

# The Impact of Capital Structure on the Business Cycle of Companies Active in the Automotive Industry and Parts, Pharmaceuticals and Chemical Products

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## ABSTRACT

The purpose of this study was to examine the impact of the business cycle on the capital structure and performance of companies active in the automotive industry, parts, pharmaceuticals, and chemical products in companies admitted to the Tehran Stock Exchange. According to the purpose of this study, six hypotheses were presented which were analyzed statistically. The statistical sample of the study consisted of 51 companies admitted to the Stock Exchange, whose data were analyzed during the 5 years (2011-2012) as a test period. We use the business cycle and capital structure as well as the company's performance. Multivariate regression has been used to analyze hypotheses. The results show that the coefficients of the independent variables of the research in the hypotheses according to the statistics obtained from these variables, the results indicate the significance of this coefficient. These findings indicate that there is a direct relationship between the business cycle and the capital structure of automobile and parts companies. Also, the business cycle has no significant effect on the capital structure of companies active in the pharmaceutical and chemical products industry.

## KEYWORDS

Business cycle, capital structure, pharmaceutical industry, chemical products

## INTRODUCTION

In capital markets, the credit of companies depends to a large extent on their capital structure and, in fact, depends on how the production and delivery of services depend on the supply and use of financial resources. For this reason, capital structure is considered as the most important factor

affecting the valuation of companies and their orientation in capital markets. Most companies provide the required funds in a variety of ways. But factors such as company performance, risk, industry, and access to financing markets as well as economic and political environments have cautioned them about making optimal decisions in this regard.

The issue of capital structure is one of the issues that has been the subject of many research and testing so far, and both theoretical research and empirical research are ongoing. Theoretical debates on capital structure seek to achieve a degree of balance between two sources of financing, that is, debt and equity of the owners of capital, which at that point could maximize the value of the company's shares and, on the contrary, reduce the cost of financing resources to the minimum.

Undoubtedly, identifying different ways of financing and using the right financial tools will help management to make better decisions and benefit more from companies, and the optimal use of financial resources in the discussion of capital structure, In fact, managers will have the opportunity to increase the value of the entire company and the wealth of the owners of the capital.

## PROBLEM STATEMENT

In the wake of corporate growth and technology development, huge amounts of capital and finance have been intensified and numerous financial markets have been developed. In turn, this requires, on the one hand, the multiplicity of corporate financing methods and, on the other hand, requires managers to determine the appropriate financing strategy and determine the optimal structure of the company's capital. Capital structure is considered as the most important parameter affecting the valuation of companies and their orientation in capital markets. The current and changing environment has made credit rating

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companies partly dependent on their capital structure. The preparation of an appropriate strategy based on economic, marketing, production and financial variables is one of the most important tasks of managing a company. A proper financial strategy strengthens the ability of the company to achieve its overall corporate strategy goals.

Firms have access to a variety of financial resources for implementing profitable investment projects, settling deadlines, increasing working capital, and paying dividends to shareholders (Molla Nazari et al., 2010). These resources are classified into two broad categories. Internal resources, such as accumulated profits and external resources such as foreign direct investment, bond markets, foreign trade borrowings and stock releases (Bandyopadhyay & Barua, 2016). The use of any of the financing methods or any combination of them reflects the pattern of capital structure of the company. The main goal of capital structure decisions that maximizes the company's market value is through the appropriate combination of corporate finance (Ansari et al., 2013). Contrary to the Modigliani and Miller (1958) theory of irrelevance, which states that capital structure is independent of the value of the company. But more modern theories, such as hierarchical theory and balance theory, predict that many variables may affect the corporate capital structure. An overview of existing literature shows that many corporate characteristics may be effective on the capital structure and how to choose between debt and equity issues (Bandyopadhyay & Barua, 2016). The corporate capital structure is influenced by numerous internal and external factors. Internal factors are factors that influence internal capital structure decisions, and external factors are those factors that affect the capital structure decisions of the external environment (Sinai, 2007).

So far, much attention has been focused on specific company features such as financial leverage, size, growth opportunities, and so on. In addition to corporate features, macroeconomic conditions may also be considered as determinants of the corporate capital structure (Bandyopadhyay & Barua, 2016). Economic factors play a major role among the determinants of capital structure. Although financial managers have come to believe that economic factors are important in determining the structure of capital, they usually give the most importance to intra-organizational factors (Setayesh et al., 2011). Internal researchers such as Setayesh et al. (2011), Hejazi and Khademi (2013), Karimi et al. (2014) and foreign researchers such as De Jong et al. (2008) and Jõeveer (2013) influence the macroeconomic variables along with corporate features the capital structure of the companies studied.

One of the economic variables that has recently attracted the attention of researchers is the business cycle (Levy & Hennessy, 2007, Bandyopadhyay & Barua, 2016, Khamsabadi, 2014, Reza Gharebagh and Mohammadi, 2015). The term "business cycle" refers to patterns that are repeated in a system of economic recession and economic prosperity. Economic prosperity refers to a situation where business activities are at its peak. After the flourishing economic period, business activity is reduced, which is

referred to as a recession (Novo, 2011). Economic conditions can have different effects on companies and affect the behavior of accounting data. Therefore, knowing the change in the behavior of accounting data with respect to business cycles can help investors and other financial market decision makers to more accurately predict future accounting data and to allocate more efficient resources (Pourheidari and Ahmadpour, 2011). Financing decision as one of the determinants of financial stability in companies is affected by economic fluctuations (Reza Gharebagh and Mohammadi, 2015). Economic fluctuations affect the company's operations and play an important role in its financial decisions (Enqvist et al., 2014).

#### IMPORTANCE AND NECESSITY OF RESEARCH

One of the issues faced by financial managers is the determination of the company's capital structure. Also, due to the competitive nature of markets today, the optimal allocation of resources to maintain the position and development of companies is vital and inevitable. Companies adopt different policies in order to maximize utility in their business cycle. Therefore, before deciding to invest heavily, it is essential. The optimal capital structure is tailored to the business cycle, taking into account all its conditions and variables, and the information provided is the basis for decision making and planning. In addition, it provides part of the information needs of financial managers. It can also be theoretically useful for scholars and researchers in the field of finance (Bandyopadhyay & Barua, 2016).

Each company, in order to survive, grow and compete with other companies, needs to attract company capital, affects the capital structure, and these financing decisions must be made in a way that is in line with the company's investment strategy.

Referring to university research and literature, the main reasons for failure of companies are the lack or inadequacy of their inadequate and inadequate financing and financing. However, comprehensive research has not been conducted in this regard in Iran. However, by examining the business cycle on the capital structure of companies active in the automotive industry, parts, pharmaceuticals, and chemical products of companies admitted to the Tehran Stock Exchange, many of the liabilities and losses of the capital structure can be attributed to the cycle identify and control the life of the organization in which the companies are located and by providing the appropriate strategies for optimizing the optimal capital structure for companies. In this regard, considering the importance of examining each of the variables and their impact on each other, we examine the relationship between variables (Islam & Khandaker, 2015 and Degryse et al., 2012).

#### BACKGROUND RESEARCH

Zhang et al. (2015) examined the effect of economic uncertainty on the capital structure of Chinese companies. The results showed that large corporations close to the

capital are losing their financial leverage with increasing monetary policy uncertainty, but smaller and marginalized companies tend to be less likely.

Sarlak et al. (2015) investigated the relationship between the characteristics of the capital company during the life cycle stages of the company during the years 2008- 2011. For this purpose, it was divided. Companies in the life-cycle research model using the Kinson Cash Crisis Model (2011) and considering the theories of hierarchy of capital structure, the relationship of variables or size of a company, growth opportunities, risk, dividend, asset visibility, Profitability and future cash savings were reviewed, except for the financial leverage debt. Regression results from the review of 231 companies show that, despite the differentiation of the company's life cycle to growth stages, maturity, decline, no difference in their financing was observed. Companies in each phase of their life cycle prefer debt financing; in other words, companies follow hierarchical theory in providing their financing.

Mohammadi et al. (2014) investigated the relationship between working capital management and economic value added in different business cycles. According to the results of this research, during the economic downturn, the association of some of the variables of working capital and economic value added increases, but during the economic period, the severity of this relationship is reduced.

Makhova and Zinker (2014) examined the impact of macroeconomic factors on the structure of corporate capital, and eventually concluded that macroeconomic policies such as monetary and monetary policies affect capital structure decisions.

Safari Graylie (2008) investigated the effect of capital structure on the profitability of companies admitted to Tehran Stock Exchange. His research results showed that there is a positive relationship between the ratio of short-term debt to assets and profitability of the company as well as between the ratio of debt to assets and profitability, but there is a negative relationship between the ratio of non-current debt to assets and profitability. Meanwhile, the results of industry analysis showed that the type of industry is effective in having or not having this relationship, so that the patterns were accepted in some industries and grew in some others.

Kordestani and Najafi Omran (2008) examined the determinants of capital structure in companies listed on Tehran Stock Exchange. The results of the survey of 93 companies during the 2003-1999 period indicated that profitability is one of the factors affecting the capital structure (debt ratio) and, according to hierarchical theory, there is a negative and significant relationship between these two variables.

#### RESEARCH HYPOTHESES

- The business cycle has a significant effect on the capital structure of the companies' active in the automotive and parts industry.

- The business cycle has a significant impact on the capital structure of the companies' active in the pharmaceutical industry.
- The business cycle has a significant impact on the capital structure of companies active in the chemical industry.

#### METHOD AND TOOL FOR COLLECTING INFORMATION

Measurement and measurement tools are tools that the researcher can measure variables with and help them to analyze the phenomenon studied and eventually discover the truth. Therefore, they must be designed and organized so that they can collect information about measuring and measuring variables in a desirable manner (Hafeznia, 2013, 171).

The process of gathering information is the beginning of a process in which the researcher collects field and library findings and is inductively compressed by classification and then analyzes and evaluates their hypotheses and ultimately issuing a warrant. In this research, the library method was used to collect information; and considering that the only reliable reference for collecting financial data, computer databases and the library of the Stock Exchange Organization and the new software, [www.rdis.ir](http://www.rdis.ir) Therefore, the required data of this research were collected through the mentioned references.

#### Society and Research Sample

The statistical population of the study consists exclusively of all listed companies in Tehran Stock Exchange. The statistical sample of this study, the total of accepted companies in the Tehran Stock Exchange, is selected using systematic elimination methods. The statistical sample should have the following conditions.

1. During the mentioned period, they are constantly active in the stock market.
2. Their financial period will end in March.
3. It is not part of investment and financial intermediation companies and insurance companies and banks.
4. During this period, there will be no change in fiscal year.
5. All financial and other financial information required, including notes accompanying financial statements, will be available.

Based on the calculations, the sample number is  $n = 51$ , and the samples were randomly selected from among different industries.

#### RESEARCH METHODOLOGY

Considering the purpose of the research on the analysis of the impact of the business cycle on the capital structure of the companies active in the automotive industry, parts, pharmaceuticals and chemical products, this research is based on the correlation and methodology of the research, the quasi-experimental and post-event type in the field a positive accounting research.

Which is done using real information and because it can be used in the process of using information, so a kind of research is applied. The post-event method is a method in which research using past information and studying past relationships of dependent variables and variables Independent examines the relationships between them.

In other words, post-event method is a way to find out the possible cause from past information and from the disability. This research is also based on actual financial statements and notes accompanying corporate financial statements. In this research, the total amount of data required to test the hypotheses has been collected by direct withdrawal of the required information from the financial statements and the organization's website. EViews software is used to analyze the data.

### RESEARCH MODEL

In their research, the researcher seeks to identify variables and how they relate to each other. The researcher, on the basis of initial studies and the study of the literature, attempts to determine the variables studied, lists them, and formulates them in the form of an analytical and dissimilar model. To this end, the design of the theoretical framework for research should be designed; these models reflect the purpose of the research and indicate the issues, angles and dimensions of the problem that must be studied (Hafeznia, 2013, 122).

The model used to test the hypothesis in accordance with (Bondyopadaya and Baruva, 2016) is as follows:

$$CS_{it} = \beta_0 + \beta_1 LNTA_{it} + \beta_2 LNAGE_{it} + \beta_3 TANG_{it} + \beta_4 SALES_{it} + \beta_5 CR_{it} + \beta_6 PBR_{it} + \beta_7 PROF_{it} + \beta_8 DDOWN_{it} + e_{it}$$

Where in:

- **Dependent Variable:**

CS: Capital structure (total debt ratio on total assets and long-term debt ratio over total assets)

- **Independent Variable:**

LNTA: firm size (total asset logarithm)

DDOWN: The trade cycle indicator (1 for years with a recession and 0 for otherwise). To determine the years of recession, we first calculate GDP for the entire realm of research time. Then we compare GDP (GDP) of each year of the realm of time with the obtained average. If that year's GDP is less than the average of the average of the whole period, then that year is considered to be a recession and the DDOWN variable is equal to 1, otherwise it is 0.

- **Control Variable:**

LNAGE: logarithm of company life

TANG: Visibility of assets

SALES: Sales circle

CR: Current ratio

PB: The stock price ratio on the book value of each share

PROF: Profitability

In the above model, capital structure indices are the dependent variable, representing the business cycle of the role of independent variable and other variables play the role of control variable.

### DESCRIPTIVE STATISTICS

In general, the descriptive statistics are called the methods by which they can process and summarize the information collected. This kind of statistics merely describes the society with the sample and aims to compute the parameters of society or sample of research (Azar and Momeni, 2010). In the present study, the sample was investigated during the period from 2011 to 2015, including 51 companies. In this section, the mean, median (central criteria), standard deviation, maximum and minimum (dispersion criteria) of the variables used are calculated and are presented in Table 1. A summary of the status of the descriptive statistics of the research variables after the screening and deletion of data is presented in Table 1.

Tab.1.Descriptive indexes of the studied variables

Variable	Average	Mid dle	Standa rd deviat ion	Maxim um	Minim um	Sampl e size
Capital Structure	0.60	0.62	0.16	0.88	0.11	255
Current Ratio	1.42	1.26	1.07	9.95	0.19	255
Business Cycle	0.80	1.00	0.40	1.00	0.00	255
Lnage	3.21	3.17	0.62	3.98	1.79	255
Logarithm of Total Assets	5.95	6.02	0.60	7.36	4.44	255
Price to Book Ratio	3.06	2.77	1.70	8.96	0.58	255
Profit	0.11	0.87	0.10	0.59	0.00	255
Sales	0.96	0.86	0.51	2.69	0.11	255
Tangibility Total Assets	0.74	0.73	0.35	3.58	0.14	255

According to Table (1), we can examine all the variables according to the relevant indicators from the statistical point of view and determine which characteristics of the research variables are. The average is the central index and represents the average of the data so that if the data are rotated on a regular basis, the mean value is exactly the point of equilibrium or the center of gravity distribution. We see it in the first row and for the capital structure variable it is 0.60. And the second column represents the intermediate variables, indicating that 50% of the data is less than the

middle number of the set and 50% of the data is greater than the middle number of the set. The median value for the capital structure variable is 0.62. We see the third column of the standard deviation, which is one of the most important criteria for dispersion. In general, scattering measures are criteria that scan and compare the distributions of observations around the mean. According to the above table, this value for the capital structure is 0.16.

The fourth and fifth columns represent the highest and lowest data observations, which according to the above table, the largest and lowest data in the capital structure are 0.88 and 0.11, respectively. Finally, in the last column of the table, we see the total number of data (51 companies for 5 fiscal years).

The qualitative features of other main variables of the present study are also evident in the above table.

#### NORMAL TEST OF DEPENDENT VARIABLE

In this research, the least squares method is used to estimate the pattern parameters. The ordinary least squares method is based on the assumption that the dependent variable of the study has a normal distribution, and their abnormal distribution leads to a violation of the assumptions of this method for estimating the parameters, therefore, the normal distribution of the dependent variable of the research is to be tested. In this study, this issue is examined through Jarque and Bera statistics. The zero assumption and the opposite assumption in this test are as follows:

H0: The variables under study have a normal distribution

H1: The variables under study have a normal distribution

If the significance level of the test statistic is more than 0.05% (prob > 0.05), the H0 hypothesis is based on the normal distribution of the variable. The results of the Jarque test are presented in relation to the dependent variable of the research in the following table.

Tab.2. Test results of normality of the dependent variable

Variable	Jarque's statistics	The significance level
CS (capital structure)	15.03	0.00

According to Table 2, based on this test, since the significance level is less than 0.05, the distribution of the dependent variable is not normal and the assumption of H0 is not accepted on the normal distribution of the variable, the assumption H0 is rejected and the assumption H1 is accepted. But since the sample size is greater than 30, it does not disrupt the research.

#### TEST OF HYPOTHESES

Regarding the theoretical framework and the research background, the research model is a multivariate regression model. To test the first hypothesis of the research, the following model is used:

$$CS_{it} = \beta_0 + \beta_1 LNTA_{it} + \beta_2 LNAGE_{it} + \beta_3 TANG_{it} + \beta_4 SALES_{it} + \beta_5 CR_{it} + \beta_6 PBR_{it} + \beta_7 PROF_{it} + \beta_8 DDOWN_{it} + e_{it}$$

Hypothesis 1: The business cycle has an impact on the capital structure of companies active in the automotive and parts industry.

Tab.3. Results of regression analysis of the first hypothesis

Variable	Coefficient	Statistics t	Significance factor
Width from origin	1.02	2.52	0.01
Current ratio	0.87	3.35	0.00
Business cycle	0.59	0.52	0.03
Age of the company	0.15	2.96	0.00
Size of the company	0.00	1.38	0.16
Stock price on book value	0.42	2.05	0.04
The proportion of sales on total assets	0.21	0.35	0.72
The ratio of fixed assets to total assets	0.08	0.81	0.41
Profitability	0.61	14.90	0.00
The coefficient of determination	0.87	F statistics	94.44
Adjusted coefficient of determination	0.86	Significance level of F	0.00
		Durbin-Watson	1.84

In Table 3, the significance of the whole model is verified with regard to the fact that the f significance level of 0.05 (0.00) is verified with a confidence of 0.95 that the total model is meaningful. The coefficient of model determination also indicates that 0.87 percent of the changes in the dependent model (capital structure) were entered by the independent variable (business cycle). The model is explained in the model. This value indicates the intensity of the relationship between the variables.

It can be claimed that the whole model has a meaningful value. Also, given the adjusted coefficient for the model, which is equal to 86%, it can be stated that, in total, the independent and control variables of the research explain more than 40% of the dependent variable variations. Also, in this study, Durbin-Watson test was used to test the residual correlation, which is one of the assumptions of regression analysis and is called self-correlation. According to the

preliminary results of estimating the model, the value of the Durbin- Watson is 1.84 percent, and since it is between 1.5 and 2.5 and values close to 2 represent the lack of self-correlation, it can be concluded that the remainders are independent of each other.

Second hypothesis: There is a significant difference between the business cycle and the capital structure of the companies' active in the pharmaceutical industry.

Tab.4. Regression analysis results of the second hypothesis

Variable	Coefficient	Statistics t	Significance factor
Width from origin	0.55	0.89	0.37
Current ratio	0.14	2.73	0.00
Business cycle	-0.14	1.89	0.10
Age of the company	0.10	1.90	0.06
size of the company	0.00	0.00	0.99
Stock price on book value	0.16	-0.87	0.38
The proportion of sales on total assets	0.62	0.60	0.54
The ratio of fixed assets to total assets	0.02	0.14	0.88
Profitability	0.64	1.62	0.10
The coefficient of determination	0.19	F statistics	2.35
Adjusted coefficient of determination	0.11	Significance level of F	0.02
		Durbin-Watson	1.97

In the review of Table (4), the significance of the whole model is confirmed given that the f significance level of is less than 0.05 (0.02). With 95% confidence, the significance of the whole model is confirmed. The coefficient of model determination also indicates that 0.19 percent of the changes in the dependent model (capital structure) were introduced by the independent variable (business cycle). The model is explained in the model. This value indicates the intensity of the relationship between the variables. It can be claimed that the whole model has a meaningful value. Also, given the adjusted coefficient for the model, which is 0.11%, it can be stated that in the aggregate, the independent and control variables of the research explain 0.11% of the variations of the dependent variable. Also, in this study, Durbin-Watson test was used to test the residual correlation, which is one of the assumptions of regression analysis and is called self-correlation. According to the preliminary results of the model estimation, the value of the Durbin- Watson statistic is 1.97 percent, and since it is between 1.5 and 2.5, and

values close to 2 indicate the lack of self-correlation remains, it can be concluded that the remainders are independent of each other.

Hypothesis 3: The business cycle has a significant effect on the capital structure of companies active in the chemical industry.

Tab.5. Results of regression analysis of the third model

Variable	Coefficient	Statistics t	Significance factor
Width from origin	0.56	1.88	0.07
Current ratio	-0.03	-3.41	0.00
Business cycle	0.03	0.76	0.27
Age of the company	0.03	1.21	0.23
Size of the company	0.05	2.77	0.01
Stock price on book value	0.00	1.62	0.11
The proportion of sales on total assets	-0.33	-1.50	0.14
The ratio of fixed assets to total assets	0.03	0.89	0.37
Profitability	-0.51	-2.40	0.02
The coefficient of determination	0.77	F statistics	0.11
Adjusted coefficient of determination	0.70	Significance level of F	0.00
		Durbin-Watson	1.84

In the review (Table 5), the significance of the whole model is confirmed given that if the f significance level of the f statistic is less than 0.05 (0.00), with a confidence of 0.95, the significance of the whole model is confirmed. The coefficient of model determination also indicates that 0.77% of the changes in the dependent model (capital structure) were entered by the independent variable (business cycle). The model is explained in the model. This value indicates the intensity of the relationship between the variables. It can be claimed that the whole model has a meaningful value. Also, due to the adjusted coefficient for the model, which is 0.70%, it can be stated that in total, the independent and control variables of the research account for more than 0.70% of the variations of the dependent variable. Also, in this study, Durbin- Watson test was used to test the residual correlation, which is one of the assumptions of regression analysis and is called self-correlation. According to the preliminary results of the model estimation, the value of the Durbin-Watson is 1.84%, and since it is between 1.5 and 2.5 and values close to 2 indicate a lack of self-correlation, it can be concluded that the remainders are not independent.

## DISCUSSION AND CONCLUSION

In the significance analysis of the coefficients according to the presented results, the significance level for the trade cycle variable is equal to (0.03). This probability is less than 0.05, as a result of the existence of a significant relationship between capital structure and corporate cycle at 95% confidence level. The positive coefficient of this variable is equal to (0.59). There is a direct relationship between the capital structure and the business cycle, therefore, it can be said that there is a significant relationship between capital structure and business cycle. Therefore, according to the analysis, the first hypothesis is confirmed.

In the significance of the coefficients, according to the results, the significance level for the business cycle variable is equal to (0.10). This probability is less than 0.10, as a result of the existence of a significant relationship between capital structure and corporate cycle at the 0.90 confidence level. The negative coefficient of this variable equals (0.14), there is an indirect relationship between the capital structure and the business cycle. As a result, there can be no significant relationship between capital structure and business cycle. Therefore, according to the analysis, the second hypothesis is rejected.

In the significance analysis of the coefficients according to the presented results, the significance level for the business cycle variable is equal to (0.27), which is more probable than 0.05. As a result, there is a significant relationship between capital structure and business cycle of companies at 95% confidence level. The positive coefficient of this variable, which is equal to (0.03), has a direct relationship between capital structure and business cycle, thus, it can be said that there is no significant relationship between capital structure and business cycle. Therefore, according to the analysis, the third hypothesis is rejected.

- **Suggestions:**

In this research, functional suggestions are presented as follows: selecting each item requires time and experience in familiarizing the variables between the business cycle and the structure of capital and corporate performance. But this research suggests that a combination of the following applies to companies:

1. A business cycle may be caused by volatility in an economic activity that occurs during an interval that may lead to a recession or a boom in a company. According to the confirmation of the research hypothesis, a significant relationship between the business cycle and the capital structure is suggested. With the increase of 100 units in the business cycle, the amount of 59 units of capital structure changes.
2. Based on the results of testing the research hypotheses, it is suggested to the directors of the company to consider the influential factors when deciding on financing and determining the structure of the appropriate capital for the company. And according to the weight of the variables introduced in the research model, to create or improve the capital structure of companies.

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