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The risk assessment of the investments in the companies belonging to the manufacturing industry in Romania, listed on the Bucharest Stock Exchange

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Abstract: *VaR represents an advanced model of risk management, appropriate for estimating the financial risk of a financial title taken individually or of a portfolio of titles. The research aims to quantify the maximum loss of the securities value, based on their daily closing prices, at a 5% relevance level, using the historical simulation method. The research sample consists of a number of 33 companies belonging to the manufacturing industry in Romania, listed on the Bucharest Stock Exchange, at standard and premium categories. Based on a number of 260 statistical observations, corresponding to the working days from the period 01.01.2016 - 31.12.2016, it was determined the maximum loss of value for investors, at the potofolio's level and also for the title that belongs to the company with the highest rentability of the closing price. The results have shown that by diversifying the investment in a portfolio of securities, the potential loss of value for investors it's reduced substantially.*

Key-words: *Value at Risk (VaR), Non-parametric historical simulation method, closing price, portofolio, maximum loss.*

1. Introduction

The VaR model represents the most widely used instrument for estimating the market risk (Trenca, I., 2009). This model involves quantifying the maximum loss that a financial title or a portfolio of titles can record, for a certain level of confidence and time horizon (Yun Hsing Cheung, Robert J. Powell, 2012, pp. 112).

Value at Risk can be determined through several methods: the nonparametric historical simulation method, the parametric method, the Monte Carlo simulation, etc. (Culp 2001; Jorion 2001; Linsmeier & Pearson 2000). After many studies found in the literature review, it was concluded that each of the methods has both advantages and disadvantages (Lechner & Ovaert, 2010; Deepak & Ramanathan, 2009; Pritsker, 1997). In this paper, we choosed to speak about the

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method of nonparametric historical simulation, according to which the information found in the titles recent past prices are relevant in assessing the risk from the near future (Codirlaşu, A., Chidesciuc, N.A., 2008, pp. 107). The advantage of this method consists in her simplicity (Stan Georgiana, 2015, pp.2), being the most appropriate for determining the risk, in the periods of financial turbulence (Yun Hsing Cheung, Robert J. Powell, 2012, pp. 113). A disadvantage of this method, it's that it's not detecting the risk of occurrence of future phenomena, and the values resulted after her application are deeply influenced by the database that it was used (Codirlaşu, A., Chidesciuc, N.A., 2008, pp. 108).

2. Literature review

Value at Risk model was applied by many romanian researchers. Therefore, Ion Stancu and Florentina Bălu (2006) determined the maximum expected loss of a portofolio of 4 currencies (USD, EUR, GBP, JPY), during the period september december 2005, taking into account a probability of 95%, and a time horizon of one day. The conclusion that they reached is that the portfolio's Value at Risk it's inferior to the amount of Value at Risk determined for each currency, this result being determined by the correlations between the exchanges of those currencies. Ţimurlea Mihai and Bobeică Gabriel (2003), carried out a research on one-day horizon, during the period 2007-2013, in which they highlighted the volatility of the EURO/RON exchange rate, as well as the Value at Risk of a portfolio composed of EURO currency. Terinte Paula Andreea (2015), has undertaken a study on daily data, during the period of time 2011-2015, considering a portfolio with a value of 100.000 RON, composed of the titles of Transilvania bank (TLV), SIF 2 Moldova, Antibiotice (ATB), TransElectrica (TEL) and Petrom (SNP). Also in the foreign literature, there can be found many studies regarding the Value at Risk model. Therefore, Andersen T., Bollerslev T., Christoffersen P.F., Diebold F.X., (2012), highlights the need of an efficient management regarding the risk of the financial titles. Fen-Ying C. (2010), considers that Value at Risk model represents the most useful and appropriate method to estimate the portfolio's or financial titles risk, as it is efficient and simple to calculate. Duncan Wilson (1995) highlighted that Value at Risk method represents an instrument to determine the market risk. Darnel A.C., Evans S.P., (1990), argue that the VaR model has certain limitations, since it's forecasts, may not be appropriate in certain situations.

3. Material and methods

Non-parametric historical simulation method was applied to the company that recorded the highest closing price at the end of the studied period of time,

respectively to Conted Dorohoi S.A. (CNTE), and also to the portfolio of the titles belonging to the 33 companies from the manufacturing industry in Romania, listed on the Bucharest Stock Exchange, at the standard and premium categories.

The title's rentability was determined according to the below formula:

$$R\ (\%) = \frac{P1-P0}{P0} \text{ x}100$$

where R - the rentability of the financial title, $P_{1/0}$ - the title's closing price at the moment $t_{1/}$ t_0

The needed information for carrying out this research was collected from the companies annual financial statements, available at www.bvb.ro. The chosen confidence level is 95%, the level of statistical significance is 5%, and the investment value is 1.000.000 lei. Also, it was determined the maximum weekly and monthly expected loss, by multiplying the daily loss with √5 (the number of working days from a week), and with √22 (the number of working days from a month).

4. Results and discussions

The research has been done both for the company with the highest closing price at the end of the studied period of time (Conted Dorohoi S.A.-CNTE), and for the portfolio of titles that belong to the 33 companies from the manufacturing industry from Romania.

4.1. Conted Dorohoi S.A. company

No. of observations	260
Minimum daily rentability	-11.11%
Maximum daily rentability	8.08%
Average rentability	-0.07%
Interval	19.19%
Standard deviation	0.0174
Skewness	-0.8844
Kurtosis	11.8702
Confidence level	95%
The smallest 5% observations	13
5% VaR	-2.68%
The last closing price	45.2
The investment amount	1.000.000
Daily potential loss (5% VaR Value)	(26.763)
Weekly potential loss (5 days)	(59.846)
Monthly potential loss (22 days)	(125.534)

Table 1. *The VaR model for Conted Dorohoi S.A.company*

In the table no. 4.1., there can be noticed the results of the Value at Risk model, applied for this company by using it's closing priced during the period 01.01.2016 - 31.12.2016.

During the period 01.01.2016-31.12.2016, the maximum loss of the companies title's was 11%, the medium loss was 0,07% and the maximum rentability recorded high fluctuations (an interval of 19,19%). At a chosen confidence level of 95%, significance level of 5% and an investment value of 100.000 lei, there would have been a potential daily loss of 26.763 lei, a potential weekly loss (for 5 working days) of de 59.846 lei and a potential monthly loss (for 22 working days) of 125.534 lei. In the figure no. 4.1. it was highlighted the distribution of the rentability of the titles that belong to Conted Dorohoi S.A. company.

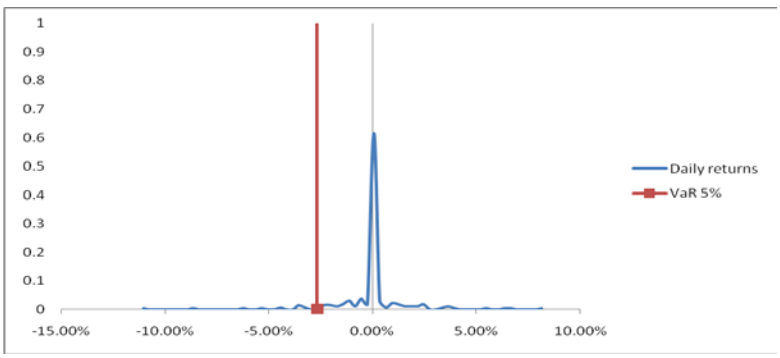

Fig. 1. *The rentabilities distribution*

The rentabilities situated between -0.10% and 0.20%, have the highest frequency, representing around 62% from the total number of observations.

4.2. The portfolio of titles belonging to the 33 companies

In the table no. 4.2. are presented the results of the VaR model applied to the titles portfolio, based on their rentability.

During the studied period, the maximum loss of the titles portfolio was 2.73%, the maximum rentability was 6,40%, and the average rentability was 0.1084%. At the chosen significance level of 5%, the observation at this level represents a loss of 0.89%. Therefore, at an investment of 1.000.000 lei there would have been a maximum potential daily loss of 8.856,85 lei, a maximum potential weekly loss of 19.804,51 lei and a maximum potential monthly loss of 41.542,30 lei. In the figure no. 4.2., it was highlighted the distribution of the rentability of the titles portfolio.

No. of observations	260
Minimum daily rentability	-2.73%
Maximum daily rentability	6.40%
Average rentability	0.1084%
Interval	9.13%
Confidence level	95%
The smallest 5% observations	13
5% VaR	-0.89%
The last closing price	2.1374
5% VaR of the closing price	2.1185
The investment amount	1.000.000
Daily potential loss (5% VaR Value)	(8.856,85)
Weekly potential loss (5 days)	(19.804,51)
Monthly potential loss (22 days)	(41.542,30)

Table 2. *The VaR model for the titles portfolio*

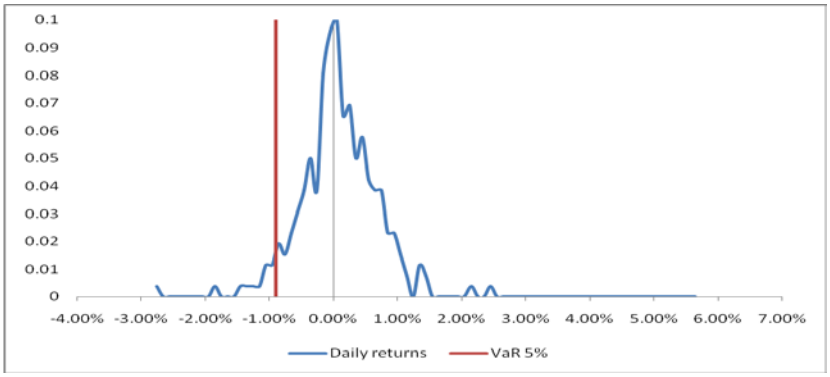

Fig. 2. *The rentabilities distribution regarding the titles portfolio*

The rentabilities situated between -0.20% and 1.10%, have the highest frequency, representing around 70% from the total number of observations.

5. Conclusions

The results obtained after applying the VaR model, demonstrated that the titles belonging to Conted Dorohoi S.A. company, recorded a maximum potential daily loss of 2,68% for the studied period of time, and for the portfolio of titles belonging to the 33 companies, the maximum potential daily loss was only 0,89%. Therefore, by diversifying the investment into a portfolio of titles, the risk, highlighted by the maximum potential loss, can be substantially reduced.

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