

The dynamic effect of participation index on the stable firm dynamics: evidence from non-financial firms from Türkiye

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International
Journal of Islamic
and Middle
Eastern Finance
and Management

885

Received 31 August 2024
Revised 27 February 2025
30 July 2025
Accepted 11 September 2025

Abstract

Purpose – This study aims to examine whether the inclusion of firms in the participation index provides sustainability according to firm growth and financial leverage within the Islamic finance principles framework by using the Local Projections method for Turkish nonfinancial firms.

Design/methodology/approach – The authors use the semiparametric local projections method which allow us to make dynamic panel impulse-response analysis. At the same time, the data set the authors use is a hand collected data set. In this framework, the authors investigate the impact of inclusion in the participation index for two quarters on the firm dynamics of Turkish nonfinancial firms using the local projections methodology.

Findings – The results suggest that firms included in the index for at least two quarters experience more stable growth and significantly lower leverage, while short-term inclusion yields weaker effects. These findings suggest that prolonged compliance with Islamic financial standards strengthens internal financing capacity and shields firms from debt exposure. The study contributes to Islamic finance theory by incorporating time-varying Shariah compliance and offers practical implications for financial regulation and firm governance.

Practical implications – This study highlights the impact of Islamic finance on firm growth, and stability, indicates its potential to decrease dependence of debt, support sustainable growth and increase economic resilience through its principles and practices. For high-value businesses to benefit from the Islamic finance principles, policymakers can create opportunities to reduce reliance on debt and increase liquid assets by aligning financial structures with Shariah standards.

Originality/value – To the best of the authors' knowledge, this is the first study in the emerging markets Islamic finance context that uses a time-varying participation index approach in its empirical analysis and sheds new light on this relationship in the literature.

Keywords Islamic finance, Participation index, Türkiye, Nonfinancial firms, Local projections, Dynamic shocks

Paper type Research paper



International Journal of Islamic
and Middle Eastern Finance and
Management
Vol. 19 No. 4, 2026
pp. 885-907
© Emerald Publishing Limited
1753-8394
DOI 10.1108/IMEFM-08-2024-0440

JEL classification – C33, C54, G23, L25

1. Introduction

Islamic financial products cater to a diverse client base seeking ethical and Shariah-compliant financial services. These products have gained increasing popularity among Muslim individuals, institutions and those who value ethical investing and risk-sharing principles. The basic principles for Shariah compliance for any product or business include the prohibition of *riba*, maysir, garar, and the avoidance of prohibited activities, such as alcohol, pork products and gambling. Avoiding investing in sectors considered unethical or harmful according to Islamic principles, such as certain financial derivatives, contributes to a more stable and socially responsible financial system.

Islam provides avenues for those who can alleviate uncertainty by sharing the risks involved in economic activities with others. It offers behavioral guidelines and decision-making principles that, when followed, decrease uncertainty. Sharing risk enables its distribution among participants, thereby reducing it for individual stakeholders. Islamic finance facilitates risk sharing and diversification with its instruments and institutions, serving as mechanisms to mitigate risks (Iqbal and Mirakhor, 2013).

The Islamic finance industry has expanded significantly worldwide. In 2022, it will reach an estimated value of US\$3.25tn, which corresponds to a moderate growth rate of 6.2% (year-on-year) in assets. Notably, the overall Islamic capital market, which includes sukuk, Islamic funds and Islamic equities, recorded slower growth for the first time in five years. Remarkably, Islamic indices outperformed their conventional counterparts over a 10-year period. Shariah indices consistently showed more robust relative returns over longer periods, outperforming global indices over the 3, 5 and 10-year maturities (IFSB, 2023). These long-term returns underscore the resilience of Shariah-compliant equities and support the argument that Islamic financial principles foster sustainable financial performance.

Sustainability, within this context, denotes a company's ability to operate independently without relying on government or other external support. In Islamic finance, this also entails economic, social and environmental well-being without compromising the interests of future generations. Unlike conventional financial markets, Islamic finance is based on ethical foundations, aiming to prioritize stability and fairness within market systems through moral principles. However, given that Islamic finance investors and participants are relatively new and unexperienced, fostering the growth of Islamic stock markets to achieve stability, resilience and fairness in a transparent and sustainable manner will require time and development (Iqbal and Mirakhor, 2013).

Islamic scholars have historically expressed reservations about conventional stock markets and have advocated for Shariah-compliant alternatives. However, due to the complexities involved in this venture, they have spearheaded the formation of Islamic indices by implementing a screening process within the existing stock markets, seen as a more viable approach. With the rising demand for Shariah-compliant (SC) stocks, various index providers have begun developing their own Islamic indices using similar screening methodologies. In 1983, Bank Islam Malaysia Bhd became the pioneer in stock screening for Shariah compliance. SC stock indices include the DJIMI (Dow Jones Islamic Market World Index) [1], the Financial Times Stock Exchange (FTSE) GII [2], both established in 1999 and Borsa Istanbul (BIST) Participation Index, which commenced publication in 2011 [3].

These indices apply standardized financial filters to ensure Shariah compliance, however, specific calculations vary across index providers. The debt-equity ratio, which should be smaller than 33%, can be calculated by dividing the book value of the firm's debt to the firm's market value (e.g. Dow Jones and Standard&Poor's [S&P] [4]) or total assets (e.g. [FTSE] and Morgan Stanley Capital International [MSCI]) [5]. Interest-bearing items – equity ratio should be smaller than 33%, which is calculated by dividing the sum of cash plus interest-

bearing items to the firm's market value or total assets. Financial screening also involves evaluating ratios related to the firm's liquidity. The total of cash and accounts receivable should be below 50% (e.g. FTSE) or 33% (e.g. MSCI) of the total assets. Moreover, the total of cash and interest-bearing items should be less than 33% of the average daily market capitalization (e.g. FTSE and MSCI).

Shariah screening criteria may mean that SC companies adhere to different governance standards compared to non-Shariah compliant (NSC) companies. This difference arises from factors such as ethical screening and a capital structure characterized by low debt dominance. As SC firms avoid exceeding a certain debt limit, their governance may be comparatively less effective in resolving agency conflicts. This could be due to constraints related to religious considerations, potentially leading to challenges in adopting an optimal financing mix or flexible capital structure (Anwer *et al.*, 2023). As these companies need to ensure that their financial structure complies with permissible debt, cash and receivables thresholds they have fewer external financing options than NSC companies. Consequently, their ability to secure external debt financing is limited. This limited availability of external finance leads SC firms to rely on internal financing (Tawfik and Elmaasrawy, 2023). We can assume that SC firms are constrained by internal financing, which means that the factors affecting their capital structure differ from those affecting NSC firms.

The development of participation-based indices in Türkiye is supported by the Advisory Board of the Participation Banks Association of Türkiye (TKBB), whose Share Certificate Issuance and Trade Standard and supporting documents and guide provide the operational framework. This framework ensures that companies are selected based on rigorous criteria – primarily their trading volume and the market value of their free float shares – resulting in the formation of indices such as the BIST Participation All, 30, 50 and 100. Additionally, thematic indices like the BIST Participation Sustainability and Dividend Indices have been developed to cater to investors with specific interests in sustainability and dividend-focused investments.

Scholars have used these indices to explore various dimensions of market behavior and investment decision-making. For example, Öztürk and Özdemir (2024) investigate whether a relationship exists between the financial decisions of investors in international Islamic indices and those investing in Türkiye's Participation Index. Similarly, Gençtürk *et al.* (2022) examine how COVID-19-related measures – such as social distancing and travel restrictions – impact the performance of the Participation-30 index, offering insights into the market's response to external shocks. Kahyaoglu and Akkuş (2020) analyze volatility spillover between the BIST-30 and the Katilim-30 indices and provide evidence on how market risks might transfer across different segments of the Turkish capital markets. Adeyemi and Tekdoğan (2024) focus on the methodological underpinnings of Shariah screening methods, assessing their rationale and potential religious influences across several Islamic indices, including the BIST Participation Index. However, no prior study examines the effect of the duration of participation index inclusion on firm dynamics using dynamic modeling techniques like local projections (LP) to model shocks in a dynamic way. This study addresses that gap by examining whether longer-term inclusion in the BIST Participation Index leads to more sustainable firm dynamics, specifically in terms of firm growth and financial leverage. Dynamic analyses are conducted separately for each period based on fixed effects and free from modeling error, degrees of freedom is not dependent on inflation and participation index-sustainable firm dynamics is handled in a dynamic framework independent of classical OLS (ordinary least squares) in the short and long term. Compared to standard analyses, LP have considerable advantages in these aspects and the impulse-response analyses discussed in this study are based on these coefficients calculated separately for each period.

At the same time, the LP method is a semiparametric method and is highly robust to modeling errors like standard analyses. With this structure, the study presents findings based on analyses that are highly dynamic and free from modeling errors. The financial literature suggests that SC and NSC companies make different corporate financing decisions. Companies with a low debt-to-equity ratio are less valuable than those with a high debt-to-equity ratio. For SC and NSC firms, the capital structure factors of size, growth, profitability, asset tangibility and firm risk often have different implications. (Tawfik and Elmaasrawy, 2023). The capital structure of SC companies is determined by touchability and profitability, according to Ahmad and Azhar (2015), who analyzed the factors affecting the capital structure of SC companies in Malaysia using a sample of 194 SC companies from 2009 to 2013. Akbar *et al.* (2023) compared the impact of capital structure determinants on the leverage of SC and NSC companies in Pakistan. They found a negative correlation between leverage and touchability for both companies. El Alaoui *et al.* (2017) examined the relationship between a company's leverage, return on assets and stock price volatility using a firm. They found that changes in capital structure affect the firm's return and volatility but that SC shares have lower volatility than NSC shares but the same return. Using a sample of the 200 largest nonfinancial companies traded in the Malaysian and Pakistani stock markets, Bugshan and Bakry (2023) examined the relationship between corporate capital structure decisions and Shariah compliance. They found that Shariah compliance influences firms' financial decisions regarding capital structure, resulting in a significant difference in leverage between SC and NSC firms. Alnori and Alqahtani (2019) investigated the impact of Shariah compliance status on capital structure decisions and the speed of adjustment of nonfinancial firms in Saudi Arabia. They found that SC firms have significantly lower leverage and slower adjustment, which is also consistent with the findings of Bugshan and Bakry (2023) when both market and book proxies for capital structure are used. Husaeni (2018) investigated the possible effects of internal factors on capital structure in the Jakarta Islamic Index. The study found that capital structure is significantly affected by firm size, liquidity, return on assets (ROA) and sales growth. Yildirim *et al.* (2018) used a sample of companies from seven countries to analyze the most reliable determinants of capital structure of SC and NSC companies. They found that profitability is negatively related to leverage consistently across both leverage ratios and firm types and that the different independent variables have different effects on the two types of companies depending on the measure of leverage.

The drivers of firm performance [6] are another area of finance where little attention is paid to religious motives and rules, such as Shariah compliance. The operational performance of SC and NSC firms in six Gulf Cooperation Council (GCC) countries was analyzed by Akguc and Al Rahahleh (2018). They discovered evidence of a significant operating profit margin for SC firms, which can be attributed to their lower cost structure and higher total asset turnover. In the MENA (Middle East and North Africa) region, Farooq and Alahkam (2016) compared the performance of nonfinancial SC and NSC firms. They found that the former perform better than the latter and argued that the latter take excessive financial risk due to their higher debt, which, in turn, affects their performance. Pepis and De Jong (2019) examined how SC business practices affected the long-term financial performance of practicing firms and found that Shariah compliance had a positive impact on long-term financial performance, as evidenced by higher ROA and return on sales (ROS). Using a sample of 634 SC firms listed on Bursa Malaysia, Saba *et al.* (2021) examined the impact of Shariah compliance on firm performance. They found that Shariah compliance has a positive impact on firms' profitability and growth and increases firms' value because they conduct transactions in accordance with

Shariah and avoid nonpermissible activities. [Tahir and Ibrahim \(2020\)](#) examined the difference in performance between SC firms and conventional firms and found that SC firms performed better than their NSC counterparts. They also found a positive impact of operating cash flow on performance for both types of firms. Interestingly, when analyzing the significant correlation between external fundamentals, firm performance and internal characteristics, [Ho and Mohd-Raff \(2019\)](#) found that firms that adhere to Shariah principles manage their liquidity effectively and maintain sufficient cash to increase their profitability compared to firms that do not. However, this is inconsistent with the liquidity test criteria for Shariah compliance. [Table 1](#) presents the literature review and the potential contribution of this study. Within this framework, the methodology, modeling approach and analysis of this study differ from previous literature.

This study aims to contribute to Islamic finance literature in an important emerging market context by focusing on something different from the literature summarized above. This study focuses on firm growth and financial leverage in terms of the impact of inclusion in the participation index on sustainable firm dynamics. Specifically, we consider firm-level durable inclusion in an Islamic finance-based participation index using the LP method based on [Jordà \(2005\)](#), which is quite flexible in the dynamic modeling of firm dynamics. With this method, we use quarterly data on Turkish nonfinancial firms for 2021Q4–2024Q4 to examine the sustainable and stable growth and financial leverage of firms with the persistent shock of being included in the participation index. These sample periods were chosen because of the availability of quarterly financial information for the analysis. This study analytically proves that in an important emerging market like Türkiye, firms operating with a financing model that is very close to Islamic rules can achieve favorable stability by working in accordance with Islamic finance rules and reducing interest-free debts. Furthermore, Turkish nonfinancial firms operate in an environment marked by macroeconomic volatility, including high inflation and escalating borrowing costs due to recent interest rate hikes over the sample period. These challenges exacerbate financial instability, particularly for firms reliant on external debt. In this sense, participation index screens firms for Shariah compliance by enforcing debt thresholds and prohibiting speculative activities. This potentially mitigates financial instability.

Our study makes several contributions to the literature. To our knowledge, this is the first study in the context of Türkiye that analytically shows why firms that do not use financial structures close to Islamic principles should have financial structures close to Islamic principles to have better and more stable firm dynamics. By using LP, we circumvent limitations of traditional panel data models enabling a more flexible estimation of short- and long-run responses to index inclusion. We shift the focus from static comparisons of SC vs NSC firms to a dynamic treatment of Islamic finance exposure. We argue that the continuity and duration of compliance play a critical role in shaping firm outcomes, a dimension largely overlooked in previous studies.

The inclusion of firms in the participation index is analyzed using a time-varying, hand-collected data set and an impulse response analysis of the LP method based on the participation index shock. Our results are quite interesting and could contribute to the existing literature. The results indicate that inclusion in the participation index (in this study, we examine the effect of full participation in the participation index on sustained firm dynamics by considering a continuous and two-quarter shock) results in more stable firm growth and that financial leverage is negative and ensures this stability. Interestingly, in the robustness checks, we also find that inclusion in the participation index for only one quarter does not provide the same

Table 1. Summary of literature review and potential contribution of this study to the literature

Study	Topic	Profitability	Size	Tangibility	Nondebt tax shield	Depreciation	ROA	Growth	Dynamic model (yes or no)
Ahmad and Azhar (2015)	Capital structure	X	X	X					No
Akbar <i>et al.</i> (2023)	Capital structure	X	X	X	X				Yes
El Alaoui <i>et al.</i> (2017)	Capital structure	X							Yes
Bugshan and Bakry (2023)	Capital structure	X	X	X		X	X		Yes
Alnori and Alqahtani (2019)	Capital structure	X	X	X		X			Yes
Husaeni (2018)	Capital structure		X				X	X	No
Yildirim <i>et al.</i> (2018)	Capital structure	X	X	X					No
Farooq and Alahkam (2016)	Firm performance	X	X					X	No
Akguc and Al Rahahleh (2018)	Firm performance	X	X				X	X	No
Pepis and De Jong (2019)	Firm performance	X	X				X		No
Saba <i>et al.</i> (2021)	Firm performance	X	X	X			X	X	No
Ho and Mohd-Raff (2019)	Firm performance		X				X	X	No
Tahir and Ibrahim (2020)	Firm performance	X	X				X		No
The present study	Firm growth and capital structure	X	X	X	X	X	X	X	Yes

Source(s): Elaborated by the authors

(continued)

Table 1. Continued

Study	Time-varying measurement of sustainable and continuous participation to islamic index		Shock-related islamic finance participation estimation	Country	Period	Method	Does the study approves the positive effect of islamic finance on firm dynamics? (yes or no)
Ahmad and Azhar (2015)	No	No	No	Malaysia	2009–2013	Pooled TSCS	Yes
Akbar <i>et al.</i> (2023)	No	No	No	Pakistan	2008–2018	GMM	Yes
El Alaoui <i>et al.</i> (2017)	No	No	No	Eight European countries	2001–2013	Dynamic panel	Yes
Bugshan and Bakry (2023)	No	No	No	Malaysia and Pakistan	2005–2019	OLS and GMM	Yes
Alnori and Alqahtani (2019)	No	No	No	Saudi Arabia	2005–2016	GMM	Yes
Husaeni (2018)	No	No	No	Indonesia	2014–2016	MLR	Yes
Yildirim <i>et al.</i> (2018)	No	No	No	Seven countries	2004–2014	Panel	Yes/No
Farooq and Alahkam (2016)	No	No	No	MENA	2005–2009	Pooled OLS	No
Alguc and Al Rahleh (2018)	No	No	No	GCC countries	2000–2014	Pooled OLS	Yes
Pepis and De Jong (2019)	No	No	No	Global	1990–2018	Event study	Yes
Saba <i>et al.</i> (2021)	No	No	No	Malaysia	2000–2014	Panel	Yes
Ho and Mohd-Raff (2019)	No	No	No	Malaysia	1999–2015	Panel regression	Yes
Tahir and Ibrahim (2020)	No	No	No	Global	2011–2014	Panel	Yes
The present study	Yes	Yes	Yes	Türkiye	2005Q1–2023Q1	Panel	Yes

sustainability and stability. Therefore, the study is expected to contribute to the Islamic finance literature and initiate new discussions.

Based on the theoretical and empirical foundation outlined above, we formulate the following hypotheses:

- H1. The growth of the firms included in the participation index is expected to be stable after inclusion in the participation index.
- H2. The financial leverage of firms included in the participation index is expected to be stable after inclusion in the participation index.

The content plan of the study is as follows. Section 2 deals with the literature review and the development of hypotheses, while Section 3 explains the data and methodology in detail. Section 4 discusses the findings and robustness checks. The final section discusses the conclusion with implications for management and policy, limitations and further recommendations.

2. Data and methodology

The data set used in the study is obtained from two different data sources. The first data source is Thomson Reuters (now LSEG) Eikon database, which is based on firm-level financial statements. The second data source is Bursa Istanbul database. Firms in the participation index based on Bursa Istanbul indices were obtained by the authors from the Bursa Istanbul Web page. Since the participation index is regulated by Bursa Istanbul as of 2021Q4, the participation index is included in the analysis as of 2021Q4. The data set is end at 2024Q4. The firm-level variables in the data set and their calculation methods are presented in Table 2.

Table 2. Definition and calculation methods of the variables used in the study

The notation of variable	The name of variable	Measurement method	Source
FG _{i,t}	Firm growth	Ratio of the difference between the revenue in the current period and the revenue in the previous period to the revenue in the previous period	Computed by the authors using the Refinitiv Eikon database/terminal
ROA _{i,t}	Return on assets	Net operating income/total assets	Computed by the authors using the Refinitiv Eikon database/terminal
LEV _{i,t}	Financial leverage	Total liabilities/total assets	Computed by the authors using the Refinitiv Eikon database/terminal
SIZE _{i,t}	Firm size	Natural logarithm of total assets	Computed by the authors using the Refinitiv Eikon database/terminal
K/A	Asset tangibility	Fixed assets to total assets	Computed by the authors using the Refinitiv Eikon database/terminal
δ/A _{i,t}	Nondebt tax shield	Depreciation to total assets	Computed by the authors using the Refinitiv Eikon database/terminal
IFTreat	Participation index treatment variable	Time-variant participation index dummy variable that takes the value 1 if the firm is included in the participation index and 0 otherwise	Hand-collected by the authors using the Bursa Istanbul website

Source(s): The authors' using the Refinitiv Eikon Terminal, except IFTreat variable

Table 2 details the calculation of the variables used in this study. All variables in Table 2 are adjusted for outliers below 1% and above 99% in both tails. At the same time, except for the IFTreat and the FG variables, all variables in the financial statements are adjusted for inflation by using GDP (Gross Domestic Product) Deflator. Descriptive statistics of the variables in Table 2 are presented in Table 3.

Table 4 indicates that there is a correlation between the variables. According to the results of the correlation analysis, the effect of being in the participation index on FG is positive and statistically significant at the 5% statistical significance level. The effect of being in the participation index on firm leverage is negative, but this effect is not significant (at the 5% level).

Table 3. Descriptive statistics

Variable	Mean	SD	Min.	Max.	Observations
FG _{i,t}	0.009	0.61	-1.99	2.21	n = 3,970 n = 336 T-bar = 11.71
LEV _{i,t}	0.51	0.22	0.04	1.29	n = 4,109 n = 341 T-bar = 12.09
ROA _{i,t}	0.03	0.05	-0.13	0.22	n = 4,082 n = 341 T-bar = 11.97
SIZE _{i,t}	18.68	1.69	14.81	23.27	n = 4,110 n = 339 T-bar = 12.12
IFTreat _{i,t}	0.48	0.49	0	1	n = 4,192 n = 342 T-bar = 12.25
δ/A _{i,t}	0.004	0.008	0	0.05	n = 2,595 n = 260 T-bar = 9.98
K/A _{i,t}	0.21	0.20	0.0002	0.84	n = 4,077 n = 337 T-bar = 12.09

Source(s): Authors' own work using the Refinitiv Eikon Terminal, except IFTreat variable. IFTreat variable is hand collected by the authors

Table 4. Pairwise correlations

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)
(1) FG	1.000						
(2) LEV	0.009	1.000					
(3) ROA	0.153***	-0.106***	1.000				
(4) SIZE	0.056***	0.291***	-0.047***	1.000			
(5) δ/A	0.044**	0.161***	-0.040**	-0.027	1.000		
(6) K/A	0.020	-0.140***	-0.155***	0.078***	-0.072***	1.000	
(7) IFTREAT	0.000	-0.109***	0.188***	-0.048***	-0.012	0.028*	1.000

Note(s): *** $p < 0.01$; ** $p < 0.05$; * $p < 0.1$

Source(s): Authors' own work using the Refinitiv Eikon Terminal, except IFTreat variable

Table 5. Distribution of firms in the participation index by quarters

The participation index status of firms	2021				2022				2023				2024			
	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3
Firms not included in the participation index	157	156	163	169	180	192	165	156	175	175	162	162	143			
Firms included in the participation index	141	160	161	161	149	149	176	170	151	151	162	162	144			
Total	298	316	324	330	329	341	341	326	326	326	324	324	287			
Note(s): The number of firms may change every quarter depending on the firms' balance sheets available at that time and the outlier elimination (since the trimming method is used)																
Source(s): Authors' own work																

Table 5 shows the number of firms included and excluded in the participation index. It is observed that the number of firms included in the participation index among Turkish nonfinancial firms is relatively high. This can be interpreted as the participation index having an important incentive for firms included in the participation index among nonfinancial firms.

The methodology used in this study is the LP method proposed by Jordà (2005). The reasons for choosing this method are very important and suitable for analyzing the relationship between the participation index and the sustainability of companies. The LP method has significant advantages over the vector autoregressive (VAR) models based on Sims (1980) in applied economic and financial modeling literature.

The LP method based on Jordà (2005) allows the use of methods such as the standard fixed effects method (as in this study) instead of the VAR method, which is based on a system equation (in this analysis, lags of each endogenous variable are considered). It thus avoids the problems of VAR analysis such as degrees of freedom or excessive number of parameters.

The LP method is a semiparametric method and is based on quite different assumptions from the standard VAR model. For instance, the LP method does not require the selection of a lag level and lags of the variables themselves. To start with a simple example of VAR analysis, let w_t be a vector and let the variables in this vector be random and stationary (normally it can also be nonstationary according to Jordà (2023), so in this study we did not use unit root tests etc. in our analysis). This vector w_t is the vector of variables cover the time period $t = 1, \dots, T$. We can express a VAR (1) process in this context as in equation (1):

$$(w_t - \mu) = A(w_{t-1} - \mu) + \epsilon_t; \quad \epsilon_t \sim D(0, \Omega) \quad (1)$$

where $w_t = (w_{1t}, \dots, w_{jt}, \dots, w_{kt})'$ for $j = 1, \dots, k$ follows a VAR(1) process. In simple terms, the response of w_{jt+h} to a shock size δ_i in ϵ_t is expressed as follows:

$$R_{ij}(h) = E[w_{jt+h} | \epsilon_t = \delta_i; w_{t-1}] - E[w_{jt+h} | \epsilon_t = 0; w_{t-1}] = A_{[j,i]}^h \delta_i \quad (2)$$

for $h = 0, 1, \dots, H$ and where $A_{[j,i]}^h$ denotes the j^{th} row of the matrix A raised to the h^{th} power. In this calculation, the residuals (ϵ_t) are generally correlated with each other and are a linear combination of the structural residuals.

The LP method uses a recursive substitution that does not require the stationary assumption, so that the VAR method in A1.1 is obtained through the LP method as in equation (3):

$$(w_{t+h} - \mu) = A^{h+1}(w_{t-1} - \mu) + A^h \epsilon_t + \dots + A^0 \epsilon_{t+h}, \quad (3)$$

with $A^0 = I$.

The previous calculation shows us to regress w_{jt+h} on w_{t-1} , and is expressed as in equation (4):

$$w_{jt+h} = c_{jh} + \beta_{jh+1} w_{t-1} + v_{jt+h}; \quad v_{t+h} = B_h \epsilon_t + \dots + B_0 \epsilon_{t+h}; \quad (4)$$

for $h = 0, 1, \dots, H$.

Following equation (4), the impulse response function in equation (5) is obtained as follows:

$$R_{ij}(h) = E[w_{jt+h} | \epsilon_t = \delta_i; w_{t-1}] - E[w_{jt+h} | \epsilon_t = 0; w_{t-1}] = \beta_{jh} \delta_i, \quad (5)$$

which will be equal to $A_{[h]}^h \delta_i$, and that $B_h = A^h$.
All in all, the LP method differs from the VAR method in these equations and encourages us to test the contribution of Islamic finance to firm dynamics in terms of sustainability in four important points:

- (1) Allowing nonlinear modeling. The impact of Islamic finance on firm dynamics is nonlinear (i.e. first decreasing and then increasing vice versa).
- (2) It does not need stationary variables.
- (3) It does not require information criteria. In this way, it does not require any information criterion as in the classical VAR model.
- (4) The model is not sensitive to misspecification. This is particularly important in this study, which aims to explore the long-run and short-run effects of Islamic finance on firm dynamics (included in the robustness check). Here, we follow [Jordà \(2023\)](#), and boldface indicates vectors and capital letters indicate matrices.

This study uses two separate variables to test sustainability through Islamic finance: FG and LEV. In the models of these two variables, the sustainability of Islamic finance, which is considered as FG and LEV in the long run, is tested by introducing a participation index inclusion shock. In the first equation, FG is tested through Islamic finance in this study as follows:

$$FG_{i,t} = \beta_0 + \beta_1 SIZE_{i,t} + \beta_2 ROA_{i,t} + \beta_3 Q2_{i,t} + \beta_3 Q3_{i,t} + \beta_4 Q4_{i,t} + \beta_5 IFTreat_{i,t} + \gamma_d + u_{i,t} \quad (6)$$

In [equation \(6\)](#), SIZE: firm size, ROA stands for return on assets, and Q2-Q4 refers to the seasonal dummy variables added to the models to control for seasonality. Please note that one dummy is missing to avoid falling into the dummy variable trap [\[7\]](#). [Equation \(6\)](#) considers firm growth as sales growth, which is more consistent with the nature of Islamic finance, which promotes a more stable financial system by prohibiting speculative transactions, such as excessive risk-taking and uncertainty. The variables in [equation \(6\)](#) are chosen following the existing literature on FG ([Beck et al., 2005, 2008](#); [Van Biesebroeck, 2005](#); [Kang and Eum, 2022](#); [Coad and Srhoj, 2020](#); [Orser et al., 2000](#); [Lee and Cowling, 2014, 2015](#)). Therefore, firm size in [equation \(6\)](#) (measured by the variable SIZE) refers to firm size. Firm size has an important place in the existing literature on firm dynamics. As firm size increases, the firm is expected to grow more than other relatively small firms ([Beck et al., 2008](#); [Van Biesebroeck, 2005](#); [Coad, 2021](#); [Kang and Eum, 2022](#); [Coad and Srhoj, 2020](#) [Orser et al., 2000](#); [Lee and Cowling, 2014, 2015](#)). In [equation \(6\)](#), the effect of Islamic finance (measured by inclusion in the participation index in this equation) is expected to contribute to stable FG.

[Equation \(7\)](#) tests the relationship between financial leverage and participation in the participation index. [Equation \(7\)](#) can be expressed as follows:

$$LEV_{i,t} = \beta_0 + \beta_1 SIZE_{i,t} + \beta_2 ROA_{i,t} + \beta_3 Q2_{i,t} + \beta_4 Q3_{i,t} + \beta_5 Q4_{i,t} + \beta_6 IFTreat_{i,t} + \beta_7 \delta / A_{i,t} + \beta_8 K / A_{i,t} + \gamma_d + u_{i,t} \quad (7)$$

[Equation \(7\)](#) is estimated based on capital structure theories. In [equation \(7\)](#), LEV stands for financial leverage, SIZE stands for firm scale, ROA again stands for return on assets, Q2–Q4

is a seasonal dummy variable, δ/K stands for depreciation to assets and K/A stands for asset tangibility. In particular, the δ/K variable is included to express the nondebt tax shield. K/A for asset tangibility is calculated as net fixed assets to total assets and is included in the model. To test the pecking order or trade-off theories, ROA, which represents internal finance, is also included in the model for this purpose. The selection of all variables follows the literature based on capital structure theories (Myers, 1977, 1984; Whited, 1992; Rajan and Zingales, 1995; Fama and French, 2002; Delcours, 2007; Lemmon *et al.*, 2008; Leary, 2009; Chow *et al.*, 2018; Baños-Caballero *et al.*, 2010). Profitability is used due to the current literature (see Shyam-Sunder and Myers, 1999; Antoniou *et al.*, 2008; Rajan and Zingales, 1995; Bevan and Danbolt, 2004) indicates a positive relationship between leverage and profitability.

3. Findings and discussion

3.1 Preliminary analysis

In the first part of the analysis of the study, the nonfinancial companies included in the shareholding index are comparatively analyzed based on two different indicators that show the sustainability of Islamic finance for the sample of this study.

Figure 1 compares the SC and NSC firms for the FG variable representing firm growth. It can be seen that the growth indicators of the companies that were not included in the shareholding index are unstable. On the other hand, the growth performance of companies included in the participation index is more stable, even if periodic declines exist. Companies included in the participation index generally have a relatively higher FG than companies not included in the participation index. These findings are consistent with existing literature, including Husaeni (2018), Akguc and Al Rahahleh (2018) and Pepis and De Jong (2019), Ho and

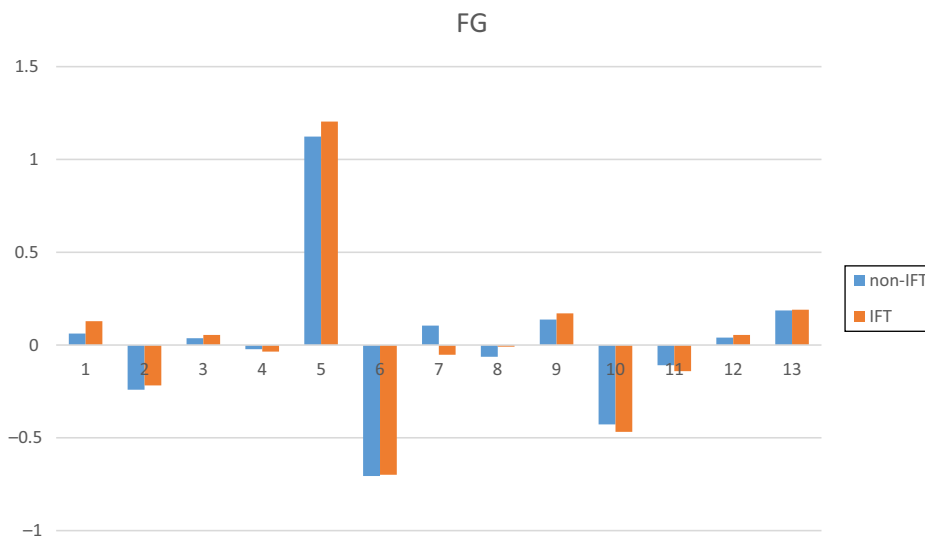


Figure 1. FG for the companies listed in the participation index and the FG of other firms
Source(s): Authors' own work using the Refinitiv Eikon Terminal, except IFTreat variable. Non-IFT: No Islamic finance-indexed firms, while IFT denotes the Islamic finance indexed firms

Mohd-Raff (2019), Tahir and Ibrahim (2020) and Saba *et al.* (2021) and differ from the findings of Farooq and Alahkam (2016).

Figure 2 indicates the financial leverage ratios for companies that are included in the participation index and for companies that are not included in the participation index in comparison with the individual periods. It can be seen that the financial leverage ratios of companies included in the participation index are relatively low and stable, as with the FG variables parallel to the logic of the Islamic economy. These results are in line with the existing literature, including Alnori and Alqahtani (2019), Saba *et al.* (2021), Tahir and Ibrahim (2020) and Bugshan and Bakry (2023).

As shown in Figure 1, SC firms tend to have slightly more stable and growth trajectories than NSC firms, which exhibit greater volatility. Similarly, Figure 2 shows that SC firms maintain consistently lower leverage ratios. These patterns align with earlier studies such as Husaeni (2018) and Saba *et al.* (2021), which suggest that SC firms avoid excessive debt and exhibit stronger internal financing capacity. The preliminary data thus support the notion that Shariah-compliant practices can be associated with financial discipline and stability.

3.2 Main model findings

The relationship between the FG variable and the shock of inclusion in the participation index, which is estimated by using the LP methodology, is presented in Figure 3. According to the results of the impulse-response function in Figure 3, it is seen that the shock of inclusion in the participation index increases firm growth. This effect lasts for approximately

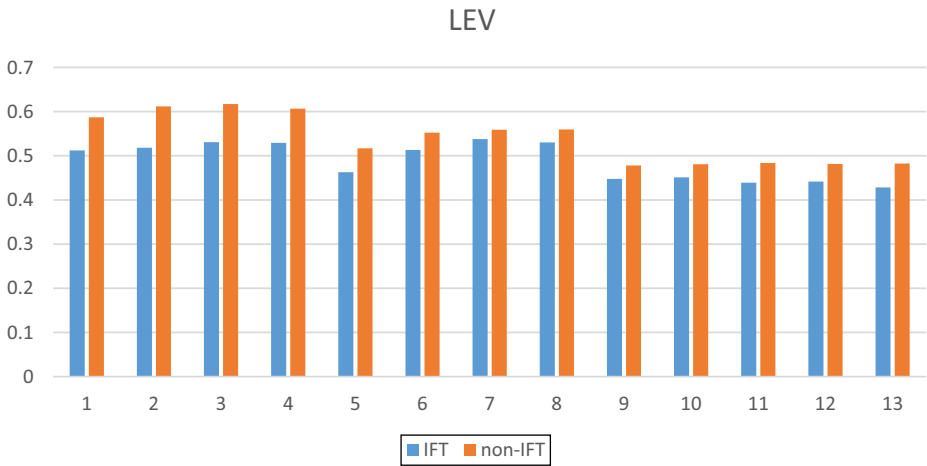


Figure 2. LEV for the companies listed in the participation index and the LEV of other firms
Note(s): There might be questions regarding the leverage ratios of companies featured in the participation index, given that these ratios exceed the allowable threshold of 33 percent. This discrepancy arises from the screening criteria, which measures the proportion of interest-bearing debts in the financial statement concerning the higher value between average market value or total assets. Our leverage ratio encompasses all liabilities of the firm, not solely interest-bearing debts and notably uses total assets, rather than average market value, as the denominator in its computation
Source(s): Authors' own work using the Refinitiv Eikon Terminal, except IFTreat variable. Non-IFT: No Islamic finance-indexed firms, while IFT denotes the Islamic finance indexed firms

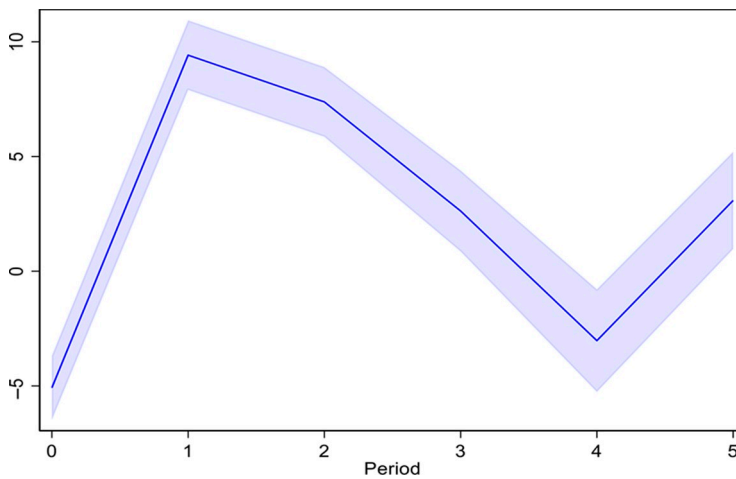


Figure 3. Effect of participation to the participation index shock on firm growth
Source: Authors' own work

two years. The steady firm growth following index inclusion suggests that compliance builds reputational capital and investor confidence, which is useful for strategic positioning.

In [Figure 3](#), it is seen that firm growth (proxied by sales growth) has not a sustainable effect after inclusion in the participation index, however; the Islamic finance and firm growth should be stable as [Husaeni \(2018\)](#) and [Saba et al. \(2021\)](#) point. Based on this result, it has been determined that entering the index for one quarter to comply with Islamic principles would not be stable. At the same time, the fact that adopting Islamic principles takes time should also be taken into account; this is clearly evident in the results of our local projections model at $t = 0$. Consequently, using the LP methodology, we modeled the impact of entering this participation index as having a two-quarter effect in the robustness check section. Treating it as such can produce more stable results.

The stability may also be attributed to the internal financing model encouraged by Islamic finance, which favors retained earnings over debt-funded expansion. Our dynamic analysis provides new evidence by showing that this effect is not only present but also persistent over time.

[Figure 4](#) shows the effects of inclusion in the participation index on the financial indebtedness of companies. In this Impulse response function (IRF) calculation, the effect of inclusion in the participation index on the financial indebtedness of companies is negative and stable. This effect causes the financial leverage ratio to continue to decline over time. The observed reduction in financial leverage implies that firms managing their balance sheets to align with Islamic thresholds may not only meet ethical goals but also reduce exposure to interest-rate volatility. This is a critical insight for Chief Financial Officers (CFOs) operating in inflationary environments.

SC companies tend to be particularly sensitive to leverage in their capital structure, which can have a detrimental effect on their profitability. Strict adherence to SC practices may limit investment opportunities and hinder access to certain markets or financial instruments. However, in the context of pecking order theory and in light of the above findings on firm growth, this result suggests that a firm that experiences stable and increasing growth while effectively using its assets to generate profits tends to accumulate higher retained earnings. Consequently, these increased internal funds reduce the firm's dependence on external financing. These findings are

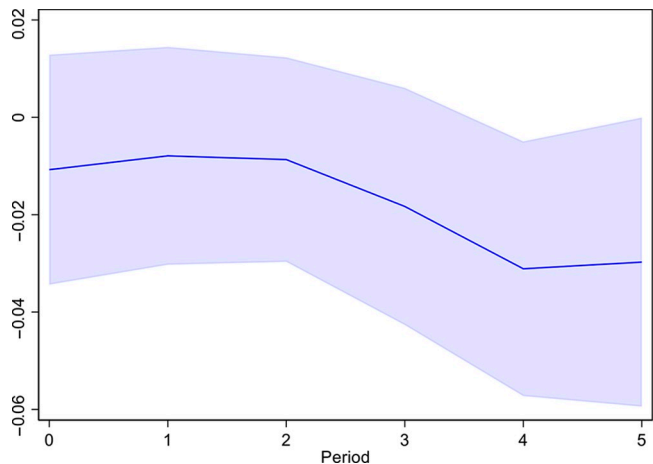


Figure 4. Effect of participation to the participation index shock on firm financial leverage
Source: Authors' own work

consistent with the existing literature, including [Alnori and Alqahtani \(2019\)](#), [Tahir and Ibrahim \(2020\)](#) and [Bugshan and Bakry \(2023\)](#), who argue that SC firms operate under stricter debt constraints. In our case, we further show that not only is the leverage lower, but its trajectory becomes more stable once firms are screened into the index. This suggests that the participation index functions as both a selection mechanism and a behavioral anchor: once included, firms are incentivized to maintain a conservative capital structure to remain eligible.

Within the framework of the findings obtained, the two hypotheses addressed in this study, “ H_1 : The growth of the firms included in the participation index is expected to be stable after inclusion in the participation index” and “ H_2 : The financial leverage of firms included in the participation index is expected to be stable after inclusion in the participation index”, were partly confirmed, respectively. In particular, it is necessary to remain stable in the participation index for firm growth.

3.3 Robustness checks

In the “robustness checks” section of the study, we test the robustness of the results obtained with the existing models (the main models mentioned above) by choosing different modeling preferences used in the LP methodology. In these models, the main models are estimated with stable two-quarter shocks to participation in the participation index. However, these robustness checks also examine whether the participation index provides stable and sustainable firm dynamics for the firms that do not remain in the participation index for these two quarters. Therefore, the results of the LP method-based impulse-response analysis, shown in [Figures 3 and 4](#), are tested again for firm sustainability of the companies for the companies that are included in the participation index for two quarters. It is well known that th companies included in the participation index for a long-time can gain in reputation. The results of this robustness test are shown in [Figures 5 and 6](#).

[Figures 5 and 6](#) show that participation in the participation index for one period also provides a stable or sustainable performance in terms of FG and financial leverage. In other words, to be included in the participation index for one period also contributes to a stable FG and leverage. However, the results in [Figures 5 and 6](#) suggest that to be included in the participation index

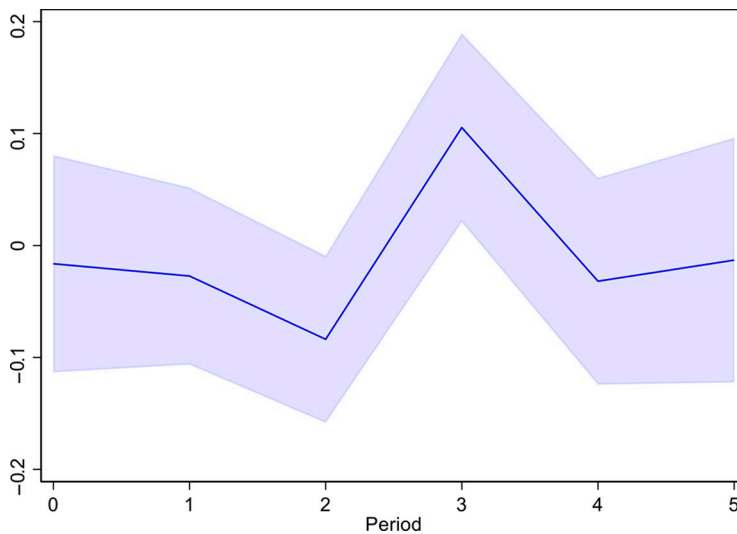


Figure 5. Effect of participation to the participation index shock on firm growth, two quarters participation index shock
Source: Authors' own work

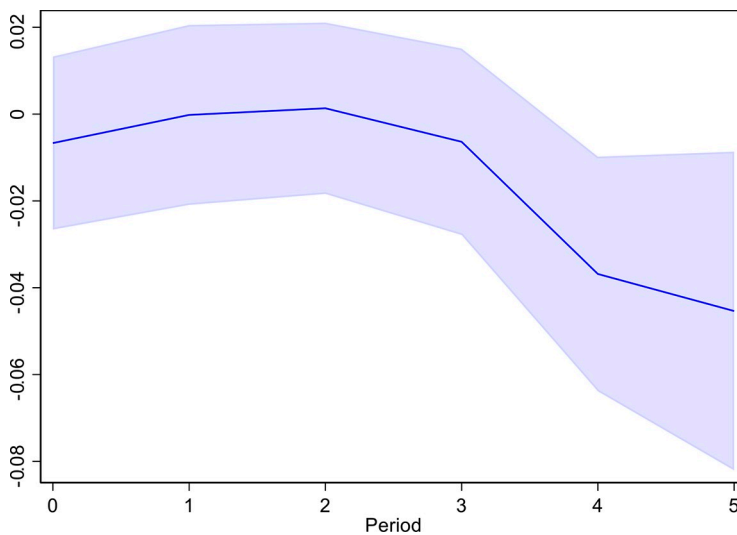


Figure 6. Effect of participation to the participation index shock on firm financial leverage, two quarters participation index shock
Source: Authors' own work

should be continuous and are relatively less than the results we obtained in the main models (see [Figure 3](#) for main model results for FG and [Figure 4](#) for the financial leverage). [Figure 5](#) shows that although being in the participation index differs from the main model results (in [Figure 3](#)) in terms of FG. The effect of the shock of inclusion in the participation index for one period did not increase FG as in the main model. [Figure 6](#) shows that although being in the participation index differs from the main model results (in [Figure 4](#)) in terms of leverage, it is seen that even staying in the participation index for one period provides stability in the financial leverage of firms. We believe that this is due to the fact that the firm needs to reach a certain debt threshold to be included in the participation index. It is seen that being included in the participation index, even for one period, is very beneficial for the debt structure of the firm and provides stability. Although short-term index inclusion reduces leverage modestly, its effect on firm growth is negligible. This may reflect the lag required for firms to reorganize internal financing or the temporary nature of reputational benefits.

These results show that short-term inclusion does not yield similar benefits. The effects on firm growth are weaker and less consistent, and the reduction in leverage is more muted. This contrast reinforces the argument that it is the sustained alignment with Islamic finance principles, rather than momentary compliance, that drives stability. These results also expand on earlier finding by demonstrating that duration of compliance is a key dimension previously overlooked in the literature.

[Figure 6](#) shows that financial leverage decreased even further in the long term for firms included in the participation index for two quarters. This finding indicates that Islamic finance has serious potential in terms of both financial leverage and growth in the long term.

The last robustness check in this paper is based on solving a problem arising from balance sheet practices in parallel with the literature. For firms that do not report depreciation and amortization, [equation \(7\)](#) is reestimated by taking depreciation and amortization values as zero. In this robustness check exercise, missing information and loss of observation are corrected. These results are also presented in [Appendix Figure A1](#). The effect of Islamic finance on financial leverage is found to be the same as in the main model.

Our analysis confirms that the participation index represents a strategic framework that aligns firm growth with prudent financial management. By comparing our results with the pecking order and trade-off theories, we find that stable growth, supported by retained earnings, helps firms reduce dependency on external financing. According to our findings, the fact that firms have a structure that is compatible with Islamic finance causes firms to have a more stable financial structure and a more reasonable growth process.

4. Conclusion

This study examines whether the inclusion of firms in the participation index provides sustainability in terms of firm growth and financial leverage within the framework of Islamic finance principles by using the LP method for Turkish nonfinancial firms. We examine the impact of inclusion in the participation index for one quarter on the firm dynamics of Turkish nonfinancial firms. Also, for a robustness check, we investigate the sustainability and stability effects of inclusion in the participation index for two quarters.

Our results suggest that a company that grows stable not only generates more retained earnings but also adheres to the principles of Islamic finance, which include prudence, ethical behavior and risk sharing. The observed decline in financial leverage underscores the need for internal financing arrangements that are in line with Shariah principles, thereby highlighting the ethical review process inherent in Islamic finance. This process includes the avoidance of speculative transactions and interest-based obligations. The effect of the shock of inclusion in the participation index for one period did not increase firm growth as in the

main model. However; it is seen that even staying in the participation index for one period provides stability in the financial leverage of firms. Moreover, according to the results of robustness checks being included in the participation index for a short period of time has short-term effects, and it has been determined that firms need to be included in this index for a longer period of time to be stable.

High-value companies can be rejected to be included in the participation index, as they cannot meet the financial criteria because of their high debt-to-equity ratios. For these firms to benefit from the positive outcomes of adhering to Islamic finance principles, policymakers can provide viable opportunities for these companies to mitigate their reliance on debt-based financing and enhance their liquid assets. This can be formulated to help firms reorganize their financial portfolios, lowering their dependency on debt and bringing their financial structures into compliance with Islamic finance standards, by providing alternative financing methods based on Shariah principles. One of the potential alternatives could be crowdfunding, specifically in its equity-based or profit-sharing structures. Another alternative could be offering incentives like tax breaks for firms transitioning to equity-based financing to meet participation index criteria.

The results present important policy implications for Islamic finance research and practical applications. From an academic standpoint, the findings enhance our understanding of how aligning with Islamic finance principles affects firm growth and stability. In practical terms, the analysis shows that Islamic finance can decrease external debt dependence of the companies and increase sustainable growth. This provides strategic guidance for business decision-makers and policy authorities. The study further emphasizes Islamic finance's potential role in influencing financial regulatory frameworks and corporate governance standards. The wider societal benefits include promotion of responsible business practices, strengthened market confidence and support for long-term social welfare through the alignment of business performance with Islamic finance principles.

The study's limitations include the fact that we used the calculation of the participation index starting from 2021, the firm information included in the participation index in the data set started as of this date and the use of publicly traded firm data. However, the LP methodology eliminates these time constraints based on the participation index by calculating the participation index shock. Publicly traded firm data are used compulsorily due to the firms included in the participation index.

Moreover, the recent policy rate increase experienced in Türkiye has led to high interest rates, resulting in increasing borrowing costs. This situation has caused many companies in the participation index to resort to interest-bearing investments and consequently be excluded from the index. According to the findings, staying within the index appears more profitable and stable for firms. Therefore, for future studies, conducting a cost-benefit analysis comparing adherence to Shariah-compliance criteria with capitalizing on low borrowing costs is recommended.

It may be advisable for future studies to investigate in more depth the stable growth and financial leverage of firms in the participation index by looking at their relationship with corporate governance. Alternatively, we recommend that a cross-country participation index-sustainable firm growth and leverage structure be investigated in a dynamic framework. Moreover, the effects of the inclusion in the participation index on ESG performance could be investigated for the future research.

Notes

[1.] Dow Jones Islamic Market Index

[2.] Financial Times Stock Exchange Global Islamic Index

- [3.] BIST Participation Index commenced publication on January 6, 2011, sponsored by four participation banks. The index's inception date was set as December 31, 2008. The founding members of the index were Albaraka Türk, Kuveyt Türk, Bank Asya and Türkiye Finans participation banks. The advisory role for the index was managed by Bizim Menkul Değerler A. Ş. and the Participation Banks Association of Türkiye, while Borsa İstanbul was responsible for index calculation (Ülev, 2016). As of November 12, 2021, it has completely joined Borsa İstanbul (Borsa İstanbul, 2021). For details regarding BIST Participation Index and its screening criteria, see <https://borsaistanbul.com/en/index/1/3/participation>
- [4.] Standard and Poor's Global Broad Market Index Shariah
- [5.] Morgan Stanley Capital International World Islamic Index
- [6.] Since firm growth is also considered as an indicator of firm performance, we have also discussed this literature.
- [7.] Dummy variable trap is a problem that generally appears as "to set the constant term in the regression equation equal to zero" if four seasonal dummies are used (see Hirschberg and Lye, 2001).

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Further reading

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Appendix. Additional robustness check result

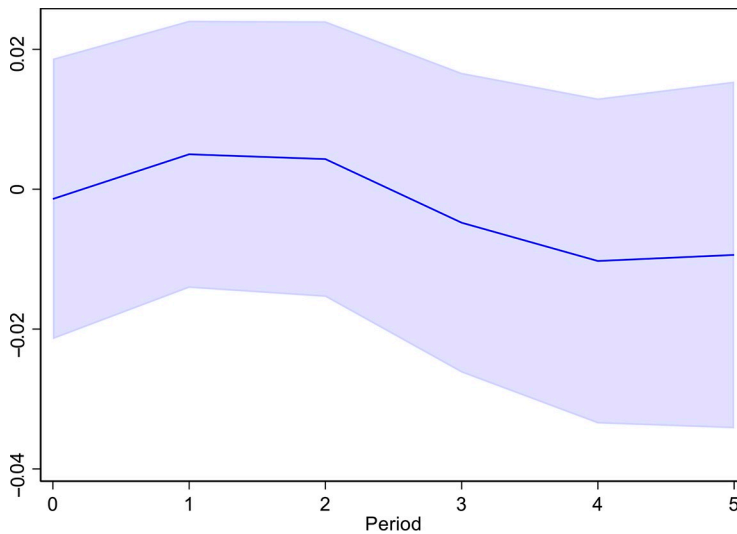


Figure A1. Obtained findings from the LP model for the leverage-participation to the participation index nexus for firms that do not report depreciation when depreciation is taken as 0

Source: Authors' own work

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