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How Financial Inclusion Moderates the Curvilinear Nexus between Tangible Investment and Sustainable Firm Growth: New Evidence from the Middle East and North Africa Region

Wafa Khémiri [1], Eman Fathi Attia [2,3,*] and Ahmed Chafai [4]

[1] Department of Finance, École Supérieure de Commerce de Tunis, Campus Universitaire Manouba, University of Manouba, LARIMRAF LR21ES29, Manouba 2010, Tunisia; wafakhe@yahoo.fr
[2] Accounting Department, College of Business and Administration, University of Business and Technology, Jeddah 21448, Saudi Arabia
[3] Accounting and Finance Department, College of Business and Technology, Arab Academy for Science & Technology and Maritime, Cairo P.O. Box 1029, Egypt
[4] Department of Economics, École Supérieure de Commerce de Tunis, Campus Universitaire Manouba, University of Manouba, ThÉMA LR16ES10, Manouba 2010, Tunisia; ahmed.chafai@esct.rnu.tn
* Correspondence: e.attia@ubt.edu.sa or eman.attia@aast.edu

Abstract: The aim of this study was to examine the curvilinear relationship between tangible investment and sustainable firm growth in the MENA region, as well as the moderating role of financial inclusion on this connection. To achieve this, we selected a sample of 465 firms over the period 2007–2020. Employing a system GMM model for the empirical analysis, the findings reveal that there is a curvilinear (inverted U-shaped) nexus between tangible investment and sustainable firm growth. Moreover, this study employs a moderating effect model to demonstrate that financial inclusion can enhance sustainable firm growth. The system GMM model further indicates that financial inclusion moderates the curvilinear relationship between tangible investment and sustainable firm growth. This study offers valuable insights for strategic firm planning and policy development, highlighting the role of financial inclusion in promoting firm sustainability.

Keywords: financial inclusion; investment; sustainable firm growth; SGMM; MENA region

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1. Introduction

In the modern era, investment is a key factor in economic growth. This factor must be supported by the adoption of a financial inclusion policy, as this policy plays an important role in helping these two aspects. By providing access to banking services for firms and individuals, financial inclusion encourages corporate investment, which in turn stimulates growth and promotes economic development. In this way, financial inclusion creates an environment conducive to the growth of firms by providing them with the financial resources they require to grow [1,2].

Theoretically, the connection between investment and firm growth and its relationship to financial inclusion can be approached using sustainable growth theory [3] and financial theories that explore the connection between investment, debt, and firm growth, and, in particular, agency, pecking order, and trade-off theories. These theoretical frameworks converge in stressing that asymmetric information and poor debt policies lead to inefficiencies in investment projects, manifested in underinvestment and overinvestment. They recommend the adoption of strict policies to avoid risky projects and financial distress. This exposes some firms to financing constraints and hampers their growth. To address the limitations of traditional bank lending, financial inclusion is seen as an urgent need for some firms to access formal sources of finance at an affordable cost [4,5].

Empirically, there is not much research on this topic yet, but it can be analyzed on two levels: country based and firm based. For the first level, studies have investigated how

investment and economic growth affect each other, and have shown that investment is very important for increasing economic growth [6–8]. For the second level, previous studies have looked at how tangible investments contribute to company growth [9–15].

However, the linear link between investment and firm growth has been the focus of prior studies. Therefore, the goal of this study is to fill a gap in the literature by investigating the curvilinear nexus between tangible investments and sustainable firm growth in the MENA region. To be more precise, this study postulates that the connection between tangible investment and sustainable firm growth may follow an inverted U-shape. This relationship reveals two scenarios: underinvestment and overinvestment. In the first scenario, sustainable firm growth improves as tangible investment increases, but only up to an inflection point. In the second scenario, beyond this point, sustainable firm growth begins to worsen due to the excess tangible investment. This study suggests that tangible investment may not necessarily improve sustainable firm growth, and that it is crucial for firms to be involved in the process of optimizing their sustainability. Consequently, firms need to reach a certain investment threshold to optimize their sustainability in MENA countries.

In this case, it is important to assess the impact of tangible investment on sustainable firm growth while considering the effects of other factors that may influence this relationship. Particularly, financial inclusion has the potential to perform as a moderating factor on the link between tangible investment and sustainable firm growth by enabling firms, especially small firms, to obtain access to finance services that are tailored to their needs and on affordable terms [16]. Financial inclusion can thus reinforce the positive effect of tangible investment on sustainable firm growth, by facilitating the financing of productive projects, stimulating entrepreneurship and innovation, and promoting social inclusion. In addition, financial inclusion can mitigate the negative impact of tangible investment on sustainable firm growth, by limiting the risk of under–overinvestment.

Some studies have analyzed the correlation between financial inclusion and sustainable firm growth, both at the country level [17,18] and firm level [19–21]. Although some research has pointed to the importance of tangible investment and financial inclusion for enterprise growth, there is another gap in the existing research concerning the potential trade-off between tangible investment and financial inclusion. In fact, these two approaches can pursue similar objectives: minimizing conflicts of interest and financial constraints and enhancing firm growth. Therefore, it is necessary to assess how financial inclusion moderates the correlation between tangible investment and sustainable firm growth.

Within this framework, this research has the primary objectives outlined below. First, to assess the nonlinear link between tangible investment and sustainable firm growth in the MENA region. Second, to investigate the moderating impact of financial inclusion on the tangible investment–sustainable firm growth nexus.

In order to achieve these objectives, this study endeavors to bridge this gap by investigating the subsequent research inquiries: (i) To what extent does the tangible investment improve the sustainable growth of the listed firms in the MENA region? (ii) Is the relationship between tangible investment and sustainable growth likely to be strengthened or weakened by financial inclusion?

Consequently, the present paper attempts to provide three main contributions to the extant literature. First, this paper is the first attempt to test the nonlinear link between tangible investment and sustainable firm growth in MENA countries. Second, this study contributes to the scholarly discourse by offering further suggestions on the moderating effect of financial inclusion on the tangible investment–sustainable firm growth nexus. Third, although various studies have been conducted on the influence of tangible investment on sustainable firm growth in various countries and regions, this paper represents the initial endeavor to examine the association between tangible investment and sustainable firm growth in MENA countries.

Sociopolitical changes in the MENA region over the past decade, such as the Arab Spring, have significantly transformed the business environment and investment cli-

mate [22]. In addition, recent financial inclusion strategies in this region, supported by the World Bank, have aimed to improve financial inclusion and promote policy reforms. Despite these efforts, the level of financial inclusion remains low (53%) compared to the global average (76%) and that of Sub-Saharan Africa (55%) in 2021 [23]. Challenges, such as the need for sound institutional frameworks, and external macroeconomic vulnerabilities, such as current account imbalances, further complicate investment decisions. These changes and challenges could then affect sustainable firm growth.

This research investigates the nonlinear link between tangible investment and sustainable firm growth using a two-step System Generalized Method of Moments (SGMM). It considers the possibility of the shareholder–manager reacting positively to optimal investment levels. For the first time, this research highlights the impact of financial inclusion on the curvilinear impact of tangible investment on sustainable firm growth through the manager–shareholder approach. This research suggests that the risks of under- and overinvestment for sustainable firm growth are reduced by the integration of financial inclusion.

The subsequent sections are organized in the following manner: Section 2 discusses the theoretical framework and research hypotheses, whereas Section 3 centers on the methodology and data employed in this study. The obtained results are scrutinized and deliberated upon in Section 4, with the conclusions being delineated in Section 5.

2. Literature Review and Hypotheses

2.1. Tangible Investment and Sustainable Firm Growth Nexus

Sustainable growth theory argues for the maximum growth of a firm's sales without depleting their cash, with an emphasis on operational efficiency and a sound financial strategy [3]. It encourages asset growth through the reinvestment of equity and profits, aiming for financial stability without excessive external financing [24]. In the same vein, [25] suggested that growth should maintain operating, debt, and dividend ratios, considering debt and dividend policies. This complements Higgins' theory and is related to the agency, trade-off, and pecking order theories that emerged after the rejection of perfect information [26]. These theories deal with the inefficiency of investments due to asymmetric information, with the pecking order theory recommending a specific financing sequence, and the agency and trade-off theories recommending an optimal financing equilibrium [27–31].

As mentioned above, the empirical studies can be divided into two different levels of analysis: country and firm levels. At the country level, several studies have examined the link between investment and economic growth and have shown that investment is fundamental to stimulate economic growth [6–8,32,33]. These studies have highlighted the significance of investment as a driving force for large-scale economic activity.

At the firm level, the contribution of tangible investment to firm growth has been studied unevenly. The linear link between investment and sales growth has been the topic of a few studies [9–11,13–15,34–37].

In addition, further research that included firm investment in corporate performance models has produced results with moderate significance [38–42]. The findings from these studies specify that tangible investment choices significantly affect corporate performance.

This paper aims to explore the relationship between tangible investment and sustainable firm growth, building on the existing research that has linked tangible investment and firm performance. This study focuses primarily on two major theories, namely agency and arbitrage theories, which are widely used to analyze corporate financial decisions [28,30]. These theoretical frameworks aim to determine the optimal levels of financial decisions and to understand their impact on long-term firm growth and performance. By exploring the perspectives offered by agency and trade-off theories, two types of relationships between tangible investment and corporate performance can be identified. First, under trade-off theory, a positive relationship between tangible investment and sustainable firm growth is based on the idea that tangible assets can be used as collateral, providing protection

for creditors in the case of a firm's bankruptcy. This protection of the creditors' interests facilitates access to external financing for firms with valuable tangible assets, enabling them to access higher levels of debt than firms with fewer tangible assets. Thus, firms that invest in tangible assets that can be used as collateral are more inclined to take on debt to finance their projects [43]. This positive relationship between asset tangibility and corporate debt levels is in line with the principles of trade-off theory, which aims to balance the benefits and costs of debt and equity to create an optimal financial structure for sustainable growth [30].

Second, however, under agency theory, a negative relationship between tangible investment and firm growth stems from the risk inherent in firms with significant access to liquid tangible assets. Managers in such firms may take advantage of the debt by selling unsecured tangible assets at undervalued prices to obtain short-term financing, which may compromise the long-term growth prospects. On the other hand, larger firms, which generally enjoy more stable cash flows, may opt for increased indebtedness to maximize their tax benefits, but this strategy may result in diminished growth opportunities due to the inherent financial risks [28,29,44]. This underlines the importance of determining an optimal level of investment in tangible assets to ensure sustainable company performance.

Although some previous studies have addressed the impact of tangible investment on firm growth, they have not examined its impact on firm sustainability [14,15]. In addition, they have neglected the nonlinear relationship between tangible investment and firm growth (i.e., an optimal threshold). The first hypothesis of this study is stated below:

Hypothesis 1 (H1). *There is a curvilinear (an inverted U-shaped curve) nexus between tangible investment and sustainable firm growth.*

H1 (a). *Trade-off theory suggests that tangible investment positively impacts sustainable firm growth.*

H1 (b). *Agency theory suggests that tangible investment negatively impacts sustainable firm growth.*

2.2. The Moderating Role of Financial Inclusion

Financial inclusion plays an essential role in alleviating the financial constraints faced by firms, especially SMEs [5,16,45,46]. By improving their access to financial products, such as loans and insurance, it facilitates their ability to invest in productive projects and to grow [36]. In addition, financial inclusion promotes the formalization of the economy, increasing investor confidence and creating a healthier and more dynamic business environment [47]. It stimulates firm growth, encourages investment, and contributes to sustainable economic development [20,48,49].

Empirical research has established financial inclusion's significant influence on firms' long-term growth at both the country and firm levels. It is essential for economic development and business prosperity. Studies have shown that financial inclusion impacts economic growth differently across developed and developing countries [5,17,18,36,47,50–59]. Additionally, the link between financial inclusion and sustainable economic growth has emphasized its role in sustainable development [19–21,60–62].

Topical research has also investigated the nonlinear link between financial inclusion and economic growth, employing various econometric techniques [48,63,64].

Other recent studies have investigated the moderating influence of financial inclusion (other factors) on various variables and the economic growth nexus [53,64]. A few recent studies have explored the moderating effect of other determinants of financial inclusion [65].

There are still very few firm-level studies that have assessed the effect of financial inclusion on sustainable firm growth, in both developed and developing countries. More specifically, a few recent studies have examined the linear link between financial inclusion and sustainable firm growth (or sales growth and firm performance) [66–69]. In addition, other recent studies have examined the nonlinear (threshold effect) link between financial inclusion and firm growth [1,49].

Other studies have explored the moderating effect of financial inclusion (or other factors) on the link between one factor (financial inclusion) and firm growth [14,66–68,70,71].

According to the literature, it is worth noting that the study of the moderating effect of financial inclusion on the relationship between investment and sustainable firm growth has not yet been addressed. In this case, our study will fill this gap. Considering the previous discussions, the second hypothesis is stated as follows:

Hypothesis 2 (H2). *Financial inclusion moderates the tangible investment–sustainable firm growth nexus.*

3. Research Methodology

3.1. The Sample and Data Collection

This study selected a sample of 465 firms listed on ten stock exchanges in ten MENA countries over the period 2007–2020. These countries include Egypt, Jordan, Kuwait, Morocco, Oman, Qatar, Saudi Arabia, Tunisia, and the United Arab Emirates (UAE) (see Table 1). The data were collected from a variety of sources. The firm-level information was extracted from the Refinitiv Eikon database. The macroeconomic indicators came from the World Bank's World Development Indicators (WDI), while the data on financial inclusion (FII) and the composite index were compiled from the International Monetary Fund's (IMF) Financial Access Survey (FAS).

Table 1. Distribution of firms.

Countries	Number of Firms	Number of Observations	%
Egypt	91	1274	20%
Jordan	83	1162	18%
Kuwait	67	938	14%
Morocco	39	546	8%
Oman	38	532	8%
Qatar	19	266	4%
Saudi Arabia	72	1008	15%
Tunisia	25	350	5%
UAE	31	434	7%
Total	465	6510	100%

The data used in this study are annual financial and economic data. Unlike some recent studies, the financial data were sourced from the Refinitiv Eikon database. The choice of this database allowed us to choose a long period of 14 years, allowing us to consider certain events that occurred during this period. In addition, the period of this study marks radical changes in the region's economy and industry. Its choice is, therefore, important for the following reasons. First, the onset of the subprime crisis in 2007 had some perverse influences on the MENA economies. Second, the MENA region experienced political and economic turmoil, especially after 2011. After this period, some of the countries in our sample experienced political turmoil, which hindered their growth (Egypt and Tunisia). In addition, the economic turmoil triggered by the outbreak of the COVID-19 health crisis slowed down not only the economies of the MENA region, but also the economy as a whole.

However, despite the perversity of these various crises, the stock markets of some of the countries in the region (particularly the GCC) experienced spectacular growth during the period of our study. In addition, we excluded the firms listed on the Bahrain stock market from our sample because one of the main objectives of our study was to investigate the moderating impact of financial inclusion on the connection between tangible investment and sustainable firm growth, and the data on financial inclusion in Bahrain are not available. Therefore, we excluded this country from our sample to avoid biasing the results. The exclusion was then extended to include insurance companies, financial institutions, and

banks. This was because they have distinctive accounting practices, governance practices, and financial structures compared to non-financial firms [72,73]. Finally, to ensure the reliability of the data and to minimize measurement errors, we excluded from the sample firms with missing data (especially in the case of dividend payments). This resulted in a final sample of 6510 firm-year observations from 465 non-financial firms listed on ten stock exchanges in ten countries over the period 2007–2020. To mitigate the impact of outliers on our analysis, we applied winsorization to all the firm-level variables, setting the threshold at the 1st and 99th percentiles.

3.2. Empirical Model

To test hypothesis 1, this study follows [14] to investigate the curvilinear nexus between tangible investment and sustainable firm growth. The estimated model can be expressed as follows:

$$SGR_{cit} = \beta_0 + \beta_1 Invest_{cit} + \beta_2 Invest^2_{cit} + \beta_n \sum_{n=3}^{10} X_{cit} + \beta_j \sum_{j=11}^{12} M_{cit} + \varepsilon_{cit} \quad (1)$$

where SGR_{cit} is the sustainable growth rate for country c, for firm i at time t; $Invest_{cit}$ is the tangible investment for country c, for firm i at time t; X_{cit} is the vector of control variables; M_{cit} is the vector of macroeconomic variables; and ε_{cit} is the error term.

Several studies have explored areas of firm growth using SGMM [14,15,68,74,75]. There are many advantages to using SGMM. It is especially useful when dealing with omitted variable bias and measurement error. Furthermore, it allows for mitigating the problems associated with dynamic panel heterogeneity and potential endogeneity. Endogeneity may arise from reverse causality, where investment may affect a firm's growth, but a firm's growth may affect investment [76]. Indeed, managers may be encouraged to invest in promising projects by an increase in the firm's growth level. The presence of this reverse causality (i.e., simultaneity bias) can make the results of OLS regressions unreliable [14,15].

SGMM is also useful for small T and large N panels, linear functional relations, dynamic dependent variables, independent variables which are not strictly exogenous, individual fixed effects, and heteroskedasticity and autocorrelation within but not across individuals [77]. Specifically, it is effective when, as in the case of our study, a panel has a smaller time dimension (T equals 14) than its cross-sectional dimension (N equals 465).

However, testing for autocorrelation in the second-order AR (2) model failed to produce significant results, indicating that autocorrelation does not exist. The indication is that the lag structure of the model is suitable. Only one lag is needed for the SFG variable. Appropriate instruments, such as for the lagged values of $t-1$ and $t-2$ for the difference equation and a single lag for the level equation, were used to ensure the accuracy of the dynamic SGMM estimation technique. The Hansen J statistic of over-identifying restrictions was applied to assess the robustness of these instruments. This suggested that the instruments employed were well suited to the models.

To test Hypothesis 2, this paper scrutinizes the moderating effect of financial inclusion on the relationship between investment and sustainable firm growth. The SGMM developed by [74] was used for this purpose. The estimated model can be expressed as follows:

$$\begin{aligned} SGR_{cit} = {} & \beta_0 + \beta_1 Invest_{cit} + \beta_2 Invest^2_{cit} + \beta_3 FII_{ct} \\ & + \beta_4 Invest_{cit} \times FII_{ct} + \beta_5 Invest^2_{cit} \times FII_{ct} \\ & + \beta_n \sum_{n=6}^{13} X_{cit} + \beta_j \sum_{j=14}^{15} M_{cit} + \varepsilon_{cit} \end{aligned} \quad (2)$$

where FII_{ct} is the financial inclusion indicator of country c at time t.

3.3. Definition of Variables

3.3.1. Dependent Variable

The sustainable firm growth (SFG) rate is an indicator of a company's ability to finance its growth from its own resources without recourse to additional external financing. It is often applied to predict asset purchases, forecast cash flows, develop borrowing strategies, assess the long-run competitiveness and profitability, and assess the long-run growth. Following [49], we used the model from [3] to compute the SFG rate, which has the following description:

$$SFG = \begin{array}{l}\text{Net profit ratio} \times \text{Asset turnover ratio} \\ \times \text{Retention rate} \times \text{Equity multiplier}\end{array} \quad (3)$$

where the Net profit rate is the ratio of the net income divided by the net turnover, the turnover rate is the ratio of the net turnover divided by the balance sheet total, the retention rate is the ratio of the retained earnings divided by the net profit for the year, and the equity multiplier is the ratio of the total assets divided by the total equity.

3.3.2. Main Independent Variable

When measuring corporate investment, the empirical studies are divergent. Some studies have adopted the ratio of the fixed assets at time t (ratio of net property, plant, and equipment (PPE) at time t minus the net PPE at time $t-1$, plus depreciation at time t) divided by the net PPE at time $t-1$ [78]. Other studies have employed the ratio of the tangible fixed assets at time t minus the tangible fixed assets at time $t-1$, plus depreciation at time t divided by the net fixed assets at time t [79]. Furthermore, further studies have opted to use the ratio of the tangible assets to capital stock [80]. In this study, we employed the ratio of the capital expenditures less depreciation, divided by the fixed assets [81].

3.3.3. Moderator Variable

The financial literature does not agree about the measurement of financial inclusion. Different methodologies have been proposed. Empirical studies have used different indicators that represent different aspects of financial inclusion, such as the use of banking systems, penetration, and availability [67,82]. In this context, several studies [49,83,84] have suggested that combining these different aspects of financial inclusion could be an effective approach to assess the global development of financial inclusion.

Following [49], we employed two dimensions (access and usage) for the measurement of financial inclusion. For the first dimension, the number of deposit accounts with commercial banks per 1000 inhabitants, the number of cash dispensers per 100,000 inhabitants, and the number of cash dispensers per 1000 km^2 were used as the indicators (demographic penetration and geographical penetration, respectively). For the second dimension, two indicators were also employed, i.e., outstanding deposits with commercial banks (% of GDP) and outstanding commercial bank loans (% of GDP).

To build the composite index, we followed several studies that used principal component analysis (PCA) [49]. This method aims to linearly combine the different financial inclusion dimensions. The indicators used for each dimension must be normalized (i.e., between zero and one) before the PCA is carried out. Following [83], we used the *min–max* and *softmax* normalization techniques. The *min–max* normalization uses minimum and maximum observations, as follows: $mmx = \left[X_i - X_{(\min)}\right] / \left[X_{(\max)} - X_{(\min)}\right]$, where $X_{(\min)}$ and $X_{(\max)}$ are the minimum and maximum data points, respectively. The normalized score ranges between 0 and 1. The *softmax* normalization uses an exponential function, mean, and standard deviation as follows: $softmax = 1/1 + \exp^{(-V)}$, where $V = [X_i - (x)mean]/sigma$ and sigma is the standard deviation. The purpose of splitting the variables using these two techniques was to transform the data into a common scale without distorting the differences between the value ranges. This was particularly important for our study of financial inclusion, where the variables can operate on very different

scales and units of measurement. Both techniques were carefully selected to ensure that the normalization process aligned with the objectives of our study and provided a clear and interpretable data set for analysis. Furthermore, this division aimed to bolster the robustness of our study.

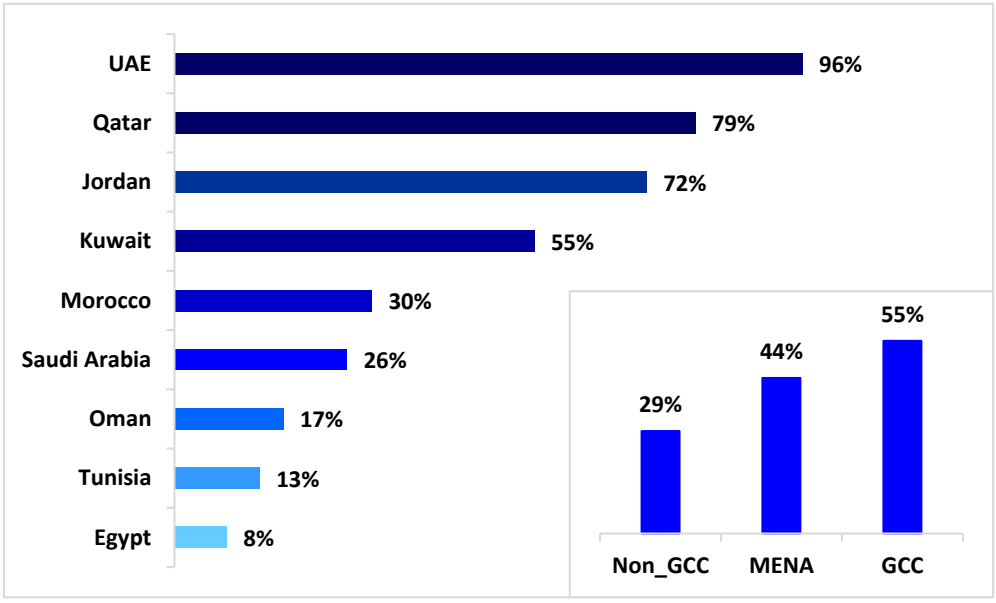
This study used PCA to capture the common variation between the two indicators of each dimension, since the access dimension consists of two indicators and the use dimension also consists of two indicators. Then, we used PCA to extract the common principal component of each dimension. These dimensions capture different aspects of an inclusive financial industry. Two specific tests, namely Bartlett's test of sphericity and the Kaiser–Meyer–Olkin (KMO) test, were carried out to test the suitability of the data for factor analysis.

At this point, we followed [49] in the construction of a multidimensional index of financial inclusion, as follows:

$$FII = \sum_{i=1}^{n} \gamma_{ij} X_i \tag{4}$$

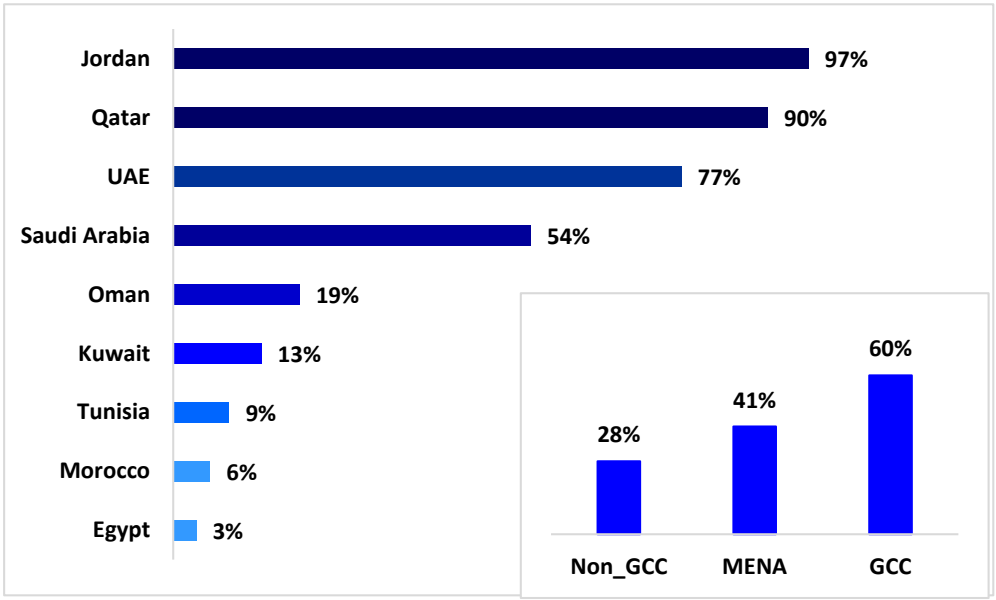
where γ_{ij} are the component weights and X_{ij} are the original variables. For both dimensions, we obtained the same weights (i.e., 0.7071). Similarly, for ease of analysis, on a scale of 0 to 1, we then normalized this index for each country (using *min–max* and *softmax* normalization techniques). A value of 0 corresponds to financial exclusion and a value of 1 corresponds to financial inclusion. Table A1 presents the level of financial inclusion according to the two normalization techniques: the *min–max* and the *softmax*.

The financial inclusion indicators for the MENA countries are presented in Figure 1. The GCC countries (Kuwait, Oman, Qatar, Saudi Arabia, and the UAE) appear to have higher levels of financial inclusion. However, the levels are still too low in the non-GCC countries. This is particularly the case in Egypt, followed by Tunisia and Morocco [49]. Based on this first reading, the implementation of financial inclusion policies in the non-GCC countries is still at an embryonic stage.



(a) *min-max normalization technique*

Figure 1. *Cont.*



(b) *softmax normalization technique*

Figure 1. Financial inclusion indicators across MENA countries.

3.3.4. Control Variables

There are many factors that contribute to sustainable firm growth. In this case, we used various control variables that have been previously identified in the literature. These control variables include financial leverage, size, tangibility, risk, non-debt tax shields, liquidity, dividends, net equity issued, inflation, and GDP growth. To control for financial leverage (LEV), we used the ratio of the total debt and total assets. In addition, we employed the firm size (Size) measured by the natural logarithm of the total assets. To determine the capacity of a firm to receive external financing (TANG), we used the ratio of its fixed assets to total assets. To control for the risk (Risk), we followed [49] and used Altman's Z-score (which is computed using the following equation):

$$A\_Z = 1.2 \times (WC/TA) + 1.4 \times (NI/TA) + 3.3 \times (EBIT/TA) + 0.6 \times (BVE/TBVL) + 0.999 \times (SAL/TA) \quad (5)$$

where *WC* is the working capital, *TA* is the total assets, *NI* is the net income, *EBIT* is the earnings before interest and taxes, *BVE* is the book value of the equity, *TBVL* is the total book value of the liabilities, and *SAL* is the sales.

To control for the non-debt tax shields, we used the ratio of depreciation to the total assets (NDTS). The liquidity was measured by the ratio of the current assets to current liabilities (LIQ). In addition, we utilized the ratio of the dividend to total assets to measure the dividend. To control for the net equity issued (NEI), we used the ratio of the net equity issued to the firm's market value. Finally, we introduced into our model inflation and GDP growth as control variables to control for macroeconomic stability and economic conditions, respectively [49].

4. Findings and Discussion

4.1. Summary Statistics and Correlation Matrix

The descriptive statistics presented in Table 2 provide an important overview of the variables used. Regarding the dependent variable (SFG), it stands out for its considerable variation, highlighted by a mean of 0.505 and a considerable standard deviation of 17.271, representing a noticeable fluctuation in the growth rate. As a point of reference, this rate exceeds the average of 0.0677 for Pakistani firms [85] (Akhtar et al., 2022), the average of 0.042 for Chinese firms [68], and the average of 0.301 for firms in North Africa [49]. This

initial analysis suggests that the level of sustainable growth is more important for firms operating in the MENA region than in other regions.

Table 2. Descriptive statistics.

Variable	Obs.	Mean	Std. Dev.	Min	Max
Dependent variable					
SFG	6510	0.505	17.271	−609.558	881.932
Independent variable					
Invest	6510	0.103	0.868	−2.915	6.685
Moderator variables					
FII_{mmx}	6510	0.432	0.337	0	1
$Access_{mmx}$	6510	0.406	0.377	0	1
$Usage_{mmx}$	6510	0.417	0.342	0	1
FII_{sfx}	6510	0.494	0.207	0.191	0.884
$Access_{sfx}$	6510	0.495	0.215	0.258	0.854
$Usage_{sfx}$	6510	0.494	0.210	0.175	0.879
Control variables					
Size	6510	12.455	2.441	7.713	18.383
TANG	6510	0.321	0.259	0.042	0.898
Risk	6510	1.284	1.825	−2.713	12.609
NDTS	6510	0.032	0.032	0.021	0.174
LIQ	6510	0.382	0.273	0.005	0.929
DIV	6510	0.024	0.045	0.003	0.278
NEI	6510	0.002	0.096	−0.475	0.389
INF	6510	0.047	0.105	−0.26	0.338
GDPG	6510	−0.003	0.038	−0.152	0.067

Note: This table provides the descriptive statistics, i.e., number of observations, mean, standard deviation, and minimum and maximum values for all the variables used in this research.

Furthermore, the independent variable (Invest) has a moderate mean of 0.103, suggesting a relatively modest average level of tangible investment, but marked by significant dispersion, as shown by its standard deviation of 0.868. This rate is below the average rate observed for sub-Saharan firms, estimated at 0.501 [14].

The moderators (different components of financial inclusion) also show a diversity among their means and standard deviations. This finding stems from the need for MENA-based firms to adopt formal financial services, including access to banking credit institutions, to ensure their sustainability. The control variables, such as LEV for the level of indebtedness and Size for the size of the firm, shed light on the characteristics of the firms analyzed. In addition, the macroeconomic variables INF and GDPG seem to maintain a certain stability, characterized by moderate means and limited standard deviations.

Figure 2 illustrates the evolution of tangible investment in the MENA region. We can see that the values indicate a general decline in tangible investment between 2007 and 2020. More specifically, this decline was significant between 2011 and 2012, especially for the non-GCC region. This was mainly due to political instability. However, in 2014, an increase in investment levels was observed, especially for the GCC countries, due to increased investment in infrastructure and economic diversification projects. However, a further decline was noted in 2020, mainly due to the impact of the COVID-19 pandemic on the global economy and investment.

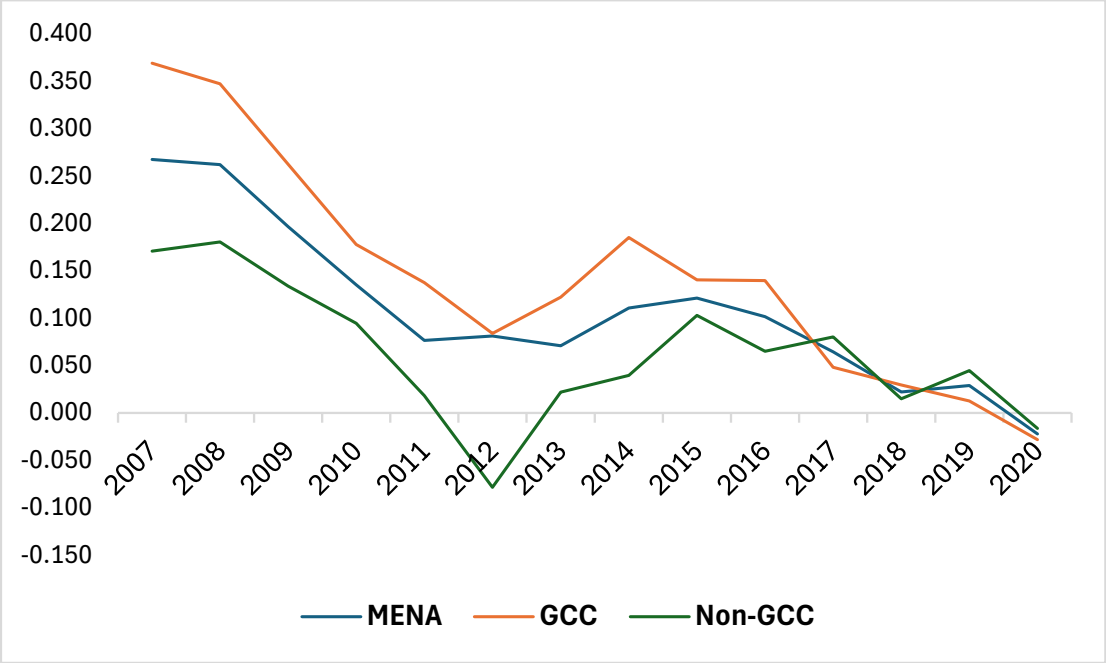


Figure 2. Tangible investment across MENA countries.

Table 3 provides a summary of the results of the Pearson correlation matrix. The correlation test suggests that none of the estimated coefficients surpassed 0.80, indicating the absence of multicollinearity problems among the variables.

To test the stationarity of all the variables used in our balanced panel, we employed several unit root tests, namely those in [86,87] and the Fisher-type (augmented Dickey–Fuller) [88] test. The null hypotheses of these tests implied that all the panels contained a unit root. The outcomes are shown in Table 4, and indicate that all the variables were stationary at the level, i.e., I (0).

4.2. Main Findings

As explained earlier, this section explores the nonlinear link between tangible investment and sustainable growth for the MENA-based firms. The results of the J-Hansen test allow us to conclude that the null hypothesis for the instrumental variables is verified (Table 5). Similarly, the null hypothesis for the first- and second-order correlation is confirmed by the results of the AR (2) test. Consequently, it is likely that these results are a confirmation of the relevance of the use of the SGMM.

The empirical results in columns (1) and (2) of Table 5 show that the coefficients of the variable SFG_{t-1} indicate statistical significance at the 1% level, but with conflicting signs. Regarding column (1), the coefficient of the variable SFG_{t-1} displays a positive and statistically significant impact on SFG_t. As for column (2), this coefficient has a positive and statistically significant sign at the 1% level. In fact, the negative effect of SFG_{t-1} on SFG_t is explained by the fact that the current growth is strictly higher than the lagged growth, indicating the emergence of accelerated growth. A positive correlation between lagged growth and current growth was found by [15,68].

Table 3. Correlation matrix results.

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)
(1) *SFG*	1																
(2) *Invest*	−0.006	1															
(3) FII_{mmx}	−0.025 *	0.026 *	1														
(4) FII_{sfx}	−0.020	0.027 *	0.983 *	1													
(5) $Access_{mmx}$	−0.025 *	0.042 *	0.737 *	0.721 *	1												
(6) $Access_{sfx}$	−0.023	0.031 *	−0.131 *	−0.129 *	−0.077 *	1											
(7) $Usage_{mmx}$	0.005	−0.017	0.615 *	0.650 *	−0.024 *	−0.104 *	1										
(8) $Usage_{sfx}$	−0.016	−0.030 *	0.102 *	0.109 *	0.070 *	−0.076 *	0.059 *	1									
(9) *Size*	0.012	−0.023	0.015	0.011	0.116 *	0.002	−0.107 *	0.074 *	1								
(10) *TANG*	−0.002	−0.069 *	−0.062 *	−0.073 *	0.055 *	−0.085 *	−0.162 *	−0.014	0.096 *	1							
(11) *Risk*	0.008	−0.011	−0.199 *	−0.196 *	−0.171 *	0.051 *	−0.108 *	0.027 *	−0.076 *	−0.220 *	1						
(12) *NDTS*	0.056 *	−0.134 *	−0.140 *	−0.155 *	−0.120 *	−0.039 *	−0.064 *	0.024	0.011	0.174 *	0.177 *	1					
(13) *LIQ*	0.033 *	−0.078 *	−0.301 *	−0.308 *	−0.263 *	−0.002	−0.162 *	0.059 *	−0.009	−0.192 *	0.127 *	0.015	1				
(14) *DIV*	−0.012	0.002	−0.068 *	−0.072 *	−0.059 *	−0.001	−0.038 *	0.009	−0.012	−0.053 *	0.140 *	0.098 *	0.112 *	1			
(15) *NEI*	−0.012	0.093 *	−0.047 *	−0.036 *	−0.027 *	0.017	−0.029 *	−0.018	−0.004	−0.003	−0.078 *	−0.067 *	0.012	0.025 *	1		
(16) *INF*	−0.034 *	0.016	−0.230 *	−0.226 *	−0.121 *	0.048 *	−0.208 *	0.011	−0.008	−0.037 *	0.102 *	−0.050 *	0.082 *	−0.007	0.044 *	1	
(17) *GDP*	−0.039 *	−0.022	−0.244 *	−0.271 *	−0.118 *	0.055 *	−0.247 *	0.009	0.011	−0.008	0.115 *	0.009	0.152 *	0.027 *	0.050 *	0.333 *	1

* Denotes statistical significance at the 1% level.

Table 4. Unit root results.

Variables	ADF	LLC	IPS
	Level	**Level**	**Level**
SFG	1718.750 ***	−14.584 ***	−32.246 ***
	(0.000)	(0.000)	(0.000)
Invest	2187.430 ***	−64.783 ***	−27.075 ***
	(0.000)	(0.000)	(0.000)
FII_{mmx}	1258.280 ***	−13.383 ***	−9.281 ***
	(0.000)	(0.000)	(0.000)
$Access_{mmx}$	1299.590 ***	−9.436 ***	−2.938 ***
	(0.000)	(0.000)	(0.002)
$Usage_{mmx}$	1047.820 ***	−9.944 ***	−6.429 ***
	(0.000)	(0.000)	(0.000)
FII_{sfx}	1092.590 ***	−13.543 ***	−5.468 ***
	(0.000)	(0.000)	(0.000)
$Access_{sfx}$	1850.670 ***	−19.603 ***	−16.131 ***
	(0.000)	(0.000)	(0.000)
$Usage_{sfx}$	1732.830 ***	−21.978 ***	−13.811 ***
	(0.000)	(0.000)	(0.000)
Size	1248.680 ***	−54.884 ***	−13.684 ***
	(0.000)	(0.000)	(0.000)
TANG	1210.010 ***	−1724.680 ***	−146.804 ***
	(0.000)	(0.000)	(0.000)
Risk	1238.250 ***	−15.049 ***	−5.734 ***
	(0.000)	(0.000)	(0.000)
NDTS	1264.680 ***	−11.591 ***	−6.532 ***
	(0.000)	(0.000)	(0.000)
LIQ	1363.990 ***	−116.066 ***	−14.440 ***
	(0.000)	(0.000)	(0.000)
DIV	1073.870 ***	−3756.790 ***	−221.089 ***
	(0.000)	(0.000)	(0.000)
NEI	2542.710 ***	−337.942 ***	−45.200 ***
	(0.000)	(0.000)	(0.000)
INF	3373.830 ***	−62.327 ***	−40.724 ***
	(0.000)	(0.000)	(0.000)
GDPG	1996.430 ***	−24.211 ***	−18.683 ***
	(0.000)	(0.000)	(0.000)

Notes: *** present the significance at the 1% levels. The values in parentheses are the *p*-values. LLC is the Levin, Lin, and Chu test; IPS is the Im, Pesaran, and Shin W-stat test; and ADF is the augmented Dickey–Fuller test.

Moving on to the variables of interest, the results shown in column 1 (Table 5) reveal that Invest exerts a notably positive influence on SFG. More precisely, a 10.0% rise in Invest causes a 15.71% rise in SFG. This finding can be justified by the way that Invest can contribute to the enhancement of SFG. This result is consistent with that of [14]. Indeed, corporate investment could improve the productivity and efficiency of MENA firms, leading to lower costs, higher margins, and greater profitability. This, in turn, would enable firms to reinvest more in their activities to ensure their sustainability.

Nevertheless, this finding can be enhanced through the exploration of the curvilinear nexus (U-shaped curve) between Invest and SFG. To do so, we follow [49,84,89] and use the test for the presence of an inverted U-shaped relationship [90]. The results, shown in Table 6, imply that the correlation between Invest and SFG is an inverted U-shape.

Table 5. Main results.

	(1)	(2)
Variables	***SFG***	***SFG***
L.SFG	0.319 ***	−0.105 ***
	(0.003)	(0.005)
Invest	1.571 ***	0.752 ***
	(0.068)	(0.055)
$Invest^2$		−0.106 ***
		(0.008)
Size	−1.017 ***	−0.164 ***
	(0.067)	(0.026)
TANG	5.580 ***	−2.586 ***
	(0.441)	(0.371)
Risk	−0.433 ***	0.254 ***
	(0.042)	(0.044)
NDTS	3.352 ***	6.113 ***
	(0.348)	(0.548)
LIQ	1.089 ***	−3.307 ***
	(0.491)	(0.432)
DIV	−2.022 ***	−7.030 ***
	(0.229)	(0.986)
NEI	5.140 ***	1.476 ***
	(0.427)	(0.232)
INF	1.369 ***	−0.950 ***
	(0.238)	(0.132)
GDPG	−1.318 ***	−4.156 ***
	(0.667)	(0.553)
Constant	2.453 ***	1.236 ***
	(0.861)	(0.309)
Observations	6045	6045
Number of firms	465	465
Number of instruments	200	131
AR (1) (*p*-value)	0.000	0.000
AR (2) (*p*-value)	0.307	0.235
Hansen test (*p*-value)	0.082	0.350

Notes: Significance levels are denoted by *** for the 1%.

This finding may be better appreciated by looking at the results of firm-specific control variables, such as Size, LIQ and TANG. As can be seen in Table 5, Size exhibits a detrimental impact on SFG. This result is a clear indication that small enterprises are more prone to rapid growth than large enterprises. This is because large firms are limited in their ability to sustain dynamic growth, as they have already achieved significant economies of scale and have reduced their costs to a minimum. Smaller firms, on the other hand, enjoy greater flexibility and agility and can easily seize new opportunities, enabling them to accelerate their development and pursue more sustainable growth. This dynamism creates an environment conducive to small firms innovating and diversifying. As a result, small firms are in a good position to thrive in a market that is constantly evolving. The authors of [15,49] came to mixed conclusions, although this finding contradicts the findings of [68].

Table 6. Test for the U-shaped curve.

Group	Lower Bound	Upper Bound
Interval	−2.91	6.68
Slope	1.37 ***	−0.66 ***
	(13.58)	(−11.69)
Overall test		
t-value	11.69	
p-value	0.000	
Extreme point	3.551	

Note: t-values are provided within parentheses. Significance levels are denoted by *** for 1%. The test for the presence of an inverted U-shaped relationship is performed using the "utest" command in STATA 17.

When examining the nonlinearity between Invest and SFG, the results obtained for the LIQ and TANG variables confirm a change in sign. Similarly, there are also differences in the effect of LIQ on SFG. In column (1) of Table 5, the results show that LIQ has a positive effect on SFG, suggesting that firms depend on their own financing to invest and grow. However, as the level of Invest increases, LIQ has a negative influence on SFG (column 2). This finding is an indication that LIQ problems within firms lead to the use of external financing. These findings are in accordance with those of [49].

In addition, Risk negatively impacts SFG (column 1). This result contrasts with the result in column 2. In economic terms, firm risk is a source of financial difficulties and costs and, thus, a threat to the SFG, and vice versa. This mixed result is like that found by [49] for North African firms.

Moreover, NDTS is significantly positively associated with SFG. This outcome indicates that firms take advantage of the tax advantage substitute to sustain their growth. This finding is in accordance with the results reported by [85]. However, DIV has a negative effect on SFG. This result indicates that an increase in the dividend payout is associated with a decrease in SFG. In this case, restrictions on dividend payouts to shareholders are necessary to preserve corporate growth. On the other hand, the constructive influence of NEI on SFG suggests that firms that issue new shares can attract the attention of investors, particularly those looking for growth opportunities. By issuing shares, firms can raise the capital they need to fund expansion and development projects. This result is like that found by [69].

It appears that macroeconomic variables are important for determining whether or not sustainable growth occurs. INF affects SFG both positively and negatively. Economically, a rise in the level of INF increases the cost of borrowing and restricts access to capital, which jeopardizes the expansion of firms, and vice versa. The authors of [85] concluded that INF negatively and significantly affects SFG.

Finally, the coefficients of the GDP are negative and significant. This indicates a negative impact on SFG from the expected economic downturn in the MENA region. This is related to certain events that took place in the MENA region (the subprime crisis, the Arab Spring, the political transition, the Covid 19 pandemic, etc.). This result contrasts with the findings of [85].

4.3. Moderating Effect

Once the risks of underinvestment and overinvestment are identified by the first step, it is crucial to determine whether the *FII* policy can influence the behavior of managers in terms of the alignment of interests and risk aversion, and whether this policy can prevent underinvestment or overinvestment scenarios. Testing the moderating effect of *FII* on the inverted U-shaped association between *Invest* and *SFG* is the main objective of this subsection.

As far as the *FII* variable is concerned, it appears that all of these coefficients exhibit statistical significance at the 1% level for all of the regressions (Table 7). Indeed (columns 1 and 4), *FII* has a positive and statistically significant effect on *SFG*. Based on this result, it is

likely that an increase in *FII* would reduce external financial constraints. Indeed, agency costs and asymmetric information are reduced when some firms are more financially inclusive than others. This boosts firm growth. The positive role of *FII* becomes clearer when the signs of certain variables introduced into the model are observed, namely collateral and Size, which positively affect growth (columns 1 and 4). This shows that the most financially inclusive firms are those with substantial fixed assets, which they can lend out when needed. These firms do not face external financial constraints, and vice versa, because of their large size. The results are in line with those reported by [68].

Table 7. Moderating effect results.

Dependent Variable: SFG		FII_{mmx}			FII_{sfx}	
VARIABLES	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
L.SFG	−0.082 ***	−0.084 ***	−0.093 ***	−0.078 ***	−0.079 ***	−0.095 ***
	(0.005)	(0.004)	(0.005)	(0.005)	(0.005)	(0.005)
Invest	0.107 ***	0.434 ***	0.919 ***	0.099 ***	0.624 ***	1.271 ***
	(0.020)	(0.076)	(0.103)	(0.021)	(0.149)	(0.155)
$Invest^2$			−0.172 ***			−0.228 ***
			(0.017)			(0.024)
FII	2.174 ***	2.280 ***	−1.208 ***	2.859 ***	2.989 ***	−2.646 ***
	(0.233)	(0.232)	(0.224)	(0.546)	(0.559)	(0.503)
Invest × *FII*		−0.574 ***	−0.479 ***		−0.909 ***	−1.062 ***
		(0.114)	(0.116)		(0.231)	(0.214)
$Invest^2$ × *FII*			0.144 ***			0.232 ***
			(0.019)			(0.033)
Size	0.036 *	0.042 **	−0.047	0.043 **	0.048 ***	−0.052
	(0.019)	(0.019)	(0.034)	(0.019)	(0.018)	(0.033)
TANG	0.577 ***	0.593 ***	−2.287 ***	0.533 **	0.529 **	−2.462 ***
	(0.219)	(0.215)	(0.371)	(0.225)	(0.222)	(0.356)
Risk	0.059 **	0.062 **	0.238 ***	0.044	0.049 *	0.233 ***
	(0.029)	(0.029)	(0.045)	(0.029)	(0.029)	(0.043)
NDTS	13.490 ***	14.058 ***	50.186 ***	13.935 ***	13.744 ***	49.234 ***
	(2.275)	(2.286)	(5.830)	(2.276)	(2.353)	(5.817)
LIQ	1.692 ***	1.744 ***	−3.810 ***	1.511 ***	1.517 ***	−3.663 ***
	(0.254)	(0.261)	(0.495)	(0.268)	(0.278)	(0.515)
DIV	−4.967 ***	−5.866 ***	−4.403 ***	−5.627 ***	−5.890 ***	−5.311 ***
	(0.836)	(0.778)	(1.001)	(0.801)	(0.810)	(0.977)
NEI	−0.469 ***	−0.545 ***	1.303 ***	−0.589 ***	−0.711 ***	1.209 ***
	(0.149)	(0.150)	(0.245)	(0.153)	(0.154)	(0.252)
INF	−0.755 ***	−0.746 ***	−0.704 ***	−0.863 ***	−0.835 ***	−0.775 ***
	(0.161)	(0.156)	(0.162)	(0.159)	(0.153)	(0.145)
GDPG	−3.273 ***	−3.567 ***	−2.908 ***	−2.410 ***	−2.540 ***	−3.636 ***
	(0.700)	(0.729)	(0.590)	(0.670)	(0.701)	(0.581)
Constant	−2.050 ***	−2.221 ***	0.847 **	−2.506 ***	−2.654 ***	1.864 ***
	(0.306)	(0.298)	(0.424)	(0.465)	(0.458)	(0.465)
Observations	6045	6045	6045	6045	6045	6045
Number of firms	465	465	465	465	465	465
Number of instruments	96	96	131	96	96	131
AR (1) (*p*-value)	0.000	0.000	0.000	0.000	0.000	0.000
AR (2) (*p*-value)	0.310	0.309	0.238	0.305	0.305	0.239
Hansen test (*p*-value)	0.131	0.094	0.971	0.124	0.119	0.959

Notes: ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Regarding the moderating effect of *FII* on the *Invest-SFG* relationship, a nonlinear relationship is still found, but its nature has changed from negative ($Invest_{cit} \times FII_{ct}$) to positive ($Invest^2_{cit} \times FII_{ct}$), implying the existence of a U-shaped association between *Invest* and *SFG* (columns 3 and 6). In this case, the results show that *FII* moderates the correlation between *Invest* and *SFG*.

4.4. Robustness Checks

4.4.1. Alternative Measure of SFG

In order to confirm the reliability of our results, we have carried out an additional test by modifying the measurement of *SFG*. Following [49,85], we used Van Horne's static

SFG model (denoted *SSFG*). The *SSFG* is quantified in the following manner: retained earnings × net profit rate × (1 + debt/equity ratio) × {1/(total assets/total sales) − 1}. As another alternative measure, we chose sales growth. This variable is referred to as the *SFGOW* variable. This variable is measured as the ratio of the change in turnover at time *t* and at time *t* − 1 divided by the turnover at time *t* − 1. The results are reported in Table 8.

Table 8. Change in dependent variables.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
VARIABLES	**SSFG**						**SFGOW**	
L.SFG	0.646 ***	−1.767 ***	0.638 ***	0.667 ***	−0.113 ***	−0.012 ***	−0.011 ***	−0.085 ***
	(0.000)	(0.292)	(0.000)	(0.000)	(0.002)	(0.000)	(0.000)	(0.000)
Invest	0.137 ***	186.380 ***	−2.972 ***	−3.700 ***	0.375 ***	0.711 ***	0.329 ***	0.603 ***
	(0.030)	(30.015)	(0.102)	(0.080)	(0.005)	(0.003)	(0.003)	(0.001)
$Invest^2$		−44.427 ***	0.434 ***	0.142 ***		−0.130 ***	−0.052 ***	−0.151 ***
		(7.985)	(0.035)	(0.022)		(0.001)	(0.001)	(0.000)
FI			2.563 ***	3.860 ***			0.972 ***	0.237 ***
			(0.247)	(0.215)			(0.015)	(0.007)
Invest × *FII*			0.741 ***	4.253 ***			−0.215 ***	−0.300 ***
			(0.220)	(0.143)			(0.004)	(0.002)
$Invest^2$ × *FII*			0.418 ***	0.383 ***			0.019 ***	0.106 ***
			(0.067)	(0.044)			(0.001)	(0.000)
Size	0.140 ***	−6.797 ***	−0.502 ***	0.276 ***	0.017 ***	0.022 ***	0.224 ***	0.268 ***
	(0.032)	(1.894)	(0.033)	(0.019)	(0.003)	(0.002)	(0.002)	(0.000)
TANG	0.297 **	−492.490 ***	4.012 ***	0.146 ***	−0.743 ***	−1.102 ***	−2.367 ***	−3.967 ***
	(0.127)	(177.432)	(0.188)	(0.056)	(0.030)	(0.022)	(0.041)	(0.009)
Risk	0.593 ***	−12.634	2.073 ***	0.642 ***	0.021 ***	−0.001	0.184 ***	0.182 ***
	(0.017)	(15.199)	(0.027)	(0.018)	(0.004)	(0.003)	(0.003)	(0.001)
NDTS	−21.575 ***	−2007.071	−24.903 ***	−13.872 ***	3.021 ***	3.402 ***	−50.843 ***	−18.476 ***
	(0.186)	(1639.074)	(0.462)	(0.131)	(0.246)	(0.193)	(0.465)	(0.081)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
VARIABLES	SFGS						Sales	
LIQ	13.374 ***	−344.459 ***	16.054 ***	8.841 ***	−0.978 ***	−1.057 ***	1.275 ***	−1.426 ***
	(0.177)	(102.004)	(0.280)	(0.094)	(0.023)	(0.015)	(0.023)	(0.004)
DIV	−95.528 ***	807.585 ***	−102.816 ***	−53.755 ***	1.674 ***	2.055 ***	10.897 ***	6.328 ***
	(1.524)	(140.887)	(1.783)	(0.884)	(0.104)	(0.083)	(0.114)	(0.022)
NEI	6.440 ***	−84.264 ***	14.229 ***	−1.420 ***	0.761 ***	0.923 ***	−3.553 ***	−1.476 ***
	(0.182)	(29.204)	(0.285)	(0.103)	(0.037)	(0.026)	(0.024)	(0.006)
INF	−0.773 ***	36.988	−2.859 ***	1.296 ***	0.669 ***	0.737 ***	1.407 ***	0.469 ***
	(0.092)	(27.786)	(0.124)	(0.047)	(0.027)	(0.022)	(0.016)	(0.004)
GDPG	−0.427	−308.139 ***	−45.821 ***	−2.320 ***	−4.190 ***	−4.697 ***	−1.470 ***	−1.792 ***
	(0.275)	(32.566)	(0.434)	(0.149)	(0.078)	(0.074)	(0.048)	(0.011)
Constant	−14.238 ***	296.766 ***	−12.264 ***	−13.779 ***	1.034 ***	1.126 ***	−1.905 ***	−1.137 ***
	(0.550)	(30.375)	(0.594)	(0.285)	(0.041)	(0.033)	(0.025)	(0.008)
Observations	6045	6045	6045	6045	6045	6045	6045	6045
Number of firms	465	465	465	465	465	465	465	465
Number of instruments	200	16	194	275	392	391	202	335
AR (1) (*p*-value)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
AR (2) (*p*-value)	0.317	0.390	0.314	0.319	0.029	0.116	0.070	0.032
Hansen test (*p*-value)	0.187	0.265	0.028	0.112	0.321	0.083	0.051	0.072

Notes: Standard errors are presented in parentheses. Statistical significance is denoted by *** and ** at the 1% and 5%levels, respectively.

The results are consistent with those of Table 7, specifying the existence of a curvilinear correlation between *FII* and *SSFG* (*SFGOW*). As illustrated in Table 8, the results obtained allow us to conclude that the levels of *SSFG* are consistently higher than the levels of *SFGOW*. Looking at the case of Model (1), we observe that the level of *SSFG*, estimated at 0.646%, is higher than that of *SFGOW*, which is equivalent to 0.113%. This result reveals that MENA firms' sustainable growth rates (*SSFG*) exceed their sales

growth rates (*SFGOW*). This reflects the fact that these firms have more than enough capital to cover their capital expenditure. As a result, there is a need for an increase in liquidity, a reduction in leverage, or an increase in dividend payouts. The *SSFG* rate is consistent with a fixed fiscal policy, unlike the *SFGOW* rate (sales rate). Finally, other variables significantly affect sustainable growth. In conclusion, the two main hypotheses, H1 (H1 (a) and H1 (b)) and H2, are still admissible.

4.4.2. Alternative Change in Independent Variables

In addition, we used an alternative measure for *Invest*. This variable was assessed by the ratio of the change between the value of the tangible assets at time t and $t-1$ divided by the value of the tangible assets at time $t-1$ (*Ainvest*). This ratio was adopted to measure the short-term investment [14].

Table 9 summarizes the results, and indicates that a nonlinear relationship has also been found between *Ainvest* and *SFG*. In addition, *FII* moderates this relationship. Based on these findings, hypotheses 1 and 2 are also validated, showing the robustness of the main results.

Table 9. Changes in main independent variables.

VARIABLES	(1) SFG	(2) SFG	(3) SFG/FII_{mmx}	(4) SFG/FII_{sfx}
L.SFG	0.031 ***	0.021 ***	1.596 ***	1.574 ***
	(0.005)	(0.001)	(0.006)	(0.006)
Ainvest	0.111 ***	0.071 ***	0.010 ***	0.081 ***
	(0.011)	(0.001)	(0.001)	(0.001)
$Ainvest^2$		−0.012 ***	−0.011 ***	−0.011 ***
		(0.001)	(0.001)	(0.001)
FII			0.525 ***	2.959 ***
			(0.072)	(0.180)
Ainvest × *FII*			−0.023 *	−0.052 ***
			(0.011)	(0.002)
$Ainvest^2$ × *FII*			0.013 ***	0.013 ***
			(0.001)	(0.001)
Size	−6.932 ***	−2.578 ***	−1.119 ***	−0.989 ***
	(1.346)	(0.147)	(0.048)	(0.048)
TANG	9.027	14.655 ***	1.064 ***	3.029 ***
	(13.712)	(1.178)	(0.179)	(0.200)
Risk	−8.155 ***	−2.093 ***	−0.246 ***	−0.390 ***
	(2.027)	(0.250)	(0.037)	(0.037)
NDTS	687.215 ***	144.982 ***	29.303 ***	52.486 ***
	(84.875)	(10.993)	(1.984)	(2.813)
LIQ	−41.149 ***	24.319 ***	12.352 ***	13.360 ***
	(10.843)	(1.605)	(0.416)	(0.479)
DIV	4.122	−58.642 ***	−30.919 ***	−26.366 ***
	(26.114)	(5.222)	(1.298)	(1.315)
NEI	−6.566 *	−2.757 ***	−2.697 ***	−2.369 ***
	(3.744)	(0.343)	(0.124)	(0.143)
INF	1.357	−0.796 ***	2.821 ***	2.741 ***
	(1.831)	(0.106)	(0.129)	(0.135)
GDPG	−20.644 **	−4.482 ***	2.491 ***	2.506 ***
	(8.418)	(0.818)	(0.379)	(0.334)
Constant	92.856 ***	18.288 ***	7.649 ***	2.985 ***
	(17.660)	(1.768)	(0.433)	(0.415)
Observations	6045	6045	6045	6045
Number of firms	465	465	465	465
Number of instruments	54	210	260	260
AR (1) (*p*-value)	0.000	0.000	0.000	0.000
AR (2) (*p*-value)	0.182	0.857	0.977	0.733
Hansen test (*p*-value)	0.805	0.669	0.696	0.941

Notes: Statistical significance is denoted by ***, **, and * at the 1%, 5%, and 10% levels, respectively.

4.4.3. Decomposition of FI

Table 10 illustrates both the results obtained for the direct effect of the different components of *FII* (access and usage) on *SFG*, and the moderating effects of the interaction term of the different components of *FII* and *Invest* on *SFG*.

Table 10. Robustness check: change in financial inclusion indicators.

Dependent Variable: SFG	**(1)**	**(2)**	**(3)**	**(4)**
VARIABLES	$Access_{mmx}$	$Access_{sfx}$	$Usage_{mmx}$	$Usage_{sfx}$
L.SFG	1.412 ***	1.359 ***	1.313 ***	1.345 ***
	(0.003)	(0.007)	(0.003)	(0.002)
Invest	0.782 ***	1.955 ***	0.527 ***	0.846 ***
	(0.022)	(0.337)	(0.014)	(0.027)
$Invest^2$	−0.155 ***	−0.218 ***	−0.134 ***	−0.095 ***
	(0.005)	(0.046)	(0.003)	(0.004)
FII	1.071 ***	−0.575	−3.930 ***	−1.051 ***
	(0.060)	(0.626)	(0.101)	(0.112)
Invest × *FI*	−0.898 ***	−2.584 ***	−0.885 ***	−1.046 ***
	(0.027)	(0.493)	(0.027)	(0.038)
$Invest^2$ × *FI*	0.191 ***	0.222 ***	0.256 ***	0.080 ***
	(0.006)	(0.080)	(0.007)	(0.007)
Size	−0.048 ***	−0.155 **	−0.151 ***	−0.020 ***
	(0.006)	(0.068)	(0.007)	(0.006)
TANG	−5.001 ***	0.188	−1.132 ***	0.365 ***
	(0.223)	(0.574)	(0.077)	(0.083)
Risk	0.363 ***	0.908 ***	0.805 ***	0.945 ***
	(0.015)	(0.120)	(0.021)	(0.025)
NDTS	7.057 ***	−0.933	30.719 ***	27.402 ***
	(1.158)	(6.104)	(1.138)	(1.153)
LIQ	2.148 ***	0.100	−1.860 ***	0.024
	(0.104)	(0.459)	(0.063)	(0.084)
DIV	−16.327 ***	−29.346 ***	−47.520 ***	−44.804 ***
	(0.613)	(3.203)	(1.257)	(1.104)
NEI	−0.523 ***	−0.675	0.096*	−0.077
	(0.053)	(0.464)	(0.052)	(0.055)
INF	2.194 ***	0.740 ***	1.921 ***	2.343 ***
	(0.099)	(0.222)	(0.057)	(0.059)
GDPG	0.989 ***	0.002	−1.540 ***	0.849 ***
	(0.166)	(0.743)	(0.157)	(0.103)
Constant	−0.424 ***	1.742 **	3.331 ***	−0.193 *
	(0.076)	(0.872)	(0.110)	(0.102)
Observations	6045	6045	6045	6045
Number of firms	465	465	465	465
Number of instruments	169	106	183	171
AR (1) (*p*-value)	0.000	0.000	0.000	0.000
AR (2) (*p*-value)	0.280	0.857	0.754	0.720
Hansen test (*p*-value)	0.129	0.992	0.099	0.057

Notes: Statistical significance is denoted by ***, **, and * at the 1%, 5%, and 10% levels, respectively.

Both access components have positive and statistically significant signs at the 1% level (see columns (1) and (2)), as shown in Table 10. This suggests that $Access_{mmx}$ index reduces the transaction costs and makes financial resources easier to allocate, thereby improving economic efficiency. Firms are thus able to obtain loans for investment in new projects or an expansion of their activities, thereby maintaining their sustainability. However, it is argued that the $Usage_{mmx}$ index reduces the sustainability of firms. In economic terms, this suggests that financial institutions are not providing the necessary financial services to meet the specific needs of some firms, which may constrain their capacity to develop and diversify. All the other variables have the same findings as in the prior regressions.

4.4.4. Subsample Test

Although the descriptive analysis above shows that the adoption of *FII* in the GCC countries was more developed than in the non-GCC countries, a question needs to be asked: Do the GCC countries offer better opportunities for sustainable growth as compared to the

non-GCC countries? If so, what are the main reasons for the prosperity of one policy at the expense of the other?

This subsection aims to establish whether the results obtained in the previous steps apply to the whole region, or whether these results are limited to a specific group of countries. In order to do this, we have divided our sample into two groups, the GCC countries and the non-GCC countries. Based on the results reported in Table 11, the nonlinear link between *Invest* and *SFG* is further confirmed for both cases (see columns (2) to (4) for the GCC case and columns (6) to (8) for the non-GCC case), suggesting that H1 is accepted for both the GCC and non-GCC countries.

In addition, the results still show that *FII* moderates the relationship between *Invest* and *SFG*, further confirming H2. Specifically, there is still a nonlinear correlation between *Invest* and *SFG*. However, there is a divergence in the shape of the curve. For the GCC countries, the results show a U-shaped relationship. This indicates that the managers of GCC firms have adopted a strategy based on *FII* to improve their tangible investment. This strategy has helped managers to reduce the risk of underinvestment, and thus enhance *SFG*. These results contrast with those from the non-GCC countries, where the curve remains in an inverted U-shape, indicating that the low level of *FII* is not sufficient to reduce the effects of sub-optimal investment strategies (under- and overinvestment). This shows that the levels of *FII* are higher in GCC countries than in non-GCC countries.

4.5. Discussion

This is a discussion of the main findings of our paper. First, this study predicted a curvilinear relationship between *Invest* and *SFG*, supporting H1. Although the association between *Invest* and *SFG* is an inverted U-shape, this curve can be subdivided into two distinct parts (Figure 3): the left and right parts. In the first part, *SFG* increased as *Invest* increased, while in the second part, *SFG* was reduced as *Invest* improved beyond an extreme point. Depending on the curve's position, the MENA firms' *SFG* could be affected in two directions, i.e., according to the investment levels. In other words, the coefficients of *Invest* shifted from positive to negative, revealing that raised levels of *Invest* were related to greater levels of the MENA firms' *SFG*. There exists an optimum *Invest* level of 3.551. This characterizes the threshold at which elevated *Invest* levels result in a rise in the MENA firms' *SFG*. Indeed, the positive effect of *Invest* on *SFG* can be seen by the need for firms in the MENA region to invest in fixed assets to support their long-term growth. This result is consistent with several studies, such as [14,15]. It demonstrates the relevance of the agency theory and allows us to admit hypothesis H1 (a). Nevertheless, beyond this critical threshold, a rising *Invest* decreased *SFG*. Specifically, overinvestment in fixed assets becomes an obstacle to the growth of the firms. This is due to the additional cost of investment and the lack of funds to support new projects and sustainable growth. The results of the study conducted by [14] are in line with the results of this study, as both of them demonstrated the negative impact of tangible investment on firm growth. *The acceptance of hypothesis H1 (b)* is clearly supported by these results. The results support the foundations of the agency and trade-off theories.

Table 11. GCC countries vs. non-GCC countries.

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	GCC Countries						Non-GCC Countries	
	SFG	SFG	SFG/FII_{mmx}	SFG/FII_{sfx}	SFG	SFG	SFG/FII_{mmx}	SFG/FII_{sfx}
L.SFG	0.488 ***	0.045 ***	0.034 ***	0.012	0.047 ***	0.039 ***	0.031 ***	0.032 ***
	(0.003)	(0.011)	(0.011)	(0.012)	(0.002)	(0.0022)	(0.002)	(0.002)
Invest	0.628 ***	0.571 ***	1.895 ***	3.218 ***	−0.024 ***	0.939 ***	0.279 ***	0.224 ***
	(0.025)	(0.033)	(0.169)	(0.396)	(0.001)	(0.047)	(0.000)	(0.001)
$Invest^2$		−0.102 ***	−0.430 ***	−0.612 ***		−0.192 ***	−0.068 ***	−0.061 ***
		(0.006)	(0.037)	(0.072)		(0.008)	(0.001)	(0.001)
FII			−3.171 ***	−2.657 ***			−0.264 ***	−0.637 ***
			(0.324)	(0.325)			(0.003)	(0.004)
Invest × *FII*			−1.996 ***	−4.111 ***			0.020 ***	0.092 ***
			(0.184)	(0.511)			(0.001)	(0.001)
$Invest^2$ × *FII*			0.479 ***	0.791 ***			−0.024 ***	−0.041 ***
			(0.041)	(0.095)			(0.001)	(0.001)
Size	0.659 ***	0.101 ***	0.096 ***	0.065 ***	−0.315 ***	−0.278 ***	−0.081 ***	−0.126 ***
	(0.043)	(0.017)	(0.020)	(0.021)	(0.002)	(0.034)	(0.000)	(0.000)
TANG	−5.319 ***	−5.774 ***	−7.306 ***	−5.601 ***	−0.608 ***	−6.841 ***	−2.021 ***	−2.319 ***
	(0.136)	(0.329)	(0.623)	(0.562)	(0.020)	(0.269)	(0.004)	(0.003)
Risk	−2.830 ***	−0.799 ***	−0.629 ***	−0.516 ***	−0.015 ***	0.295 ***	0.053 ***	0.108 ***
	(0.014)	(0.041)	(0.044)	(0.054)	(0.004)	(0.095)	(0.001)	(0.001)
NDTS	366.917 ***	41.664 ***	22.052 ***	26.438 ***	19.382 ***	71.199 ***	17.862 ***	18.320 ***
	(0.572)	(2.484)	(2.450)	(2.957)	(0.240)	(5.480)	(0.041)	(0.045)
LIQ	45.054 ***	13.041 ***	10.468 ***	9.659 ***	−1.778 ***	−5.881 ***	−0.754 ***	−0.424 ***
	(0.104)	(0.721)	(0.734)	(0.914)	(0.018)	(0.250)	(0.002)	(0.001)
DIV	−107.010 ***	−16.144 ***	−11.886 ***	−8.979 ***	−15.380 ***	−25.024 ***	−12.325 ***	−12.567 ***
	(0.269)	(1.150)	(1.323)	(1.152)	(0.058)	(1.240)	(0.026)	(0.021)
NEI	−3.210 ***	−3.054 ***	−2.480 ***	−2.216 ***	0.133 ***	0.406	−0.033 ***	0.031 ***
	(0.083)	(0.185)	(0.225)	(0.209)	(0.022)	(0.302)	(0.002)	(0.002)
INF	−3.413 ***	−3.266 ***	−3.379 ***	−2.493 ***	−1.171 ***	−0.387	−1.367 ***	−0.613 ***
	(0.038)	(0.170)	(0.235)	(0.254)	(0.031)	(0.349)	(0.003)	(0.003)
GDPG	−10.416 ***	−5.056 ***	−2.519 ***	−4.622 ***	−5.156 ***	−9.303 ***	−7.669 ***	−6.919 ***
	(0.105)	(0.352)	(0.438)	(0.519)	(0.073)	(0.882)	(0.011)	(0.013)
Constant	−21.825 ***	−2.821 ***	0.834 ***	0.299	5.411 ***	7.543 ***	2.163 ***	2.141 ***
	(0.505)	(0.246)	(0.194)	(0.290)	(0.028)	(0.479)	(0.003)	(0.004)
Observations	2951	2951	2951	2951	3094	3094	3094	3094
Number of firms	227	227	227	227	238	238	238	238
Number of instruments	196	122	122	122	200	38	204	204
AR (1) (*p*-value)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
AR (2) (*p*-value)	0.820	0.228	0.210	0.232	0.571	0.048	0.496	0.536
Hansen test (*p*-value)	0.167	0.062	0.459	0.724	0.239	0.326	0.145	0.259

Notes: Standard errors are given in parenthesis. Statistical significance is denoted by *** at the 1%.

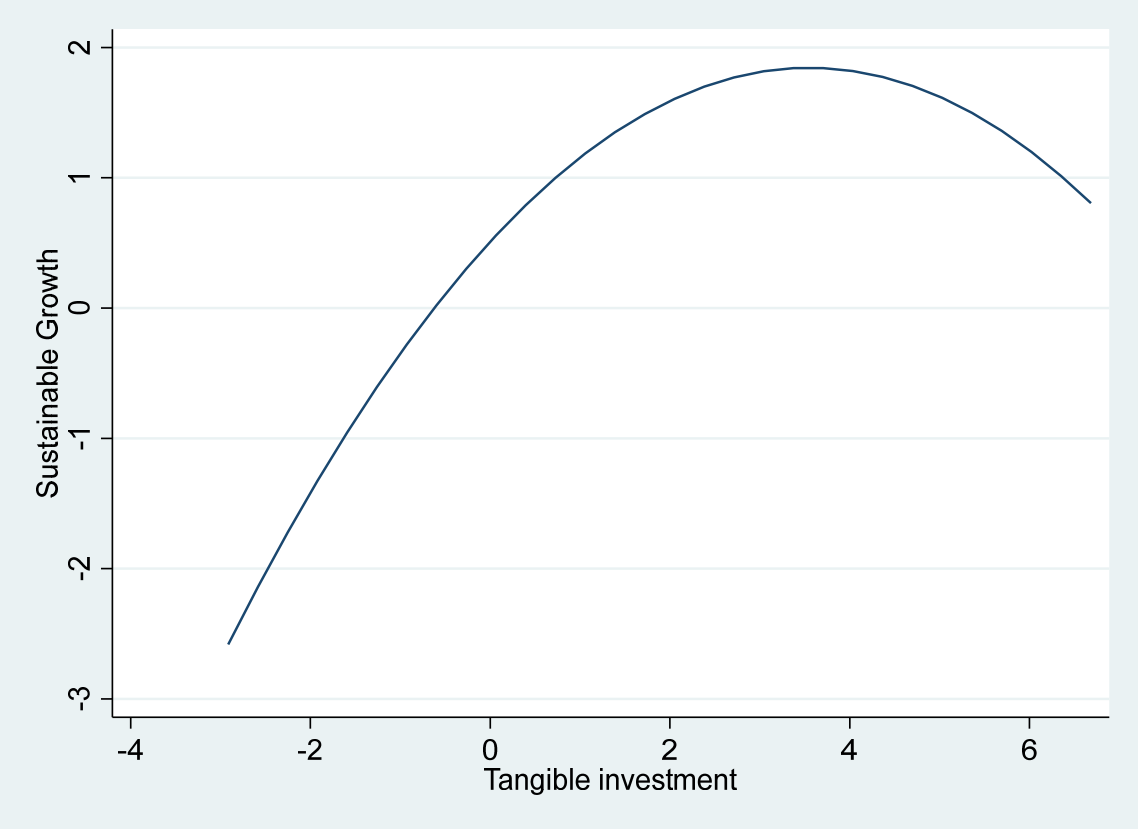


Figure 3. The curvilinear nexus between *Invest* and *SFG*.

Second, the results show that *FII* moderates the correlation between *Invest* and *SFG*, supporting H2. Specifically, the findings also reveal two bounds: a lower and an upper. At the lower bound, the results show that there is a negative impact from the interaction of the variables—$Invest_{cit} \times FII_{ct}$—on *SFG*. This result is likely related to agency theory, suggesting that tangible investments can hinder firm growth due to the potential misuse of assets for short-term gains and larger firms' debt strategies that may limit future growth. In this case, one might think that financial inclusion, or access to and the use of formal financial services by individuals and businesses, would help to reduce underinvestment and boost sustainable growth for the listed firms in the MENA region. However, this is not necessarily the case, for several reasons. First, the private sector in the MENA region is constrained by many structural and institutional factors that limit its development, such as political instability, corruption, weak governance, regulatory uncertainty, and lack of competition [46]. These factors may not be overcome by financial inclusion alone. Second, the MENA entrepreneurs and firms may not have a high demand for formal financial services, due to cultural, religious, or social factors that influence their needs and preferences. For instance, some Islamic principles that prohibit interest and uncertainty may reduce the use of insurance and savings products in some MENA countries [45]. Third, the financial intermediation process, which is vital for allocating resources to productive investments and enhancing firm performance, may not improve with financial inclusion. The financial sector in the MENA region is still bank-based, which tends to favor large and well-connected firms over SMEs and innovative ventures [45]. The financial markets in the region are also underdeveloped and lack depth, diversity, and liquidity, which restrict the availability of alternative sources of financing and risk management [46]. Therefore, *FII* is not a sufficient condition for reducing underinvestment and improving MENA's *SFG*.

However, at the upper bound, the outcome reveals the positive impact of the interaction of the variables—$Invest^2_{cit} \times FII_{ct}$—on *SFG*. This result is likely related to trade-off theory, indicating that firms can be exposed to financial risks by taking on debt to benefit

from tax advantages, which underlines the need for optimal investment in tangible assets. *FII* can enhance the efficiency and productivity of firms by providing them with more financing options, such as credit, savings, insurance, and payments. This can help firms to invest in profitable projects, diversify their risks, and cope with shocks [49].

5. Conclusions and Policy Recommendations

The aim of this study was to examine the curvilinear nexus between *Invest* and *SFG*, as well as the moderating effect of *FII* on this relationship. Reflecting on the economic landscape of the MENA, where the investment climate is highly variable due to factors such as oil prices and geopolitical dynamics, our analysis revealed a curvilinear (an inverted U-shaped) association between tangible investment and SFG. This relationship mirrors the real-world scenario where initial investments drive firm growth up to a point, after which the benefits diminish. For instance, the GCC countries, particularly led by Saudi Arabia, are expected to attract the most investment attention and exhibit growth prospects, supported by higher oil prices and a robust macroeconomic backdrop. However, the region also faces challenges, such as political instability, extreme unemployment, and economic uncertainty, which can impact the trajectory of firm growth. Our results suggest that while tangible investments initially contribute to SFG, beyond a certain threshold the growth declines, underscoring the need for a balanced and strategic approach to investment in the region.

In addition, based on the real-life situation, where financial inclusion is an essential factor in the fight against extreme poverty and the promotion of economic well-being, our findings acquire practical relevance. The MENA region has seen financial inclusion emerge as a key driver in the fight against several challenges (poverty, political instability, etc.). Our results show that financial inclusion moderates the relationship between tangible investment and SFG, echoing the broader impact of financial access measures that have been statistically significant in reducing extreme poverty across the region. This result thus underlines the essential role of financial inclusion in fostering sustainable business growth. This constitutes one of the main objectives of the Vision 2030 of several MENA countries.

Managers, policymakers, and governments are encouraged to determine the optimal level of tangible investment, support financial inclusion policies, and take additional measures to improve investment efficiency and ensure firm performance and sustainability to support the sustainability of firms in the MENA region. These include expanding formal financial services (granting non-traditional loans, developing alternative guarantee mechanisms, etc.). In this context, it is essential to differentiate between the GCC and non-GCC countries. This will allow for the challenges and vulnerabilities of one sub-region to be studied without being at the expense of the other, and for measures to be taken, based on sound risk management, to encourage investment and support sustainable firm growth.

In addition, there are several different ways in which MENA firms could enhance their sustainability by taking advantage of financial inclusion. First, by widening access to financial services in underserved areas, they could tap into new markets, thereby fostering economic growth and development. Secondly, by supporting small and medium-sized enterprises (SMEs) that often find it difficult to access traditional banking services, they could promote financial inclusion by offering financing alternatives, such as microcredit or peer-to-peer lending platforms, which could boost business sustainability. In addition, raising the awareness of financial education among consumers and businesses could promote informed financial choices, thereby contributing to sustainability. Innovations in the financial products tailored to the needs of unbanked or underbanked populations could also encourage financial inclusion, for example, digital financial services that reduce transaction costs and improve accessibility. Similarly, alignment with Sustainable Development Goals (SDGs), such as poverty reduction, gender equality, and economic growth, could increase the impact in terms of sustainability. Finally, by supporting renewable energy and green technology projects through inclusive financing, firms could contribute to environmental

sustainability. By integrating financial inclusion into their business models, they could not only advance social and economic development, but also lay the foundations for long-term sustainability and resilience in the MENA region.

Finally, it is essential to conduct detailed research to better understand the impact of investment and financial inclusion on sustainable firm growth. Indeed, this research requires the inclusion of additional variables in the baseline model. These include industry, institutional, and macroeconomic variables. Furthermore, it is essential to extend the study to the unlisted firms and to consider other regions, such as ASEAN-5, Sub-Saharan Africa, Latin America, or Central and Eastern European countries. This will enable us to make more comprehensive and relevant recommendations on how to help firms grow sustainably.

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Appendix A

Table A1. Financial inclusion indicator for MENA.

	Financial Inclusion Index		**Access Dimension**		**Usage Dimension**	
Countries	FII_{mmx}	FII_{sfx}	AD_{mmx}	AD_{sfx}	UD_{mmx}	UD_{sfx}
Egypt	0.008	0.003	0.144	0.253	0.301	0.324
	(0.006)	(0.002)	(0.032)	(0.012)	(0.005)	(0.020)
Jordan	0.719	0.965	0.291	0.665	0.789	0.419
	(0.024)	(0.014)	(0.027)	(0.012)	(0.010)	(0.016)
Kuwait	0.548	0.134	0.860	0.577	0.325	0.753
	(0.049)	(0.013)	(0.039)	(0.024)	(0.002)	(0.020)
Morocco	0.301	0.056	0.566	0.418	0.269	0.605
	(0.038)	(0.010)	(0.045)	(0.023)	(0.003)	(0.034)
Oman	0.166	0.192	0.215	0.309	0.363	0.363
	(0.018)	(0.023)	(0.043)	(0.015)	(0.008)	(0.019)
Qatar	0.793	0.903	0.494	0.707	0.772	0.550
	(0.053)	(0.033)	(0.105)	(0.032)	(0.007)	(0.061)
Saudi Arabia	0.263	0.543	0.012	0.386	0.613	0.238
	(0.016)	(0.009)	(0.004)	(0.007)	(0.004)	(0.010)
Tunisia	0.130	0.085	0.271	0.294	0.291	0.401
	(0.031)	(0.006)	(0.036)	(0.011)	(0.001)	(0.025)
UAE	0.956	0.772	0.896	0.834	0.732	0.794
	(0.025)	(0.037)	(0.038)	(0.011)	(0.010)	(0.012)
Average MENA's FII	0.440	0.409	0.417	0.494	0.495	0.494
Average GCC's FII	0.545	0.603	0.495	0.563	0.561	0.540
Average Non-GCC's FII	0.290	0.277	0.318	0.408	0.413	0.437

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