under-invest, i.e., when information asymmetry exists, the adverse impact of debt on a firms' investment is magnified (Ahmad et al., 2023). Other studies have validated the pecking order theory predictions, as demonstrated in the case of developed and developing countries by Bessler et al. (2011) and the case of China by Qu et al. (2018). In contrast, there are a few empirical studies that find a strong positive correlation between leverage and CI (Ghosh, 2006; Ismail & Yunus, 2015).

Only a few studies have addressed the question of the nonlinear correlation between access to credit and CI in industrialized and emerging economies. A non-linear relationship between leverage and CI has been highlighted in several studies (e.g., Gebauer et al., 2018; Khémiri & Noubbigh, 2020b). However, other studies have concluded that debt has a threshold effect on CI (e.g., Ameer, 2014; Ismail & Yunus, 2015).

As already mentioned, most studies on FI focused on its impact on corporate finance, particularly on firm growth and performance. The aim of this paper is to fill a gap in the research by investigating the correlation between FI and CI. The study proposes that the FI-CI nexus is expected to follow an inverted U-shaped relationship. A conceptual approach based on agency theory suggests that there is an optimal level of FI: high FI increase investment by reducing the agency costs of equity (resolving conflicts of interest between managers and shareholders) until the inflection point occurs, after which they begin to generate agency conflicts related to debt (the emergence of conflicts of interest between shareholders and fund lenders) thus reducing CI. Given the aforementioned theoretical and empirical framework, our main hypothesis is as follows:

**Hypothesis 1.** The relationship between FI and CI is non-linear (U-shaped).

Based on this latest finding, it is important to question how FI affects CI. As one of the main financial decisions, investment efficiency requires significant funds, both internal and external. This decision must be supported using formal financial services, dictated by the reduction of information asymmetry. It is in this context that FI can play a vital role in avoiding overinvestment and/or underinvestment scenarios and ensuring the firm's long-term sustainability. However, such an impact seems to differ from one economy to another. This requires a return to strong governance practices. To put it differently, there is evidence to suggest that enhancing the AQ, (internal and external) can mitigate suboptimal investment strategies (Shahid & Abbas, 2019, Ling & Wu, 2022, and Ahmad et al., 2023).

## 2.2. The moderating role of AQ

As already mentioned, agency theory could be used to interpret the moderating role of AQ in the correlation between FI and CI, which suggests that conflicts of interest can occur between managers, shareholders, and controlling shareholders due to differences in their goals, risk preferences, and access to information. AQ can help mitigate these conflicts by providing independent verification of financial statements, improving the quality of financial reporting, and reducing information asymmetry between insiders and outsiders. This can enhance the credibility of a firm's financial information, reduce its cost of capital, and make it easier for them to access external financing and signal their creditworthiness to investors and lenders (Jensen & Meckling, 1976; Attia, 2020). Particularly, agency theory proposes that using external AQ as a mechanism to monitor managers is an effective way to ensure that corporate disclosure is of good quality (Becker et al., 1998; Watts & Zimmerman, 1983). External auditing provides reasonable assurance that the accounting principles applied by the firm are of good quality, prevents behavior that takes advantage of the situation, reduces the risk of incorrect information, and improves the allocation of resources and efficiency of contracts, especially in debt contracts (Watts & Zimmerman, 1983).

In practice, several studies explored that audit quality can have a significant linear impact on firm performance and investment efficiency, while other studies demonstrated that audit quality can act as a

moderating factor on firm performance (e.g., Alsmady, 2022; Ardianto et al., 2023; Attia, 2020; Bacha et al., 2020; Boubaker et al., 2018; Chen & Vann, 2017; Du & Lai, 2018; Hammami & Hendijani Zadeh, 2020; Huynh et al., 2020; Lugli & Bertacchini, 2022; Tang, 2023; Wang et al., 2022; Zahid et al., 2022). AQ is critical to optimizing firm performance. This is achieved by focusing on improving AQ. Agency theory postulates that AQ increases the credibility of financial statements. This leads to more effective risk management, informed decision making and a reduction in the imperfect information gap between stakeholders (Alsmady, 2022; Attia, 2020). In addition, audit fees are negatively affected by customer liquidity and listing duration. Higher levels of disclosure to the audit committee are related to higher fees, but individual characteristics of audit committees do not influence audit fees. Big 4 auditors charge higher fees, especially for small firms, after controlling for self-selection bias. These findings emphasize that audit fee determinants depend on the institutional framework in which firms operate, and auditor size and specific risk measures are also critical in determining audit fees for AIM firms (Xue & O'Sullivan, 2023).

The firm performance is influenced by several factors. The negative impact of imperfect information on shareholder wealth is notable, although leverage plays a moderate role in this relationship (Huynh et al., 2020). In addition, the interaction between Big 4 audit firms and environmental, social and governance (ESG) criteria has been found to have a negative impact on firm performance (Zahid et al., 2022). Moreover, the conjoint effect between earnings management and corporate governance positively and significantly affects overall firm performance, confirming agency theory predictions (Boachie & Mensah, 2022).

Moreover, few studies have examined the moderating influence of AQ on the relationship between FI and other firm-related factors. AQ (through audit committees) plays a significant role in the effectiveness of investments and acts as a mediator in the relationship between investor confidence and FI (Shahid & Abbas, 2019).

Moreover, the active presence of the largest ultimate shareholders on the board of directors and as the CEO is associated with issues of underinvestment and overinvestment (Pellicani & Kalatzis, 2019). Companies with a high AQ from one of the top ten audit firms (Big10) have better investment efficiency (Ling & Wu, 2022). This implies that these firms are better at making wise investment decisions and could benefit from improving their investment efficiency even more. Regarding access to credit and its indirect effect on CI, it can be noted that most studies have thoroughly investigated the joint impact of leverage and various other factors such as Tobin's Q (Aivazian et al., 2005), size and age, ownership structure (Firth et al., 2012; Ling & Wu, 2022), dividend payments, cash-flow, IFRS, taxation, and inflation (Khémiri & Noubbigh, 2020b), Kaplan-Zingales (KZ) index (Pellicani & Kalatzis, 2019), asymmetry of information (Ahmad et al., 2023) on CI. As a result, the research focus has been narrowed down, and less attention has been given to other potential areas of investigation. Based on all arguments, the second hypothesis is posited here:

**Hypothesis 2.** AQ moderates the nonlinear (U-shaped) relationship between FI and CI.

### 3. Methodology

#### 3.1. Data

This study draws on data from a variety of sources. The Refinitiv Eikon database is used for firm-level information, while macroeconomic data such as GDP growth and inflation rates are extracted from the World Development Indicators (WDI) of the World Bank.

Our research sample comprises listed non-financial firms in the MENA region (Egypt, Jordan, Kuwait, Morocco, Oman, Qatar, Saudi Arabia, Tunisia, and UAE). The annual data covers the period from 2007 to 2020. The choice of these countries depends essentially on the availability of data on FI. More specifically, according to the Thomson Reuters Eikon database, our initial sample consists of 1184 listed firms in the MENA region. However, we excluded firms from the financial sector, as they do not have the same governance characteristics. In addition, we have excluded firms that do not have three successive years of data in the period under consideration, and firms that do not have AQ information. After applying these criteria, our final sample firms 400 firms from 11 different sectors. These firms are classified according to the Campbell (1996) method, giving a total of 5600 firm-year observations. Table 1 show the breakdown of firms.

To reduce the influence of outliers in our analysis, we apply a winsorisation to all variables at the firm level, adjusting them to the 1st and 99th percentiles. Table 2 show the distribution of firms by country.



**Table 1.** Breakdown of firms.

|   | Number of firms |
|---|-----------------|
| Number of firms   | 1184            |
| Less financial sector firms   | 362             |
| Less firms that do not have three successive years of data available during the period under consideration and firms that do not have audit quality information | 422             |
| The final sample  | 400             |

**Table 2.** Distribution of firms.

| Countries    | Number of firms | Number of observations | %    |
|--------------|-----------------|------------------------|------|
| Egypt        | 78              | 1092                   | 20%  |
| Jordan       | 72              | 1008                   | 18%  |
| Kuwait       | 55              | 770                    | 14%  |
| Morocco      | 27              | 378                    | 7%   |
| Oman         | 27              | 378                    | 7%   |
| Qatar        | 19              | 266                    | 5%   |
| Saudi Arabia | 71              | 994                    | 18%  |
| Tunisia      | 25              | 350                    | 6%   |
| UAE          | 26              | 364                    | 7%   |
| Total        | 400             | 5600                   | 100% |

## 3.2. Variables

### 3.2.1. Dependent variable

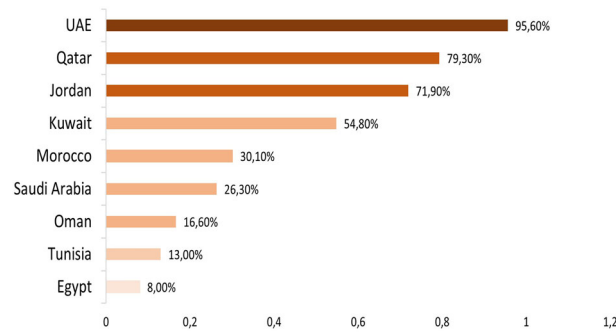
Since firms need to invest to generate value, it is crucial to have a better knowledge of the factors that influence CI decisions (Mykhayliv & Zauner, 2017). In this case, we utilize the ratio of capital expenditures less depreciation divided by fixed assets (Dang et al., 2012). The choice of this variable is of crucial importance in our study for several reasons. Firstly, it quantifies the propensity of firms to invest in long-term, sustainable assets, which is essential for generating value and ensuring their long-term survival on the market. Indeed, capital investment decisions play a central role in firm growth and competitiveness, as well as in their ability to innovate and adapt to market changes. In addition, the use of this variable enables us to analyze firm behavior regarding their investment choices in a precise and operational manner. By calculating this ratio, we can assess the proportion of resources allocated by firms to the expansion of their productive capacities and the acquisition of fixed assets, while considering the depreciation associated with these investments. Consequently, by including this variable in our study, we aim to better understand the determinants of corporate investment decisions, and provide valuable insights for managers, investors, and economic decision-makers.

### 3.2.2. Independent variables

Following Khémiri et al. (2023), we measure FI from double key aspects: access and usage. For access aspect, we consider three specific indicators: the number of deposit accounts in commercial banks (per 1,000 adults), the number of ATMs (per 100,000 adults) and the number of ATMs (per 1,000 km<sup>2</sup>). Regarding the usage aspect, we analyze two separate indicators: the percentage of outstanding deposits in commercial banks in relation to GDP and the percentage of outstanding loans in commercial banks in relation to GDP. Principal component analysis (PCA) was employed to construct the composite indicator. Before applying PCA, the *softmax* normalization technique is used to standardize the indicators of each dimension. In addition, we construct two dimensions: Access and Usage (Khémiri et al., 2023). We use Bartlett's sphericity test and the Kaiser-Meyer-Olkin (KMO) test to test the suitability of the data for factor analysis (Table A1). According to Khémiri et al. (2023), the following multi-dimensional index is created for FI:

$$FI = \sum_{i=1}^n \delta_{ij} X_i \quad (1)$$

Where  $\delta_{ij}$  are the component weights; and  $X_{ij}$  are the original variables. For both dimensions, we apply the same weights (i.e., 0.7071). We further normalize this index on a scale from 0 to 1 by applying



**Figure 1.** FI indicators across MENA countries.

the *softmax* technique, following Khémiri et al. (2023). It should be pointed out that a score of 0 corresponds to financial exclusion and a score of 1 to FI.

The Figure 1 shows that different countries have different levels of FI (For more detail, see Table A2). There appears to be a regional pattern. For example, the Gulf Cooperation Council (GCC) countries (such as UAE, Qatar, Kuwait, Saudi Arabia, and Oman) generally have higher FI indicators compared to North African countries like MENA, Tunisia, and Morocco. This might be due to differences in economic development and financial infrastructure.

### 3.2.3. Moderating variables

To measure the AQ, we constructed a composite indicator using two dimensions: audit committee (ACD) and external audit (EAD). For the first dimension, we use three indicators such as audit committee size (ACSIZE) measured by the total number of members on the audit committee, audit committee independent (ACIND) measured by the ratio of independent non-executive directors in the audit committee to total committee members, and audit committee meeting (ACMEET) measured by the number of meetings per year held by the audit committee (e.g., Shahid & Abbas, 2019; Attia, 2020). For the second dimension, we utilize two indicators namely the Big Four (BIG4) is a dummy variable equal to 1 if firms are audited by one of the Big 4 auditors (Deloitte, Ernst & Young, KPMG, PWC), and 0 otherwise, and Auditor change (ACH) is a dummy variable where take 1 if the firm changes its auditor in the year following a restatement announcement, and 0 otherwise (e.g., DeAngelo, 1988; Zahid et al., 2022).

For that purpose, PCA aggregates the variables associated with each factor into a unique composite score, thereby avoiding multicollinearity and reducing measurement error. As with the FI measure, we also run Bartlett's sphericity test and the Kaiser-Meyer-Olkin (KMO) test to test the suitability of the data for factor analysis. As shown in Table A3, this indicates that the data are suitable for PCA. We also construct a multidimensional index for AQ using equation (2).

$$AQ = \sum_{i=1}^n \alpha_{ij} X_i \quad (2)$$

Where  $\alpha_{ij}$  are the component weights; and  $X_i$  are the original variables. For both dimensions, we apply the same weights (i.e., 0.7071). In order to make the analysis easier, we also normalize this index using the *min-max* normalization technique on a scale from zero to one. Note that zero means low AQ and one means high AQ.

### 3.2.4. Control variables

There are many factors that contribute to an investment efficiency. In this case, we use various control variables that have been previously identified in literature. These control variables include financial leverage, Tobin's Q, cash-flow, size, tangibility, inflation, and GDP growth. We use financial leverage (LEV) as control variable because previous research has shown that access to credit can reduce agency costs and investment inefficiency. Leverage can have different effects on CI, depending on the situation and context. According to agency theory, leverage can have a negative impact on CI by playing

a disciplinary role that breaks up vertical alliances between stakeholders. However, in some cases, leverage can have a positive effect on investments by creating a conflict of interest between managers and lenders. In summary, leverage can have positive or negative consequences on CI depending on the situation and stakes involved. Leverage is used as an indicator of financial health. It is calculated as the ratio of the book value of long-term debt to total assets at time  $t$  (Gebauer et al., 2018). In addition, to assess the growth opportunities of a firm, Tobin's Q (TQ) is included as a control variable. This variable is defined as the ratio of the market value of equity plus the book value of long-term debt to the book value of total assets (Firth et al., 2012). Cash-flow (CF) is a proxy for the self-financing ability of a firm. It is assessed by the ratio of net profit after tax and income before extraordinary items plus depreciation (at time  $t$ ) to the capital stock (at time  $t$ ) (Ameer, 2014). Higher cash-flow is expected to have a positive effect on CI according to agency and asymmetric information theories. It has been shown that this relationship can lead to overinvestment by those who support the idea of free cash-flow. On the other hand, those who support the financial constraint hypothesis argue that this connection can lead to not investing enough (underinvestment). We use firm size (SIZE) as a control variable because previous studies have shown that large firms do not typically face financial difficulties. The natural logarithm of total sales is used to control. Tangibility (TANG) is a control variable for the assessment of the creditworthiness of the firm. This is calculated as the ratio of tangible assets to total assets (Attia & Mehafdi, 2023; Gebauer et al., 2018). Finally, following Khémiri and Noubbigh (2020a), we introduce inflation and GDP growth as control variables in our model to control for macroeconomic conditions.

### 3.3. Empirical model

In this section, we attempt to answer our research questions. To do this, we test our two research hypotheses. The first hypothesis is to examine the nonlinear relationship between FI and CI for MENA listed firms. To do so, following Shahid and Abbas (2019) and Khémiri and Noubbigh (2020a), we employ the two-step SGMM recommended by Blundell and Bond (1998). The estimation model can be formulated in the following way:

$$\begin{aligned} CI_{ijt} = & \alpha_0 + \beta_1 CI_{ijt-1} + \beta_2 FI_{it} + \beta_3 FI_{it}^2 + \beta_4 LEV_{ijt} \\ & + \beta_5 TQ_{ijt} + \beta_6 CF_{ijt} + \beta_7 SIZE_{ijt} + \beta_8 Tang_{ijt} \\ & + \beta_9 IF_{it} + \beta_{10} GDP_{it} + \varepsilon_{ijt} \end{aligned} \quad (3)$$

Where  $CI_{ijt}$  is the measure of corporate investment of country  $i$  firm  $j$  at time  $t$ ,  $CI_{ijt-1}$  is one-year lag of CI,  $FI_{it}$  represents the measure of financial inclusion of firm  $i$  at time  $t$ ,  $FI_{it}^2$  is the square term of FI investigating the inverted U-shaped relationship.  $LEV_{ijt}$ ,  $TQ_{ijt}$ ,  $CF_{ijt}$ ,  $SIZE_{ijt}$ ,  $Tang_{ijt}$ ,  $IF_{it}$ ,  $GDP_{it}$  are the measures of control variables (leverage, Tobin's Q, cash-flow, the firm size, tangibility, inflation rate, and GDP growth, respectively) and  $\varepsilon_{it}$  is the error term.

Several studies (e.g., Gebauer et al., 2018; Khémiri & Noubbigh, 2020a) have used SGMM to examine the topic of firm investment. Using SGMM has several advantages. First, the SGMM mitigates the dynamic panel heterogeneity, omitted variable, measurement error, and potential endogeneity problems (Attia et al., 2022; Attia & Mehafdi, 2023). The potential endogeneity can be due to the reverse causality, which implies that the FI can affect CI, but CI can also affect access to credit (Khémiri & Noubbigh, 2020a). Higher CI levels can encourage managers to access external finance. Second, it operates if a panel has a smaller temporal size, like ours ( $T$  equals 14), than its cross-sectional size ( $N$  equals 400).

However, the first and second order autocorrelations of AR (1) and AR (2) cannot be rejected, implying that there is no autocorrelation. This indicates that the lag structure of the models is satisfactory and only one lag is needed for the CI variable. The use of appropriate instruments in the estimation depends on the accuracy of the SGMM technique. In this instance, lagged values such as  $t-1$  and  $t-2$  were used as instrumentation for the difference formula and a single lag for the level formula. The reliability of the instruments was assessed using the Hansen J statistic of over-identifying restrictions. This indicated that the instruments used were reliable for the models.

The second hypothesis is to investigate the moderating effect of AQ on the FI-CI nexus. To do so, the baseline model is changed. In particular, the interaction terms are added as follows to model (2):

$$\begin{aligned}
 CI_{ijt} = & \alpha_0 + \beta_1 CI_{ijt-1} + \beta_2 FI_{it} + \beta_3 FI_{it}^2 + \beta_4 AQ_{ijt} \\
 & + \beta_5 FI_{it} \times AQ_{ijt} + \beta_6 FI_{it}^2 \times AQ_{ijt} + \beta_7 LEV_{ijt} \\
 & + \beta_8 TQ_{ijt} + \beta_9 CF_{ijt} + \beta_{10} SIZE_{ijt} + \beta_{11} Tang_{ijt} \\
 & + \beta_{12} IF_{it} + \beta_{13} GDP_{it} + \varepsilon_{ijt}
 \end{aligned} \quad (4)$$

Where  $AQ_{it}$  is measure of audit quality of country  $i$ , firm  $j$  at time  $t$ .

## 4. Findings and discussions

### 4.1 Statistical analyses

We used a set of unit root tests, namely the Levin-Lin-Chu (Levin et al., 2002) and Im-Pesaran-Shin (Im et al., 2003) tests, to test the stationarity of all variables used in our balanced panel. These tests indicate that there is a unit root in all panels at the null hypothesis. Table A4 shows the outcomes of these tests. They show that all variables are stationary at the (I (0)) level.

Table 3 provides a summary of the variables included in our sample. The average value of CI in MENA is 0.112%. Additionally, the average value of FI is 0.474. This value ranges from 0.191 to 0.884, which is still too low, especially in terms of usage, as its average value (equal to 0.444) is lower than that of access to credit (0.481). This is because MENA firms rely on credit to invest rather than on household access to financial services. This low level of FI requires the MENA authorities to strengthen their FI policy. In summary, all variables, except for the mean of the cash-flow variable, have consistently increased over the period from 2007 to 2020.

Table 4 suggests that since none of the correlation coefficients between the exogenous variables exceed 0.80, a multicollinearity problem is unlikely to affect the empirical models in the study (Gujarati, 2004).

**Table 3.** Descriptive statistics.

| Variable | Obs  | Mean   | Std. Dev | Min    | Max    | Skewness | Kurtosis | Normality |
|----------|------|--------|----------|--------|--------|----------|----------|-----------|
| CI       | 5600 | 0.112  | 0.874    | -2.915 | 6.685  | 4.967    | 40.230   | 0.000     |
| FI       | 5600 | 0.474  | 0.194    | 0.191  | 0.884  | 0.382    | 1.933    | 0.000     |
| ACC      | 5600 | 0.481  | 0.210    | 0.258  | 0.854  | 0.518    | 1.545    | 0.000     |
| USA      | 5600 | 0.444  | 0.192    | 0.175  | 0.879  | 0.739    | 2.307    | 0.000     |
| AQ       | 5600 | 0.512  | 0.187    | 0.013  | 0.913  | -0.411   | 2.737    | 0.000     |
| ACD      | 5600 | 0.499  | 0.213    | 0.117  | 0.967  | 0.048    | 1.875    | 0.000     |
| EAD      | 5600 | 0.528  | 0.123    | 0.004  | 0.609  | -3.481   | 13.764   | 0.000     |
| LEV      | 5600 | 0.210  | 0.209    | 0.011  | 0.919  | 1.301    | 5.041    | 0.000     |
| TQ       | 5600 | 1.059  | 1.054    | 0.113  | 6.389  | 2.488    | 10.871   | 0.000     |
| CF       | 5600 | -0.048 | 0.413    | -2.068 | 1.535  | -0.838   | 11.462   | 0.000     |
| Size     | 5600 | 12.452 | 2.440    | 7.713  | 18.383 | 0.281    | 2.444    | 0.000     |
| Tang     | 5600 | 0.328  | 0.262    | 0.017  | 0.898  | 0.466    | 2.084    | 0.000     |
| IF       | 5600 | 0.0482 | 0.053    | -0.049 | 0.2951 | 1.887    | 8.355    | 0.000     |
| GDP      | 5600 | 0.032  | 0.044    | -0.088 | 0.196  | 0.475    | 6.098    | 0.000     |

**Table 4.** Pearson correlation matrix.

| Variables | (1)     | (2)     | (3)     | (4)     | (5)     | (6)     | (7)    | (8)     | (9)     | (10)   | (11)    | (12)    | (13)   | (14)  | VIF  |
|-----------|---------|---------|---------|---------|---------|---------|--------|---------|---------|--------|---------|---------|--------|-------|------|
| (1) CI    | 1.000   |         |         |         |         |         |        |         |         |        |         |         |        |       |      |
| (2) FI    | 0.026*  | 1.000   |         |         |         |         |        |         |         |        |         |         |        |       | 1.82 |
| (3) ACC   | 0.042*  | 0.737*  | 1.000   |         |         |         |        |         |         |        |         |         |        |       | 1.15 |
| (4) USA   | -0.017  | 0.615*  | -0.024* | 1.000   |         |         |        |         |         |        |         |         |        |       | 1.86 |
| (5) AQ    | 0.011   | -0.038* | -0.045* | -0.012  | 1.000   |         |        |         |         |        |         |         |        |       | 1.06 |
| (6) ACD   | 0.008   | -0.052* | -0.066* | -0.008  | 0.879*  | 1.000   |        |         |         |        |         |         |        |       | 2.13 |
| (7) EAD   | 0.009   | 0.008   | 0.014   | -0.006  | 0.630*  | 0.190*  | 1.000  |         |         |        |         |         |        |       | 1.50 |
| (8) LEV   | -0.037* | -0.058* | -0.075* | 0.008   | -0.018  | -0.015  | -0.012 | 1.000   |         |        |         |         |        |       | 1.33 |
| (9) TQ    | -0.013  | -0.244* | -0.090* | -0.295* | 0.023   | 0.020   | 0.015  | -0.103* | 1.000   |        |         |         |        |       | 1.15 |
| (10) CF   | 0.071*  | 0.013   | 0.031*  | -0.030* | -0.006  | 0.001   | -0.015 | -0.051* | 0.067*  | 1.000  |         |         |        |       | 1.01 |
| (11) Size | -0.023  | 0.015   | 0.116*  | -0.107* | -0.033* | -0.056* | 0.019  | 0.032*  | -0.025* | -0.003 | 1.000   |         |        |       | 1.04 |
| (12) Tang | -0.069* | -0.062* | 0.055*  | -0.162* | -0.007  | -0.013  | 0.009  | 0.160*  | 0.046*  | -0.016 | 0.096*  | 1.000   |        |       | 1.07 |
| (13) IF   | 0.028*  | -0.411* | -0.333* | -0.252* | -0.020  | -0.018  | -0.014 | -0.067* | 0.159*  | 0.057* | -0.049* | -0.039* | 1.000  |       | 1.30 |
| (14) GDP  | -0.023  | -0.244* | -0.118* | -0.249* | -0.001  | -0.005  | 0.006  | -0.063* | 0.195*  | 0.024* | 0.011   | -0.008  | 0.301* | 1.000 | 1.16 |
| Mean VIF  |         |         |         |         |         |         |        |         |         |        |         |         |        |       | 1.35 |

\*presents significant at 5%level respectively.

## 4.2. Main results

Using the two-stage, SGMM estimator, this subsection aims to investigate the non-linear (curvilinear) correlation between FI-CI within MENA listed companies. The validity of the null hypothesis regarding the instrumental variables is approved by the results of the J-Hansen test presented in Table 5. Furthermore, the strength of the null hypothesis is reinforced by the results of the AR (2) test, which supports the absence of a second order correlation. These results allow us to conclude that the SGMM estimator seems appropriate for the present study.

According to the findings presented in Table 5, the coefficients of the investment variable are significant, but they have opposite signs. In column (1), there is a negative and significant effect of  $CI_{ijt-1}$  on  $CI_{ijt}$ . This can be explained by the high costs borne by MENA firms related to fixed assets. In contrast, as shown in column (2),  $CI_{ijt-1}$  has a significant and positive effect on  $CI_{ijt}$ . This suggests that certain MENA firms could enhance their production, decrease expenses, improve quality, and increase their competitive edge. They can achieve maximum benefits by appropriately strategizing and administering their fixed assets, while considering the required upkeep, upgrades, and repairs for efficient and sustainable utilization of these assets.

Furthermore, regarding the direct impact of FI on CI. The findings reported in column (1) showed that FI has a significant impact on CI. This impact is positive. Increasing the FI by 10.0% will result in increasing the CI by 1.43%.

The understanding of this result can be deepened by examining the nature of the relationship between IC and FI through a U-shaped test. The introduction of the quadratic term of the IF shows a positive effect on the IC, suggesting a U-shaped curve. However, this observation is not sufficient to prove the existence of this curve. It is essential to check the lower and upper limits of the correlation, as well as the extreme point.

For the U-shaped curve to be valid, the slope of the lower limit must be both negative and significant, while the slope of the upper limit must be positive and significant (Lind & Mehlum, 2010). The extreme point of the curve must lie between the minimum and maximum values of the curve. To perform this test, the U-shaped (or inverted U-shaped) relationship test was applied (Lind & Mehlum, 2010).

**Table 5.** Main results.

| VARIABLES                  | (1)<br>Linear        | (2)<br>Curvilinear   |
|----------------------------|----------------------|----------------------|
| $CI_{t-1}$                 | 0.248***<br>(0.005)  | 0.247***<br>(0.005)  |
| FI                         | 0.143***<br>(0.012)  | -0.487***<br>(0.047) |
| $FI^2$                     |                      | 0.778***<br>(0.059)  |
| LEV                        | -0.064***<br>(0.015) | -0.077***<br>(0.017) |
| TQ                         | 0.071**<br>(0.003)   | 0.026***<br>(0.004)  |
| CF                         | 0.068***<br>(0.007)  | 0.069***<br>(0.007)  |
| Size                       | -0.041***<br>(0.001) | -0.041**<br>(0.002)  |
| Tang                       | -0.058***<br>(0.014) | -0.071<br>(0.015)    |
| IF                         | 0.051***<br>(0.001)  | 0.031***<br>(0.001)  |
| GDP                        | -0.051<br>(0.061)    | -0.021***<br>(0.011) |
| Constant                   | 0.023<br>(0.021)     | 0.057**<br>(0.025)   |
| Observations               | 5200                 | 5200                 |
| Number of firms            | 400                  | 400                  |
| Number of instruments      | 246                  | 246                  |
| AR (1) (p-value)           | 0.000                | 0.000                |
| AR (2) (p-value)           | 0.115                | 0.115                |
| Hansen test (p-value)      | 0.072                | 0.094                |
| Endogeneity test (p-value) | 0.000                | 0.000                |

\*\*\*, \*\* and \* indicate statistical significance at the 1%, 5% and 10% levels respectively. Standard errors are shown in brackets.

**Table 6.** U-shaped test.

| Group                | Lower bound           | Upper bound          |
|----------------------|-----------------------|----------------------|
| Interval             | 0                     | 1                    |
| Slope                | -0.383***<br>(-8.707) | 0.809***<br>(13.431) |
| <b>Overall test</b>  |                       |                      |
| t-value              | 8.71                  |                      |
| p-value              | 0.000                 |                      |
| <b>Extreme point</b> | 0.321                 |                      |

Note. t-values are in parentheses. \*\*\* represent significance at 1% levels respectively.

The “*utest*” tool in STATA 17 was used for this analysis, which provides detailed information on the type of test used and the results, indicating whether the relationship moves from decreasing to increasing or vice versa over the interval examined. The results of this approach are presented in Table 6. All the necessary criteria are met, which proves that the non-linear relationship between FI and CI persists. This non-linearity takes the form of U.

Let’s now move on to discussing the findings obtained from the control variables. It appears that most of these variables have significant effects on investment. Specifically, leverage negatively affects CI. This result can be understood by the way that leverage leads to an excess of financial risk and distress costs for a firm, which can reduce its cash-flow and profitability. This can limit the amount of internal funds available for investment and make it more difficult for the firm to access external funds. It can also create agency problems between stakeholders (especially between a firm’s shareholders and its managers or creditors), which may affect their investment decisions. Indeed, shareholders may prefer riskier projects that offer higher returns, while creditors may prefer safer projects that guarantee debt repayment. This can lead to a risk of under-investment, since investment opportunities (TQ) exert a positive effect on IC (Khémiri & Noubbigh, 2020b). This could be better explained by theories relating to financial constraints and financial decisions (pecking order theory). The risk of underinvestment is still justified, since the results obtained suggest that CF positively influences IC in the presence of high investment opportunities (i.e., the sign of TQ is positive).

In addition, the Tobin’s Q coefficients are positive and significant at the 1% level. This means that growth opportunities have a positive effect on CI. More precisely, when Tobin’s Q is high, it may indicate that the firm’s assets are appreciated by the market compared to their book value. In this case, firms are high incentivized to invest in new tangible assets because they can obtain sufficient returns on these assets in the market. Therefore, the high presence of growth opportunities for MENA firms increases their ability to finance new investments. This finding is comparable to the one discovered by Ameer (2014).

Regarding the cash-flow (CF) variable, its coefficients have positive signs and are significant at the 1% level. From an economic perspective, based on the negative and significant signs found on the growth opportunities variable (Tobin’s Q) and relying on agency theory predictions and the hypothesis of free-cash-flow, one can predict the existence of an overinvestment scenario. Managers spend excess funds on risky projects, which can generate disputes between stakeholders (shareholders and managers) and high monitoring costs. This result is like the one found by Khémiri and Noubbigh (2020b).

Furthermore, it appears from the reference model that firm Size reduces CI as these coefficients are negative and statistically significant at the 1% level. Large MENA firms may face financial, competitive, and regulatory pressures that restrict their ability to invest in new investment projects. They may face higher costs to comply with regulations, which can hinder their investment capacity. They may also be more likely to face regulatory hurdles to obtain approval for new investment projects. Due to an information asymmetry level, firms are limited in their ability to obtain credit to manage their investment projects. As a result, this leads to the presence of financial constraints. This result is like that of Firth et al. (2012).

Similarly, we can propose that the negative effect of collateral on CI is merely a revelation of the existence of financial constraints since the TANG coefficients are negative and significant at the 1% level. This negative effect reduces the capacity of MENA firms to invest in new equipment and facilities, as well as to innovate to remain competitive in the market. This impact refers to the fact that the more tangible assets a firm has, the less likely it is to invest in new equipment or facilities. This is due to the



high cost and difficulty of replacing these tangible assets in case of technological change or obsolescence. This result contrasts with Ameer (2014).

Let us now move on to explaining the results obtained on the macroeconomic variables. The inflation positively impacts CI. This result can be explained by the fact that inflation can reduce the real cost of borrowing, which can make it cheaper for firms to finance their investment projects. This can increase the net present value of future cash-flows and the expected return on investment (DeAngelos and Masulis, 1980; Khémiri & Noubbigh, 2020b).

Moreover, the GDP growth has a negative impact on CI. A lower GDP growth indicates a weaker demand for goods and services, which can reduce the profitability and cash-flow of firms. This can discourage firms from investing or force them to cut back on their investment spending.

In summary, the findings suggest that a U-shaped relationship exists between FI and CI. This certainly suggests that an optimal level exists, beyond which access to banking services may encourage managers to overinvest. The same observation is also confirmed by the results obtained for growth opportunities (negative sign of the Tobin's Q variable) and cash-flow (positive sign), further suggesting the existence of an over-investment scenario. This scenario is due to the increase in agency costs and the level of information asymmetry among the stakeholders of MENA firms. To reduce this scenario, the implementation of monitoring mechanisms and audit systems is indispensable (internal audit), or even mandatory (external audit) to avoid the risk of overinvestment. This will be discussed in the following subsection.

### 4.3. Moderating effects

After detecting the presence of the over-investment risk in the previous results, it is important to know if the AQ adopted by MENA firms can help reduce this type of risk and assist them in accessing credit to finance their activities. In this subsection, the main objective is to test the moderating effect of AQ (ACD, EAD, and AQ) on the U-shaped relationship between FI and CI.

The results obtained are comparable to those seen in main regression analyses, though with some differences (Table 7). If we focus now on the AQ variables (measured by different components), it appears that these coefficients have a positive and statistically significant at the 1% level (column 1). This finding suggests that the AQ increase investment activities in tangible assets. For example, increasing the AQ by 10.0% will result in increasing the CI by 3.82% (Column 1).

The findings of the moderating role of AQ on the relationship between FI-CI show that the inverted U-shaped relationship has been detected again (Table 7), indicated that this relationship is negatively moderated by AQ. Specifically, the negative effect of the audit committee (ACD) on the CI of MENA listed firms implies that having an effective ACO can make firms more cautious about investing in tangible assets because they are under closer scrutiny from internal AQ (column 1). This can result in a decrease in risky or unprofitable investments, which can be advantageous in the long run for firms and their shareholders. This finding contradicts that of Shahid and Abbass (2019).

Additionally, the negative impact of external audit (EXA) on CI of listed MENA firms can be understood because of increased caution and monitoring in investment decision-making, leading to a reduction in investment spending. This situation may be related to the fact that external AQ focus more on compliance and risk management, which can make firms less willing to invest in assets that are deemed too risky or unprofitable. This can have long-term implications for the growth and competitiveness of firms, as well as their ability to generate returns for their shareholders. The negative effect of global AQ on CI reveals that the presence of two types of auditors (ACD and EAD) can lead to more caution and monitoring in investment decisions. This may reduce firms' propensity to invest in physical assets that are perceived to be too risky or unprofitable.

### 4.4. Robustness checks

#### 4.4.1. Alternative measure of CI

We perform an additional test by changing the CI measure to check the robustness of our results. To do this, we use the ratio of tangible assets to capital stock (Khémiri & Noubbigh, 2020b), also using the

**Table 7.** Moderating effect results.

| VARIABLES             | (1)<br>AQ            | (2)<br>ACD           | (3)<br>EAD           |
|-----------------------|----------------------|----------------------|----------------------|
| CI <sub>t-1</sub>     | −0.253***<br>(0.005) | 0.320***<br>(0.003)  | 0.329***<br>(0.004)  |
| FI                    | −1.336***<br>(0.491) | −0.608***<br>(0.148) | 1.495***<br>(0.416)  |
| FI <sup>2</sup>       | 2.423***<br>(0.511)  | 1.095***<br>(0.159)  | −1.282***<br>(0.467) |
| AQ                    | 0.382**<br>(0.188)   | 0.114**<br>(0.045)   | 0.550***<br>(0.132)  |
| FI X AQ               | 2.444**<br>(0.960)   | 0.507*<br>(0.264)    | 3.658***<br>(0.789)  |
| FI <sup>2</sup> X AQ  | −4.200***<br>(1.003) | −0.730***<br>(0.274) | −3.977***<br>(0.885) |
| LEV                   | −0.073***<br>(0.025) | −0.060***<br>(0.014) | −0.076***<br>(0.017) |
| TQ                    | 0.011***<br>(0.005)  | 0.025***<br>(0.004)  | 0.026***<br>(0.004)  |
| CF                    | 0.091***<br>(0.008)  | 0.062***<br>(0.005)  | 0.065***<br>(0.006)  |
| Size                  | −0.031<br>(0.002)    | −0.033**<br>(0.001)  | −0.031*<br>(0.002)   |
| Tang                  | −0.109***<br>(0.024) | 0.081<br>(0.012)     | 0.021<br>(0.014)     |
| IF                    | 0.072***<br>(0.001)  | 0.053***<br>(0.003)  | 0.041***<br>(0.001)  |
| GDP                   | −0.031***<br>(0.001) | −0.031***<br>(0.007) | −0.022***<br>(0.001) |
| Constant              | −0.117<br>(0.106)    | 0.174***<br>(0.035)  | −0.290***<br>(0.074) |
| Observations          | 5200                 | 5200                 | 5200                 |
| Number of firms       | 400                  | 400                  | 400                  |
| Number of instruments | 273                  | 285                  | 246                  |
| AR (1) (p-value)      | 0.003                | 0.000                | 0.000                |
| AR (2) (p-value)      | 0.205                | 0.090                | 0.087                |
| Hansen test (p-value) | 0.591                | 0.204                | 0.293                |

\*\*\*, \*\* and \* indicate statistical significance at the 1%, 5% and 10% levels respectively. Standard errors are shown in brackets.

two-step SGMM technique. The outcomes are displayed in [Table 8](#) showing that the previous outcomes are solid.

#### 4.4.2. Alternative measures of FI

After obtaining an overview of the overall impact of FI on CI, it is crucial to test the impact of each of its two components (Access and Usage) on CI. In this context, we also employed two step SGMM technique. [Table 9](#) presents the results that help determine how the various components of FI affect the investment of MENA firms? The findings obtained are like those showed in the previous regressions. However, there are some differences in terms of the usage dimension.

For the access dimension, the result shows that the relationship between access and CI is non-linear, but the shape of the curve has changed. This result seems important for decision-makers and policy-makers in the future. Specifically, there is a nonlinear (inverted U-shaped) link between FI. From an economic point of view, this inverted U-shaped relationship indicates that the optimal investment level is at a level of FI that allows firms to easily access the necessary financing at reasonable costs, while ensuring a stable and safe regulatory environment for investors. However, beyond this optimal level, firms reduce their use of credit to pay high costs. Similarly, Nizam et al. (2021) found that there is a non-monotonic relationship between FI (access to credit) and firm growth.

Unlike the access dimension results, the usage dimension result suggests the U-shaped correlation between usage and CI. This show that the previous results were robust. Specifically, it shifts from negative to positive. There is an optimal level of usage below which or companies can reduce their investment in tangible assets when using more digital financial services, such as mobile money, online banking, or e-commerce platforms. This implies that the negative effect is due to the psychological and social factors of FI, rather than economic and financial factors. However, beyond this threshold, an increase in the use of financial services reduces CI.

**Table 8.** Robustness check: changing the dependent variable.

| VARIABLES             | (1)<br>Linear        | (2)<br>Curvilinear    |
|-----------------------|----------------------|-----------------------|
| CI <sub>t-1</sub>     | −0.012***<br>(0.002) | −0.013***<br>(0.002)  |
| FI                    | −6.678**<br>(2.523)  | −14.587***<br>(3.903) |
| FI <sup>2</sup>       | 12.979***<br>(3.784) | 16.755***<br>(4.114)  |
| AQ                    |                      | 16.673***<br>(1.431)  |
| FI X AQ               |                      | 27.472***<br>(7.625)  |
| FI <sup>2</sup> X AQ  |                      | −30.623***<br>(8.159) |
| LEV                   | −5.811***<br>(1.683) | −4.985***<br>(1.868)  |
| TQ                    | 0.791**<br>(0.323)   | 0.918**<br>(0.385)    |
| CF                    | −1.360<br>(1.053)    | −1.613<br>(1.058)     |
| Size                  | −0.198<br>(0.152)    | −0.172<br>(0.172)     |
| Tang                  | −0.949<br>(1.384)    | −0.361<br>(1.599)     |
| IF                    | 0.205***<br>(0.064)  | 0.224***<br>(0.072)   |
| GDP                   | 0.440***<br>(0.079)  | 0.401***<br>(0.091)   |
| Constant              | 3.603*<br>(2.175)    | 11.605<br>(8.291)     |
| Observations          | 5200                 | 5200                  |
| Number of firms       | 400                  | 400                   |
| Number of instruments | 273                  | 0.273                 |
| AR (1) (p-value)      | 0.000                | 0.000                 |
| AR (2) (p-value)      | 0.527                | 0.599                 |
| Hansen test (p-value) | 0.774                | 0.827                 |

\*\*\*, \*\* and \* indicate statistical significance at the 1%, 5% and 10% levels respectively. Standard errors are shown in brackets.

#### 4.4.3. Alternatives measures of AQ

As mentioned earlier, one of the goals of this research is to evaluate whether AQ has an impact on the relationship between FI and CI. We used overall measures to AQ (external, internal, and global) in our baseline model, but these measures only provide a general idea of the moderating effect of AQ on this correlation. To strengthen our results, we therefore decided to test the moderating effect of each component of the audit (internal and external) on this correlation. The results reported in Table 10.

As shown in Table 10, it appears that all components of internal and external AQ are significant. Let us begin with the analysis of the internal audit (ACD) dimensions (ACSIZE and ACMEET, and ACIND). Their coefficients have opposite signs but are all significant at the 1% level. This result indicates that ACSIZE can have a negative impact on the CI. Indeed, a larger audit committee can lead to an increase in costs related to audit meetings and audit process management, as well as increased complexity in investment decision-making. Additionally, a larger audit committee can also lead to a dilution of individual member responsibilities, which can reduce the effectiveness of the audit. This can result in a decrease in AQ and thus a reduction in investor confidence in the financial information presented by the firm. Therefore, ACSIZE can have a negative impact on CI by reducing AQ and complicating investment decision-making. In addition, this result indicates that ACMEET can be perceived as a burden for MENA firms due to the costs in time and resources they entail. The meetings can disrupt normal firms' activities and require the participation of key members such as executives and board members, which can slow decision-making and disrupt normal firms' management. In addition, audit meetings may be seen as an indication of problems or weaknesses in the firm's management, which can create uncertainty and risk for potential investors. Therefore, the negative impact of ACMEET on CI may be due to the perception of investors that holding such meetings may be a sign of potential problems within the firm. This result contrasts with that observed by Shahid and Abbas (2019). In fact, these authors found

**Table 9.** Robustness check: changing the independent variable.

| VARIABLES             | (1)<br>Access        | (2)<br>Access        | (3)<br>Usage         | (4)<br>Usage         |
|-----------------------|----------------------|----------------------|----------------------|----------------------|
| CI <sub>t-1</sub>     | 0.672***<br>(0.007)  | 0.669***<br>(0.009)  | 0.698***<br>(0.007)  | 0.641***<br>(0.003)  |
| FI                    | 0.126***<br>(0.021)  | -0.798***<br>(0.305) | -0.161***<br>(0.027) | -1.009***<br>(0.073) |
| FI <sup>2</sup>       | -0.085***<br>(0.021) | 0.794***<br>(0.303)  | 0.192***<br>(0.029)  | 1.045***<br>(0.072)  |
| AQ                    |                      | -0.047<br>(0.090)    |                      | -0.020<br>(0.015)    |
| FI X AQ               |                      | 1.758***<br>(0.604)  |                      | 1.582***<br>(0.128)  |
| FI <sup>2</sup> X AQ  |                      | -1.689***<br>(0.603) |                      | -1.625***<br>(0.129) |
| LEV                   | -0.041***<br>(0.008) | -0.049***<br>(0.011) | -0.050***<br>(0.007) | -0.093***<br>(0.009) |
| TQ                    | 0.014<br>(0.021)     | -0.017<br>(0.021)    | 0.016<br>(0.021)     | -0.051***<br>(0.002) |
| CF                    | 0.039***<br>(0.005)  | 0.031***<br>(0.006)  | 0.040***<br>(0.005)  | 0.077***<br>(0.003)  |
| Size                  | -0.033***<br>(0.001) | -0.023**<br>(0.001)  | -0.015<br>(0.001)    | -0.025***<br>(0.001) |
| Tang                  | -0.019**<br>(0.008)  | -0.011<br>(0.010)    | -0.016**<br>(0.008)  | -0.091***<br>(0.008) |
| IF                    | 0.037***<br>(0.001)  | 0.034***<br>(0.001)  | 0.017***<br>(0.002)  | 0.032***<br>(0.001)  |
| GDP                   | 0.017<br>(0.014)     | 0.019<br>(0.012)     | 0.015<br>(0.017)     | -0.033***<br>(0.002) |
| Constant              | 0.022**<br>(0.011)   | 0.044<br>(0.051)     | 0.017<br>(0.013)     | 0.098***<br>(0.015)  |
| Observations          | 5200                 | 5200                 | 5200                 | 5200                 |
| Number of firms       | 400                  | 400                  | 400                  | 400                  |
| Number of instruments | 270                  | 270                  | 270                  | 381                  |
| AR (1) (p-value)      | 0.000                | 0.000                | 0.000                | 0.000                |
| AR (2) (p-value)      | 0.050                | 0.500                | 0.150                | 0.087                |
| Hansen test (p-value) | 0.440                | 0.419                | 0.789                | 0.388                |

\*\*\*, \*\* and \* indicate statistical significance at the 1%, 5% and 10% levels respectively. Standard errors are shown in brackets.

that the audit committee has a positive impact on the investment of listed firms in India and Pakistan. Furthermore, the positive effect of ACIND on CI is that firms with an ACIND can benefit from an improvement in the quality of the audit. This can increase investors' confidence in the financial information presented by the firms, reduce information asymmetry, and, therefore, reduce perceived investment risk. In addition, an ACIND can help improve corporate governance, thereby increasing transparency and reducing the likelihood of financial irregularities. Overall, this can lead to an increase in investment in MENA firms with an ACIND.

Let us now move on to the analysis of the external audit quality (EAD) dimensions (BIG4 and ACH). Their coefficients have also opposite signs but are all significant. In addition, the positive impact of the BIG4 on MENA firms' investment decisions can be interpreted as evidence of the importance of AQ and the confidence it inspires in investors. By engaging the services of the Big 4, MENA firms can leverage their expertise and experience to improve their corporate governance and financial transparency, which in turn can reduce perceived risks for investors, resulting in increased investment activity. Zahid et al. (2022) have demonstrated that Big Four enhances the performance of firms in Western Europe. However, they found that the interaction term of Big4 and ESG (environmental, social, and governance factors) has a negative moderating impact on ESG-ROA nexus.

In contrast, the negative effect of auditor change (ACH) on CI can be understood because of transition costs that firms face when they change their audit firm. These costs can include the reorganization of accounting and internal control systems to comply with the standards and practices of the new auditor. Additionally, changing the auditor can signal a lack of continuity or stability in the firm's governance, which can discourage potential investors by creating uncertainty and risk. Overall, this can lead to a decline in CI due to a perceived increase in costs and risks. Some differences were also observed in the change of the nonlinear relationship between FI and CI, which became inverted U-shaped (see columns 1, 2, 3 and 4).

**Table 10.** Robustness check: changing the moderating variables.

| VARIABLES             | (1)<br>ACSIZE         | (2)<br>ACMEET        | (3)<br>ACIND         | (4)<br>BIG4          | (5)<br>ACH           |
|-----------------------|-----------------------|----------------------|----------------------|----------------------|----------------------|
| CI <sub>t-1</sub>     | −0.232***<br>(0.005)  | −0.250***<br>(0.004) | 0.361***<br>(0.002)  | 0.356***<br>(0.003)  | 0.360***<br>(0.002)  |
| FI                    | −15.661***<br>(1.280) | −1.696***<br>(0.489) | −0.521***<br>(0.034) | 1.278***<br>(0.328)  | −0.601***<br>(0.041) |
| FI <sup>2</sup>       | 20.216***<br>(1.393)  | 2.891***<br>(0.512)  | 0.845***<br>(0.037)  | −1.305***<br>(0.307) | 0.959***<br>(0.045)  |
| AQ                    | −2.587***<br>(0.255)  | −0.311***<br>(0.094) | 0.088***<br>(0.014)  | 0.047***<br>(0.007)  | −0.193***<br>(0.025) |
| FI X AQ               | 15.967***<br>(1.281)  | 1.865***<br>(0.516)  | 0.296***<br>(0.076)  | 0.194***<br>(0.037)  | 0.645***<br>(0.119)  |
| FI <sup>2</sup> X AQ  | −20.500***<br>(1.397) | −2.957***<br>(0.544) | −0.621***<br>(0.077) | −0.221***<br>(0.035) | −1.169***<br>(0.119) |
| LEV                   | −0.110***<br>(0.021)  | −0.105***<br>(0.022) | −0.089***<br>(0.008) | −0.096***<br>(0.012) | −0.079***<br>(0.009) |
| TQ                    | 0.011***<br>(0.004)   | 0.002<br>(0.004)     | 0.014***<br>(0.002)  | 0.013***<br>(0.002)  | 0.011***<br>(0.002)  |
| CF                    | 0.078***<br>(0.007)   | 0.095***<br>(0.008)  | 0.073***<br>(0.003)  | 0.075***<br>(0.004)  | 0.071***<br>(0.003)  |
| Size                  | −0.005***<br>(0.002)  | −0.005**<br>(0.002)  | −0.003***<br>(0.001) | 0.001<br>(0.001)     | −0.003***<br>(0.001) |
| Tang                  | −0.080***<br>(0.021)  | −0.109***<br>(0.021) | −0.032***<br>(0.008) | −0.030***<br>(0.010) | −0.021**<br>(0.008)  |
| IF                    | 0.005***<br>(0.001)   | 0.006***<br>(0.001)  | 0.003***<br>(0.000)  | 0.003***<br>(0.000)  | 0.003***<br>(0.000)  |
| GDP                   | 2.861***<br>(0.262)   | 0.391***<br>(0.093)  | 0.194***<br>(0.016)  | 0.589***<br>(0.066)  | 0.029*<br>(0.016)    |
| Constant              | −0.232***<br>(0.005)  | −0.250***<br>(0.004) | 0.361***<br>(0.002)  | 0.356***<br>(0.003)  | 0.360***<br>(0.002)  |
| Observations          | 5200                  | 5200                 | 5200                 | 5200                 | 5200                 |
| Number of firms       | 400                   | 400                  | 400                  | 400                  | 400                  |
| Number of instruments | 273                   | 273                  | 384                  | 384                  | 384                  |
| AR (1) (p-value)      | 0.002                 | 0.003                | 0.000                | 0.000                | 0.000                |
| AR (2) (p-value)      | 0.142                 | 0.210                | 0.80                 | 0.082                | 0.080                |
| Hansen test (p-value) | 0.147                 | 0.209                | 0.244                | 0.372                | 0.355                |

\*\*\*, \*\* and \* indicate statistical significance at the 1%, 5% and 10% levels respectively. Standard errors are shown in brackets.

In essence, while AQ and FI contribute to enhancing the effectiveness of listed firms in MENA, they remain insufficient. Specifically, our analysis shows that the combination between FI and external AQ help to avoid the overinvestment scenario. They urge managers to use borrowed funds to maximize shareholder wealth, confirming their disciplinary role in this case. However, the internal AQ remains weak and does not prevent agency problems among stakeholders. This suggests the presence of an overinvestment scenario related to the use and CI of excess funds by managers for non-productive purposes and the increase in internal audit costs.

#### 4.4.4. Subsample

Finally, we subdivide our sample in tow subsample: GCC and Non GCC countries. The robustness of the previous results is demonstrated by the results presented in Table 11.

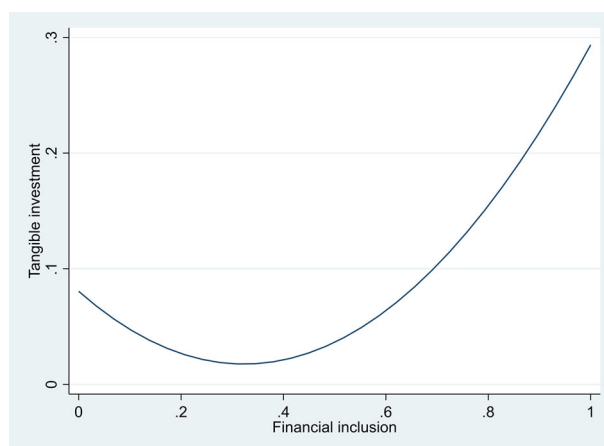
#### 4.5. Discussion

Our study aims to address the mixed results in the literature (Gebauer et al., 2018; Khémiri & Noubbigh, 2020b) through theoretical clarification and empirical evaluation regarding how FI influences CI. In the literature, FI is closely associated with firm performance, and access to formal financial services is linked to benefits for CI (Gebauer et al., 2018). However, prior findings also imply that high levels of FI could negatively affect CI by imposing transaction costs (Khémiri & Noubbigh, 2020b). Furthermore, the impact of AQ on CI has also been the subject of analysis in other studies. However, since these are two different approaches with similar goals (management discretion and reduction of conflicts of interest), potential areas of conflict between FI and AQ can be identified. In this case, we investigated firstly the U relationship between FI and CI and secondly the moderating effect of AQ on the FI-CI link. For this purpose, we

**Table 11.** Robustness check: Subsample.

| VARIABLES             | (1)                  | (2)                  | (3)                   | (4)                  | (5)                  | (5)                   |
|-----------------------|----------------------|----------------------|-----------------------|----------------------|----------------------|-----------------------|
|                       |                      | GCC countries        |                       |                      | Non GCC countries    |                       |
|                       | CI                   | CI                   | CI                    | CI                   | CI                   | CI                    |
| CI <sub>t-1</sub>     | 0.243***<br>(0.003)  | 0.229***<br>(0.003)  | −0.259***<br>(0.005)  | 0.389***<br>(0.002)  | 0.388***<br>(0.002)  | −0.060***<br>(0.003)  |
| FI                    | 0.138***<br>(0.012)  | −0.863***<br>(0.056) | 7.265***<br>(0.707)   | −0.025**<br>(0.012)  | −0.200***<br>(0.034) | −4.123***<br>(0.554)  |
| FI <sup>2</sup>       |                      | 0.941***<br>(0.050)  | −5.159***<br>(0.554)  |                      | 0.431***<br>(0.058)  | −11.842***<br>(1.279) |
| AQ                    |                      |                      | 5.125***<br>(0.406)   |                      |                      | 0.437***<br>(0.064)   |
| FI X AQ               |                      |                      | 16.941***<br>(1.482)  |                      |                      | 7.313***<br>(1.009)   |
| FI <sup>2</sup> X AQ  |                      |                      | −12.662***<br>(1.162) |                      |                      | −20.827***<br>(2.304) |
| LEV                   | −0.084***<br>(0.017) | −0.154***<br>(0.018) | −0.314***<br>(0.032)  | 0.023**<br>(0.009)   | 0.028***<br>(0.009)  | 0.048**<br>(0.020)    |
| TQ                    | 0.015***<br>(0.003)  | 0.013***<br>(0.004)  | −0.018**<br>(0.007)   | 0.011<br>(0.024)     | 0.031<br>(0.021)     | −0.066<br>(0.043)     |
| CF                    | 0.065***<br>(0.004)  | 0.067***<br>(0.005)  | 0.066***<br>(0.006)   | 0.086***<br>(0.004)  | 0.088***<br>(0.004)  | 0.159***<br>(0.006)   |
| Size                  | 0.017<br>(0.011)     | 0.01<br>(0.021)      | 0.041<br>(0.037)      | −0.011***<br>(0.001) | −0.012***<br>(0.001) | −0.021***<br>(0.002)  |
| Tang                  | −0.171***<br>(0.013) | −0.118***<br>(0.014) | −0.169***<br>(0.026)  | 0.074***<br>(0.012)  | 0.077***<br>(0.012)  | 0.106***<br>(0.020)   |
| INF                   | 0.036***<br>(0.002)  | 0.035***<br>(0.001)  | 0.083***<br>(0.001)   | 0.062***<br>(0.003)  | 0.061***<br>(0.004)  | 0.071***<br>(0.001)   |
| GDPG                  | −0.031***<br>(0.001) | −0.055***<br>(0.001) | −0.072***<br>(0.001)  | 0.011***<br>(0.000)  | 0.010***<br>(0.000)  | 0.017***<br>(0.001)   |
| Constant              | 0.156***<br>(0.020)  | 0.352***<br>(0.029)  | −2.073***<br>(0.198)  | 0.047***<br>(0.015)  | 0.065***<br>(0.015)  | 0.405***<br>(0.050)   |
| Observations          | 3575                 | 3575                 | 3575                  | 1625                 | 1625                 | 1625                  |
| Number of firms       | 275                  | 275                  | 275                   | 125                  | 125                  | 125                   |
| Number of instruments | 234                  | 234                  | 255                   | 232                  | 232                  | 239                   |
| AR (1) (p-value)      | 0.000                | 0.000                | 0.002                 | 0.000                | 0.000                | 0.000                 |
| AR (2) (p-value)      | 0.200                | 0.219                | 0.500                 | 0.238                | 0.127                | 0.173                 |
| Hansen test (p-value) | 0.387                | 0.382                | 0.952                 | 0.422                | 0.238                | 0.420                 |

\*\*\*, \*\* and \* indicate statistical significance at the 1%, 5% and 10% levels respectively. Standard errors are shown in brackets.

**Figure 2.** The U-shaped curve of the FI-CI nexus.

applied the SGMM method using a data covering the period 20007–2020. Our results provide empirical evidence proving hypothesis 1. In line with this hypothesis, FI exerts a curvilinear effect on CI. Furthermore, these results validate hypothesis 2, indicating that AQ acts as a moderator in the link between FI and CI.

In addition, the results indicate that the relationship between FI and CI is U-shaped, which confirms H1. Firms to the left of the curve in [Figure 2](#) experience a decrease in CI as their FI level rises, while those to the right of the curve experience an exponential rise in CI as their FI level rises after the extreme point. In



concrete terms, the sign of the FI coefficients changes from a negative to a positive one. More precisely, there is a maximal level of FI equal to 32.1%. Beyond this level, the CI starts to decrease. In other words, improvements in formal financial services remain insufficient, preventing firms from investing in appropriate projects. This reflects the existence of a risk of underinvestment arising from the problems of non-selection and moral hazard (Jensen & Meckling, 1976 and Khémiri & Noubbigh, 2020b). However, as the level of FI increases beyond this threshold, the risk of underinvestment vanishes. This suggests that, by reducing financial constraints, improvements in FI encourage firms to invest in profitable projects. The trade-off between FI and CI is important for investment efficiency under these conditions.

As for the investigation of the moderating effect of AQ on the relationship between FI and CI, the result indicates that AQ moderates the correlation between FI and CI. This result provides support for agency theory predictions and the validity of hypothesis 2. Specifically, the results reveal that there is an inverted U-shaped link between the interaction of FI-AQ (for all three components) and CI. This result indicates that low FI accompanied by high AQ can stimulate investments due to the lack of resources and uncertainty regarding the quality of investments. However, too high levels of FI and significant AQ can also limit investments due to increased audit fees and financial distress (agency costs and bankruptcy risk). In fact, the increase in compliance and governance costs reduces the capacity of firms to invest in tangible assets. Compliance costs can be significant for listed firms, especially in developing countries such as MENA, where regulations can be complex and changing. Regulatory changes in the MENA region, particularly in countries such as Saudi Arabia, the United Arab Emirates, Qatar, and Morocco, are reshaping corporate governance to enhance competitiveness and economic growth. These countries have introduced new company laws and corporate governance codes to align with their economic visions. Specific regulatory changes concern directors' remuneration, diversity, related party transactions (RPT), share issuance, minority squeeze-out, SPACs/SPVs (ISS Insights, 2023). These regulatory changes reflect a broader trend in the MENA region to improve corporate governance practices to stimulate economic growth and competitiveness. Therefore, there is an optimal point of FI and AQ that allows maximizing firms' tangible investments.

## 5. Conclusion and policy implications

The purpose of this paper is the investigation of the effect of FI on CI. Specifically, we examine, for the first time, the U-shaped relationship between FI and CI. Moreover, we aim to extend our study by examining the moderating effect of AQ (internal and external) on the FI-CI nexus using two step SGMM.

The results of our study provide important insights into the relationship between FI and CI. We support the presence of a U-shaped link between FI and CI, suggesting an optimal level below which FI leads to underinvestment by firms. Managers are unable to use formal financial services due to high levels of information asymmetry between them and lenders. These results confirm hypothesis H1. We also conclude that the impact of FI on CI is primarily determined by firms' ability to access credit rather than households' ability to access financial services. We also found that the moderating effect of AQ on the FI-CI link partially reduces the underinvestment scenario, which confirms hypothesis 2.

### 5.1. Implications

As far as we are aware, this is the first study demonstrating the nonlinear impact of FI on CI. Our outcomes have important implications for policymakers and business leaders in MENA countries, who need to take certain measures to avoid the risk of underinvestment and contribute to the recent literature on investment policy determination. First, to avoid the risk of underinvestment, financial institutions and firm managers need to set an optimal level of FI. The results of the study show that the effects of the components of FI on CI in the MENA region vary, so it is important not to take global measures when making decisions. A proper assessment of FI policy is essential for effective risk management. Secondly, if the risk of underinvestment arises, the interaction of FI and AQ can play a crucial role in reducing it, but it cannot avoid it altogether. In this context, managers are advised to strengthen internal governance practices (especially internal audit) to protect shareholders' interests and avoid unprofitable investments. Finally, strengthening AQ (internal and external) is also crucial to effective risk management and investment promotion.

## 5.2. Limitations and future research

This study has limitations that suggest promising directions for future research. First, although the sample size of this research is adequate for the analyses performed, it would be beneficial for future studies to increase the sample size. This would not only enable the results obtained to be better validated, but also enable the conclusions to be generalized to a larger number of companies. Second, focusing exclusively on listed firms could ignore important dynamics present within unlisted firms and SMEs. The latter constitute an important part of the MENA economy, and present governance structures that may differ significantly from those of listed firms. Therefore, future research should include these types of firms, providing a more comprehensive overview of governance practices in the region. Thirdly, although AQ has been used as an indicator to evaluate governance practices, there are a multitude of other governance mechanisms worth exploring. Future studies could explore how elements such as board structure, minority shareholder rights and transparency of financial reporting influence corporate governance. A multidimensional approach could reveal complex interactions between different governance mechanisms and their impact on corporate investment. Finally, it is essential to further explore the impact of FI on different aspects of corporate operations. While this study has highlighted the importance of FI, its implementation may require a considerable allocation of resources. The question arises as to whether FI can coexist harmoniously with other strategies aimed at similar objectives, or whether it competes for limited resources. Therefore, future research could investigate the trade-off between FI and other corporate initiatives to determine best practices for sustainable and inclusive growth.

## Author contributions statement

The conception and design, or analysis and interpretation of the data: Ahmed Chafai, Wafa Khémiri, Rewayda Tobar, Eman Fathi Attia, Hady Omar Abozeid. The drafting of the paper: Ahmed Chafai, Wafa Khémiri, Rewayda Tobar, Eman Fathi Attia, Hady Omar Abozeid. The critical revision of intellectual content: Ahmed Chafai, Wafa Khémiri, Rewayda Tobar, Eman Fathi Attia, Hady Omar Abozeid. The final approval of the version to be published: Ahmed Chafai, Wafa Khémiri, Rewayda Tobar, Eman Fathi Attia, Hady Omar Abozeid. All authors agree to be accountable for all aspects of the work.

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## Data availability statement

The data presented in this study are available on request.

## References

- Ahmad, M. M., Hunjra, A. I., & Taskin, D. (2023). Do asymmetric information and leverage affect investment decisions? *The Quarterly Review of Economics and Finance*, 87(February), 337–345. <https://doi.org/10.1016/j.qref.2021.05.001>
- Aivazian, V. A., Ge, Y., & Qiu, J. (2005). The impact of leverage on firm investment: Canadian evidence. *Journal of Corporate Finance*, 11(1-2), 277–291. [https://doi.org/10.1016/S0929-1199\(03\)00062-2](https://doi.org/10.1016/S0929-1199(03)00062-2)
- AlShammari, N., Willoughby, J., & Behbehani, M. S. (2023). Political unrest, the Arab spring, and FDI flows: A quantitative investigation. *Cogent Economics & Finance*, 11(2), 2228092. <https://doi.org/10.1080/23322039.2023.2228092>
- Alsmady, A. A. (2022). Quality of financial reporting, external audit, earnings power and companies performance: The case of Gulf Corporate Council countries. *Research in Globalization*, 5, 100093. <https://doi.org/10.1016/j.resglo.2022.100093>
- Alzoubi, E. S. S. (2018). Audit quality, debt financing, and earnings management: Evidence from Jordan. *Journal of International Accounting, Auditing and Taxation, Final Articles of Advances in International Accounting*, 30(March), 69–84. <https://doi.org/10.1016/j.intaccaudtax.2017.12.001>
- Ameer, R. (2014). Financial constraints and corporate investment in Asian countries. *Journal of Asian Economics*, 33, 44–55. <https://doi.org/10.1016/j.asieco.2014.05.004>
- Ardianto, A., Anridho, N., Ngelo, A. A., Ekasari, W. F., & Haider, I. (2023). Internal audit function and investment efficiency: Evidence from public companies in Indonesia. *Cogent Business & Management*, 10(2), 2242174. <https://doi.org/10.1080/23311975.2023.2242174>
- Attia, E. (2020). *Evaluating the effectiveness of corporate governance mechanisms and external audit on earnings management: Empirical study of companies listed in the Egyptian stock market* [Doctoral thesis]. University of Huddersfield.
- Attia, E. F., Ismail, T., & Mehafdi, M. (2022). Impact of board of directors attributes on real-based earnings management: Further evidence from Egypt. *Future Business Journal*, 8(1), 56. <https://doi.org/10.1186/s43093-022-00169-x>
- Attia, E., & Mehafdi, M. (2023). The dynamic endogeneity issue between corporate ownership structure and real-based earnings manipulation in an emerging market: Advanced dynamic panel model. *Risks*, 11(11), 189. <https://doi.org/10.3390/risks11110189>
- Babajide, A. A., Abiodun Okunlola, F., Isola Lawal, A., Bosede Akinjare, V., & Bose Lawal-Adedoyin, B. (2021). Financial inclusion: Implication on per capita income in Nigeria. *Asian Economic and Financial Review*, 11(8), 603–617. <https://doi.org/10.18488/journal.aefr.2021.118.603.617>
- Bacha, S., Ajina, A., & Ben Saad, S. (2020). CSR performance and the cost of debt: Does audit quality matter? *Corporate Governance: The International Journal of Business in Society*, 21(1), 137–158. <https://doi.org/10.1108/CG-11-2019-0335>
- Bagheri, A., & Chitsazan, H. (2018). Challenges of entrepreneurial finance: A systematic analysis of empirical researches. In N. Faghih and M. R. Zali (Eds.), *Entrepreneurship education and research in the Middle East and North*

- Africa (MENA): Perspectives on trends, policy and educational environment* (pp. 347–361). Contributions to Management Science. Springer International Publishing. [https://doi.org/10.1007/978-3-319-90394-1\\_18](https://doi.org/10.1007/978-3-319-90394-1_18)
- Beck, T., Büyükkarabacak, B., Rioja, F. K., & Valev, N. T. (2012). Who gets the credit? And does it matter? Household vs. firm lending across countries. *The B.E. Journal of Macroeconomics*, 12(1) <https://doi.org/10.1515/1935-1690.2262>
- Becker, C. L., DeFond, M. L., Jiambalvo, J., & Subramanyam, K. R. (1998). The effect of audit quality on earnings management. *Contemporary Accounting Research*, 15(1), 1–24. <https://doi.org/10.1111/j.1911-3846.1998.tb00547.x>
- Ben Ali, M. S. (Ed.). (2022). *Key challenges and policy reforms in the MENA region: An economic perspective*. Perspectives on Development in the Middle East and North Africa (MENA) Region. Springer International Publishing. <https://doi.org/10.1007/978-3-030-92133-0>
- Ben-Hassoun, A., Aloui, C., & Ben-Nasr, H. (2018). Demand for audit quality in newly privatized firms in MENA region: Role of internal corporate governance mechanisms audit. *Research in International Business and Finance*, 45(October), 334–348. <https://doi.org/10.1016/j.ribaf.2017.07.167>
- Bessler, W., Drobetz, W., & Grüninger, M. C. (2011). Information asymmetry and financing decisions\*. *International Review of Finance*, 11(1), 123–154. <https://doi.org/10.1111/j.1468-2443.2010.01122.x>
- Blundell, R., & Bond, S. (1998). Initial conditions and moment restrictions in dynamic panel data models. *Journal of Econometrics*, 87(1), 115–143. [https://doi.org/10.1016/S0304-4076\(98\)00009-8](https://doi.org/10.1016/S0304-4076(98)00009-8)
- Boachie, C., & Mensah, E. (2022). The effect of earnings management on firm performance: The moderating role of corporate governance quality. *International Review of Financial Analysis*, 83(October), 102270. <https://doi.org/10.1016/j.irfa.2022.102270>
- Boubaker, S., Houcine, A., Ftiti, Z., & Masri, H. (2018). Does audit quality affect firms' investment efficiency? *Journal of the Operational Research Society*, 69(10), 1688–1699. <https://doi.org/10.1080/01605682.2018.1489357>
- Bousnina, R., & Gabsi, F. B. (2022). Current account balance and financial development in MENA countries: The role of institutions. *Comparative Economic Studies*, 64(1), 109–142. <https://doi.org/10.1057/s41294-021-00153-4>
- Campbell, J. Y. (1996). Understanding risk and return. *Journal of Political Economy*, 104(2), 298–345. <https://doi.org/10.1086/262026>
- Chauvet, L., & Jacolin, L. (2017). Financial inclusion, bank concentration, and firm performance. *World Development*, 97(September), 1–13. <https://doi.org/10.1016/j.worlddev.2017.03.018>
- Chen, Y., & Vann, C. E. (2017). Clawback provision adoption, corporate governance, and investment decisions. *Journal of Business Finance & Accounting*, 44(9-10), 1370–1397. <https://doi.org/10.1111/jbfa.12259>
- Dang, V. A., Kim, M., & Shin, Y. (2012). Asymmetric capital structure adjustments: New evidence from dynamic panel threshold models. *Journal of Empirical Finance*, 19(4), 465–482. <https://doi.org/10.1016/j.jempfin.2012.04.004>
- DeAngelo, H., & Masulis, R. W. (1980). Leverage and dividend irrelevancy under corporate and personal taxation. *The Journal of Finance*, 35(2), 453–464. <https://doi.org/10.2307/2327405>
- DeAngelo, L. E. (1988). Managerial competition, information costs, and corporate governance: The use of accounting performance measures in proxy contests. *Journal of Accounting and Economics*, 10(1), 3–36. [https://doi.org/10.1016/0165-4101\(88\)90021-3](https://doi.org/10.1016/0165-4101(88)90021-3)
- Du, X., & Lai, S. (2018). Financial distress, investment opportunity, and the contagion effect of low audit quality: Evidence from China. *Journal of Business Ethics*, 147(3), 565–593. <https://doi.org/10.1007/s10551-015-2986-5>
- Emara, N., & Mohieldin, M. (2020). Financial inclusion and extreme poverty in the MENA region: A gap analysis approach. *Review of Economics and Political Science*, 5(3), 207–230. <https://doi.org/10.1108/REPS-03-2020-0041>
- Fazzari, S., Hubbard, R. G., & Petersen, B. (1988). Investment, financing decisions, and tax policy. *The American Economic Review*, 78(2), 200–205.
- Firth, M., Malatesta, P. H., Xin, Q., & Xu, L. (2012). Corporate investment, government control, and financing channels: Evidence from China's listed companies. *Journal of Corporate Finance*, 18(3), 433–450. <https://doi.org/10.1016/j.jcorpfin.2012.01.004>
- Gebauer, S., Setzer, R., & Westphal, A. (2018). Corporate debt and investment: A firm-level analysis for stressed Euro area countries. *Journal of International Money and Finance*, 86, 112–130. <https://doi.org/10.1016/j.jimonfin.2018.04.009>
- Ghosh, S. (2006). Did financial liberalization ease financing constraints? Evidence from Indian firm-level data. *Emerging Markets Review*, 7(2), 176–190. <https://doi.org/10.1016/j.ememar.2005.09.008>
- Guariglia, A., & Yang, J. (2016). A balancing act: Managing financial constraints and agency costs to minimize investment inefficiency in the Chinese market. *Journal of Corporate Finance*, 36(February), 111–130. <https://doi.org/10.1016/j.jcorpfin.2015.10.006>
- Gujarati, D. N. (2004). *Basic econometrics*. 4th ed. Tata McGraw Hill.
- Hammami, A., & Hendijani Zadeh, M. (2020). Audit quality, media coverage, environmental, social, and governance disclosure and firm investment efficiency: Evidence from Canada. *International Journal of Accounting & Information Management*, 28(1), 45–72. <https://doi.org/10.1108/IJAIM-03-2019-0041>
- Hoshi, T., Kashyap, A., & Scharfstein, D. (1991). Corporate structure, liquidity, and investment: Evidence from Japanese industrial groups. *The Quarterly Journal of Economics*, 106(1), 33–60. <https://doi.org/10.2307/2937905>
- Huynh, T. L. D., Wu, J., & Duong, A. T. (2020). Information asymmetry and firm value: Is Vietnam different? *The Journal of Economic Asymmetries*, 21, e00147. <https://doi.org/10.1016/j.jeca.2019.e00147>

- Im, K. S., Pesaran, M. H., & Shin, Y. (2003). Testing for unit roots in heterogeneous panels. *Journal of Econometrics*, 115(1), 53–74. [https://doi.org/10.1016/S0304-4076\(03\)00092-7](https://doi.org/10.1016/S0304-4076(03)00092-7)
- Insights, I. S. S. (2023). Recent regulatory changes in key MENA markets expected to reshape corporate governance. Retrieved from <https://insights.issgovernance.com/posts/recent-regulatory-changes-in-key-mena-markets-expected-to-reshape-corporate-governance/>.
- Ismail, M. A., & Yunus, M. M. (2015). Cash flow-investment relationship in Malaysia: A panel threshold regression analysis. *Jurnal Pengurusan*, 45(2015), 49–59. <https://doi.org/10.17576/pengurusan-2015-45-05>
- Jensen, M. C. (1986). Agency costs of free cash flow, corporate finance, and takeovers. *The American Economic Review*, 76(2), 323–329.
- Jensen, M. C., & Meckling, W. H. (1976). Theory of the firm: Managerial behavior, agency costs and ownership structure. *Journal of Financial Economics*, 3(4), 305–360. [https://doi.org/10.1016/0304-405X\(76\)90026-X](https://doi.org/10.1016/0304-405X(76)90026-X)
- Kadapakkam, P.-R., Kumar, P. C., & Riddick, L. A. (1998). The impact of cash flows and firm size on investment: The international evidence. *Journal of Banking & Finance*, 22(3), 293–320. [https://doi.org/10.1016/S0378-4266\(97\)00059-9](https://doi.org/10.1016/S0378-4266(97)00059-9)
- Kaplan, S. N., & Zingales, L. (1997). Do investment-cash flow sensitivities provide useful measures of financing constraints?\*. *The Quarterly Journal of Economics*, 112(1), 169–215. <https://doi.org/10.1162/003355397555163>
- Khan, N., Zafar, M., Funso Okunlola, A., Zoltan, Z., & Robert, M. (2022). Effects of financial inclusion on economic growth, poverty, sustainability, and financial efficiency: Evidence from the G20 Countries. *Sustainability*, 14(19), 12688. <https://doi.org/10.3390/su141912688>
- Khémiri, W., & Noubbigh, H. (2020a). Size-threshold effect in debt-firm performance nexus in the Sub-Saharan region: A panel smooth transition regression approach. *The Quarterly Review of Economics and Finance*, 76(May), 335–344. <https://doi.org/10.1016/j.qref.2019.09.009>
- Khémiri, W., & Noubbigh, H. (2020b). Does Sub-Saharan Africa overinvest? Evidence from a panel of non-financial firms. *The Quarterly Review of Economics and Finance*, 77(August), 118–130. <https://doi.org/10.1016/j.qref.2019.11.005>
- Khémiri, W., & Noubbigh, H. (2021). Joint analysis of the non-linear debt-growth nexus and capital account liberalization: New evidence from Sub-Saharan region. *The Quarterly Review of Economics and Finance*, 80, 614–626. <https://doi.org/10.1016/j.qref.2021.04.009>
- Khémiri, W., Chafai, A., & Alsulami, F. (2023). Financial inclusion and sustainable growth in North African firms: A dynamic-panel-threshold approach. *Risks*, 11(7), 132. <https://doi.org/10.3390/risks11070132>
- Khémiri, W., Chafai, A., Attia, E. F., Tobar, R., & Farid Fouad, H. (2024). Trade-off between financial inclusion and Islamic bank stability in five GCC countries: The moderating effect of CSR. *Cogent Business & Management*, 11(1), 2300524. <https://doi.org/10.1080/23311975.2023.2300524>
- Khémiri, W., Fathi Attia, E., & Chafai, A. (2024). How financial inclusion moderates the curvilinear nexus between tangible investment and sustainable firm growth: New evidence from the Middle East and North Africa region. *Sustainability*, 16(6), 2573. <https://doi.org/10.3390/su16062573>
- Lang, L., Ofek, E., & Stulz, R. (1996). Leverage, investment, and firm growth. *Journal of Financial Economics*, 40(1), 3–29. [https://doi.org/10.1016/0304-405X\(95\)00842-3](https://doi.org/10.1016/0304-405X(95)00842-3)
- Lee, C.-C., Wang, C.-W., & Ho, S.-J. (2020). Financial inclusion, financial innovation, and firms' sales growth. *International Review of Economics & Finance*, 66, 189–205. <https://doi.org/10.1016/j.iref.2019.11.021>
- Levin, A., Lin, C.-F., & James Chu, C.-S. (2002). Unit root tests in panel data: Asymptotic and finite-sample properties. *Journal of Econometrics*, 108(1), 1–24. [https://doi.org/10.1016/S0304-4076\(01\)00098-7](https://doi.org/10.1016/S0304-4076(01)00098-7)
- Li, X., Lai, J., & Tang, J. (2016). Study of the influence of corporate governance level on investors' confidence. *Canadian Social Science*, 12(5), 8–16.
- Lind, J. T., & Mehlum, H. (2010). With or without U? The appropriate test for a u-shaped relationship\*. *Oxford Bulletin of Economics and Statistics*, 72(1), 109–118. <https://doi.org/10.1111/j.1468-0084.2009.00569.x>
- Ling, X., & Wu, W. (2022). Leverage and investment efficiency: Evidence from China's deleveraging policy. *Finance Research Letters*, 47, 102629. <https://doi.org/10.1016/j.frl.2021.102629>
- Lugli, E., & Bertacchini, F. (2022). Audit quality and digitalization: Some insights from the Italian context. *Meditari Accountancy Research*, 31(4), 841–860. <https://doi.org/10.1108/MEDAR-08-2021-1399>
- Ma, Y., & Jiang, Y. (2024). Digital financial inclusion and corporate investment efficiency: Evidence from small- and medium-sized enterprises in China. *Review of Development Economics*, 28 (3). <https://doi.org/10.1111/rode.13089>
- Modigliani, F., & Miller, M. H. (1958). The cost of capital, corporation finance and the theory of investment. *The American Economic Review*, 48(3), 261–297.
- Myers, S. C. (1977). Determinants of corporate borrowing. *Journal of Financial Economics*, 5(2), 147–175. [https://doi.org/10.1016/0304-405X\(77\)90015-0](https://doi.org/10.1016/0304-405X(77)90015-0)
- Myers, S. C., & Majluf, N. S. (1984). Corporate financing and investment decisions when firms have information that investors do not have. *Journal of Financial Economics*, 13(2), 187–221. [https://doi.org/10.1016/0304-405X\(84\)90023-0](https://doi.org/10.1016/0304-405X(84)90023-0)
- Mykhayliv, D., & Zauner, K. G. (2017). The impact of equity ownership groups on investment: Evidence from Ukraine. *Economic Modelling*, 64, 20–25. <https://doi.org/10.1016/j.econmod.2017.03.005>
- Ndoye, A., & Barajas, A. (2022). Chapter 7 financial inclusion. In *Promoting Inclusive Growth in the Middle East and North Africa*. International Monetary Fund. <https://www.elibrary.imf.org/display/book/9798400200038/CH007.xml>.



- Nizam, R., Karim, Z. A., Sarmidi, T., & Rahman, A. A. (2021). Financial inclusion and firm growth in ASEAN-5 countries: A new evidence using threshold regression. *Finance Research Letters*, 41, 101861. <https://doi.org/10.1016/j.frl.2020.101861>
- Pellicani, A. D., & Kalatzis, A. E. G. (2019). Ownership structure, overinvestment and underinvestment: Evidence from Brazil. *Research in International Business and Finance*, 48, 475–482. <https://doi.org/10.1016/j.ribaf.2018.10.007>
- Peprah, J. A., Koomson, I., Sebu, J., & Bukari, C. (2020). Improving productivity among smallholder farmers in Ghana: Does financial inclusion matter? *Agricultural Finance Review*, 81(4), 481–502. <https://doi.org/10.1108/AFR-12-2019-0132>
- Qu, W., Wongchoti, U., Wu, F., & Chen, Y. (2018). Does information asymmetry lead to higher debt financing? Evidence from China during the NTS reform period. *Journal of Asian Business and Economic Studies*, 25(1), 109–121. <https://doi.org/10.1108/JABES-04-2018-0006>
- Sarhan, A. A., Ntim, C. G., & Al-Najjar, B. (2019). Antecedents of audit quality in MENA countries: The effect of firm- and country-level governance quality. *Journal of International Accounting, Auditing and Taxation*, 35(June), 85–107. <https://doi.org/10.1016/j.intaccaudtax.2019.05.003>
- Shahid, M. S., & Abbas, M. (2019). Does corporate governance play any role in investor confidence, corporate investment decisions relationship? Evidence from Pakistan and India. *Journal of Economics and Business*, 105, 105839. <https://doi.org/10.1016/j.jeconbus.2019.03.003>
- Stiglitz, J. E., & Weiss, A. (1981). Credit rationing in markets with imperfect information. *The American Economic Review*, 71(3), 393–410.
- Tang, F. (2023). Fair value estimates of investment property, corporate governance and audit pricing: Evidence from the Hong Kong real estate industry. *Journal of Accounting in Emerging Economies*, ahead-of-print (ahead-of-print). <https://doi.org/10.1108/JAEE-06-2022-0188>
- Wang, W., Yu, Y., & Li, X. (2022). ESG performance, auditing quality, and investment efficiency: Empirical evidence from China. *Frontiers in Psychology*, 13(October), 948674. <https://doi.org/10.3389/fpsyg.2022.948674>
- Watts, R. L., & Zimmerman, J. L. (1983). Agency problems, auditing, and the theory of the firm: Some evidence. *The Journal of Law and Economics*, 26(3), 613–633. <https://doi.org/10.1086/467051>
- World Bank. (2021). *Middle East and North Africa (MENA) Regional Update 202, Preventing a Lost Decade Unlocking the Region's Potential*.
- Xu, M., Yang, Z., Lin, Y.-E., & Li, G. (2024). Maturity mismatched investment, digital financial inclusion, and digital orientation: Evidence from China. *International Review of Financial Analysis*, 91(January), 102957. <https://doi.org/10.1016/j.irfa.2023.102957>
- Xue, B., & O'Sullivan, N. (2023). The determinants of audit fees in the alternative investment market (Aim) in the UK: Evidence on the impact of risk, corporate governance and auditor size. *Journal of International Accounting, Auditing and Taxation*, 50, 100523. <https://doi.org/10.1016/j.intaccaudtax.2023.100523>
- Zahid, R. M. A., Khan, M. K., Anwar, W., & Maqsood, U. S. (2022). The role of audit quality in the ESG-corporate financial performance nexus: Empirical evidence from Western European companies. *Borsa Istanbul Review*, 22, S200–S212. <https://doi.org/10.1016/j.bir.2022.08.011>

## Appendix A.

**Table A1.** Outcomes of Bartlett test of sphericity, Kaiser-Meyer-Olkin, and Total variance explained (PCA).

Panel A: Applicability Tests

|                     |   | Bartlett test of sphericity |                    |               | KMO                   |
|---------------------|---|-----------------------------|--------------------|---------------|-----------------------|
|                     |   | Chi-square                  | Degrees of freedom | p-value       |                       |
| Access              |   | 53.550                      | 3                  | 0.000         | 0.500                 |
| Usage               |   | 48.409                      | 1                  | 0.000         | 0.500                 |
| Financial inclusion |   | 94.701                      | 1                  | 0.000         | 0.500                 |
| Panel B: PCA        |   |                             |                    |               |                       |
| Component           |   | Eigenvalue                  | Difference         | % of Variance | Cumulative variance % |
|                     | 1 | 1.599                       | 0.607              | 0.533         | 0.533                 |
|                     | 2 | 0.993                       | 0.585              | 0.331         | 0.864                 |
| Access              | 3 | 0.408                       | –                  | 0.136         | 1.000                 |
|                     | 1 | 1.569                       | 1.139              | 0.785         | 0.785                 |
| Usage               | 2 | 0.430                       | –                  | 0.215         | 1.000                 |
|                     | 1 | 1.080                       | 0.161              | 0.540         | 0.540                 |
| Financial inclusion | 2 | 0.919                       | –                  | 0.460         | 1.000                 |



**Table A2.** Cross-country financial inclusion indicators.

| Countries            | Financial inclusion index | Access dimension | Usage dimension |
|----------------------|---------------------------|------------------|-----------------|
| Egypt                | 0.080                     | 0.144            | 0.301           |
| Jordan               | 0.719                     | 0.291            | 0.789           |
| Kuwait               | 0.548                     | 0.860            | 0.325           |
| Morocco              | 0.301                     | 0.566            | 0.269           |
| Oman                 | 0.166                     | 0.215            | 0.363           |
| Qatar                | 0.793                     | 0.494            | 0.772           |
| Saudi Arabia         | 0.263                     | 0.012            | 0.613           |
| Tunisia              | 0.130                     | 0.271            | 0.291           |
| UAE                  | 0.956                     | 0.896            | 0.732           |
| Average MENA's FI    | 0.440                     | 0.417            | 0.495           |
| Average GCC's FI     | 0.545                     | 0.495            | 0.561           |
| Average Non-GCC's FI | 0.290                     | 0.318            | 0.413           |

**Table A3.** Outcomes of Bartlett test of sphericity, Kaiser-Meyer-Olkin, and Total variance explained (PCA).

| Panel A: Applicability Tests |            |                    |               |                       |
|------------------------------|------------|--------------------|---------------|-----------------------|
| Bartlett test of sphericity  |            |                    |               |                       |
|                              | Chi-square | Degrees of freedom | p-value       | KMO                   |
| ACD                          | 48.540     | 3                  | 0.000         | 0.750                 |
| EAD                          | 37.750     | 1                  | 0.000         | 0.625                 |
| AQ                           | 33.720     | 1                  | 0.000         | 0.650                 |
| Panel B: PCA                 |            |                    |               |                       |
| Component                    | Eigenvalue | Difference         | % of Variance | Cumulative variance % |
| ACD                          | 1 1.269    | 0.273              | 0.423         | 0.423                 |
|                              | 2 0.996    | 0.262              | 0.332         | 0.755                 |
|                              | 3 0.734    | –                  | 0.272         | 1.000                 |
| EAD                          | 1 1.060    | 0.120              | 0.530         | 0.530                 |
|                              | 2 0.940    | –                  | 0.470         | 1.000                 |
|                              | 1 1.152    | 0.305              | 0.576         | 0.576                 |
| AQ                           | 2 0.847    | –                  | 0.424         | 1.000                 |

**Table A4.** Unit root results.

| Panel A: Unit root |                        |                       |
|--------------------|------------------------|-----------------------|
| Variables          | LLC Level              | IPS Level             |
| CI                 | –64.78***<br>(0.000)   | –27.07***<br>(0.000)  |
| FI                 | –13.39***<br>(0.000)   | –9.28***<br>(0.000)   |
| ACC                | –7.17***<br>(0.000)    | –2.99***<br>(0.000)   |
| USA                | –9.94***<br>(0.000)    | –6.43***<br>(0.000)   |
| AQ                 | –10.66***<br>(0.000)   | –5.77***<br>(0.000)   |
| ACD                | –10.37***<br>(0.000)   | –5.42***<br>(0.003)   |
| EAD                | –99.89***<br>(0.000)   | –13.87***<br>(0.000)  |
| LEV                | –8.49***<br>(0.000)    | –2.29***<br>(0.002)   |
| TQ                 | –51.50***<br>(0.000)   | –13.41***<br>(0.003)  |
| CF                 | –29.09***<br>(0.000)   | –22.43***<br>(0.000)  |
| Size               | –54.88***<br>(0.000)   | –13.68***<br>(0.008)  |
| Tang               | –1724.68***<br>(0.000) | –146.80***<br>(0.000) |
| IF                 | –60.82***<br>(0.000)   | –38.11***<br>(0.008)  |
| GDP                | –24.70***<br>(0.000)   | –18.85***<br>(0.000)  |

Notes: \*\*\* and \*\* display the significance at the 1% level. The values in parentheses are p-values.