

The Relationship Between the Leverage Ratio, Liquidity Management and Profitability in Romania Oil and Gas Industry

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Abstract: *This paper studies the relationship between leverage ratio which is represented by the total debts/equity, liquidity management represented by the ratio cash/short term liabilities, profitability which is measured using the formula gross profit/total assets and the turnover/total assets ratio in the Romanian oil and gas industry. This study has been developed using data from the period 2004-2018 of 9 companies from the oil and gas industry listed on the Bucharest Stock Exchange. After the database was collected, and the indicators were computed, they were processed using three-panel regression in the EViews software application to be analyzed and evaluated in the best possible way. The results showed that assets an indirect (negative) relationship between the leverage ratio and liquidity management (cash/short term liabilities), and a positive one with the rest of them. All these indicators are computed from the available information.*

Keywords: *leverage ratio; liquidity management; profitability; turnover; oil and gas industry; Bucharest Stock Exchange.*

Introduction

The present paper aims to identify the determinant factors for the leverage ratio represented as a ratio between the total liabilities and the equity among the companies in the oil and gas industries in Romania.

Companies listed on the Bucharest Stock Exchange were chosen. These companies operate in the extraction and processing of oil, in its transport or they are suppliers for the required equipment to carry out the activity in this industry. The eight oil companies which were selected: Conpet S.A., Rompetrol Rafinare S.A., Oil Terminal S.A., Uztel S.A., Petrol ExportImport S.A., Compania Energopetrol S.A., Condmag S.A. Also, Transgaz was selected because it is a company from the gas transportation industry. (Bucharest Stock Exchange)

We chose these industries because Romania has a tradition of over a century and a half in oil extraction and processing and it requires high-quality management. It is worth mentioning that the first commercial oil derrick in the world was built in Romania and that it is the first country to cross street lighting with the lamp. Romania is among the first countries to start producing crude oil. (Historia) Also, the gas industry is an important industry in Romania. OMV Petrom has large gas fields, most of them in the Black Sea. It is one of the biggest providers in Romania.

The data source obtained is the Bucharest Stock Exchange Website, the data have an annual frequency and the interval for which they are obtained over 2004-2018, this means a period of 15 years. Thus, a data set consisting of 134 observations will be reached, which will be further used in order to identify the determinants of the indebtedness of these companies considered in the present paper.

The gross series chosen to be downloaded were as follows: Turnover, EBIT, Total Assets, Long-term Assets, Current Assets, Total Debts, Cash and Bank Accounts, Equity and Financial Expenses for each year for each company. Based on these series of data, new series will be calculated which will constitute the variables considered in the panel models to be achieved.

Theory predicts a negative relationship between leverage ratio and cash and a positive relationship with all other terms.

Literature review

In "Risk Management Decision in a total business setting" the authors had an opinion that profitability and solvency are two of the common objectives of the firm which are emphasized in financial and economic literature. In fact, they sustained that the maximization of the firm value to its shareholders represents a widely accepted objective, and earnings per share were considered the most relevant indicator by them. They also considered that it may be a relationship between the expected return and the uncertainty involving its receipts. Also, they considered an ability to diversify resources to reduce the investor risk, because hazard diversification can increase the risk. (Mehr & Forbes, 1973)

The importance of the liquidity administration it is presented in many Economics articles. We know from theory that alternative investments require a premium return because they are less liquid than market investments. "This liquidity premium varies over time because of the function of preferences, leverage technology, the developments in financial technology, and changes in institutional arrangements." (Scholes, 2000)

An important role in liquidity management has the risk management department, because, as (Schmit & Kendall, 1990) presented in their paper that "risk management can be described as the performance of the activities designed to minimize the negative impact (cost) of uncertainty (risk) regarding possible losses." But the process to evaluate their results is complex and difficult and it will be shown in time.

The companies will always find alternative providers and ways to supply liquidity in the marketplace. Even if better risk-measurement models reduce costs, and as a result, financial firms develop new products and activities that make their constituents better off, quantitative modeling has failed from time to time, especially in the crisis periods. (Scholes, 2000). In the "Financial Risk Management by Insurers: An Analysis of the Process", the liquidity risk is defined as the risk of a funding crisis. (Santomero & Babbel, 1997)

The importance of financial leverage when a company chose the risk management strategy is evidenced by Gloy and Baker in 2002 in their work "The Importance of Financial Leverage and Risk Aversion in Risk-Management Strategy Selection" (pp.1130-1142). They demonstrated this using a first-degree stochastic dominance with a risk-free asset (SDRA) equation. Also, their results showed that the risk-free return is very important in the computation. (Gloy & Baker, 2002)

The increase in value of the firm comes from the reduction in dead-weight costs, and an increase in debt capacity, which in turn can benefit the firm through valuable tax shields or reductions in agency costs of excess free cash flow, so increasing the likelihood of costly financial distress, risk management can decrease the expected value of the firm. (Smith & Stulz, 1985)

To evaluate the likelihood of financial distress, Tufano used the "cash costs" (the cost of cash to produce a gold ounce) and leverage. The result was a direct relationship between financial distress and both elements. More than that, when the cash flow level is low, it is very costly to obtain additional financing, especially outside the company. (Tufano, 1996)

Database description

The leverage ratio will be calculated as the ratio of the total debts to the total assets of each firm: $\text{Leverage Ratio} = \text{Total Debts} / \text{Equity}$ (formula 1)

The profitability of the firm will be represented by the ratio between gross profit and total assets: $\text{Profitability} = \text{Gross Profit} / \text{Total Assets}$ (formula 2)

The company liquidity management will be measured using the ratio cash/ short term liabilities, which show us the entity capacity to pay their debts during the following year using the available cash at the end of the year: $\text{Liquidity} = \text{Cash} / \text{Short Term Liabilities}$ (formula 3)

Another way of looking at liquidity management, but this time is an overall one or "the big picture", it is represented by the assets structure, which is quantified in this research by the following relationship: $\text{Assets Structure} = \text{Long Term Assets} / \text{Total Assets}$ (formula 4), but this indicator is not statistic relevant.

It will also be considered as an explanatory variable: "Turnover_Assets" = Turnover/Total Assets (formula 5), which will help us to find the determinants of leverage for oil and gas companies.

The next step in the process is the presentation of leverage ratio evolution (Figure 1) in the studied period for all entities using a graphic, and the descriptive statistics (Table 1) on the data series considered will be produced.

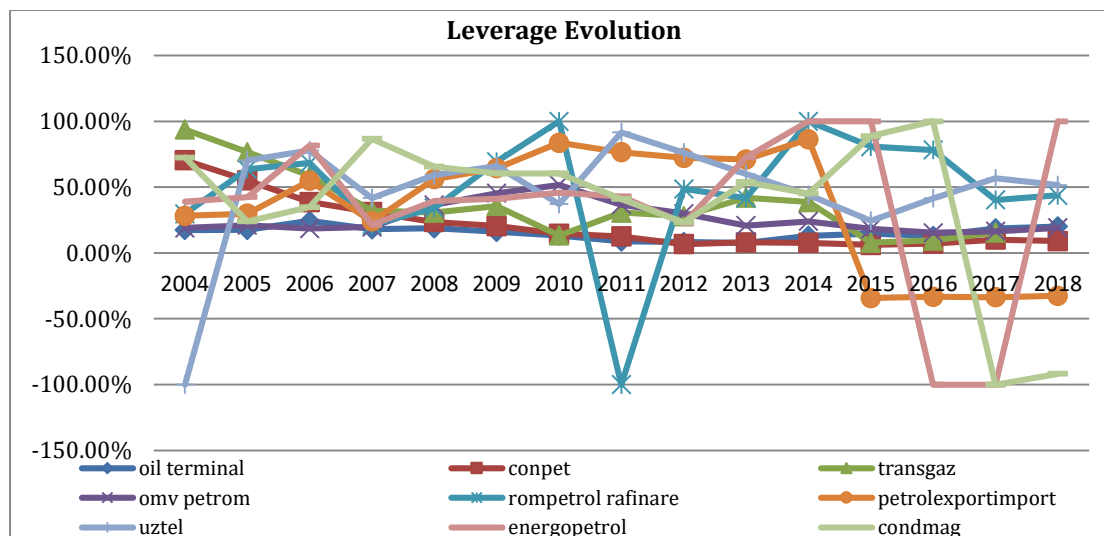


Figure 1. Leverage Evolution (own data)

Below, it is a centralized table that presents a series of statistical indicators such as the average, the median, the maximum value, the minimum value, the average square deviation or the number of observations considered. All of these had as main purpose a better characterization of the data series considered.

Table 1. Descriptive statistics (Own data)

	LEVERAGE	CASH_SHTL	Profitability	TURNOVER_ASSETS
Mean	45%	51%	0.9%	84%
Median	44.3%	7.0%	1.7%	0.6%
Maximum	447%	620.7%	25.7%	757.0%
Minimum	-100%	0%	-146%	0.1%
Std. Dev.	0.544	1.12	0.15	0.97
Sum	60.62	69.63	0.12	113
Sum Sq. Dev.	39.37	168.19	3.07	126.84
Observations	134	134	134	134

I tried to take into account the company's ability to pay financial expenses every year. This was calculated by the ratio between gross profit and financial expenses. Unfortunately, this indicator was not statistically relevant because it had a P-value of the t-test higher than a 10% probability.

Following the calculation of the statistical indicators for the data series to be used in the case study, a number of useful aspects can be observed in their characterization: the series of indebtedness, the structure of assets and the turnover/assets of the firm have values of the average very close to those of the median, suggesting that the series is symmetrical, the values being equally distributed on each side of the mean. It can also be observed that for all series we have very dispersed values (large differences between maximum and minimum), which suggests that companies have been well chosen, covering a large range of behaviors and eliminating the risk that by choosing selective companies to be influenced by the results of the case study. Moreover, the number of observations for each data series is 134, being a sufficiently large number that can provide statistically consistent results.

Next, we will go to presenting the methodology to be used to estimate the relationship in the case study.

Research methodology

As I mentioned earlier, the present paper will attempt to identify the extent to which factors such as company profitability, liquidity, asset structure, turnover/assets ratio, cash/short term liabilities ratio, but also the percentage of cash and cash equivalents influences the indebtedness of a company in the oil and gas sector. The general form of the model to be estimated is presented below:

Leverage Ratio = Total Debts/ Equity (formula 1)

Leverage Ratio_{it} = $\alpha_i + \beta_2(\text{Cash/ Short Term Liabilities})_{it} + \beta_3 \text{Profitability}_{it} + \beta_4 (\text{Turnover/Assets})_{it} + \varepsilon_{it}$
(formula 6)

Starting from the above relationship and from the variables described above, at the beginning of this case study, the parameters for each variable will be estimated using the econometric machine known from the literature.

Starting from the econometric approach presented by (Greene, 2002) and (Brooks, 2008), or even using course notes presented in accordance with the literature and written by (Codirlasu, 2007), it will go further towards the realization of 3 types of estimations, for each of which are presented the econometric and economic results and interpretations, emphasizing which one is more appropriate and which is statistically and econometrically significant.

The first and best-known way of estimation is the so-called Pooled Regression based on a group of data. Its main advantage is that it is intuitive to interpret, and estimating using Eviews does not involve significant user input. The results can be as useful and precise as those obtained through the two following ways that will be presented, but the method is less close to reality and imposes higher restrictions. For example, it does not allow differentiation by any variable among the enterprises, it is assumed that they are perfectly homogeneous, that they have the same characteristics. Even if they were chosen as part of the same sector, we certainly know that there are many differences between them, and closer to reality would have been a way to include differentiation factors.

The second method to be used for panel data analysis is the Fixed Effects estimation. This is more permissive, leaving room for the calculation of a model constant for each of the twenty companies surveyed. This is a method that allows for greater flexibility.

The third method to be used is the estimation using random effects that allow the free term to be distributed independently by regressions, allowing for consideration of the correlations that may occur between the different regression classes. Thus, this latter mode is the estimation that offers the greatest flexibility, but it could not be said ex-ante that it is more suitable for a particular data category. In order to make a decision between these last two estimation methods (both methods allow greater flexibility and a better reality approach), the literature suggests applying the Hausman test to identify the most appropriate estimation method for the data series considered in each study.

Empirical results

As we explained earlier, the estimate will be made using Eviews for each of the three proposed methods. The results will be further presented using Eviews outputs and will be interpreted statistically and economically.

The first estimate will be performed for a pooled regression. Estimation was made in Eviews using OLS (Ordinary least squares), and the output provided by the software used is shown below (Table 2):

Table 2. Pool Regression Results

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CASH_STL	-0.084801	0.038996	-2.174634	0.0315
PROFIT_ASSETS	0.689495	0.286122	2.409795	0.0174
TURNOVER_ASSETS	0.194354	0.044286	4.388596	0
C	0.330576	0.062172	5.317153	0
R-squared	0.20542	Mean dependent var		0.452435
Adjusted R-squared	0.187084	S.D. dependent var		0.544089
S.E. of regression	0.490561	Akaike info criterion		1.442861
Sum squared resid	31.28447	Schwarz criterion		1.529363
Log-likelihood	-92.67165	Hannan-Quinn criter.		1.478012
F-statistic	11.20282	Durbin-Watson stat		1.979334
Prob(F-statistic)	0.000001			

(Eviews-own data)

Following the estimation of the coefficients using the data group regression method, a series of economic interpretations can be made on the influence of the variables considered (liquidity (cash/short term liabilities), turnover/assets and the profitability (gross profit/assets)) on the leverage ratio of firms in the oil and gas sector. In this sense, it is first necessary to validate statistically the results, and this will be done by applying the t-Student test, using the data displayed by Eviews by default.

The functionality of the t-Student test:

Null hypothesis (H0): The coefficient is not significantly different from zero;

Alternative hypothesis (H1): The coefficient is significantly different from zero;

The probability displayed by Eviews by default shows us the error that someone is committing when he incorrectly rejects the null hypothesis (the estimated coefficient is not significantly different from zero). Therefore, it is intended that this probability be as small as possible, and the significance threshold to be chosen is 10%. We can see that all the independent variables can be used the 5% significance threshold.

Starting from the methodology presented above, it can be noticed that the parameters for the variables: Profitability, Cash_Shtl (cash/short term liabilities) and Turnover_Assets are significantly different from zero according to the probabilities calculated by the software used. Also, the constant of the estimated model is significantly different from zero, the associated probability is 0%. Following these explanations regarding the statistical and econometric validity of the calculated coefficients, it is possible to go further towards their economic interpretation.

Through this model, it was desired to highlight the manner in which the variables considered explain the leverage ratio for firms in the oil sector in the period 2004-2018. Thus, on the basis of the estimates, it is possible to draw a series of conclusions regarding the meaning of the relations that the independent variables have with the leverage ratio.

Therefore, it was observed that there was a negative relationship between Leverage ratio and cash/short term liabilities, and positive relationship for the two others. A negative relationship between the Liquidity indicator represented by the Cash/ Short Term Liabilities ratio and the Leverage ratio may be economically justifiable: Increasing the cash of a firm is the result of good investments that are often financed from external sources (loans), but which put into operation generates cash flow. That (excess) of cash which is not used to pay the short term liabilities has contributed to the decrease of the long term liabilities and the indebtedness degree, or to increase capital by increasing profit, so it will lead to a decrease in the leverage ratio calculated as a ratio between total debt and equity.

Also, the negative can be explained by the fact that the most of the debts are on short term, and the increase of debts will generate future cash-flows, so it is a direct relationship between the equity and the long term assets, but it affects in a negative way the percentage of the liabilities in the equity. Also, it can be explained

by the economic situation that the short term assets are paid by the long term liabilities, and this is not the best option for a long period and for the future of the entity. It is not necessarily a bad thing, because, this could mean that the company made investments for the long term which are paid by the shareholders.

A direct (positive) relationship was obtained between the ratio of Turnover/Total Assets and the leverage ratio. Thus, an increase in this report leads to an increase in indebtedness and also in the leverage ratio. This means, that most of the debts are represented by marginal cost, by indirect costs. And the increase in turnover will determine the increase in costs. The increase in the ratio can be achieved either by increasing the company's turnover (which may affect the level of indebtedness by adding new marginal costs/direct costs.) or by lowering the total assets (which may lead to a company's receivables reduction, and pay the debts) or both options (increasing the inventory and decreasing the turnover). Also, if the ratio increase it can be made by increasing the turnover, it will generate more cash and it can be used to pay liabilities or decreasing the assets (which can be the inventory) and this will be explained by a higher quality of the assets management, and it will not be necessary to buy new assets and pay liabilities for them.

Another positive relationship was also obtained for profitability: gross profit/ total assets, as it is highlighted that as the company's performance increases, the repayment capacity improves and we are witnessing a reduction in the leverage ratio. This positive relationship can be explained by the fact that the most of the debts are on short term, and the increase of debts will generate future cash-flows, so it is a direct relationship between the equity and the long term assets, but it affects in a negative way the percentage of the liabilities in the equity. Also, it can be explained by the economic situation that the long term assets are paid by the short term liabilities, and this is not the best option for a long period and for the future of the entity. This means, that fixed assets are very well used, and they help to increase the profits, or that the profit is the result of the long term investment.

Next, it will go in the direction proposed by the methodological chapter of this paper and the estimate will be made using fixed effects. The result of this estimate is further presented as an output from the Eviews software (table 3):

Table 3. Fixed Effects Regression- Results

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CASH_STL	-0.04775	0.054208	-0.88079	0.0802
PROFIT_ASSETS	0.796603	0.294239	2.707333	0.0078
TURNOVER_ASSETS	0.196134	0.052561	3.731583	0.0003
C	0.309783	0.067041	4.62078	0
R-squared	0.309728	Mean dependent var		0.452435
Adjusted R-squared	0.24749	S.D. dependent var		0.544089
S.E. of regression	0.471983	Akaike info criterion		1.421536
Sum squared resid	27.17764	Schwarz criterion		1.681044
Log-likelihood	-83.2429	Hannan-Quinn criter.		1.526992
F-statistic	4.976527	Durbin-Watson stat		2.117722
Prob(F-statistic)	0.000002			

Eviews-own data

The first step in analyzing and interpreting the results obtained from the estimation using fixed effects will again be the verification of the statistical significance of the estimated parameters. From this date, the indicator: cash/short term liabilities, is higher than 5%, but we will use 10% as accepted value. For the rest of the value we now speak of a 5% significance threshold of the probability that the t-Student test would be statistically relevant. The results confirm that they are significantly different from zero and it can continue to trust their economic interpretation.

The meaning of relationships observed in the previous estimate is also maintained when fixed effects are included. Thus, all relationships are in the same way. It can be observed a significant increase in R-squared, which gave us the reason to suppose that this method is much better than the previous one.

Next, we will go to the estimation using random effects as outlined in the methodology at the beginning of this paper. The results obtained will be presented below as an output from Eviews (table 4):

Table 4. Random Effects Regression- Results

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CASH_STL	-0.06968	0.045209	-1.541303	0.0957
PROFIT_ASSETS	0.744851	0.284531	2.617823	0.0099
TURNOVER_ASSETS	0.197324	0.047734	4.13381	0.0001
C	0.320158	0.081747	3.916427	0.0001
Effects Specification			S.D.	Rho
Cross-section random			0.154253	0.0965
Idiosyncratic random			0.471983	0.9035
Weighted Statistics				
R-squared	0.19708	Mean dependent var	0.281035	
Adjusted R-squared	0.178551	S.D. dependent var	0.519329	
S.E. of regression	0.470713	Sum squared resid	28.80423	
F-statistic	10.63633	Durbin-Watson stat	2.060071	
Prob(F-statistic)	0.000003			
Unweighted Statistics				
R-squared	0.204038	Mean dependent var	0.452435	
Sum squared resid	31.33886	Durbin-Watson stat	1.974334	

Eviews-own data

It can be seen that all estimated coefficients are significantly different from zero, according to the t-Student test (the probabilities associated with them are not higher than the established significance threshold of 10%). Again, we can see that the meanings of relationships observed in the previous estimates are also maintained when random effects are included. Thus, all relationships are in the same way.

The Hausman Test (table 5) involves computing a distributed Chi-square statistic, and its assumptions are as follows:

Null Hypothesis (H0): The Random Effects model is suitable for this study.

Alternative Hypothesis (H1): The Fixed-Effects model is suitable for this case study.

The decision will be based on the value of the Chi-square statistic and the probability associated with it according to the implicit calculations provided by the Eviews software.

Starting from the functionality presented above, it will go further to interpret the results obtained in Eviews following its application.

Table 5. Correlated Random Effects - Hausman Test

Correlated Random Effects - Hausman Test			
Equation: Untitled			
Test cross-section random effects			
Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	2.334374	3	0.506

Eviews-own data

It can be seen that the probability associated with the test is greater than 5% (the critical threshold chosen), which does not lead to the rejection of the null hypothesis according to which the model is random using random effects. Thus, it can not be said that for the present case study the fixed effects in the estimation are more appropriate, according to the Hausman test applied in Eviews and presented above.

We will go further and we will use the Redundant Fixed Effects Tests (Table 6).

Null Hypothesis (H0): The effects are redundant for this study.

Table 6. Redundant Fixed Effects Tests (Eviews-own data)

Redundant Fixed Effects Tests			
Equation: Untitled			
Test cross-section fixed effects			
Effects Test	Statistic	d.f.	Prob.
Cross-section F	2.304437	-8,122	0.0246
Cross-section Chi-square	18.857453	8	0.0156

It can be seen that the probability associated with the test is lower than 5% (the critical threshold chosen), which does lead to the rejection of the null hypothesis according to which the effects are redundant.

Conclusions

The research identified some of the determinant factors for the value of the leverage ratio represented as a ratio between the total liabilities and the equity among the companies in the oil and gas industry in Romania. The only independent variable used in this paper: cash/short term liabilities which is a liquidity management indicator had a negative (indirect) relationship with the leverage ratio.

We can see that the Risk Management Department is very important because it will decide which is the company strategy regarding profitability, liquidity, and risk. It is well known that long investments have higher returns, but also, they need a lot of "blocked" cash. This is one of the reasons why risk management became starting with 2004 very important in an organization or a project. Every investor wants a high profit, but also it wants very low risks.

Liquidity became day by day one of the most important elements in a company. It is very important for a company to manage the return-time-risk equation For a CEO company it is important to have cash, but for the investor, it is important to have high returns. On the other hand, the profitability which was measured using the formula gross profit/total assets and the turnover/total assets ratio had a positive (direct) relationship with the leverage ratio.

Suppose that total assets and liquidity are relatively constant during a medium/long period then we can say that cash indebted from the third parties is well invested for the selected companies are well. So the managers take money with responsibility and they have higher returns than the costs. Also, with this money, they grow their activity (turnover) faster than the fixed assets.

Unfortunately, as you can see from the tests effectuated it cannot be concluded which of the Random or Fixed Effects model is more suitable for this study, but definitely the effects are not redundant.

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