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Variables that sway the capital structure! Evidence from the US automotive industry

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Abstract: The choice of capital structure (capst) has significant implications for a firm's financial performance and value. It is always a challenge for the firms to make the right decision on the capst proportion. The study identifies the firm variables that sway the capst decisions of the US automotive industry. In this study, we utilize unbalanced panel data from 86 firms for the period 2011–2022 making up a total of 670 firm/year observations. The dependent variable is the firm's capital structure proxied by total debt ratio, long-term debt ratio, and short-term debt ratio, while the independent variables are sales growth, firm size, profitability of firm, and tangibility ratio. Through a quantitative approach and panel regression, the study concluded that profitability of firm has a negative and significant impact on both total debt ratio and short-term debt, while sales growth, firm size, and tangibility ratio have no significant impact on any of the debt variables representing capital structure. These findings provide insights into the financial practices of the US automotive industry sample and can support future decision-making in the industry. These insights can inform decision-making related to capst choices, financial risk management, and strategic planning for automotive industry firms.

Subjects: Finance; Business, Management and Accounting; Industry & Industrial Studies

Keywords: US automotive industry; capital structure decisions; total debt ratio; short-term debt ratio; long-term debt ratio; panel data study

1. Introduction

Capital structure (capst) decisions are among the most important decisions made by a firm's management. Capst indicates the alignment of a firm's funding sources, including debt, equity, and hybrid securities. The choice of capst has significant implications for a firm's financial performance and value. Firms aim to find an optimal capst that balances the advantages through debt financing, including lower cost of capital and tax shields and by considering cost of debt financing like agency cost and bankruptcy risk.

The automotive sector is a crucial component of the global economy, with significant contributions to employment, economic growth, and technological innovation. As such, the capst decisions made by automotive firms are of particular interest to researchers and practitioners. The automotive sector faces unique challenges related to capst decisions, such as the high capital requirements for research and development and manufacturing facilities, the cyclical nature of the industry, and the increasing focus on sustainability and electrification. These challenges make capst decisions in the automotive sector a critical area of study. Based on a review of existing

literature on capst decisions, it appears that while much research has been conducted in this area, there is still a need for further investigation into the specific factors that influence capst decisions within the automotive industry. Prior research has explored the determinants of capst decisions across a variety of industries and countries, with some studies suggesting that industry-specific factors may play a significant role in shaping these decisions. However, there is a relative dearth of research focused specifically on the automotive industry, despite the fact that this is a major sector of the US economy with unique characteristics that may impact capst decisions.

Some previous studies have investigated the impact of firm-specific variables on capst decisions within the broader context of the US economy, with mixed results. For example, research by Frank and Goyal (2009) observed the lower leverage ratios with larger firms, while firms with higher levels of profitability of firm (Pr) and growth opportunities tend to have higher leverage ratios. Similarly, research by Rajan and Zingales (1995) found that size, tangibility, and Pr were significant predictors of capst decisions in the US. However, other studies have suggested that these relationships may be more complex and context-dependent, with factors such as industry structure, macroeconomic conditions, and firm-specific characteristics all potentially playing a role in shaping capst decisions.

Given the lack of research on the specific determinants of capst decisions within the automotive industry, there is a clear gap in the literature that this study seeks to address. By examining the impact of variables being specific to the firms such as SG, S, Pr, and Tr on capst decisions within this industry, this research aims to contribute to a more nuanced understanding of the factors that shape capst decisions in practice.

On priority, this study will focus on the capst decisions literature and theories already made in the previous years and its generalization to the automotive industry. Secondly, the research will provide strong evidence collected from the literature to understand the specific variables and their influence on Capst decision-making. The third section discusses the research methodology with sample and descriptive statistics presented in the section fourth and the final result discussion in the fifth. In addition, a conclusion is drawn to sum up the research in the ending section.

2. Literature review and hypotheses development

The literature regarding capst decisions and their determinants is extensive. To provide a comprehensive review, we divided it into three parts. Firstly, we discussed capst decisions in general, followed by a discussion of literature specific to capst decisions in the automotive sector. Finally, we presented literature discussing the determinants of capst decisions.

2.1. Capital structure (capst) decisions

The financial sector, despite various precautions, is still facing challenges (Mumtaz et al., 2023; Sadiq et al., 2023; Shah et al., 2023; Shaik et al., 2023). An overview of the previous research conducted on the factors that influence capst decisions has been discussed in this section. According to the pecking-order theory, whenever firms need cash flows to fund their investment projects, the first preference is given to their internally generated funds through retained earnings (Myers & Majluf, 1984), this supports to (Kayani et al., 2023) and contradicts to a research study that found that the Portuguese SMEs tend to favor debt financing over equity financing (Proença et al., 2014). In addition, the research revealed that leverage is associated with firm size and growth prospects, but adversely associated with productivity. The authors also discovered that the 2008 financial crisis had a noteworthy effect on the financing choices of Portuguese SMEs, resulting in a decreased dependence on external funding sources. Kariyasa and Dewi (2011) have employed panel data analysis to examine the connection between several firm-level factors, such as S, Pr, SG, Tr, and risk, and the firms' decisions regarding capst. Based on the results, S and Pr have a positive impact on leverage, but are negatively affected by tangibility and risk.

Fcma and Muhammad (2019) documented a study on listed banks in Bangladesh found that banks' Pr and size did not significantly affect their capst decisions, but factors such as asset structure, liquidity, growth, and business risk were significant determinants and Delcoure (2007) research on firms operating in Central and Eastern Europe identified several factors that affected leverage decisions, including differences in the banking system's financial constraints, legal frameworks, shareholder and bondholder rights protection, and corporate governance quality, additionally Mitton (2008) study on over 11,000 firms from 34 emerging markets found that the average market-value debt ratio of these firms increased by 15 percentage points during 1980–2004, attributed to changes in the characteristics of emerging market firms and the availability of debt financing at the country level. Cassar (2004) survey-based study on start-ups found that financing decisions were influenced by various factors such as start-up size, asset structure, organization type, growth orientation, and owners' characteristics, and these decisions had implications for the overall capst decision of the firm. These studies highlight the need to consider multiple factors and regional differences when making capst decisions.

Several studies have been conducted to analyze the factors influencing capst decisions and their impact on performance. Dessí and Robertson (2003) conducted a study that considered endogeneity and dynamics while examining the determinants of capst and their impact on performance. The study found that previous research did not consider the endogeneity issue in their analysis; however, in the future, it should be viewed with caution. Additionally, Rabbani (2020) analyzed the capst decision of private companies in Japan using a dataset spanning over 30 years. The study concluded that the leverage ratios of private companies demonstrate more persistence compared to public firms. The regression analysis reveals a positive correlation which appears to be significant between the initial leverage ratios and the firms' future leverage ratios, and the significant variations in leverage ratios may be attributed to undisclosed factors.

Sharma (2018) focused on the Indian real estate sector, analyzing 125 prominent firms listed on the BSE India. The study found that variables such as Pr, firm size, age, debt service capacity growth, and tax shield significantly influenced the capst decision. The findings of the study have implications for real estate companies seeking to raise short-term as well as long-term loans, as well as stakeholders interested in understanding the financing of the sector. De Miguel and Pindado (2001) conducted a study of the factors that determine the capst decision from different theoretical perspectives, considering the influence of institutional factors. The study presented a target adjustment model that demonstrated Spanish firms incur lower transaction costs compared to their US counterparts. The study's results corroborate tax and financial distress theories, as well as the interrelation between investment and financing choices. Khan et al. (2021) conducted a study on the capst decision of commercial banks in Saudi Arabia, using annual data from 11 Saudi commercial banks for the period 2010–2017. The study found that Saudi banks exhibit high leverage and book leverage is positively correlated with incomes instability, growth prospects, and bank size, while negatively correlated with Pr and tangibility. Despite having comparable determinants of capst to non-financial firms, Saudi banks exhibit distinct characteristics. Finally, Sharma (2018) and De Miguel and Pindado (2001) emphasized the importance of considering firm-level and institutional factors while making financing decisions; additionally, Khan et al. (2021) highlighted the unique characteristics of capst decision-making in the banking sector.

2.2. Capital structure (capst) decisions: automotive industry

Several studies have explored the factors influencing capst decisions in the automotive industry in various contexts. Rafique (2011) implies Pr to have a negatively significant influence on the capst, while financial leverage positively and significantly impacts the capst decision of automotive companies in Pakistan. Furthermore, the research discovered that the result of Pr on the capst decision is more pronounced than the effect of financial leverage. Sathyanarayana and Malvalli (2015) focused on the Indian context and reviewed capst in the automobile, IT, and hotel sectors. Their research found that Pr, size, growth prospects, and tangibility are critical factors affecting capst in all three sectors. Kirwok and Ayuma (2017) documented that debt financing is more

commonly used than equity funding in the industry due to its tax advantages and lower costs of capital. They emphasized the significance of considering the distinct features of the automotive sector, such as high capital expenditures and cyclical demand, when analyzing capst decisions, on similar grounds Triantoro and Bertuah (2020) identified Pr and SG as the key factors affecting the capst of the automotive industry and its components. Finally, Kaur and Kaur (2021) found that Pr and asset tangibility, with firm size, prove to be significant determinants of capst for Indian automobile OEMs; their results suggest that firms with higher size, productivity, and asset tangibility have lower debt-to-equity ratios, while those with lower size, Pr, and asset tangibility have higher debt-to-equity ratios.

2.3. Determinants of capital structure

Serghiescu and Văidean (2014) found a positive relationship between Pr and size with leverage, while growth prospects and asset structure had a negative impact. Additionally, they found that these relationships vary across industries. Sethi and Tiwari (2016) conducted a similar study on the Indian manufacturing industry, they concluded a positive correlation between leverage and size, Pr, tangibility, and liquidity, but a negative association with growth opportunities. Asaolu (2021) found a negative relationship between debt-to-equity ratio and long-term debt-to-total assets ratio with firm performance. However, the short-term debt-to-total assets ratio had a positive relationship with firm performance in the manufacturing sector, while the total debt-to-total assets ratio had a negative relationship in the oil and gas sector. Firm size also affects the association between capst and firm performance in both sectors. Additionally, Liu and Deng (2016) identified several significant factors of capst, including Pr, Tr, S, growth opportunities, and liquidity, in the automotive industry, and suggested that macroeconomic factors such as interest rates, inflation, and GDP growth rates also affect capst decisions.

Chia Tsun Siung (2021) revealed that the determinants of capst differed among the ASEAN countries. For example, the influence of size on capst was only noteworthy in the Philippines and Thailand, whereas Pr had an important effect on capst in completely four ASEAN nations. The examination also indicated that industry-specific factors, such as research and development expenses and marketing expenditures, significantly influenced the capst choices of companies operating in this industry.

Riaz and Afzal (2011) concluded that Pr and growth in assets have a negative correlation with debt ratios. However, the relationship between the tangibility and the size of the firm with debt ratios is mixed and not definitive. Larger companies are more inclined to borrow funds due to their diversified nature, which leads to more predictable cash flows, lowering the risk of debt financing. The Pr, tangibility, and size are the most significant determinants of capst across all three countries. Larger and more profitable firms tend to have a lower debt-to-equity ratio, while firms with higher levels of tangibility lean towards a higher debt-to-equity ratio. Additionally, the study found that growth opportunities have a favourable impact on leverage in Malaysia and Thailand, but not in Singapore (Gharaibeh, 2015; M'ng et al., 2017). Chaklader and Chawla (2016) identified that tax and inflation rates negatively affect capst choices of companies. On the other hand, Hossain and Hossain (2015) established that the most prominent factors that impact capst decisions of firms in Bangladesh are Pr, tangibility, and non-debt tax shield. In conclusion, these studies reveal that various factors play a key role in deciding a firm's capst, and their importance varies across different countries and regions.

Different studies have examined the determinants of capst and their impact on firms in various industries. Nha et al. (2016) utilize panel regression analysis with fixed effects to investigate the influence of firm-related and industry attributes on capst decisions during 2007–2013. The study finds that several factors significantly impact capst decisions, including tangibility, non-debt tax shields, liquidity, firm size, taxes paid, Pr, and growth assets. In addition, the analysis suggests that capst varies among different industries. Hatzinikolaou et al. (2002) add to the existing body of research by exploring the role of inflation uncertainty on the determinants of capst. The study

examines data from 30 Dow Jones industrial firms over a 20-year period and finds that inflation uncertainty has a negative and significant influence on a firm's debt-to-equity ratio, leading firms to reduce their leverage. Li and Islam (2019) investigate the influence of company-specific and industry-specific factors on the capst of publicly traded firms in Australia between 1999 and 2012. The findings suggest that industry-specific factors play a crucial role in determining the capst of firms, while some company-specific factors exhibit variations across industries. Vicente-Lorente (2001) analyzed the influence of strategic investments on an organization's financial policy using a resource-based approach. The study finds that strategic resources with specific and opaque characteristics can have both advantages and disadvantages from a financial perspective. Finally, Sikarwar and Goyal (2021) conduct a study using SEM analysis on 35 NSE organizations during 2001–2014 and find that growth, uniqueness; non-debt tax shields, collateral value, size, Pr, and volatility positively affect capst decisions, with Pr being the most significant factor in determining a company's capst. Overall, these studies highlight the importance of both firm-specific and industry-specific factors in determining capst decisions and suggest that inflation uncertainty and strategic investments can also play a crucial role.

The determinants of capst have been extensively researched by scholars to understand the determinants that influence a firm's financing decisions. Macan Bhaird and Lucey (2010) investigated the capst of 299 Irish SMEs and found that factors such as age, size, ownership structure, and collateral provision affect capst. Shah and Jam-E-Kausar (2012) analyzed the capst of leasing companies in Pakistan and identified that firm size is positively associated with leverage, while Pr, liquidity, and tax exhibit a negative association with leverage among the firms in the sample. Zhang and Liu (2017) investigated the relationship between total factor productivity (TFP) and measures of leverage in non-publicly traded Chinese firms and found a positive association between TFP and leverage measures in private and foreign-owned companies. Khaki and Akin (2020) analyzed data from 329 non-financial firms in Gulf Cooperation Council countries and found that size, tangibility, and growth opportunities have a positive impact on leverage, while Pr, age, financial constraints, liquidity, and government ownership negatively affect it. Additionally, Macan Bhaird and Lucey (2010) highlight the ubiquitous impact of information asymmetry on the consistency of capst estimates across various industries, while Shah and Jam-E-Kausar (2012) reveal the impact of firm characteristics on leverage, and Zhang and Liu (2017) emphasize the role of financial constraints and institutional environment. The studies collectively suggest that various firm r and industry-related factors influence a firm's capst decision-making process.

There are research studies that have explored the determinants of capst for different types of companies in different countries. Akhtar (2005) concluded that Australian multinational and domestic corporations found that growth, Pr, and size affect leverage for both types of companies, but collateral value is a crucial factor for domestic firms, while multinationals' capst is influenced by bankruptcy costs and geographical diversification. Mota and Moreira (2017) focused on Portuguese companies that have invested in Angola and found that age, asset structure, return on assets, tangibility, non-debt tax shields, liquidity, and company size affect the capst decision. Tangibility and size have a positive impact, while non-debt tax shields and liquidity have a negative impact on the capst. Eriotis et al. (2007) analyzed Greek companies and found a negative association between debt ratio and growth, quick ratio, and interest coverage ratio, whereas size exhibits a positive association. Bhaduri (2002) explored capst choice in less developed countries using the Indian corporate sector as a case study and found that growth, cash flow, size, product, and industry characteristics influence the optimal capst. Finally, Hall et al. (2004) found that determinants of capst vary among SMEs in different countries, with collateral having the strongest and growth the weakest influence. National economic, social, and cultural differences may explain the variations in the effects of determinants on capst across countries.

Sharing a similar motivation with Mundi and Gautam (2021), we decided to test the effects of sales growth measured as sales growth rate, firm size measured as logarithm of total assets, profitability measured as ROA (Demiraj et al., 2022, 2023, 2023a, 2023b; Dsouza & Habibniya,

2021; Dsouza & Pandey, 2017; Dsouza et al., 2021, 2022, 2022, 2023; Habibniya & Dsouza, 2018; Habibniya et al., 2022) and Tangibility ratio measured as total fixed assets by total assets on debt ratios of the selected firms from the US automotive division. However, viewing the firm variables as important measures of debt ratios, we formulate the following hypothesis, considering the dependent variables total debt ratio (TD), long-term debt ratio (LD), and short-term debt ratio (SD).

2.3.1. Sales growth (SG)

The determination of sales growth in this study is based on the percentage change in sales. Firms that possess a greater number of growth opportunities exhibit a reduced propensity for utilizing debt financing, as these high-growth firms perceive debt as a costly option for funding their projects (Arachchi, 2020; Chaklader & Chawla, 2016). Consequently, it is anticipated that firms with substantial sales growth exhibit a preference for a diminished level of leverage, thus leading to the formulation of the subsequent hypothesis.

H1: Firm's sales growth has an impact on debt ratios of the firms in the US automotive industry.

2.3.2. Firm size (S)

The firm size is defined as the natural logarithm of total assets for the sample firms. It is predicted that firms with more substantial asset foundations possess a greater percentage of financing through debt (Kurshev & Strebulaev, 2015; Matias et al., 2018). Therefore, firm size is assumed to have an impact on debt financing. As a result, the present research study posits the following hypothesis.

H2: Firm size has an impact on debt ratios of the firms in the US automotive industry.

2.3.3. Profitability of firms (Pr)

ROA is used to provide a proxy for the profitability of firms for the US automotive industry. It is observed that firms demonstrating greater profitability also possess a greater abundance of internal funds, with profitability being identified as a noteworthy factor impacting the financing of firms' debts (Chadha & Sharma, 2015; Chen et al., 2019; Mueller & Sensini, 2021). This principle serves as the foundation for our subsequent hypothesis.

H3: Profitability has an impact on debt ratios of the firms in the US automotive industry.

Table 1. Explanation of variables

Type of variable	Variables
Dependent variable	Total debt ratio (TD)
	Long-term debt ratio (LD)
	Short-term debt ratio (SD)
Independent variables	Sales growth (SG)
	Firm size (S)
	Profitability of firm (Pr)
	Tangibility ratio (Tr)

Note: Table 1 presents a set of dependent and independent variables. TD means the total debt ratio, LD means the long-term debt ratio, SD means short-term debt ratio, SG means sales growth, S means size of the firm, Pr means the firm's profitability, and Tr means the tangibility ratio. The study period is 2011–2022.

2.3.4. Tangibility ratio (Tr)

Tangibility is another significant determinant of capital structure decisions, and it is the ratio of total fixed assets divided by total assets. Firms with elevated levels of fixed assets employ said fixed assets as security for external borrowing (Li & Singal, 2019). Consequently, the variable Tr is projected to exert a substantial influence on the debt financing of said firms. This, in turn, gives rise to the formulation of the subsequent hypothesis.

H4: Tangibility ratio of firm has an impact on debt ratios of the firms in the US automotive industry.

2.3.5. Dependent variables

TD is used as a proxy for capital structure decisions ,and TD is measured as the total debt divided by the total assets of the firm. The ratio of long-term debt (LD) and short-term debt to total assets (SD) is also used to investigate the determinants of capital structure decisions. LD is defined as the debt due in one or more years, SD is the proportion of debt due within 1 year (Chaklader & Chawla, 2016; Chakrabarti & Chakrabarti, 2018; Purohit & Khanna, 2012)

3. Variables and the research model

In this research paper, we utilize unbalanced panel data from 86 firms for the period 2011–2022 making up a total of 670 firm/year observations. The dependent variable is the firm's capst proxied by Total debt ratio (TD), Long-term debt ratio (LD), and Short-term debt ratio (SD), while the independent variables are Sales growth (SG), Firm size (S), Profitability of firm (Pr), and Tangibility ratio (Tr). The time series data on all variables were obtained from the financial data available on the Refinitiv website. All the selected firms are listed on the stock exchange and belong to the US automotive industry.

3.1. Research model

The model below has been adopted to test our hypothesis.

$$TD_{it}/LD_{it}/SD_{it} = \beta_1 + \beta_2 \mathrm{SG}_{\mathrm{it}} + \beta_3 \mathrm{S}_{\mathrm{it}} + \beta_4 \mathrm{Pr}_{\mathrm{it}} + \beta_5 \mathrm{Tr}_{\mathrm{it}} + \text{Fixed effects} + \varepsilon_{\mathrm{it}} \quad (1)$$

Where the dependent and independent variables are mentioned. The fixed effects are proxied by covid dummy, to analyse the effect of covid on the industry; the regression model is tested with covid dummy, to identify the deviation in the results with and without covid. εit represents the error term included in the model.

4. Sample and descriptive statistics

The selected sample comprises firms listed at the stock exchange for the 2011–2022 period, from the US automotive industry, sourced through Refinitiv database. In selecting the period, we aimed at including as many of the most recent years as possible. We pooled the firm-year data from all the listed firms, excluding the data that had missing or insufficient financial information for all the selected variables. A cross- sectional and unbalanced panel was obtained after all the possible data reductions. The panel comprises 670 firm/year observations from the selected 86 firms. The outliers in the sample were not removed from the panel; however, the data was winsorized at 1% (p.0 99) level. The data was further processed with STATA software. Table 2 shows the descriptive statistics, skewness, and kurtosis results for the mentioned data.

As expressed in Table 2, the mean of TD is 0.76, LD is 0.22 and SD is 0.54; the standard deviation for TD is 4.28, LD is 0.59, and for SD is 3.92. A mean of more than 0.5 w.r.t. TD and SD, indicates that majority of the assets are funded through debt and sourcing funds more through short-term debt has been more evident; however, a high standard deviation w.r.t. TD and SD indicates an inconsistent behaviour across the US automotive industry sample. The mean and standard deviation of SG are 0.55 and 2.64. The mean value indicates that the sales growth has been positive on an average for the sample and the lower standard deviation explains a similar behaviour across

Table 2. Descriptive statistics

Variables	Observations	Mean	Standard deviation (Std. dev.)	Min.	Max.	Pr (Skewness)	Pr (Kurtosis)
Total debt ratio (TD)	670	0.76	4.28	0.00	71.58	0.00	0.00
Long-term debt ratio (LD)	670	0.22	0.59	0.00	13.78	0.00	0.00
Short-term debt ratio (SD)	670	0.54	3.92	0.00	57.80	0.00	0.00
Sales growth (SG)	670	0.55	2.64	−6.90	21.43	0.00	0.00
Firm size (S)	670	19.98	3.40	8.77	26.31	0.00	0.12
Profitability of firm (Pr)	670	−0.55	2.97	−50.83	0.29	0.00	0.00
Tangibility ratio (Tr)	670	0.43	0.19	0.00	1.00	0.05	0.15

Note: Table 2 reports the descriptive statistics. The descriptive statistics represents the mean, standard deviation, minimum value, maximum value of the set of selected variables with the skewness and kurtosis. TD means the total debt ratio, LD means the long-term debt ratio, SD means short-term debt ratio, SG means sales growth, S means size of the firm, Pr means the firm's profitability, and Tr means the tangibility ratio. The study period is 2011–2022.

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the sample. The S has a mean of 19.98 and a standard deviation of 3.40, considering the maximum and the minimum values of S. The mean indicates a balanced distribution of firms across sample w.r.t. their investments in assets. The Pr has a mean of −0.55 and a standard deviation of 2.97, having a negative mean though almost closer to zero indicates that majority of the US automotive firms are either having losses or are barely able to achieve their breakeven point. The Tr has a mean of 0.43 and a standard deviation of 0.19, having a mean of 0.43 indicates that the fixed assets comprise to be on an average 43% of the total assets, with a consistent behaviour across the sample. The skewness observations for the whole sample are almost equal to zero, indicating that the data used in the complete sample are fairly symmetrical (Kayani et al., 2023). A low kurtosis value across the whole sample states that the sample lacks outliers.

Table 3 reflects the correlation between the independent and dependent variables (Hasan et al., 2023; Hassan et al., 2023; Kayani et al., 2023). It has been observed that SG has a negative correlation with TD,SD and a positive correlation with LD. S and Pr have a negative correlation with TD, LD, and SD, being statistically significant at 5% (S and Pr) with TD,LD and SD, along with Tr, having a negative correlation with TD,SD and a positive correlation with LD. The correlation matrix provides a general and primary association among the variables; however, they need to be further tested with regression analysis to identify the influence of the independent variables on the dependent variables.

Table 4 shows the variance inflation factor (VIF) results. The variables in the model are free from multicollinearity within themselves (Hassan et al., 2023; Kayani et al., 2023)

The results in Table 5 shows the unit root test. The variables in the model are stationary, and there is a no issue of stationarity in our dataset

Table 3. Correlation among the variables

Variables	TD	LD	SD	SG	S	Pr	Tr
TD	1						
LD	0.6514*	1					
SD	0.9934*	0.5603*	1				
SG	−0.0045	0.001	−0.005	1			
S	−0.3128*	−0.1194*	−0.3235*	−0.0794	1		
Pr	−0.7091*	−0.3784*	−0.717*	−0.022	0.4226*	1	
Tr	−0.0637	0.0537	−0.0777	0.0631	0.2849*	0.067	1

Note: Table 3 reports the correlation results of coefficients based on Pearson's pairwise correlation test. TD means the total debt ratio, LD means the long-term debt ratio, SD means short-term debt ratio, SG means sales growth, S means size of the firm, Pr means the firm's profitability, and Tr means the tangibility ratio. *Statistically significant at 5% level. The study period is 2011–2022.

Table 4. VIF results

Variables	SG	S	Prft	Tr	Mean VIF
VIF	1.01	1.34	1.22	1.1	1.17
1/VIF	0.99	0.75	0.82	0.91	

Note: Table 4 reports the Variance Inflation Factor (VIF) that measures the severity of multicollinearity in regression analysis. The results indicate that the independent variables have no multicollinearity. SG means sales growth, S means size of the firm, Pr means the firm's profitability, and Tr means the tangibility ratio

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Table 5. Unit root analysis

Variables	p-Value	Inference
Augmented Dickey-Fuller		
Total debt ratio (TD)	0.00	Stationary
Long-term debt ratio (LD)	0.00	Stationary
Short-term debt ratio (SD)	0.00	Stationary
Sales growth (SG)	0.00	Stationary
Firm size (S)	0.00	Stationary
Profitability of firm (Pr)	0.00	Stationary
Tangibility ratio (Tr)	0.00	Stationary

Note: Table 5 reports the unit root analysis. As the p-value is <0.05, the series has no unit roots; thus, we conclude that the series are stationary.

5. Results and discussion

The panel regression analysis has been applied to study the impact of the independent variables on the dependent variables. The most significant results derived from the no dummy or covid dummy (the year with covid crisis is considered to be 1 and year with non-covid crisis is considered to be 0) observation is used to analyse the discussed panel regression model. Further, the Hausman test derives the selection of fixed or random effects for the analysis.

Table 6 represents the regression results. Concluded by the Hausman test static ($p = 0.0018$), the fixed effect results have been analysed for dependent variable TD. The firm's sales growth (SG), firm size (S), and tangibility ratio (Tr) have no significant impact on TD. The profitability of the firm (Pr) has a negative and significant ($p < 0.01$) impact on TD (Abey & Velmurugan, 2019; Chadha & Sharma, 2015; Chakrabarti & Chakrabarti, 2018; M'ng et al., 2017; Mundi & Gautam, 2021), and the results are same with or without covid dummy variable.

For the dependent variable SD, considering the Hausman test static ($p = 0.0001$), the fixed effect results have been analysed. The firm's sales growth (SG), firm size (S), and tangibility ratio (Tr) have no significant impact on SD. The profitability of the firm (Pr) has a negative and significant ($p < 0.01$) impact on SD (Abey & Velmurugan, 2019; Chadha & Sharma, 2015; Chakrabarti & Chakrabarti, 2018; M'ng et al., 2017; Mundi & Gautam, 2021), and the results are same with or without covid dummy variable. For the dependent variable LD, the Hausman test static ($p = 0.6081$) concludes the random effect results to be analysed. The firm's sales growth (SG), firm size (S), tangibility ratio (Tr), and profitability of the firm (Pr) have no significant impact on LD, and the results are same with or without covid dummy variable.

The firms conclude the same regression results between Pr and TD,SD. However, no significant relationship is observed w.r.t. LD. This concludes that the TD which is made up of SD and LD is strongly influenced by SD. The US automotive industry strongly depends on short-term debt for its debt funding. Secondly, having a negative and significant relationship between Pr and TD,SD indicates that more profitable firms borrow less debt and use internal financing for the projects, which supports pecking- order theory and in turn lowers the costs to the firms and helps in maintaining a best capital structure to have a cost control. Maintaining an ideal capital structure for the firm creates a governance on ideal decision-making w.r.t. funding sources. This in return helps to minimize risks caused due to unplanned debt funding and supports the firms to have proper strategic planning for having right funding choices while taking investment decisions. The managers of firms with higher profitability may not prefer to signal the market about the firm's

Table 6. Regression results

Independent variables	Dependent variables						
	Fixed effects				Independent variables	*Random effects*	
	Total debt ratio (TD)		Short-term debt ratio (SD)			Long-term debt ratio (LD)	
	No dummy	Covid dummy	No dummy	Covid dummy		No dummy	Covid dummy
Sales growth (SG)	−0.03	−0.031	−0.017	−0.018	Sales growth (SG)	−0.005	−0.005
	(0.024)	(0.024)	(0.024)	(0.024)		(0.005)	(0.006)
Firm size (S)	0.288	0.311	0.285	0.3	Firm size (FS)	0.003	0.004
	(0.276)	(0.285)	(0.228)	(0.235)		(0.015)	(0.015)
Profitability of firm (Pr)	−.836***	−.839***	−.765***	−.767***	Profitability of firm (Prft)	−0.073	−0.073
	(0.297)	(0.297)	(0.243)	(0.243)		(0.065)	(0.065)
Tangibility ratio (Tr)	−2.257	−2.261	−2.336	−2.339	Tangibility ratio (Tr)	0.179	0.178
	(1.953)	(1.955)	(1.635)	(1.636)		(0.203)	(0.204)
Observations	670	670	670	670	Observations	670	670
R-squared	0.482	0.482	0.501	0.501	Pseudo R^2	.z	.z
Durbin–Watson	0.706764	0.706537	0.7442382	0.744178	Durbin–Watson	1.967096	1.966055
Hausman test (Prob > chi2)	0.0018	0.0018	0.0001	0.0001	Hausman test (Prob > chi2)	0.6081	0.6081

Note: Table 6 represents the panel data regression results. TD means the total debt ratio, LD means the long-term debt ratio, SD means short-term debt ratio, SG means sales growth, S means size of the firm, Pr means the firm's profitability, and Tr means the tangibility ratio. The Hausman test indicates the fixed effect to be the best regression measure w.r.t. TD and SD and random effect to be the best regression measure w.r.t. LD. The standard errors are in parentheses. *** $p < .01$, ** $p < .05$, * $p < .1$ reflects the statistical significance. The study period is 2011–2022.
****p < .01, **p < .05, *p < .1.*

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future profitability. Higher profits for such firms also increase the proportion of internal funds assuming the firm is having limited growth opportunities.

6. Conclusion

The present research has aimed to add to the previous literature on capst decisions by exploring the factors that influence such decisions for automotive sector companies located in the USA. The study focuses on various firm-specific variables, including but not limited to Sales Growth (SG), Firm Size (S), Profitability of Firm (Pr), and Tangibility Ratio (Tr). In addition, the study also examined the impact of these variables on the capst decisions of automotive companies operating in the United States. Based on the analysis conducted on the US automotive industry sample, it can be concluded that the majority of assets in the sample are funded through debt, with short-term debt being more prevalent. However, the high standard deviation indicates an inconsistent behavior across the sample. Sales growth has been positive on average, with a similar behavior observed across the sample. The investment in assets is fairly balanced across the sample, with no outliers observed. The majority of firms are either having losses or are barely achieving their breakeven point. Fixed assets comprise a substantial portion of the total assets, with a consistent behavior observed across the sample. The correlation matrix shows a primary association between the independent and dependent variables. The regression analysis shows that Pr has a negative and significant impact on both total debt and short-term debt, while sales growth, firm size, and tangibility ratio have no significant impact on any of the debt variables. Thus the estimated capital structure of the automotive industry should be measured by total debt or short-term debt, because using the long-term debt measurement, none of the independent variables have a significant effect on the capital structure. These findings provide insights into the financial practices of the US automotive industry sample and can inform future decision-making in the industry. However, further research is needed to confirm these findings and to explore other potential factors that may impact the industry's financial performance.

The study's key findings offer significant value to corporations, lenders, and investors. The findings can also aid companies in determining the best capst mix to lower cost and increase firm value, as having a negative and significant relationship between Pr and TD,SD indicates that more profitable firms borrow less debt and use internal financing for the projects, which in turn lower the costs to the firms and helps in maintaining a best capital structure to have a cost control. These insights can inform decision-making related to capst choices, financial risk management, and strategic planning for automotive industry firms. Additional research may be warranted in the automotive industry, exploring alternative locations and comparing the results with those from the US. However, the study's data only cover the automotive industry in the United States. To obtain more insightful implications, researchers could gather data from the global industry and compare. To achieve a more comprehensive outlook, future research could explore different methodologies, country comparisons, and industries while lowering the significance level.

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