Impact of Leverage, Solvency and Size Effect on Mexican Capital Market Firms Returns

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Abstract

The objective is to analyze the impact of leverage (short- and long-term debt), capital structure, solvency, Returns on Assets (ROA), and firm size on the stock returns of 52 firms quoted in Mexican stock market (BMV) for the period 2011(1Q)-2021(2Q). Methodology includes three panel approaches are implemented: Pooled Ordinary Least Square (POLS), Fixed-Effect Model (FEM) and Random Effect Model (REM). Findings suggest a statistically significant negative effect of firm size stock returns, whereas there is a statistically significant and positive impact of ROA and solvency on stock returns. We recommend that, investors should pay attention, not only, to company size and profitability-related indicators, but also to indebtedness, to prices reflect the risk associated with the assets. The originality lies in the fact that the issue of capital structure and its impact on the market value of Mexican companies has been scarcely studied, and an extensive sample of companies is used, and various panel data methodologies are also used to compare the results. We conclude that, the size and profitability indicators have a significant effect on the stock returns, but the leverage does not.
JEL Classification: G32, G12, l25, M21.

Keywords: Financial leverage, capital structure, Mexican stock market, Panel Data Analysis.

Impacto del apalancamiento, solvencia y efecto tamaño en los rendimientos de las compañías de la Bolsa Mexicana de Valores

Resumen

El objetivo es analizar el impacto del apalancamiento (deuda de corto y largo plazo), el Retorno sobre Activos (ROA) y el tamaño de la empresa sobre los rendimientos accionarios de 52 empresas que cotizan en la Bolsa Mexicana de Valores (BMV) para el periodo 2011(1T)-2021(2T). En la metodología, se implementan tres modelos panel: Mínimos Cuadrados Ordinarios Agrupados (MCO), Modelo de Efectos Fijos (MEF) y Modelo de Efectos Aleatorios (REM). Los resultados sugieren un efecto negativo estadísticamente significativo del tamaño de la empresa sobre el rendimiento de las acciones, mientras que existe un impacto positivo y estadísticamente significativo del ROA y la solvencia sobre el rendimiento de las acciones. La principal recomendación es que, los inversores presten atención, no solo al tamaño y rentabilidad de la empresa, sino también al nivel de endeudamiento, de tal forma que, los precios del mercado reflejen mejor el nivel de riesgo asociado a los diversos activos. La principal limitación es que, dada la disponibilidad de los datos, solamente se abarca empresas cotizadas en la bolsa, por lo que, no se sabe cuál es el efecto en empresas de menor tamaño. La originalidad radica en que la estructura de capital y su impacto en el valor de mercado de las empresas mexicanas ha sido escasamente estudiado. Además, se utiliza una amplia muestra de empresas, así como diversas metodologías de datos de panel para comparar los resultados. Se concluye que sí hay impacto significativo del tamaño y rentabilidad operativa, pero no hay impacto significativo del nivel endeudamiento en los rendimientos accionarios de las empresas de la BMV.
Clasificación JEL: G32, G12, l25, M21.

Palabras clave: Apalancamiento Financiero, Estructura de Capital, Bolsa Mexicana de Valores, Modelos de Panel.

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1. Introduction

Financing is a key factor for a company, as it provides resources to start and expand operations. For a going concern, cash flows provide funds to support company operations and competitive growth. However, cash flow levels and trends may be inadequate to match a company's production and sales cycles, economic ups and downs, and growth prospects. To overcome the risks associated with such discrepancies, companies include debt in their financial planning.

However, changes in leverage could affect the capital structure of companies, affecting financial costs, which play an important role in terms of profitability. On this basis, several studies have attempted to determine how companies should decide on the best combination of resources to minimize financial costs while maximizing firm value and stakeholder benefits. Thus, financial managers must be farsighted when making decisions on the mix of debt and equity.

Although leverage is an ancient historical business practice, this topic has been highly controversial since the work of Modigliani and Miller (MM) (1958), a pillar of contemporary finance. Initially, these Nobel laureates claimed that a firm's mix of equity and debt is irrelevant, assuming perfect markets, no taxes, and no bankruptcy and transaction costs. The assumption of no taxes was relaxed by MM (1963) with a model presenting a theoretical framework on the tax advantages of debt. In fact, the profound development of finance as a true scientific field derives from the abundant research that relaxed MM's assumptions.

Given that the value of companies depends on their financial performance, there is a large body of research in the literature examining the relationship between leverage and stock market performance. The results have been mixed, revealing a lack of consensus on the impact of leverage and capital structure on firms' stock market performance. In this sense, the present study contributes to the existing literature by analyzing the impact of financial leverage, solvency, and firm size on financial performance, using data on Mexican listed companies.

In addition, the empirical data shed light on market efficiency and price signals, i.e., whether financial statement information is reflected in stock prices. In terms of investment strategies, the results also provide evidence on the use of fundamentals by investors in Mexico, revealing which variables are the most relevant for investment decisions.

The objective is to analyze the impact of leverage (short- and long-term debt), capital structure, solvency, Returns on Assets (ROA), and firm size on the stock returns of 52 firms quoted in Mexican stock market (BMV) for the period 2011(1Q)-2021(2Q). Methodology includes three panel approaches are implemented: Pooled Ordinary Least Square (POLS), Fixed-Effect Model (FEM) and Random Effect Model (REM).

This research contributes to the financial literature in four ways. First, by expanding the literature on the impact of leverage on the financial performance of Mexican listed companies, which is very limited. Second, the study period encompasses ten years (2011/1Q-2021/2Q), covering sub-periods of financial distress and calm, including the covid19 crisis. Third, the sample includes 52 companies, a larger set than Mexico's stock market index, the IPC35. The sample set excludes financial firms. Finally, fourth, the empirical test comprises three-panel regression models incorporating two dimensions: cross-sectional and time series, which allows for a robust capture of the structure of the information, as well as allowing us to track individual firm behavior.

The reminder of the paper is organized as follows: the following section presents the literature review, the third section describes data and methodology, the fourth part analyzes the empirical findings, and the fifth section concludes the paper.

2. Literature Review

Financial performance is crucial for companies. A *proxy* variable to measure financial market performance is the stock return. A positive stock return means that the investor bought an asset to a lower price than he/she can sell it. Hence, there is a profitable investment.

Stock returns have a special relevance for stakeholders and managers. Positive returns promote trading volume, liquidity, lower volatility and ensure financial resources are accessible and available for companies. This enables companies to make new offerings and raise fresh capital to continue and expand their operations. Stock returns are a factor commonly used to analyze the financial market performance for listed companies. It enables an examination of how the market has valued the price of an asset, based on financial information, expectations and global and local news about the market and the economy.

Considering the capital structure theory and some other variables which have been identified as important by the literature to determine the financial performance, we analyze how the leverage (short- and long-term debt), capital structure, solvency, Returns on Assets (ROA), and firm size impact on the stock returns of 52 firms quoted in Mexican stock market (BMV).

Specifically, some studies on the impact of firm size on profitability were developed by Astakhov, Havranek, & Novak (2019), they found that there is a significant impact on sizes and annual returns in the smallest and largest companies in the New York Stock Exchange. On the other hand, Irawan *et al.* (2022) found that firm size and growth have a positive impact on stock returns, but not significant.

Regarding the relationship between liquidity and stock returns, Cakici and Zaremba (2021) found that liquidity depends on firm size but is not related to stock returns. Studies on this link, analyzing the Covid-19 period, present mixed evidence. Just and Echaust (2020) argue that stock market returns are not influenced by illiquidity and are also independent of any official COVID-19 announcement on the number of cases and deaths. In contrast, the analysis by Nguyen, Hai, Nguyen (2021) demonstrates that the increase in daily confirmed COVID-19 cases has a notable adverse impact on both stock market returns and liquidity. The results vary by period and study area.

Regarding the relationship between operating performance measured by return on assets (ROA) and stock returns, it has also been explored by the literature to analyze the impact of fundamentals on the firm's market value. Aldiena and Hakim (2019) highlight that ROA and some other internal factors partially have a significant effect on the formation of stock returns of companies listed in the Jakarta Islamic Index. Aminah (2021) comes to a similar conclusion in food and beverage companies listed on the Indonesia Stock Exchange, ROA has a positive and significant effect on the value of stock returns. Hidayat *et al.* (2020) analyze the impact of earnings per share, debt/equity ratio and return on assets on stock price. The results confirm a positive effect of earnings per share on stock prices, and debt/equity ratio and return on assets do not affect the stock price of Indonesian companies.

More recent literature addressing the impact of leverage on financial performance in developed countries includes contributions by Deboi, Kurmakhadov and Li (2021), Qing et al. (2022), Krabec and Čižinská. (2022) Riaz et al. (2022). For emerging markets, recent representative papers include Duong et al. (2020), Ibrahim and Isiaka (2020), and Tripathy and Shik (2020).

Literature closely related with this research in terms of topic and the method is the following. Ibrahim and Isiaka (2020) investigate the effect of financial leverage on firm value in the Nigerian market over (2014-2018). They use Pooled Ordinary Least Squares (POLS), Random Effect Panel Data Model (REM) and Fixed Effect Panel Model (FEM) estimation techniques. Results show a negative impact of financial leverage on firm value.

Tripathy and Sahik (2020) analyze the impact of leverage on firm performance in the Indian economy. They employ 56 food processing firms' sample over the period 2008-2018 and they use POLS, REM, and FEM approaches. The data indicate that there is a positive and significant relationship between leverage and firm performance.

Other studies, in addition to analyzing the impact of leverage on firm value or performance, include control variables. Dinh and Pham (2020) study the effect of capital structure on financial performance, with return on equity as a proxy variable, among the exogenous variables self-financing, financial leverage, long-term assets and debt/asset ratio. The control factors are firm size, fixed asset ratio and growth. The dataset includes 30 pharmaceutical companies listed on the Vietnam Stock Exchange over the period 2015-2019. The results indicate that leverage has a positive and significant impact on financial performance.

Hong & Dung (2021) analyze the effect of financial leverage on stock returns of listed firms in Vietnam from 2014 to 2019. Methodology proposed includes POLS, REM and FEM. Results show a negative and significant impact of financial leverage and firms´ size on stock returns. Nevertheless, growth, returns on assets, short- and long-term debt have a positive and significant impact on stock returns.

Elfiswandi, Angela & Ramadhan (2022) examine the impact of firm size, exchange rate, earnings per share, and capital structure on stock returns. Their sample includes 100 manufacturing firms listed on the Indonesia Stock Exchange over the period 2013 - 2017. The econometric methodology includes panel and regression methods. The evidence denotes that stock returns are significantly affected by firm size, exchange rates, and earnings per share either partially or simultaneously. Applying capital structure as a control variable on stock returns, the results show that firm size, exchange rate and earnings per share variables apparently have no significant effect.

Regarding the Latin American and Mexican corporations' case, Gallegos and Cuneo (2019) present an interesting work identifying the financial performance of companies in Latin America focusing on their capital and ownership structure. A panel date methodology is employed to a sample of firms from Brazil, Chile, Mexico, and Peru, covering the period 2000-2015. The evidence suggests a positive relationship between financial performance, growth, and size of the company. However, there are mixed results for short- and long-term financial leverage, as well as for company liquidity. Special mention should be made of the ownership structure of Chilean firms, where a positive effect of the first majority shareholder on financial performance is observed.

In terms of literature about Mexico, Vega Zavala & Santillan-Salgado (2019) examine the relationship between capital structure and market value of Mexican publicly listed firms. The study

uses data from 69 companies listed on the Mexican Stock Exchange over the period 2004-2014. The results confirm the positive and significant relationship between leverage and firm value. The estimation results suggest that the connection between alterations in leverage and firm value is less pronounced for small-sized firms, while it is more prominent for large-sized firms.

Finally, closely related with our research, Tovar Rocha et al. (2022) examine the relationship between the three DUPONT financial ratio components (net profit, asset turnover, and equity multiplier) on Mexico's firms share prices. The Generalized Method of Moments (GMM) was employed for a sample of 23 companies listed on the Mexican Stock Exchange. The evidence shows that profit generation and efficiency are the two components of the DUPONT model that are strongly associated with stock prices; however, the leverage effect is the component with the least impact.

The impact depends on the period of the study, the market and the type of companies. Moreover, few studies have recently been devoted to examining the case of Latin American companies. Therefore, it is of utmost importance to analyze the impact of debt, capital structure, solvency and firm size on the performance of Mexican firms.

3. Methodology and Data

3.1 Data

This research analyzes 52 companies listed on the Mexican Stock Exchange (BMV) for the period from the first quarter of 2011 (1Q/2021) to the second quarter of 2021 (2Q/2021), according to the availability of information and their size. The companies and the sector to which they belong are listed in Table I.

Table 1. Companies included in the sample (quotation key)

TICKER	SECTOR	TICKER	SECTOR	TICKER	SECTOR
ALEATIC		BACHOCOB		AUTLANDB	
ALFAA		BIMBOA		CEMEX CPO	
ARA		CHDRAUIB		CYDSAA	
ASURB		CULTIBAB		GCC	
CERAMICB		FEMSAUBD		GMEXICOB	
GAPB		GIGANTE	Consumer Staples	ICHB	
GCARSOA1		GRUMAB		LAMOSA	Materials
GISSAA	Industrials	HERDEZ		MFRISCOA-1	
IDEALB-1		KIMBERA		PAPPEL	
KUOB		SORIANAB		PE&OLES	
OMAB		LABB	Health Care	POCHTECB	
ORBIA		AMXL		SIMECB	
PASAB		AXTELCPO		ALSEA	
PINFRA AC		AZTECACPO	Telecommunications	CIEB	
TMMA		MEGACPO		CMRB	
		TLEVISA CPO		ELEKTRA	Consumer Discretionary
				GFAMSAA	
				LIVEPOLC-1	
				SPORTS	

Source: Own elaboration

3.2 Descriptive statistics

Table 2 summarizes the descriptive statistics of the sample mean. RDTO had a minimum value of -1.38, a maximum value of 0.96 and a standard deviation of 0.16. This suggests that there was a large fluctuation among the stock returns. This shows that there was a large fluctuation among the stock returns. It was reasonable because the study period includes sub-periods of crisis and stability.

Table 2. Descriptive Statistics

	RDTO	DCP_AT	DLP_CT	DT_CT	PT_AT	ROA	SOLV_	TAM
Mean	0.010	0.129	4.289	16.085	0.576	0.417	0.103	17.509
Maximum	0.960	2.489	2762.663	26841.490	2.489	1.829	1.548	21.299
Minimum	-1.378	0.000	-187.199	-196.843	0.068	0.008	-0.371	13.657
Std. Dev.	0.164	0.170	72.787	577.551	0.194	0.307	0.115	1.394
Skewness	-0.448	3.956	33.088	45.962	0.700	1.311	2.798	0.080
Kurtosis	10.534	35.083	1154.260	2133.145	8.987	4.779	20.997	3.106
Observations	2184	2184	2184	2184	2184	2184	2184	2184

Source: Own elaboration with estimation results

Note: RDT means stock returns, DLP_CT denotes the Long-term Debt to Total Equity ratio (rate), DCP_AT is the Short-term Debt to Total Asset ratio (rate), DT_CT is the Total Debt to Total Equity ratio (rate), PT_AT denotes the Total Debt to Total Asset ratio, ROA is the Return on Assets (net income/ total assets), SOLV_ is Firm's solvency (after-tax net operating income/ total debt) and TAM is the size of firms (natural logarithm of total asset)

DT_CT has a minimum value of -196.84 and a maximum value of 26841. The minimum value is negative, suggesting that some companies had debt in excess of their total assets, while their equity was relatively small. The maximum value reveals that there were risky companies in the market that financed their businesses mainly with external resources, i.e., debt.

DLP_CT on the other hand, shows long-term debt usage. This ratio presented a minimum of -187.2 and a maximum of 2762. These were still very risky indicators to look at, especially considering long-term debt was a more strategic finance. The mean value, however, was acceptably low, at 4.29. The standard deviation was 72.79, which proved that these firms had a severely wide range for long-term debt using, from incredibly big loans to zero debt.

DCP_AT is used to illustrate the significant relationship between short-term funding and asset. On average the minimum value is 0, while the maximum value of 2.49 shows that there are companies that have twice as many liabilities as assets. The mean value and standard deviation were 0.13 and 0.17 respectively, which gives investors a sense of security about short-term debt.

TAM in 2184 observations, presents the standard deviation of 1.4, the minimum and maximum value of 13.66 and 21.3 respectively, suggesting that there was small difference between the size of the listed companies in Mexico.

SOLV was quite variable between the maximum and minimum values, with 1.55 and -0.37 respectively. 0.10 was the average solvency value. This value shows the companies' ability to pay. In this case, on average 10% of their revenues are the resources they must cover their obligations.

ROA is a measure of the operating profitability of the companies and presented an average value of 0.42. The standard deviation of 0.30 indicates that the business margin remained between (0.12 and 0.72).

To extend the preliminary analysis, Figure 1 shows the average information for the 52 companies for the first quarter of the years 2011, 2015 and 2021 to observe how the values evolve during the sample period. Figure 1 shows an unfavorable situation for Mexican companies. Profitability, measured by Return on Assets (ROA) from 2011 to 2021 decreased from 19.2% to 15.5%, solvency was also decreasing from 4.9% to 3.7%. This means that, in absolute and relative terms, profit efficiency has decreased during the period. In terms of indebtedness, financial leverage (Total Debt/Total Equity) has increased dramatically from 37% to 338%. In terms of debt distribution, long-term debt represents a significant portion of debt, at over 70%. This seems to show the effects of the pandemic in Mexican companies, lower profitability and solvency and increased liabilities.
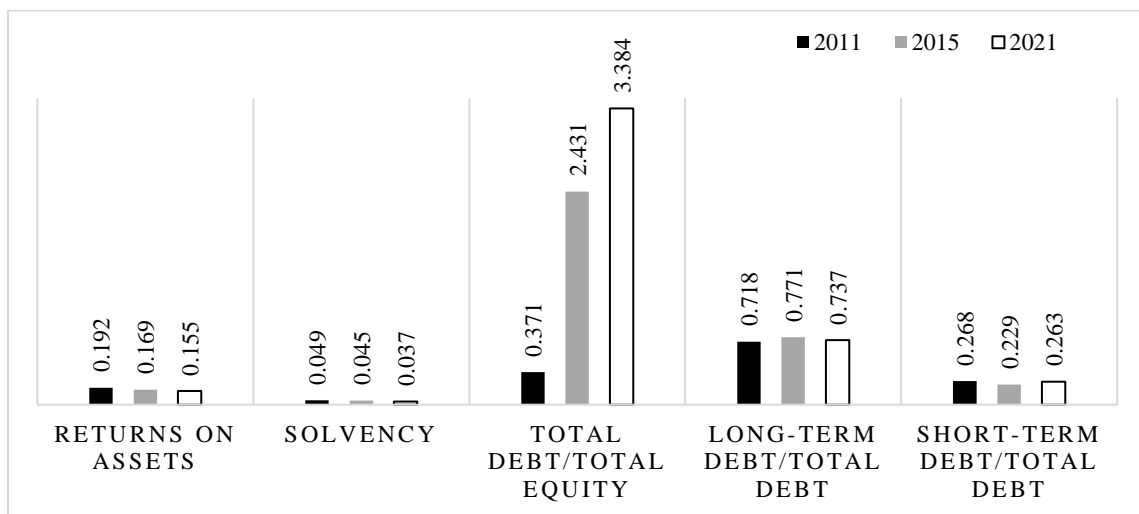

Figure 1. General Average Ratios

3.3 Methodology

The research study employed Time Series Cross Sectional (TSCS) research design that was used to show the effect of several financial ratios on stock market returns of quoted Mexican firms. TSCS has long been considered one of the best models for examining causality, along with that of purely random methods (Muriithi, Muturi & Waweru, 2016).

In addition to their power to identify causal links, TSCS designs offer a number of distinct advantages: i) more precise inference of model parameters, ii) enhanced capacity to capture complex behavior, ii.a) control of the impact of omitted variables, ii.b) detection of dynamic relationships, ii.c) supply of microfoundations for aggregate data analysis, iii) simplified computation and statistical inference, iii.a) non-stationary time series analysis, etc. (Hsiao, 2007).

To examine the impact of financial leverage, capital structure, solvency, and firm size on stock return, three panel approaches are employed: Pooled Ordinary Least Square (POLS), Fixed-Effect Model (FEM) and Random Effect Model (REM).

Proposed models have several advantages and strengths, mentioned in the following points (Wooldridge, 2010; Baltagi, 2021 and Hsiao, 2022):

Controlling for unobserved heterogeneity: The inclusion of fixed effects in the model allows for the control of time-invariant unobserved heterogeneity at the individual or entity level. This helps in capturing the specific characteristics of each entity that could potentially influence the relationship under investigation.

Accounting for unobserved individual heterogeneity: The REM takes into account unobserved individual-specific effects that are constant over time but vary across different entities. By capturing this heterogeneity, the REM provides more accurate estimates by controlling for individual-specific characteristics that may influence the relationship being studied.

Efficient utilization of panel data: The POLS approach utilizes both the cross-sectional and time-series variations in the data, thereby making efficient use of panel data. This allows for improved statistical power and efficiency in estimating the parameters of interest.

Addressing endogeneity concerns: The inclusion of fixed effects in the model helps in addressing endogeneity concerns that may arise due to omitted variable bias or unobserved time-varying factors. By controlling for unobserved individual-specific effects, the FEM helps to mitigate potential biases and provides more reliable estimates.

Allowing for heterogeneity across entities: The FEM allows for heterogeneity across entities by estimating entity-specific intercepts. This accounts for the variation in the relationship between variables across different entities, thus capturing entity-specific effects.

Efficient utilization of panel data: Similar to other panel data models, the REM efficiently utilizes both cross-sectional and time-series variations in the data. This enables more robust and efficient estimation of the parameters of interest.

Consistent estimation: Under certain assumptions, the REM provides consistent estimates of the parameters, even when the individual-specific effects are correlated with the independent variables. This contrasts with fixed effects models, where such correlation may lead to biased estimates (Schunck, 2013).

Flexibility in handling time-invariant variables: The REM allows for the inclusion of time-invariant independent variables without causing perfect multicollinearity. This flexibility is particularly useful when analyzing relationships involving variables that do not change over time (Bollen & Brand, 2010).

Summarizing, including Pooled Ordinary Least Squares (POLS), Fixed Effects Model (FEM), and Random Effects Model (REM) in the analysis provides several advantages in empirical research.

POLS allows for the efficient utilization of panel data, utilizing both cross-sectional and time-series variations, and providing improved statistical power and efficiency (Wooldridge, 2010). It is useful when there is no concern about unobserved individual-specific effects.

FEM controls for time-invariant unobserved heterogeneity at the entity level, capturing entity-specific characteristics that may influence the relationship under investigation (Baltagi, 2021).

It addresses endogeneity concerns and provides reliable estimates by controlling for unobserved individual-specific effects.

REM accounts for unobserved individual heterogeneity that is constant over time but varies across entities (Hsiao, 2022). It efficiently utilizes panel data and provides consistent estimates even when there is correlation between the individual-specific effects and the independent variables.

The advantages of including these models in the analysis allow for better control of unobserved heterogeneity, improved efficiency in utilizing panel data, addressing endogeneity concerns, and capturing entity-specific effects.

Multicollinearity is a typical phenomenon of time series. It refers to the tendency of exogenous variables to co-vary and, therefore, to make it difficult to determine the statistical significance of each independent variable. In order to establish compliance with the tolerable multicollinearity assumptions of the one-way error component models, two tests were are performed: i) variation inflation factor (VIF), and correlation analysis.

To determine the POLS model goodness of fit, and to verify the reliability of the estimation, a set of post-estimation diagnostics is interpreted. For the results of the fixed effects model and the random effects model, the F-statistic and the R-squared are analyzed. The Breusch-Pagan statistical test is also shown to test for the absence of heteroscedasticity and the Hausman test is interpreted to reveal the absence of serial correlation.

3.4 Panel Ordinary Least Square

Quarterly financial data for 52 Mexican listed companies are employed from 2011 to 2021.[2]
The regression model is expressed as follows:

$$RDTO_{it} = \beta_0 + \beta_1 DCP\_AT_{it} + \beta_2 DLP\_CT + \beta_3 DT\_CT_{it} + \beta_4 PT\_AT_{it} + \beta_5 ROA + \beta_6 SOLV\__{it} + \beta_7 TAM_{it} + \mu_i + \varepsilon_{it} \tag{1}$$

RDTO: The stock return of stock 'i' in quarter 't' (rate), is calculated as eq[1]:

$$R_t = \ln\left(\frac{P_t}{P_{t-1}}\right) \tag{2}$$

Where Rt is the Stock Return of the listed firm in quarter t, P_t is the Closing Price of stock for the last trading day of quarter[3] t and P_{t-1} is the Closing Price of stock for the last trading day of quarter t-1.

Acronym	Variable
DLP_CT	The Long-term Debt to Total Equity ratio (rate)
DCP_AT	The Short-term Debt to Total Asset ratio (rate)
DT_CT	The Total Debt to Total Equity ratio (rate)

PT_AT   The Total Debt to Total Asset ratio
ROA   The Return on Assets (net income/ total assets)
SOLV   Firm's solvency (after-tax net operating income/ total debt)
TAM   The size of firms (natural logarithm of total asset)

4. Results

Table 3. Testing for Multi-collinearity defects

Variable	R^2	VIF	1/VIF
DCP_AT	0.07966	1.086555	0.92034
DLP_CT	0.417212	1.7158898	0.582788
DT_CT	0.417375	1.7163699	0.582625
PT_AT	0.28775	1.4040014	0.71225
ROA	0.087596	1.0960057	0.912404
SOLV_	0.27414	1.3776761	0.72586
TAM	0.066514	1.0712533	0.933486
Mean VIF		1.3525359	

Source: Own elaboration with estimation results

Variation inflation factor (VIF) was used to test for multi-collinearity between variables, as shown in Table III. The mean VIF was 1.35 < 10 signaling that there was no multi-collinearity.

Table IV presents the correlation level between the variables in the model. The results shows that total debt to total equity (DT_CT), long-term debt to total equity (DLP_CT), short-term debt to total assets (DCP_AT), PT_AT, TAM is negatively correlated with stock return, while SOLV and ROA are positively correlated with stock return variable.

All variables were correlated with each other, but the coefficients were relatively low. The highest correlation coefficient was between RDTO and SOLV (0.1265). In addition, the correlation coefficients between the independent variables were lower than 0.65, which contributed to reject multicollinearity in the research model.

Table 4. Correlation matrix among the variables in the model

	RDTO	DCP_AT	DLP_CT	DT_CT	PT_AT	ROA	SOLV_	TAM
RDTO	1.000							
DCP_AT	-0.049	1.000						
DLP_CT	-0.027	0.0349	1.000					
DT_CT	-0.0181	0.0976	0.6408	1.000				
PT_AT	-0.0824	0.2391	0.0970	0.0556	1.000			
ROA	0.0685	0.0384	-0.0153	0.0043	-0.001	1.000		
SOLV_	0.1265	-0.161	-0.038	-0.014	-0.453	0.2284	1.000	
TAM	-0.003	-0.046	-0.009	-0.004	0.1727	-0.112	0.00993	1.000

Source: Own elaboration with estimation results

The model results are shown in Table 5.

Table 5. POLS, FEM and REM Results

Variable	Coefficient	t-Statistic	Prob.	Coefficient	t-Statistic	Prob.	Coefficient	t-Statistic	Prob.
	Pooled OLS			FEM			REM		
C	-0.006812	-0.150445		0.702481	3.72175	***	-0.006812	-0.150571	
DCP_AT	-0.025848	-1.209691		-0.012526	-0.34649		-0.025848	-1.210707	
DLP_CT	-3.89E-05	-0.620018		-2.22E-05	-0.349612		-3.89E-05	-0.620539	
DT_CT	-4.33E-07	-0.054823		-3.97E-06	-0.493842		-4.33E-07	-0.054869	
PT_AT	-0.026562	-1.249248		0.018388	0.471162		-0.026562	-1.250297	
ROA	0.025632	2.156521	**	0.029275	1.656766	*	0.025632	2.158332	**
SOLV_	0.137354	3.865436	***	0.094576	2.040495	**	0.137354	3.868681	***
TAM	0.000602	0.232582		-0.041322	-3.718019	***	0.000602	0.232778	
R-squared	0.019833			0.04441			0.019833		

Note: (*), (**), (***): statistically significant at 10%, 5%, 1%.
Source: Own elaboration with estimation results

The estimation results show that ROA, solvency, and firm size are the variables with a statistically significant effect on stock returns. The firm size factor has a negative impact. This is consistent with the results of Hong & Dung (2021) for the Vietnamese market. This means that investors have higher growth expectations, expected future returns are higher in small listed companies compared to large companies.

Return on assets (ROA) has a positive impact on stock returns (0.02927). This finding indicates that investors focus on profitability. Efficiency in profit generation is a crucial factor for dividend payout and company value, including share price. If profitability is positive, shareholders are more likely to buy and hold the company's shares. Improved profitability reduces the risk of default for future buyers.

Solvency has a positive impact on profitability (0.094576). It is an indicator of operating financial performance compared to debt. Solvency denotes capacity to meet the company's commitments, giving certain certainty to investors.

Empirical evidence points that total debt, long- and short-term debt each as proportion of total assets and total equity are not relevant in determining the stock market returns of the firms under study. These results are consistent with the Modigliani-Miller theorem: it is not relevant whether a firm is financed by debt, equity issuance or reinvestment of its earnings; what is important is the efficiency of profit making and the future cash flows of the firm.

The irrelevance of capital structure to the financial performance of Mexican firms was also found in other markets, such as in Sweden's real estate sector analyzed by Deboi, Kurmakhadov and Li (2021), Jordan's industrial sector investigated by Al-Slehat, *et al.* (2020), and Vietnamese non-financial listed companies studied by Anh & Thao (2019).

Table 6. Heteroscedasticity and Correlation Tests

Lagrange Multiplier Tests for Random Effects			
	Test Hypothesis		
	Cross-section	Time	Both
Breusch-Pagan	1.930614	1564.242	1566.173
Prob.		***	***
Correlated Random Effects - Hausman Test			
Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	23.648119	7	***

Note: (*), (**), (***): statistically significant at 10%, 5%, 1%.
Source: Own elaboration with estimation results

Table 6 shows the results of the heteroscedasticity (Breusch-Pagan) and correlation (Hausman) tests, respectively. The test results indicate that it is possible to reject the null hypothesis of the Breusch Pagan test for two of the three dimensions. Similarly, the Hausman correlation hypothesis can also be rejected. These results contribute to demonstrate the goodness of fit of the model.

5. Conclusion

This paper analyzes the impact of financial leverage, short- and long-term debt, firm size, solvency, and profitability on stock market returns of 52 firms listed on Mexican capital market (BMV) for the period 2011(1Q)-2021(2Q). Methodology proposed comprehends: Pooled Ordinary Least Square (POLS), Fixed-Effect Model (FEM) and Random Effect Model (REM).

The results show that there is a negative and significant impact of the firm size, since the larger the company, the lower the stock returns. Such evidence is consistent with the size anomaly in financial markets.

There is a positive and significant effect of ROA and solvency on stock returns. These results indicate that investors are interested in profitability indicators. The size anomaly and the irrelevance of debt to investors could be an indicator of weak efficiency in the Mexican stock market, since the risk of indebtedness does not impact stock prices/returns, i.e., the investment decision.

In this case, as we are analyzing publicly traded companies, investors could feel safe, since the stock market guarantees that companies meet certain requirements, such as a determined level of sales, ensuring cash flow, for debt repayment.

In some cases, companies issue securitized debt, i.e., there is a third party, called a trust. The cash flows to pay the interest on the debt come from a trust, and the risk is limited to the securitized debt; the company is not necessarily responsible for paying the debt. This process could explain why financial leverage does not affect the stock returns of listed Mexican companies.

On the other hand, financial engineering has developed instruments to finance external growth operations, for example Special Purpose Acquisition Companies (SPACs). SPACs are assets which allows to acquire a company without increasing the level of leverage. Derivatives are other type of financial assets which allows firms to hedge and leverage in the short-term.

The results are relevant to shed some light on the determinants of stock returns and the investment decision process. It is important to expand the literature on the impact of capital structure/financial leverage on firm performance in Mexico. The agenda for future studies could include the analysis of IPC35 listed firms, unlisted firms, although the availability of information is a limitation. Other methodologies can also be implemented, such as Modified Ordinary Least Squares (MOLS), Dynamic Ordinary Least Squares (DOLS), Generalized Method of Moments (GMM), among others.

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