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Strategic Factors in the Capital Structure of the Services and Communication Sectors in Mexico

Factores estratégicos en la estructura de capital de los sectores servicios y comunicaciones mexicanos

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RESUMEN

El propósito de esta investigación es identificar los factores estratégicos tanto del país como de las empresas, para incorporar la deuda a largo plazo en la estructura de capital de las empresas de servicios y el sector de la comunicación que se cotizan en la Bolsa Mexicana de Valores en los períodos 2000-2012.
El modelo matemático y los factores adoptados en este estudio empírico se obtuvieron de terceras investigaciones presentes en el marco teórico.

Palabras clave: Estructura de capital, factores de la empresa, factores del país

Código JEL: P34, O16

ABSTRACT

The purpose of this research was to identify the strategic factors of the country and the companies, to incorporate long term debt in the capital structure of the companies of services and the communication sector that they quoted on the Mexican Stock Exchange in the periods 2000-2012.
The mathematical model and the factors used in this empirical study were used in the investigations that were analyzed in the theoretical framework.

Keywords: Capital structure, Factors of the company, Factors of the country.

JEL CODE: P34, O16

INTRODUCTION

The research is motivated by of the absence of policies, rules or models into the real life of the enterprises to generate their own capital structure, which involved the reviewing of theories, the empirical studies, the existing hypotheses and the major postulates, to identify the strategic factors and determine their mathematical relationship with long-term debt in the capital structure. Thus, the above analysis established a solid foundation to the problem, the questioning and the established objectives. The studies of the capital structure in Mexico are fundamental, because the lack of a robust model to explain the financial decisions of the Mexican organizations, particularly in the services and communication sectors, this justify widely this research.

THEORETICAL FRAMEWORK

The existence or not of an optimal capital structure for the companies, as well the way it should be determined, has been one of the most controversial topics of financial literature since that Modigliani and Miller (1958), they published their article with the proposition of the irrelevance of the capital structure in the value of the enterprise. It has been 56 years since the publication of the seminal work that gave origin to corporate finances as we know nowadays and at the same time caused that capital structures studies they caught so much attention from the economy and the finances. However, the broad research done on the capital structure theory, today, they are no conclusive their answers. The theoretical models developed during the last years, they have tried since to validate and generalize sometimes, the thesis of the irrelevance of Modigliani and Miller (1958); other times, the models have been tried to adjust the thesis of maximum indebtedness, Modigliani and Miller (1963). From the convergence of both lines of research on the decade of the 60's emerged a renovated theory of the capital structure postulating the existence of an optimal structure to the proposed problem.

In this research were reviewed the following theories: optimal capital structure, Theory of the Fiscal Tax Base, Theory of the Asymmetric Information, The Theory of the Agency Costs, The Free Cash Flow Theory, The Pecking Order Theory (POT); This last theory was formally proposed by Myers (1984), based in the preliminary work of Donaldson. (1961).

The empirical studies that support all the above mentioned theories, were also reviewed, highlighting among others, the studies done by Rajan and Zingales (1995), and the study of

Wald (1999), these studies offered empirical evidence for G-7 countries. They were analyzed some institutional factors of the company, such as: The total assets (size of the firm), profit, sales (growth rate), and the capital (risk).

In the empirical studies, as well as the financial theories, the knowledge has increased and evolved; however, in the different researches done hasn't been achieved the construction of a model that includes jointly all the factors considered capital structure determinants, among the published investigations, we can mention the ones made Filbeck and Gorman (2000), Bradley, Chung (1993), Van el Der (1989), Kester (1986), Harrel and Kim (1984).

The empirical evidence suggests that besides the specific factors of the company also the macroeconomic factors or institutionals of each country are important of the capital structure (Booth L., Aivazian, V., Demirguc-Kunt, A. and Maksimovic, V. (2001), Antoniou, Guney, and Paudyal (2008), Gaytan and Bonales (2009), Dias, Thosiro and Cruz, (2009), Dias and Toshiro (2009). Nevertheless, the most part of the theoretical debate and empirical about the incorporation of the debt in the capital structure, they have been conditioned by the capital markets well-developed and with a good financial architecture, Singales (2000).

Arias, M., Arias, L., Pelayo and Cobián (2009), argued that is necessary to do an specialized research about this matter in the Mexican companies with the purpose of achieving a better understanding about their contracting and debt decisions, in order to design financial instruments adequate to their financial needs and to facilitate and support their growth.

Capital structure and the macroeconomic factors of the country

The recent empirical evidence suggests that the specific factors of every country are important aspects in forming the capital structure in the company of emerging markets, (Booth, Aivazian, Demirguc-Kunt and Maksimovic, (2001); Antoniou, Guney and Paudyal, (2008); Gaytan y Bonales (2009); Dias, Thosiro and Cruz, (2009); Dias y Toshiro (2009). Suggest that the specific factors in the explanation of decisions of hiring debt of the company are related to the economic environment and the institutional mechanisms of each country, as the financial sector, the tax system, the legal system and the accounting practices.

In the studies done about the strategic factors of the country, considered as determinants in building the capital structure of the companies, has been found that they have a significant impact, among others the following factors: i) Income tax rate), ii) inflation, iii) the interest rate and iv) the exchange rate. For that reason in this investigation of the services and communication sectors the four macroeconomic and institutional factors were considered.

Capital structure and the microeconomic factors of the company

It has been looked for to identify the strategic factors specific of the companies that could be relevant aspects forming their capital structure, with the purpose of proving the validity of the theories supporting them. Among the strategic factors of the company that can act as significant in forming the capital structure, in the empirical studies done by Dias, Toshiro and Cruz. Gaytán and Bonales (2009), Dias and Toshiro (2009), it has been found a significant evidence to incorporating debt in the capital structure, in the following factors: i) Total assets, ii) operation profit iii) capital, and iv) net sales. For this reason the four factors were also considered in this research of the services and communication sectors.

HYPOTHESIS

The income tax rate, the interest rate, the operation profit, the exchange rate and the capital are factors that are negatively related; on the contrary the inflation, the total assets and the net sales are factors that are positively related, incorporating debt in the capital structure used by the companies of the services and communication sectors in Mexico.

METHODOLOGY

The econometric model of the panel data was chosen and used to calculate the mathematical relationship of the factors, the sample of the factors was used for the period from 2000 to 2012, the technique of this model combines data of temporary dimension and cross-section. The model is also known as longitudinal joint, time series and of cross-section data, micro panel data, history analysis, and peer analysis. (Gujarati, 2003).

The technique of the panel data can develop and test complex models, according to Carrascal is applicable to the following areas a) Sales prediction, b) Cost studies, c) Financial analysis, d) Macroeconomic prediction, e) Simulation, f) Analysis and evaluation of any type of statistical data. Also it allows us to observe the causal inferences of the independent and dependent factors, these inferences of causality would be difficult to understand if only applied in isolation technique of "cross-sectional data" or the technique of "time series data". The analysis of panel data, simultaneously gathers the study of the cross-section cut and the times series studies capture the heterogeneity and the economic agents incorporating the dynamic analysis. (Rivera, 2007), (Mayorga & Muñoz, 2000).

The fundamental characteristic of the panel data is the fact of monitoring the same companies in a continuous period of time. (Wooldridge, 2001).
The analysis of the panel data studies the data set, putting together the cross section cut and the time series. The available information is processed and presented in two dimensions, generating multiple observations for each economic unit, enriching the empirical analysis. (Rivera, 2007), (Mayorga and Muñoz 2000), (Gujarati, 2003), (Mur and Angulo, 2006), (Rivera, 2007).

The model recognizes two effects, on one hand the effects that they are unequally affected to each of the study agents contained in the sample, on the other hand, the temporary effects that equally affect all individual units of study that do not vary over time, allowing to study changes in the benefits of a single company over a period of time and the variety of benefits of several companies. (Pindyck, 2001).

Model specification
It was used the fixed effects model. This model takes into account the unique characteristics of each unit (company) of the cross section, causing the intercept vary for each unit, however, assumes that the angular coefficients are consistent between the units. The estimation was performed using the method of least squares (GLS) because it provides the most robust results for the characteristics of our study sample, at the same time the White contrast was used to identify heteroscedasticity and this was corrected by cross section weighting.

The dependent variable is represented by the long-term liabilities presented by each of the companies in the sample, also, within of the regressors and as the independent variables, are the integration of each of the internal factors of the firm that could affect the debt integration in capital structure, which are specified within a common factor, so, E-Views will include a single coefficient for each variable; to correct the heteroscedasticity problem the calculation of variances and standard errors consistent to White heteroscedasticity will be included; to avoid the multicollinearity problem, initially each of the variables will be analyzed on a bivariate way and jointly afterwards, adjusted by the exclusion of factors technique; to verify a possible autocorrelation, we will use the statistic from Durvin-Watson.
The model that we will follow is the fixed effect, establishing a ratio of interception by differential intersection dichotomous variables, with the journey across weighting option, using the following equation:

$$Y_{it} = \alpha_1 + \alpha_2 D_{2i} + \alpha_3 D_{3i} + \ldots \alpha_n D_{ni} + \beta_{1i} + \beta_2 X_{2it} + \beta_3 X_{3it} + \ldots \beta_n X_{nit} + \mu_{it} \quad (1)$$

With $i = 1,.....N$; $t = 1,...T$.

Where:

i = refers to the individual or unit of study (cross section)

t = time dimension

α = vector of intercepts of n parameters

β = is a vector of K parameters

X_{it} = is the i-th observation at time t for the K explanatory variables

The total sample of observations in the model would be given by: N x T. (Mayorga and Muñoz, 2000) and (Pindyck & Rubinfeld, 2001).

SOURCE AND DATA COLLECTION

The specific variables of the companies were obtained from the financial statements published in the financial yearbook of the Mexican Stock Exchange, the source is very reliable, according to the specific laws, companies listed on the Stock Exchange have the obligation to generate reports at the end of each quarter (Schneider, 2001). The macroeconomic data were obtained from databases and publications made by the Bank of Mexico.

The study was not probabilistic, because all the companies from the services and communication sector they were quoted in 2000-2012 periods were considered. According to the stratification of the Official Journal of the Federation of Mexico, published in June 2009, for their size all are classified as large companies.

This research considered as a dependent variable: The Long-Term Liabilities. We also considered eight independent variables, of which four are company-specific variables: Total Assets, Net Sales, Operating Income and Capital, the other four are the country's macroeconomic variables: Income Tax Rate (ITR), Interest Rate, Inflation and Exchange rate.

ANALYSIS AND INTERPRETATION OF RESULTS

After applying the multivariate technique of panel data, that involved the dependent and independent variables, the economic model showed the existence of a high correlation between the independent variables, causing multicollinearity.

Multicollinearity is a high degree of correlation (linear dependency) among several independent variables. It commonly occurs when a large number of independent variables are incorporated in a regression model. Is, some independent variables showed a significance greater than 5%. So the null hypothesis was not rejected. The null hypothesis for each complementary hypothesis was defined as: Ho: Bi = 0, where i, is the independent variable to the level of significance of 5%.

Stepwise Method

The application of the method allowed us identifies the strategic factors in the capital structure that used by the services and communication sectors. The strategic factors improve the model, also the levels of adjustment and his explanation. The model redefined of the services sector only included the following independent variables: Operating Income, Total Assets and Sales. The model redefined of the communication sector only included the following independent variables: Total Assets, Capital, Interes Rate and Inflation.

Test, inflation factor of the variables variance (VIF)

The Inflation Factor of the Variables (VIF) for the services sector calculated considering only the variables of the redefined model after applying the stepwise method. The result showed a decrease in the average variance inflation factor of 15.58 to 3.89, which is into the acceptable ranges test. (Table 1)

Table 1

Services (VIF) with significant variables

VARIABLE	VIF	1/VIF
OPERATING INCOME	5.79	0.172735
TOTAL ASSETS	3.59	0.278919
SALES	2.29	0.437061
MEAN VIF	**3.89**	

Source: Own elaboration, based on financial data, of the Mexican Stock Exchange 2000-2012

The Inflation Factor of the Variables (VIF) for the communication sector calculated considering only the variables of the redefined model after applying the stepwise method. The result showed a decrease in the average variance inflation factor of 37.03 to 21.63, which is into the acceptable ranges test. (Table 2)

Table 2

Communication (vif) with significant variables

VARIABLE	VIF	1/VIF
TOTAL ASSETS	41.43	0.024137
CAPITAL	40.91	0.024447
INTEREST RATE	2.14	0.467105
INFLATION	2.03	0.492222
MEAN VIF	**21.63**	

Source: Own elaboration, based on financial data, of the Mexican Stock Exchange 2000-2012

Hausman Test

We apply the regressions necessary of panel data with random effects with the purpose of generating the enough information to apply the Hausman Test. The result of the Hausman test showed that the multivariate technique of panel data with (fixed effect) is right for this research.

Multivariate technique of panel data

The final results for the services sector after adjusting and applying the econometric model taking into consideration only the strategic factors through the panel data technique, are shown in table No. 3.

Table 3

Final results for the services sector, after applying the data panel technique, using the E-views 8.1 program:

Dependent Variable: LONG-TERM LIABILITIES?
Method: Pooled EGLS (Cross-section weights)
Date: 06/30/16 Time: 16:17
Sample: 2000 2012
Included observations: 13
Cross-sections included: 6
Total pool (balanced) observations: 78
Linear estimation after one-step weighting matrix
White cross-section standard errors & covariance (d.f. corrected)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-825640.1	131520.6	-6.277651	0.0000
SALES?	0.538669	0.063606	8.468805	0.0000
OP-INCOME?	-1.072066	0.161484	-6.638839	0.0000
TOTAL ASSETS?	0.359874	0.034193	10.52480	0.0000

Cross-section fixed (dummy variables)

Weighted Statistics

R-squared	0.911276	Mean dependent var	2029654.
Adjusted R-squared	0.892464	S.D. dependent var	2436402.
S.E. of regression	259185.8	Sum squared resid	4.64E+12
F-statistic	979.9967	Durbin-Watson stat	1.056882
Prob(F-statistic)	0.000000		

Source: Own elaboration, based on financial data, of the Mexican Stock Exchange 2000-2012

The multivariate regression panel data fixed effects shows that parity and equity are negatively correlated and that the total assets is positively correlated to incorporate long-term liabilities, showing a model explanatory power of 0.892464

Table 4

Factors that have mathematical relation by including debt in the capital structure of the services sector companies.

CONCEPT	SALES (+)	OPERATING INCOME (-)	TOTAL ASSETS (+)
SIGNIFICANCE	***	***	***

*** Significant at the 0.001 level

Source: Own elaboration based on the output results of the E-Views software (see table No.3)

Sales

Services industry has a positive mathematical relationship that this study determine yet. It coinciding with the results obtained Hall, Hutchinson, and Michaelas (2000), who studied 3,500 small and medium enterprises (SMEs) in the UK unlisted Stocks, and using the percentage increase in sales volume growth as an indicator variable, found that the level of short-term debt is positively related to growth of the company. It also coincides with the results of other authors such as Rajan and Zingales (1995) and Myers (1977).

Operating Income

In the services sector, the result shows that operating income as a factor in the inclusion of debt, to form the capital structure has a negative relationship, this result agrees with those obtained by (Jordan, Lowe and Taylor, 1998), (Philisophov and Philosophov 1999), who found, the profit is negatively related to the long term debt.

Total Assets

In the companies of services sector, we obtained a positive mathematical relationship of total assets with long-term liabilities. The total assets seem to be the most important factor in financing, especially for long-term debt, (Vigrén, 2009). This result agrees with the results shown in the classic article on this issue at the international level of Rajan and Zingales (1995), who researched the fundamental aspects of the capital structure of the company for the (G-7) countries during the period 1987-1991, finding that the total asset is a factor to incorporate debt, arguing that large companies tend to have a higher level of indebtedness. Other researchers like Frank and Goyal (2009), as well as Dias, Toshiro and Cruz. (2009) and Dias and Toshiro (2009), who obtained evidence in Latin American companies, including Mexican, agree with Rajan and Zingales.

The final results for the communication sector after adjusting and applying the econometric model taking into consideration only the strategic factors through the panel data technique, are shown in table No. 5.

Table 5

Final results for the communication sector, after applying the data panel technique, using the E-views 8.1 program:

Dependent Variable: LONG-TERM LIABILITIES?				
Method: Pooled EGLS (Cross-section weights)				
Date: 03/23/16 Time: 14:40				
Sample: 2000 2012				
Included observations: 13				
Cross-sections included: 8				
Total pool (balanced) observations: 104				
Linear estimation after one-step weighting matrix				
White cross-section standard errors & covariance (d.f. corrected)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-14876625	7603946.	-1.956435	0.0534
CAPITAL?	-1.663809	0.223719	-7.437065	0.0000
INTERES RATE?	-79088314	22643351	-3.492783	0.0007
TOTAL ASSETS?	1.182678	0.119136	9.927158	0.0000
INFLATION?	1.18E+08	58452492	2.016156	0.0467
Cross-section fixed (dummy variables)				
Weighted Statistics				
R-squared	0.945186	Mean dependent var		63323075
Adjusted R-squared	0.938632	S.D. dependent var		66028713
S.E. of regression	20402702	Sum squared resid		3.83E+16
F-statistic	144.2187	Durbin-Watson stat		1.007402
Prob (F-statistic)	0.000000			

Source: Own elaboration, based on financial data, of the Mexican Stock Exchange 2000-2012

The multivariate regression panel data fixed effects shows that parity and equity are negatively correlated and that the total assets is positively correlated to incorporate long-term liabilities, showing a model explanatory power of 0.938632

Table 6

Factors that have mathematical relation by including debt in the capital structure of the communication sector companies.

CONCEPT	CAPITAL (-)	INTEREST RATE (-)	TOTAL ASSETS (+)	INFLATION (+)
SIGNIFICANCE	***	***	***	**

*** Significant at the 0.001 level

Source: Own elaboration based on the output results of the E-Views software (see tables No.5)

Capital

The application of the statistic proves the affirmation that the formulated hypothesis holds, the countable capital is related in a negative way in the decisions that incorporate the debt of the communication companies. Those results, agree with Mason´s job (1990), Friendly Lang (1988), the important founds that they got from the United States, match with the obtained results in this empiric study, showing negative meaning related to the passive long term.

Interest Rate

In the companies of communication sector, the result shows that Risk free interest rate is negatively related with the incorporation of liability (debt or leverage), matching the results of studies conducted by Barry , Mann, Mihov, and Rodriguez (2008), who found that firms issue more debt when interest rates are lower than historical levels.

Total Assets

In the companies of communication sector, we obtained a positive mathematical relationship of total assets with long-term liabilities. The total assets seem to be the most important factor in financing, especially for long-term debt, (Vigrén, 2009). This result agrees with the results shown in the classic article on this issue at the international level of Rajan and Zingales (1995), who researched the fundamental aspects of the capital structure of the company for the (G-7) countries during the period 1987-1991, finding that the total asset is a factor to incorporate debt, arguing that large companies tend to have a higher level of indebtedness. Other researchers like Frank and Goyal (2009), as well as Dias, Toshiro and Cruz. (2009) and Dias and Toshiro (2009), who obtained evidence in Latin American companies, including Mexican, agree with Rajan and Zingales.

Inflation

In the companies of communication sector, the result shows that inflation has a positive mathematical relationship with the incorporation of liability (debt or leverage), this result coincides with the result obtained by Gaytan and Bonales (2009), the study of multinational companies belonging to the electronics industry, established in the state of Jalisco, Mexico, they also found that the inflation rate has a positive relationship to incorporate debt in capital structure.

Table 7

Strategic factors that relate with incorporating long term debt in the capital structures of the services and communication sector

CONCEPT	SALES (+)	OPERATING INCOME (-)	TOTAL ASSETS (+)	CAPITAL (-)	INTEREST RATE (-)	INFLATION (+)
SERVICES	***	***	**			
COMMUNICATION			***	***	***	**

Source: Own elaboration based on the output results of the E-Views software (see tables No.4 and 6)

The obtained results after applying the statistical tests, show that the strategic factors of the country and companies, that relate to the addition of long term debt to form the capital structure used by enterprises of the services and transformation sectors in Mexico, are not the same and they do not have the same mathematical relation to each of the sectors. This can be seen in the summary that shown in table No.7.

CONCLUSIONS

In the research the positive or negative relationship were identified of the quantitative strategic factors in the capital structure of the services and communication sectors in Mexico. The mathematical model for used identify the positive or negative relationship of the principal factors it is known as statistical technique of "panel data".

The mathematical model once defined and applied showed multicollinearity. The problem of multicollinearity demanded redefine the model, in the redefinition it was used the method stepwise to improve levels of adjustment and explanation, also decreased and improved the existence of multicollinearity with the application of the test (VIF).

Finally were identified the strategic factors that have mathematical relation with incorporating long-term debt in the capital structure of the services and communication sectors.

The multivariate regression of panel data (fixed effects), showed the following in the companies of services sector: sales and total assets are positively correlated however, operating income are negatively correlated with the incorporation of debt long-term.

The multivariate regression panel data (fixed effects) showed the following in the companies in the communication sector total assets and inflation are positively correlated however, the capital and the interest rate is negatively correlated with the incorporation of long-term debt.

The only factor that matches in the two sectors is the positive correlation of total assets with the incorporation of long-term debt.

The results are useful for generating standards and guidelines that facilitating decision making for incorporating debt in the capital structures of companies of the service and communication sectors in Mexico.

The results in the future will decrease the uncertainty and will support the decisions about tangible and intangible assets of investment projects done by companies in the services and communication sectors.

Factors emanating from the qualitative characteristics such as culture, power, country risk, and personal values, are aspects that can influence and change the results, reason why we suggest his inclusion in future researches.

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