Edelweiss Applied Science and Technology
ISSN: 2576-8484
Vol. 6, No. 1, 1-14
2022
Publisher: Learning Gate
DOI: 10.55214/25768484.v6i1.301

Investigating the capital structure determinants of energy firms

Raja Rehan
Department of Business Administration, ILMA University, Karachi, Pakistan; dr.raja@ilmauniversity.edu.pk (R.R.).

Abstract: The ongoing energy crisis has turned into a major bottleneck for economic growth and has had a long-lasting impact on the performance of energy firms. However, recognizing capital structure determinants helps these firms construct an ideal capital structure and attain their target of profitability. Thus, this study is an attempt to identify capital structure determinants for whole energy firms that are operating in dissimilar regions and countries. The 14-year balance panel data of 281 energy firms, i.e., 2007–2020, is used to perform the analysis. The debt-to-asset ratio is nominated as a dependent, whereas sales, current ratio, asset tangibility, non-debt tax shield, return on equity, inflation, gross domestic product, and energy consumption are selected as independent variables. The Panel Data Static models and Dynamic models via the Generalized Method of Moments (GMM) are executed to perform the inquiry. The results indicate that lagged dependent variables, sales, tangibility, return on equity, inflation, gross domestic products, and energy consumption are the main capital structure determinants of energy firms. The significant lagged dependent variable, tangibility, sales, and the existence of speed of adjustment point towards the practice of the Dynamic Trade-off theory by energy firms to maintain capital structure at all times. The results obtained by this empirical analysis are a new addition to the financial literature and will help policymakers develop similar policies regarding the capital structure-maintaining practices of energy firms that will enhance energy-related ties among countries.
Keywords: *Capital structure, Dynamic trade-off theory, Energy firms, GMM, Panel data static & dynamic models.*

1. Introduction

Capital Structure is how an organization finances its assets and operations by utilizing dissimilar sources of finance [1]. Interestingly, the best blend of various financial sources helps organizations achieve their key target of generating a whopping revenue. Likewise, it also enhances organizations' inclusive market value. Overall, the positive earnings of businesses due to maintaining an optimum level of capital structure at all times not only impact the country's capital market performance and economy but also alter regional-level gross domestic product (GDP). Unfortunately, how to construct an optimal level of capital structure is still one of the top unsettled problems in the corporate finance world. Nevertheless, some core traditional theories of capital structure and their dynamic forms now help firms adopt those determinants that create the best blend of equity, retained earnings, debt, and other available financial resources. Notably, the issue of identifying core capital structure determinants for energy firms is still an unsolved problem. The former inquiries (see [2, 3]) that investigate capital structure determinants of energy firms focus only on a country or a particular region, thus not offering a complete and comprehensive overview. Also, an ongoing energy crisis, which has become a major bottleneck for the economic growth of several developed and developing nations, is impacting energy firms' financial performance adversely. However, by adopting appropriate capital structure determinants, these firms can easily formulate an ideal capital structure that enhances firms' value and financial growth. Therefore, it is warranted to identify key capital structure determinants that are identical for whole energy firms operating in different countries and regions.

History: Received: 4 January 2022; Revised: 10 March 2022; Accepted: 28 October 2022; Published: 13 October 2022

Unquestionably, the energy sector is an important pillar of any economic zone. However, these sectors' circular debts in dissimilar regions crossed the red lines and now touched their peaks. For instance, the European energy sector's debt soared by more than USD 1.7 trillion in 2022 [4]. In the same vein, the energy firms operating in the region of the South Asian Association for Regional Cooperation (SAARC) are not handling their escalating debt properly; thus, the region is facing energy scarcity issues [5, 6]. Also, the increasing energy demand and its soaring prices have become the main drain on several regions and countries. The Association of Southeast Asian Nations (ASEAN) is among those regions where energy demand is mounting rapidly. It is anticipated that energy demand in ASEAN is expected to increase from 80 to 250 percent by the beginning of 2040 [7]. Also, the hike in energy rates in the member countries of the Organization for Economic Co-operation and Development (OECD) increased inflation to a level that was not detected before [8]. A similar situation is observed in China, where the consumption of electricity rose dramatically by 6.3% year-on-year and residential demand jumped to 26.8% [9]. Moreover, sanctions executed by the United States on Iran and declining oil production by Saudi Arabia are also major reasons for growing energy prices across the globe. Also, the aftermath of COVID-19 pandemic, the Russia-Ukraine war, and the reduction in oil production by the Organization of the Petroleum Exporting Countries (OPEC) have moved the world towards an oil and gas shortage. Later, this shortage also became one of the core causes of record-soaring energy prices, which further triggered the energy crisis in dissimilar countries [10]. Visibly, energy firms across the globe are facing several problems, and the most common one is rising circular debts and soaring prices of oil and gas [4]. Certainly, this impacts the capital structure and formulating practices of energy firms operating across the globe. In recent circumstances, where the world is facing an energy crisis [10], it has become hard for these firms to generate income by availing of external finance in the very short term. Nevertheless, by formulating an appropriate capital structure, energy firms can easily handle these issues. Technically, an optimum capital structure is that which moves firms towards their main target of profitability and enhances their value. Thus, this offers a need for investigating capital structure determinants for whole energy firms that are operating in dissimilar regions and countries across the globe. Considering the above-discussed circumstances and their consequences, this inquiry is an attempt to discover those capital structure determinants that are similar for whole energy firms. For this purpose, a total of 281 energy firms operating in the dissimilar countries of SAARC, OECD, ASEAN regions, and China are selected. The 14-year panel data, i.e., 2007–2020, of selected firms is used to perform empirical analysis. The outcomes obtained via panel data static models and dynamic models via executing robust estimators, i.e., Generalized Methods of Moments (GMM), designate that size, tangibility, inflation, profitability, gross domestic products, and energy consumption are the key determinants of capital structure that impact energy firms' leverage-maintaining practices. The findings will help officials construct a unique policy for these firms that are operating in dissimilar regions to control energy scarcity and energy price problems. Besides, the findings also offer an opportunity for policymakers to develop a unique capital structure formulation policy for whole energy firms that are operating in dissimilar regions and countries. This is to enhance energy-related ties among the firms functioning in dissimilar countries and regions via the sharing of resources and to fix similar energy prices to enhance energy trade across the nations. Subsequently, after Section 1 of the introduction, Section 2 discusses the available literature on the topic. Then, Section 3 describes the data types and the methodology adopted to perform analysis. After that, Section 4 demonstrates the outcomes attained from executing the GMM estimator. Section 5 discusses the validity and credibility of the outcomes attained. Lastly, Section 6 contains the conclusion of this empirical investigation.

2. Literature Review

Despite nearly a century of research, capital structure is among the most unsettled problems in the financial universe [1]. The fundamental key capital structure theories, which are Modigliani Miller (MM) propositions, Pecking Order theory, and Trade-off theory, and now their dynamic forms provide guidelines for financial concerns to pick those determinants that construct a suitable mix of dissimilar financial resources, i.e., optimum capital structure. Modigliani and Miller [11] offered proposition I, which explains that in the existence of a perfect capital market, a firm's capital structure is irrelevant to its leverage-related decisions. Later, their amended proposition II describes that a firm's market value is not affected by its dividend-related policies. After MM, the Trade-off theory is introduced, which explains that a firm can balance its costs and debt to construct an optimum level of capital structure. After this, the Pecking Order (PO) theory is presented, which is also measured as a competitor of the Trade-off theory and describes that firms first focus on availing themselves of their internal available funds, i.e., retained earnings, then move for debt and, in the end, use the option of equity to meet their financing needs. Then, the dynamic forms of these traditional theories declare that a firm's capital structure is not a static property and possesses a dynamic nature [12]. Technically, dynamic theories postulate the idea of a targeted capital structure and the existence of a speed of adjustment (SOA). The notion of SOA defines that in the event of any divergence in an optimal level of capital structure, a firm moves back to its targeted level rapidly [13]. Principally, the notion of SOA is explained by the dynamic Trade-off theory, which clarifies the idea of targeted or optimum capital structure. Several theories explain the theoretical relationship between capital structure and its selected determinants. However, very few studies have investigated capital structure determinants for energy firms operating at the regional level. For instance, Berkman, et al. [14] revealed capital structure-related determinants of energy firms that are operating in the European context. By examining 74 firms' financial data from 2009 to 2012, this inquiry described that the firms' liquidity, tangibility, and profitability are the key significant determinants for European energy firms. However, in contrast with other studies, this inquiry observed the application of the Pecking Order theory in European energy-generating firms. Likewise, Jaworski and Czerwonka [15] examined the capital structure determinants for energy firms that operate in Europe. The findings of this empirical inquiry are consistent with the previous findings of Berkman, et al. [14]. The outcomes explained the practice of the Pecking Order theory and the significant relationship of capital structure with size, profitability, and asset tangibility. Also, Shrestha [16] exposed capital structure determinants for the energy-producing firms of several Asian republics. The results explain that key capital structure determinants of Asian energy-producing firms are size, market development, profitability, and interest rate. Evidently, the deliberated former investigations (see [14, 15]) suggest that liquidity, size, profitability, NDTS, inflation, energy consumption, and tangibility are the main capital structure determinants of the energy firms that are operating in dissimilar regions and countries. Notably, for the theoretical relationships, the findings for the European region are dissimilar to those for other regions where Dynamic Trade-off is observed to be more dominant in the studied regions. Considering the former investigation outcomes, this empirical inquiry was selected to explore the relationship among tangibility, profitability, liquidity, size, NDTS, inflation, gross domestic products, and energy consumption with energy firms' capital structure, i.e., measured by debt to total assets ratio (see Figure 1).

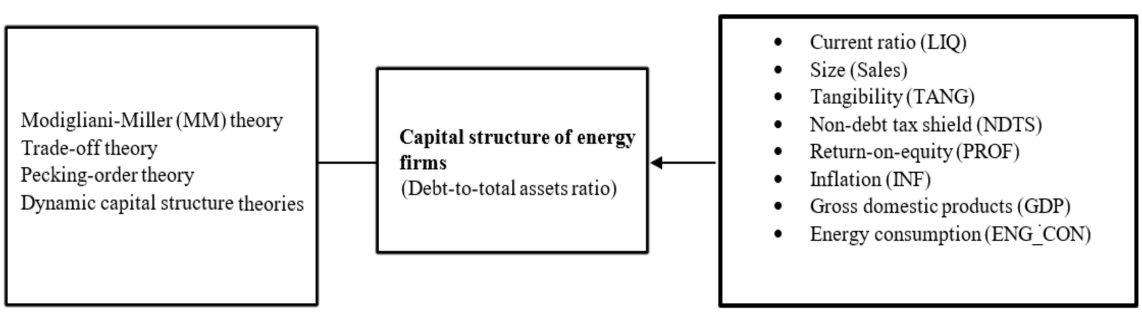

Figure 1.
Theoretical framework for energy firms de determinants.

Technically, GDP growth and inflation decrease firms' overall debt [15]. Moreover, the earlier inquiries elucidate variations in the nominated capital structure determinants (see Rehan and Abdul Hadi [1]). Therefore, it is assumed that the capital structure of energy firms is not static but rather dynamic.

The above Figure 1 explains the theoretical framework constructed to perform this empirical analysis. The nominated dependent and independent variables are explained in Table 1, given below. The key capital structure theories, MM, Trade-off, Pecking Order, and the latest Dynamic Capital Structure theories, are tested to check the capital structure-maintaining practices of whole energy firms. Subsequently, the linked hypotheses of this inquiry are given below:

H_1: There is a significant positive relationship between leverage and asset tangibility.
H_2: There is a negative relationship between leverage and size.
H_3: There is a positive relationship between firms' leverage and liquidity.
H_4: There is a significant negative relationship between leverage and NDTS.
H_5: There is a significant negative relationship between leverage and firms' profitability.
H_6: There is a significant positive relationship between leverage and GDP.
H_7: There is a significant positive relationship between leverage and inflation.
H_8: There is a significant positive relationship between leverage and energy consumption.
H_9: There is a significant dynamic relationship between leverage and selected determinants.

3. Data & Methodology

This empirical inquiry comprises a total of 281 energy firms that are operating in China and in dissimilar countries in three key economic zones: SAARC, ASEAN, and the OECD. The total 281 firms' data sample comprises 34 energy-producing firms from SAARC countries, 43 from OECD countries, 144 from ASEAN, and 60 energy-producing firms from China. For empirical analysis, a total of 14 years, i.e., 2007 to 2020, of nominated firms' yearly Balanced Panel Data, mainly gas, electricity, oil, and other dissimilar firms that are involved in generating energy, are mined from the Thomson Reuters Eikon database. Besides, to analyze the statistical relationships among the selected determinants, the data is extracted only for the below-explained determinants in Table 1.

Table 1.
Nominated variables and their measurements

S#	Variables	Symbol	Measurement	References
01	Debt-to-total assets	DTA (Y)	Total debt/Total assets	Sarioglu, et al. [17] and Demirhan [18]
02	Current ratio	LIQ* (X_1)	Current assets/Current liabilities	Mahvish and Qaisar [19] and Ata and Ag [20]
03	Sales	SIZE* (X_2)	Ln (Sales)	Jaworski and Czerwonka [15] and Nguyen [21]
04	Tangibility of Firms' asset	TANG (X_3)	Tangible fixed assets/Total assets	Berkman, et al. [14] and Sayilgan and Uysal [22]
05	Non-debt tax shield	NDTS (X_4)	Depreciation/ Total assets	Gill, et al. [23], Jaworski and Czerwonka [15] and Cortez and Susanto [24]
06	Return on equity	PROF* (X_5)	Net income/ Equity	Sarioglu, et al. [17]; Demirhan [18] and Kabakci [25]
07	Inflation	INF (X_6)	Inflation, consumer prices (Yearly %) /100	Jaworski and Czerwonka [15]; Bas, et al. [26] and Khan and Rehan [27].
08	Yearly GDP growth	GDP (X_7)	GDP growth (Yearly %) / 100	Jaworski and Czerwonka [15] and Bas, et al. [26].

Note: *LIQ = Liquidity, * SIZE = Sales, PROF* = ROE.

Table 1 displays the measure of capital structure and its selected determinants for this inquiry. Remarkably, the debt-to-total assets ratio, i.e., the ratio mentioned by DTA, is used to measure energy firms' capital structure. Likewise, the asset tangibility of selected firms is specified by TANG, and profitability is measured by return on equity, i.e., ROE. Afterward, CA, i.e., the current ratio, is used to check the liquidity position of the investigated firms. Size specifies the total annual sales of the selected energy firms, and the non-debt tax shield that is used to measure the depreciation effect on the firms' capital structure is mentioned by NDTS. Furthermore, inflation is indicated by INF and energy consumption by ENG_CON. This inquiry also considers gross domestic product, i.e., GDP, as an important capital structure determinant. Technically, this inquiry adopts INF and GDP as key determinants for energy firms by viewing recent global scenarios in which dramatically increasing inflation affects the overall GDP of several countries.

Additionally, energy consumption i.e. ENG_CON was considered by several former investigations (see for example Jaworski and Czerwonka [15]) as a core capital structure determinant for energy firms, therefore, this study also adopts it as a key determinant that influences on energy firms' capital structure maintaining practices. Certainly, the consumption of energy not only increases a firm's profitability but also declines its overall debt [15].

Analytically, the Panel Data Analysis (PDA) is implemented to discover the robust relationship between the nominated variables. Remarkably, Panel Data is a combination of time-series and cross-sectional data sets, also called pooled and longitudinal data [28]. Thus, this inquiry adopts Panel Data Static models, i.e., Fixed Effects (FE) and Random Effects (RE) models, to perform analysis. However, numerous scholars have identified that the capital structure of firms is not static but rather a dynamic property. Considering this, the Panel Data Dynamic model is also adopted to investigate the existence of dynamic capital structure determinants for energy firms. Thus, the Dynamic Panel Data model is examined by engaging a robust analytical estimator called the Generalized Method of Moments (GMM). Notably, GMM considered the best way to examine the dynamic relations among the determinants. The traditional Panel Data Model (PDM) is described in Equation 1 below:

$$PDM = y_{it} = \alpha_i + \gamma_t + \beta x_{it} + \varepsilon_{it} \qquad (1)$$

Here, PDM identifies the Panel Data model, 'i' describe the individuals (*i=1, 2,…., 281*), t is considered as a nominated period *(t=1,2,….,14)* for inquiry, $'y_{it}'$ describes the selected dependent variable, 'α_i' explains properties that are cross-sectional and 'γ_t' is clarified as a time series effects. Also, x_{it} is accepted to designate an independent variable and ϵ_{it} indicates an error term.

Analytically, this inquiry has implemented the Panel Data Analysis core models that were previously applied by Zandi, et al. [29]; Hernawati, et al. [30], and Chakrabarti and Chakrabarti [31]. The assessment models for Panel Data Static Analysis are articulated in Equations 2, 3, and 4 below:

1. Pooled Ordinary Least Square (POLS) Regression Model

$$\begin{aligned} DTA_{it} = {} & \beta_0 + \beta_1 LIQ_{it} + \beta_2 SIZE_{it} + \beta_3 TANG_{it} + \beta_4 NDTS_{it} + \beta_5 PROF_{it} \\ & + \beta_6 INF + +\beta_7 GDP_{it} + \beta_8\, ENG\_CON_{it} + \varepsilon_{it} \end{aligned} \qquad (2)$$

2. Fixed Effects (FE) Regression Model

$$\begin{aligned} DTA_{it} = {} & \beta_0 + \beta_1 LIQ_{it} + \beta_2 SIZE_{it} + \beta_3 TANG_{it} + \beta_4 NDTS_{it} + \beta_5 PROF_{it} \\ & + \beta_6 INF + +\beta_7 GDP_{it} + \beta_8\, ENG\_CON_{it} + \mu_{it} \end{aligned} \qquad (3)$$

3. Random Effects (RE) Regression Model

$$\begin{aligned} DTA_{it} = {} & \beta_0 + \beta_1 LIQ_{it} + \beta_2 SIZE_{it} + \beta_3 TANG_{it} + \beta_4 NDTS_{it} + \beta_5 PROF_{it} \\ & + \beta_6 INF + +\beta_7 GDP_{it} + \beta_8\, ENG\_CON_{it} + +\varepsilon_{it} + \mu_{it} \end{aligned} \qquad (4)$$

In Equation 2, 3, and 4, DTA explains the dependent variable, whereas LIQ, SIZE, TANG, NDTS, ROE, INF, GDP, and ENG_CON explain explanatory variables, which are described in the above-given Table 1. Moreover, in Equation 2, 3 and 4 is measured as the model error term and in Equation 4 explains the error term because of time series and individual characteristics. Typically, the POLS model is measured as a homogeneous sample [31]. Homogeneous samples are those whose units share similar characteristics such as age, background, gender, etc. [32]. Therefore, this inquiry also performs some diagnostic tests to confirm the accuracy of the constructed model. First, following the practices of former researchers (see [33, 34]), this study adopts a correlation matrix test, which is used to check the statistical relationship among the nominated variables. According to the explained criterion, if the value of the

ISSN: 2576-8484
Vol. 6, No. 1: 1-14, 2022
DOI: 10.55214/25768484.v6i1.301

coefficient is observed at +1, then it explains an accurate and positive association; if it lies at -1, then it identifies the perfect but negative connection between the investigated variables. Nevertheless, if the coefficient value is observed at 0, then it indicates the absence of any sort of relationship between the considered variables [35]. Also, Variance Inflation Factor (VIF) is performed to check the existence of any statistical relationship, i.e., multicollinearity among the nominated variables.

Remarkably, the issue of multicollinearity was observed due to the solid correlation between the existing variables of the model. Principally, if the value obtained from the VIF test surpasses 10 (see [30, 36]), then it explains the existence of a serious multicollinearity problem. The statistical model of the VIF test is portrayed below in Equations 5,6, and 7:

$$R^2Y \Longrightarrow Y_{it} = \alpha_0 + \beta_2 X_{2it} + \beta_3 X_{3it} + \beta_4 X_{4it} + \beta_5 X_{5it} + e_{it} \quad (5)$$

$$j = R^2_Y, R^2_{X1}, R^2_{X2,} R^2_{X3,} R^2_{X4,} R^2_{X5} \quad (6)$$

$$Tolrance = 1 - R^2_j \qquad VIF = \frac{1}{Tolerance} \quad (7)$$

After confirming the model's accuracy, the Breusch-Pagan Lagrange Multiplier, i.e., BPLM test, is executed to check the individuals' impacts. The null hypothesis of the BPLM test specifies that Pooled Ordinary Least Square (Pooled OLS) model is an appropriate model to perform analysis (H0: Pooled OLS is more appropriate). Whereas the alternative hypothesis (H1: Random Effects is more appropriate) indicates that the RE model is fit to perform the inquiry. Notably, the BPLM test adopts 'm' statistics of the Hausman [37] test to select the most suitable hypothesis. Therefore, if H0 of BPLM test is rejected, Hausman's test is performed to find the appropriate Panel Data model, which are FE and RE, for analysis [38]. The statistical Hausman's test model is explained below in Equation 8:

$$H = (b_1 - b_0)\,(Var\,(b_0) - Var\,(b_1))\,(b_1 - b_0) \quad (8)$$

Additionally, this study considers the difference in GMM presented by Arellano and Bond [39] to examine the significant and dynamic relationships between the debt-to-asset ratio and all nominated independent variables. Typically, the difference in GMM is detected best to discover the dynamic associations and SOA. Besides, the difference GMM is also measured best to amend the nominated dependent variable and use its legged version as another independent variable by using its initial difference, which is considered constant with time. As well, GMM is built to knob the biases of dynamic models and problems related to fixed effects [39]. This study adopts a two-step GMM procedure to perform analysis. The one-step GMM is a built-in procedure; however, for fixing the diagnostic issues connected with panel data modeling such as heteroskedasticity and autocorrelation, the two-step GMM is executed, which adjusts the dynamic model co-variances [12, 40]. The difference in GMM single-liner Equation 9 is explained below:

$$\mathrm{y_{it}} = (1 - \lambda)\,\mathrm{y_{i,t-1}} + \beta_1\,\mathrm{k_{it}} + \beta_2\,\mathrm{X_{it}} + \mu_{\mathrm{it}} \quad (9)$$
$$i = 1 \ldots 43,\ t = 1, 2, 3, \ldots, 14$$

Here, y_{it} is a dependent variable, λ indicates SOA which explains the convergence rate for y_{it} toward the firm's targeted capital structure. Then, $\mathrm{y_{i,t-1}}$ explains the dependent lagged dependent variable. Furthermore, k_{it} denotes the factor of fixed effects (FE) that moves over an individual in a nominated time, x_{it} identifies the nominated independent variable. Remarkably, if SOA not exists, then the relationships of variables undergo misspecification error [41]. Thus, to avoid the error of misspecification Equation 9 is restated as follows in below Equation 10:

ISSN: 2576-8484
Vol. 6, No. 1: 1-14, 2022
DOI: 10.55214/25768484.v6i1.301

$$y_{it} = (1-\lambda)\, y_{it-1} + \lambda \sum_{n=1}^{N} \beta_k\, X_{kit} + \varepsilon_{it} \qquad (10)$$

This empirical inquiry uses Equation 6 to examine SOA for optimum or target capital structure by executing the first difference GM. Hence, the altered statistical model of this inquiry is expressed in the below-given Equation 11:

$$DTA_{it} = (1-\lambda)DR_{i,(t-1)} + \beta_1 LIQ_{it} + \beta_2 SIZE_{it} + \beta_3 TANG_{it} + \beta_4 NDTS_{it} + \beta_5 PROF_{it} + \beta_6 INF + +\beta_7 GDP_{it} + \beta_8\, ENG\_CON_{it} + \varepsilon_{it} + \mu_{it} \qquad (11)$$

In Equation 11, DTA explains the dependent variable i.e. debt to asset ratio. Likewise, '$\delta DR_{i,(t-1)}$' is lagged dependent variable which impacts on model error term i.e. ε_{it}. Moreover, TANG, LIQ, ROE, SIZE, INF, NDTS, GDP, and ENG_CON specify selected explanatory variables which are also clarified in above given Table 1 and its explanation. Also, 'ε_{it}' identifies an error term of the model and 'μ_{it}' displays random adjustments of individuals. Moreover, for executing different GMM, the first alteration to discover the dynamic capital structure determinants of this investigation is given below in Equation 12:

$$\Delta DTA_{it} = \Delta DR_{i,t-1} + \beta_1\, \Delta LIQ_{it} + \beta_2\, \Delta SIZE_{it} + \beta_3\, \Delta TANG_{it} + \beta_4 \Delta NDTS_{it} + \beta_5\, \Delta PROF_{it} + +\beta_6\, \Delta INF_{it} + \beta_7\, \Delta GDP_{it} + \beta_8\, \Delta ENG\_CON_{it} + \Delta\, \varepsilon_{it} + \Delta \mu_{it} \qquad (12)$$

Likewise, to check the accuracy of the GMM estimator, the Sargan and autocorrelation tests are executed, which are used to check GMM model accuracy. Technically, the Sargan test is used to check the exogeneity problem. Exogeneity is a diagnostic issue in which the selected dependent variables of the regression are not dependent on the other variables of the regression. Likewise, another diagnostic test, known as the Autocorrelation test, i.e., AR (m) test, is also conducted to find the selected variables' reliance on their own earlier values. Exactly, the GMM estimator drops these two diagnostic issues from the constructed model [39].

4. Findings

To perform the investigation, all of the nominated dependent and independent variables, such as debt to asset ratio, which is selected as a dependent variable, tangibility (TANG), profitability (ROE), sales (SIZE), liquidity (LIQ), non-debt tax shield (NDTS), gross domestic products (GDP), inflation rate (INF), and energy consumption (ENG_CON), are coded into robust analytical software, i.e., SAS. The descriptive statistics, which are described in the below-given Table 2, are performed to understand the selected variables behaviour by their mean and median values, minimum (Min) and maximum (Max) values, and standard deviation (Standard. Dev.) obtained statistics.

The results clarify that the mean of the dependent variable, i.e., the debt-to-asset ratio (DTA), is 0.521. Likewise, the mean figure of TANG is 0.561, the ROE mean value is 0.984, the LIQ mean is at 1.211, and the NDTS mean is at 0.032. Also, the size, which designates the sales of selected energy firms, has a mean figure of 1.721. Then, the mean value of INF is 0.042, the GDP mean is 0.721 percent, and the ENG_CON mean is reported at 1.533. Evidently, the mined data is not demonstrating any types of variations, as all obtained figures are detected closer to others. Moreover, the standard deviation figures of all the chosen variables are not greater than their average values. Next, this investigation executed correlation matrix and VIF tests to investigate any statistical relationship among the selected variables. The outcomes of the correlation test are displayed in Table 3.

DOI: 10.55214/25768484.v6i1.301

Table 2.
Descriptive statistics of selected variables.

Variable	Mean	Median	Max.	Min.	Std. dev.
DTA	0.521	0.323	1.833	0.048	0.032
LIQ	1.211	1.321	19.56	0.066	1.016
SIZE	1.721	1.023	33.21	-0.799	0.411
TANG	0.561	0.312	2.233	0.012	0.422
NDTS	0.032	0.044	0.031	0.011	0.023
ROE	0.984	0.066	1.832	-1.04	0.041
INF	0.042	0.021	0.021	0.62	0.015
GDP	0.721	0.011	0.031	-3.18	0.422
ENG_CON	1.533	1.011	32.13	0.435	0.415

Table 3.
Correlation matrix for energy firms.

Variables	DTA	LIQ	SIZE	TANG	NDTS	ROE	INF	GDP	ENG_CON
DTA	1	-	-	-	-	-	-	-	-
LIQ	0.605	1	-	-	-	-	-	-	-
SIZE	-0.188	0.327	1	-	-	-	-	-	-
TANG	0.025	0.027	0.029	1	-	-	-	-	-
NDTS	0.217	0.371	0.246	0.100	1	-	-	-	-
PROF	0.083	0.017	0.032	0.331	0.075	1	-	-	-
INF	0.017	0.025	0.005	0.0130	0.029	0.016	1	-	-
GDP	0.165	0.127	0.015	0.102	0.142	0.322	0.024	1	-
ENG_CON	0.076	0.015	0.438	0.031	0.061	0.211	0.311	0.251	1

The correlation matrices for energy firms are exhibited in Table 3, respectively. The outcomes depict very weak connections among the nominated variables, indicating that the issue of multicollinearity in a constructed dynamic model is improbable. Subsequently, this investigation executes a GMM assessment to inspect robust relationships between the selected determinants. The results of the panel data dynamic model analysis via GMM are explained in the below tables. The VIF test findings are explained in Table 4.

Table 4.
Variance inflation factor (VIF) test.

Variables	VIF	1/ VIF
DTA	3.204	0.312
LIQ	5.335	0.187
SIZE	4.081	0.245
TANG	4.823	0.207
NDTS	3.682	0.272
ROE	6.311	0.158
INF	5.613	0.178
GDP	6.782	0.147
ENG_CON	4.802	0.208

Clearly, the obtained results from the VIF test explain the absence of a multicollinearity issue, as all the figures in Table 4 are not greater than 10. Subsequently, the BPLM test is executed to confirm the most appropriate model for analysis between pooled OLS and Random Effects (RE) models. Table 5 shows the outcomes achieved from the implementation of the BPLM test.

Table 5.
Breusch Pagan Lagrange multiplier test (Two way).

H_0: pooled OLS is more appropriate H_1: Random effects is more appropriate	
m value	**P > m**
9865	0.008

The p-value of p of BPLM test in the above Table 5 mentions not accepting the null hypothesis ($p<0.05$). Therefore, the outcome explains that the RE model is more effective than the Pooled OLS. Moving ahead, after the authentication of the RE model, this inquiry performed the Hausman test to pick the suitable Panel Data Static model from RE and FE for the investigation. The findings of the Hausman test are stated in Table 6.

Table 6.
Hausman test for selection of RE or FE model

H0: Random effects is more appropriate H1: Fixed effects is more appropriate	
Chi-square test value	8.318
P-value	0.5023

Evidently, the outcomes disclose that the p-value is greater than the defined criteria, i.e., $p< 0.05$. Therefore, the RE model is considered more fit than the FE for the assessment. The outcomes gained from the Random Effects (RE) model are presented below inTable 7.

Table 7.
Random effect (RE) outcomes for energy firms.

Wallace-Hussain: Two-way random effects				
Variables	**Estimate**	**Standard error**	**T value**	**Pr > |t|**
Intercept	0.1632	0.1760	0.9273	0.3539
DTA	0.1621	0.0783	2.0702	0.0384**
LIQ	-0.1712	0.1135	-1.5084	0.1315
SIZE	0.0212	0.0050	4.2400	0.0001**
TANG	0.0121	0.0020	6.0500	0.0001**
NDTS	0.0225	0.0120	1.8750	0.0608
PROF	0.0622	0.0120	5.1833	0.0001**
INF	2.1290	1.4560	1.4622	0.1437
GDP	0.0642	0.0131	4.9008	0.0001**
ENG_CON	0.0712	0.0135	5.2741	0.0001**
R-square				0.7018

Note: ** significant at 5% level.

Table 7 displays the outcomes attained from the Random Effects (RE) model. The nominated variables, which are TANG (tangibility), PROF (return on assets), and NDTS (non-debt tax shield), have a significant positive influence on the capital structure of energy firms. However, size (sales) is found to be a negatively significant determinant, and LIQ (current ratio) and inflation (INF) are found to be insignificant capital structure determinants for investigated firms. Clearly, the R-Square (0.7018) highlights that the investigated model is a good and fitted model, thus being able to explain the capital structure formulation practices of whole energy firms.

Subsequently, this inquiry also performs a dynamic analysis to check the existence of a dynamic capital structure and SOA for energy firms. The next tables explain the dynamic investigation, which is performed by executing GMM estimation.

Edelweiss Applied Science and Technology
ISSN: 2576-8484
Vol. 6, No. 1: 1-14, 2022
DOI: 10.55214/25768484.v6i1.301

Table 8.
GMM dynamic model description.

Model description	
Estimation method	**Two-step GMM**
Number of cross sections	281
Time series length	14
Estimate stage	2

Table 8 explains the constructed dynamic model for this empirical analysis. The total number of selected energy firms for this investigation is 281. Likewise, the size of the time series is 14 years, i.e., from 2007 to 2020. Notably, as discussed (see Section 3), this investigation also performs GMM diagnostic tests, which are the Sargan test and the autocorrelation-related AR (m) test, to check the developed models' validity and credibility.

Table 9.
Sargan test analysis.

H0: The selected instruments are effective H1: The selected instruments are not effective	
Statistics	**Prob > Chi sq**
38.21	0.1821

The Sargan test outcomes displayed below Table 9 specify that the model is not affected by any sort of exogeneity issue; therefore, the null hypothesis (H0: The selected instruments are effective) is accepted. Besides, the Sargan test outcomes clearly designate that the chosen instruments for the dynamic investigation are not associated with residuals or each other; therefore, all instruments are effective and valid. Table 10 shows the outcomes attained from the AR (m) test, which is executed to diagnose any sort of autocorrelation issue in the dynamic model.

Table 10.
Autocorrelation test analysis (AR(m)).

H0: Autocorrelation issue does not present H1: Autocorrelation presents		
Lag	**Statistics**	**Prob > Chi sq**
1	-7.13	0.831

The outcomes in Table 10 specify that the model is free from any sort of Autocorrelation issue. Thus, the null hypothesis (H0: Autocorrelation issue is not present) is accepted. Hence, the outcomes of the AR(m) test recommend that the nominated variables are not connected with residuals. Now, after finding that the model is free from any sort of diagnostic issues, the GMM estimator is executed. The outcomes attained from the GMM analysis are shown below in Table 11.

The outcomes in Table 11 disclose that DTA_1, which is a lagged dependent variable, SIZE (sales), TANG (tangibility), PROF (profitability), INF (inflation), gross domestic products (GDP), and energy consumption (ENG_CON) have a positive and significant association with the capital structure of energy firms. In addition, the significant and positive lagged dependent variable explains the existence of SOAs and dynamic capital structures for these firms. The significant lagged variable coefficient, i.e., 0.2951, and p-value (0.0001**) stipulate that in case of any deviation from these firms' targeted level of capital structure, the adjustment speed (SOA) towards its optimum level is 70% (1 -0.2951 = 0.7049). This depicts that energy firm's return to their equilibrium position to maintain a targeted or optimum level of capital structure in a maximum of one year and four months (100 ÷ 70 = 1.4285). Thus, the significant tangibility, lagged dependent variable, and existence of SOA confirmed that dynamic trade-off theory is more dominant among others in energy sector firms.

Table 11.
GMM investigation for dynamic model.

GMM: First differences transformation Estimation method: Two-step GMM Parameter estimates of energy firms					
Variables	**DF**	**Estimate**	**Standard error**	**T value**	**Pr > |t|**
Intercept	1	-0.0113	0.0232	-0.4871	0.6263
DTA_1	1	0.2951	0.0723	4.0816	0.0001**
LIQ	1	-0.3511	0.4294	0.8177	0.4136
SIZE	1	0.2931	0.0613	4.7814	0.0001**
TANG	1	0.2823	0.0673	4.1947	0.0001**
NDTS	1	-0.121	0.1086	-1.1142	0.2653
PROF	1	0.2531	0.0511	4.9530	0.0001**
INF	1	0.2344	0.0361	-6.4931	0.0001**
GDP	1	0.2523	0.0561	-4.4973	0.0001**
ENG_CON	1	0.2316	0.0321	7.2150	0.0001**

Note: ** Significant at 5% level.

5. Discussion

The capital structure determinants for energy firms present an unsettled issue due to the unique complexities of the energy industry. On the other side, the soaring energy prices and rising circular debts impact the capital structure and maintenance practices of these firms around the globe. Thus, this empirical analysis is among the initial attempts to explore key capital structure determinants for whole energy firms. To perform an investigation, a total of 281 energy firms' data, which are operating in China and dissimilar countries in the regions of SAARC, ASEAN, and the OECD, over the period from 2007 to 2020, is examined. By executing panel data static models, the results reveal that sales, i.e., sales, tangibility, profitability, gross domestic products, and energy consumption are significant capital structure determinants for energy-producing firms. Likewise, the results attained by the dynamic model via a vigorous estimator, i.e., GMM, exposed that the lagged dependent variables of the dependent variable, size, tangibility, profitability, inflation, and gross domestic products, are significant capital structure determinants for energy firms. Interestingly, both estimation tactics enlightened that liquidity, i.e., the current ratio and non-debt tax shield (NDTS), possess an insignificant relationship with the investigated firms' capital structure.

Undeniably, the outcomes postulate that energy firms are maintaining profitable businesses. Evidently, the hiking of energy tariffs around the globe has resulted in an upsurge in these firms' sales and profitability. Also, rising energy tariffs are among the core causes that triggered inflation. Thus, via GMM investigation, the inflation is observed to be significant [8]. Remarkably, the aftermath of COVID-19, the Ukraine-Russia war, the United States sanctions on Iran, and the reduction in oil production by Saudi Arabia are some of the reasons that surged energy prices, sales, and profitability of these firms and, in the end, also triggered inflation around the globe. Besides, the significant energy consumption points towards the rise of energy demand in global markets, which ultimately increased the sales and profit of energy-producing firms. The positive significant asset tangibility of both models also specifies that the assets of these firms are producing sufficient energy; therefore, the sales, profitability, and energy consumption of these firms are found to be significant. The results are consistent with the conclusions of Cole, et al. [42] who clarified tangibility and firms' profitability as significant determinants of capital structure for US energy firms. Similarly, the findings are in line with the supposition of Ghani and Bukhari [43] who affirmed a considerable association between capital structure and profitability and tangibility for Pakistan-based energy firms. Conversely, the results are not consistent with the enlightened outcomes

ISSN: 2576-8484
Vol. 6, No. 1: 1-14, 2022
DOI: 10.55214/25768484.v6i1.301

of Tailab [3], who explored the capital structure determinants of energy-producing firms in the American region and indicated insignificant connections among capital structure, profitability, and tangibility.

Remarkably, climate change dramatically increased energy consumption in most countries; for instance, in China, electricity consumption in residential areas increased by nearly 26.8% [9]. In fact, increasing economic activities in several regions rapidly increased their per capita energy consumption. Hence, global energy consumption increased because of growing industrially linked activities and also because of advances in developed and developing nations. Undeniably, increasing energy consumption, profitability, and sales enhance the overall domestic growth of products. Thus, GDP is also observed to be significant. The findings are consistent with the reported outcomes by Jaworski and Czerwonka [15], who explained the significant impact of energy consumption and GDP on energy firms' capital structures. Importantly, the significant asset tangibility, sales, and lagged dependent variable confirmed the existence of dynamic capital structure and adjustment speed for energy sector firms. Needless to say, the existence of SOA confirmed that, among others, the dynamic trade-off theory of capital structure is observed to be more dominant in energy sector firms. Overall, the outcomes support the authentication of Hypothesis 1 for asset tangibility, Hypothesis 3 for profitability, Hypothesis 6 for GDP, Hypothesis 7 for inflation, Hypothesis 8 for energy consumption, and Hypothesis 9 for the presence of a dynamic capital structure.

6. Conclusion and Policy Implications

The identification of capital structure determinants for energy firms is still an unsettled issue. Therefore, this study is set to investigate capital structure determinants for whole energy firms operating in dissimilar economic regions and countries. The results confirm that asset tangibility, sales, profitability, NDTS, inflation, and GDP are the main capital structure determinants of energy firms. Besides, the significant lagged dependent variable also confirms the existence of a dynamic capital structure and speed of adjustment for these firms. Subsequently, the significant role of dynamic capital structures confirmed the application of dynamic trade-off theory in the energy industry. The results deliver a fresh understanding for whole-energy firms operating in dissimilar countries. Moreover, it provides a guideline to policymakers for constructing similar policies for the construction of a suitable blend of dissimilar financing options. In the long term, the application of similar capital structure-preserving practices will help the energy-producing firms develop a connected energy zone and alliances among the countries and regions that will definitely help to control soaring energy prices, energy shortages in different countries, and the ongoing energy crisis.

The key restraint of capital structure-related inquiries is the availability of data, which is the main limit for identifying capital structure determinants [44]. In the same way, this study also excluded different countries and variables from the constructed sample set due to the inaccessibility of the financial data. Furthermore, another limitation is that this inquiry accepts only nine variables for investigation. Notably, only those key determinants are included in the constructed sample, whose fourteen-year-old nominated time period data is accessible. Thus, other researchers should add more economic regions, countries, and determinants such as debt-to-equity ratio as a dependent variable and tax revenue as an independent variable to the model.

Funding:

This study received no specific financial support.

Institutional Review Board Statement:

Not applicable.

Transparency:

The author confirms that the manuscript is an honest, accurate, and transparent account of the study; that no vital features of the study have been omitted; and that any discrepancies from the study as planned have been explained. This study followed all ethical practices during writing.

Competing Interests:
The author declares that there are no conflicts of interests regarding the publication of this paper.

Copyright:

References

[1] R. Rehan and A. Abdul Hadi, "Capital structure determinants of Shariah and non-Shariah companies at Bursa Malaysia–dynamic approach," *International Journal of Innovation, Creativity and Change*, vol. 6, no. 8, pp. 334-345, 2019.

[2] G. Georgakopoulos, K. Toudas, E. I. Poutos, T. Kounadeas, and S. Tsavalias, "Capital structure, corporate governance, equity ownership and their impact on firms' profitability and effectiveness in the energy sector," *Energies*, vol. 15, no. 10, p. 3625, 2022. https://doi.org/10.3390/en15103625

[3] M. Tailab, "The effect of capital structure on profitability of energy American firms," *International Journal of Business and Management Invention*, vol. 3, no. 12, pp. 8-21, 2014.

[4] J. Poh, "Europe power firms' debt soars to $1.7 Trillion on energy crisis, Bloomberg," Retrieved: https://www.bloomberg.com/news/articles/2022-07-18/europe-power-firms-debt-soars-to-1-7-trillion-on-energy-crisis#xj4y7vzkg. [Accessed 21-November-2022], 2022.

[5] E. Low and F. Mangi, "Crippling energy crisis set to worsen for debt-ridden South Asia, Bloomberg," Retrieved: https://www.bloomberg.com/news/articles/2022-07-27/crippling-energy-crisis-set-to-worsen-for-debt-ridden-south-asia#xj4y7vzkg. 2022.

[6] Oxford Analytica, "Debt in South Asia's power sectors is now endemic," *Emerald Expert Briefings*, no. oxan-db. https://doi.org/10.1108/oxan-db243978, 2019.

[7] F. Umbach, "ASEAN's energy transition: Risks and opportunities," Retrieved: https://www.gisreportsonline.com. [Accessed 8th Oct 2022], 2021.

[8] OECD, "Why governments should target support amidst high energy prices," Retrieved: https://www.oecd.org/ukraine-hub/policy-responses/why-governments-should-target-support-amidst-high-energy-prices-40f44f78/. [Accessed 8th November, 2022], 2022.

[9] Z. Ziwen, "China's power crisis: Why is it happening and what does it mean for the economy?, Economy," Retrieved: https://www.scmp.com/economy/china-economy/article/3190313/chinas-power-crisis-why-it-happening-and-what-does-it-mean. [Accessed 2022 November 28], 2022.

[10] M. A. Khan, R. Rehan, I. U. Chhapra, and A. Bai, "Inspecting energy consumption, capital formation and economic growth nexus in Pakistan," *Sustainable Energy Technologies and Assessments*, vol. 50, p. 101845, 2022. https://doi.org/10.1016/j.seta.2021.101845

[11] F. Modigliani and M. H. M. Miller, "The cost of capital, corporation finance and the theory of investment," *American Economic Review*, vol. 48, no. 3, pp. 261-297, 1958.

[12] R. Rehan, H. A. R. Abdul, and H. I. Hussain, "Sectorial-specific capital structure determinants-evidence from Bursa Malaysia," *International Journal of Innovation, Creativity and Change*, vol. 6, no. 8, pp. 346-357, 2019.

[13] B. Ghose, "Impact of business group affiliation on capital structure adjustment speed: Evidence from Indian manufacturing sector," *Emerging Economy Studies*, vol. 3, no. 1, pp. 54-67, 2017. https://doi.org/10.1177/2394901517696605

[14] A. N. Berkman, O. Iskenderoglu, E. Karadeniz, and N. Ayyildiz, "Determinants of capital structure: The evidence from European energy companies," *International Journal of Business Administration*, vol. 7, no. 6, pp. 96-106, 2016. https://doi.org/10.5430/ijba.v7n6p96

[15] J. Jaworski and L. Czerwonka, "Determinants of enterprises' capital structure in energy industry: Evidence from European union," *Energies*, vol. 14, no. 7, p. 1871, 2021. https://doi.org/10.3390/en14071871

[16] A. Shrestha, "Analysis of capital structure in power companies in Asian economies," Doctoral Dissertation, Asian Institute of Technology, 2019.

[17] S. E. Sarioglu, E. Kurun, and H. Güzeldere, "Determinants of capital structure: A study of the ISE firms operating in cement, automotive and information technology industries," *Ege Academic Review*, vol. 13, no. 4, pp. 481-496, 2013.

[18] D. Demirhan, "Analysis of firm-specific factors affecting capital structure: Application on ISE service firms," *Ege Academic Review*, vol. 9, no. 2, pp. 677-697, 2009.

[19] S. Mahvish and M. A. Qaisar, "Determinants of capital structure–a study of oil and gas sector of Pakistan," *Interdisciplinary Journal of Contemporary Research in Business*, vol. 3, no. 10, pp. 395-400, 2012. https://doi.org/10.20474/jabs-3.3.5

[20] H. A. Ata and A. G. Y. Ag, "Analysis of firm characteristics on capital structure," *Istanbul University Econometrics and Statistics e-Journal*, vol. 11, pp. 45-60, 2010.

[21] V. Nguyen, "Human capital, capital structure choice and firm profitability in developing countries: An empirical study in Vietnam," *Accounting*, vol. 6, no. 2, pp. 127-136, 2020.

[22] G. Sayilgan and B. Uysal, "An analysis on factors determining capital structure using sectoral balance sheets of the central bank of the Republic of Turkey: 1996-2008," *Ankara University Journal of SBF*, vol. 66, no. 04, pp. 101-124, 2011.

[23] A. Gill, B. Nahum, C. Pai, and S. Bhutani, "The determinants of capital structure in the service industry: Evidence from United States," *The Open Business Journal*, vol. 2, no. 1, pp. 48-53, 2009.

[24] M. A. Cortez and S. Susanto, "The determinants of corporate capital structure: Evidence from Japanese manufacturing companies," *Journal of International Business Research*, vol. 11, no. 3, pp. 121-134, 2012.

[25] Y. Kabakci, "Capital structure and business performance relationship: An implementation on food industry," *Ege Academic Review*, vol. 8, no. 1, pp. 167-182, 2008.

[26] T. Bas, G. Muradoglu, and K. Phylaktis, *Determinants of capital structure in developing countries*. London: Cass Business School, 2009.

[27] M. A. Khan and R. Rehan, "Revealing the impacts of banking sector development on renewable energy consumption, green growth, and environmental quality in China: Does financial inclusion matter?," *Frontiers in Energy Research*, vol. 10, p. 940209, 2022. https://doi.org/10.3389/fenrg.2022.940209

[28] D. Gujarati, *Basic econometrics*, 4th ed. New York: McGraw Hill, 2003.

[29] G. Zandi, R. Rehan, Q. M. A. Hye, S. Mubeen, and S. Abbas, "Do corruption inflation and unemployment influence the income inequality of developing Asian countries," *International Journal of Applied Economics, Finance and Accounting*, vol. 14, no. 2, pp. 118-128, 2022. https://doi.org/10.33094/ijaefa.v14i2.688

[30] E. Hernawati, A. R. A. Hadi, T. Aspiranti, and R. Rehan, "Non-performing financing among Islamic Banks in Asia-Pacific region," *Cuadernos de Economía*, vol. 44, no. 126, pp. 1-9, 2021.

[31] A. Chakrabarti and A. Chakrabarti, "The capital structure puzzle–evidence from Indian energy sector," *International Journal of Energy Sector Management*, vol. 13, no. 1, pp. 2-23, 2019. https://doi.org/10.1108/ijesm-03-2018-0001

[32] M. H. Bornstein, J. Jager, and D. L. Putnick, "Sampling in developmental science: Situations, shortcomings, solutions, and standards," *Developmental Review*, vol. 33, no. 4, pp. 357-370, 2013. https://doi.org/10.1016/j.dr.2013.08.003

[33] S. Dakua, "Effect of determinants on financial leverage in I ndian steel industry: A study on capital structure," *International Journal of Finance & Economics*, vol. 24, no. 1, pp. 427-436, 2019. https://doi.org/10.1002/ijfe.1671

[34] B. Latif, N. Gunarathne, J. Gaskin, T. San Ong, and M. Ali, "Environmental corporate social responsibility and pro-environmental behavior: The effect of green shared vision and personal ties," *Resources, Conservation and Recycling*, vol. 186, p. 106572, 2022.

[35] K. H. Zou, K. Tuncali, and S. G. Silverman, "Correlation and simple linear regression," *Radiology*, vol. 227, no. 3, pp. 617-628, 2003.

[36] D. N. Gujarati and D. C. Porter, *Basic econometrics*, 5th ed. USA: McGraw-Hill, 2009.

[37] J. A. Hausman, "Specification tests in econometrics," *Econometrica: Journal of the Econometric Society*, vol. 46, pp. 1251-1271, 1978.

[38] T. S. Breusch and A. R. Pagan, "The lagrange multiplier test and its applications to model specification in econometrics," *The Review of Economic Studies*, vol. 47, no. 1, pp. 239-253, 1980.

[39] M. Arellano and S. Bond, "Some tests of specification for panel data: Monte Carlo evidence and an application to employment equations," *The Review of Economic Studies*, vol. 58, no. 2, pp. 277-297, 1991. https://doi.org/10.2307/2297968

[40] I. Miteza, "Fiscal deficits, current deficits and investment: A panel causality framework of 20 OECD countries," *Applied Econometrics and International Development*, vol. 12, no. 1, pp. 6-19, 2012.

[41] T. S. Aderajew, A. Trujillo-Barrera, and J. M. Pennings, "Dynamic target capital structure and speed of adjustment in farm business," *European Review of Agricultural Economics*, vol. 46, no. 4, pp. 637-661, 2019. https://doi.org/10.1093/erae/jby035

[42] C. Cole, Y. Yan, and D. Hemley, "Does capital structure impact firm performance: An empirical study of three US sectors," *Journal of Accounting and Finance*, vol. 15, no. 6, pp. 1-9, 2015.

[43] K. Ghani and S. H. Bukhari, *Determinants of capital structure: A case of listed energy sector companies in Pakistan*. Rochester, NY: Social Science Research Network, 2010.

[44] I. Pandey, "Capital structure, profitability and market structure: Evidence from Malaysia," *The Asia Pacific Journal of Economics & Business*, vol. 8, no. 2, pp. 78-91, 2004.