EVALUATING S.C. AZOMUREŞ S.A. BASED ON FCFE

Andreea NEGRU, Ph.D.Student
E-mail: andreea.negru@money.ro
Academy of Economic Studies
Bucharest

Sorin-Iulian CIOACĂ, Ph.D.Student
E-mail: cioaca_sorin@yahoo.co
Academy of Economic Studies
Bucharest

Mihai Cristian DINICA, **Ph.D.Student**
E-mail: mihai.dinica@gmail.com
Academy of Economic Studies
Bucharest

Ana-Maria BURCĂ, Ph.D.Student
E-mail: burca.anamaria@yahoo.com
Academy of Economic Studies
Bucharest

Abstract:

Against the current economic and financial background, which increases the importance of merger and acquisition[1]*, a situation also facilitated by the integration of national capital markets, the evaluation of the company becomes a very significant topic. An economic fact over the past years on the mergers and acquisitions market is the involvement of an increasingly larger number of companies from emerging markets into such operations, which resulted in the fact that the most used evaluation method is the Discounted Cash Flow Analysis, given that capital markets were insufficiently developed in those countries, and/or the fact that many of those companies are not listed at stock exchanges. Other evaluation methods used in the financial theory and practice – namely, the discounted dividend valuation model (Gordon), the market multiples analysis and the residual income valuation are less applicable in evaluating those companies, according to Fabozzi (2010). A company's market value is estimated based on free cash flow to the firm (FCFF) or on free cash flow to equity (FCFE), discounted according to the relevant rates.*

The evaluation of S.C. Azomureş S.A., listed as First Category at the Bucharest Stock Exchange will be using an evaluation based on the free cash flow for the firm model and the Monte Carlo simulation technique, which will help us estimate a range of potential values of the company's net worth.

Cuvinte cheie: mergers, free cash flow, cash flow
Jel classification: G 22

For the beginning, we shall calculate the expected profitability rate of the company's own capital. To that end, we will resort to the CAPM, according to which the expected yield of a financial instrument is calculated starting from the risk free yield rate, to which a n amount will be added to account for the systematic – the only one that is rewarded by the market: $E(R) = R_f + \beta \times [E(R_M) - R_f]$

In order to estimate the value of the beta coefficient for Azomureş, we have used Sharpe's market model, by regressing the daily yields of Azomures shares in relation to the daily profitability indicated by the BET index for the period between 1.01 – 15.06.2011 (117 observations in all) and we have set a significance ceiling of 5%. The results of the regression model parameters estimation are listed in the following table:

	Coefficients	Standard Error	t Stat	P-value
Intercept	0.0043	0.0021	2.0906	0.0387
X Variable	0.4043	0.1980	2.0419	0.0434

As one can notice, the null hypothesis of the estimated parameters' non-significance can be rejected at a significance level of 5% (p-value is below 5% in the case of both parameters), which means that we can accept a level of beta volatility for shares in Azomures equal to 0.4043. By using this value of the beta coefficient, and by taking into account an average 0.2407% profitability of the BET index and an average 0.0257% daily yield for 5 year T-bills[1], we can estimate the future profitability rate of own capital, expected by Azomureş shareholders:

$$R_E = 0.0257\% + 0.4043 \text{ x } (0.2407\% - 0.0257\%) = 0.1126\%$$

Once the cost of own capitals estimated (discount rate), in order to evaluate the company we shall resort to a Monte Carlo Simulation, which will take into account the following aspects:

- $FCFE_i$ (cash flow available to shareholders in year i) is a random variable allocated normally;
- FCFE predicted for the year 2011 is the result of the Monte Carlo simulation with 100 equiprobable scenarios, with the average and the average square error of considered FCFE are estimated based on the current values of FCFE between 2004 and 2010;

[1] Explained in the section on modern portfolio theory.

- Predicted growth of the FCFE rate between 2012 and 2015 will be of 4%, it will then diminish annually by 1 point, and remain constant starting in 2018.

The expected value of the company's own capitals is equal to approximately 254 million RON, which, compared to the accounting value of its own capital of 549 million RON on 31.12.2010, indicates an overvaluation of the company, as a result of not taking into account the expected yield of own capital in a proper manner.

The Monte Carlo can of course be used also to estimate intervals of confidence – at various degrees of probability – for the value of the company's own capital. Given the normality of the distribution of own capital values V_0 (expressed as a sum of discounted cash flows that are normally distributed), we can estimate intervals off confidence of various degrees of probability for V_0. Thus, for $\delta \in (0,1)$ fixed, we suggest calculating values V_1 and V_2 for which: $P(V_1 \le V_0 \le V_2) = \delta$

By calculating the relationship above, the result is:

$$P\left(\frac{V_1 - E(V_0)}{\sigma(V_0)} \le \frac{V_0 - E(V_0)}{\sigma(V_0)} \le \frac{VAN_2 - E(V_0)}{\sigma(V_0)}\right) = \delta,$$

Which, with notations $z_1 = \dfrac{V_1 - E(V_0)}{\sigma(V_0)}$ and $z_2 = \dfrac{V_2 - E(V_0)}{\sigma(V_0)}$, results in:

$$P\left(z_1 \le \frac{V_0 - E(V_0)}{\sigma(V_0)} \le z_2\right) = \delta \qquad (1),$$

Or, equivalently, $N(z_2) - N(z_1) = \dfrac{1}{\sqrt{2\pi}} \displaystyle\int_{z_1}^{z_2} e^{-\frac{1}{2}x^2} dx = \delta \qquad (2)$

Relationship (1) provides the following expression of the confidence interval for V_0:

$$[E(V_0) + z_1\sigma(V_0), E(V_0) + z_2\sigma(V_0)] \qquad (3)$$

In order to determine z_1 and z_2 we shall impose the condition of minimizing the length of interval (2), because we are interested in maximum accuracy of the estimation. The length of the interval is: $(z_2 - z_1)\cdot \sigma(V_0)$ (3), which constitutes the objective function of the conditioned optimization problem, the link being given by relationship (1).

Let us build the Lagrangean function associated to the optimum problem:

$$L(z_1, z_2, \lambda) = (z_2 - z_1)\cdot \sigma(V_0) + \lambda\left(\frac{1}{\sqrt{2\pi}}\int_{z_1}^{z_2} e^{-\frac{1}{2}x^2}dx - \delta\right)$$

First order conditions are: $\begin{cases} \dfrac{\partial L}{\partial z_1} = 0 \\ \dfrac{\partial L}{\partial z_2} = 0 \\ \dfrac{\partial L}{\partial \lambda} = 0 \end{cases}$.

After making the calculations, the system (25) becomes:

$$\begin{cases} \sigma(V_0) + \dfrac{\lambda}{\sqrt{2\pi}} e^{-\frac{z_2^2}{2}} = 0 \\ -\sigma(V_0) - \dfrac{\lambda}{\sqrt{2\pi}} e^{-\frac{z_1^2}{2}} = 0 \\ \dfrac{1}{\sqrt{2\pi}}\displaystyle\int_{z_1}^{z_2} e^{-\frac{1}{2}x^2}dx - \delta = 0 \end{cases} \qquad (4)$$

The first two equations of the system (4) result in: $z_1^2 = z_2^2$, and, since $z_1 = z_2$ is not convenient (it would mean that the confidence interval is zero in length!), we deduct that: $z_1 = -z_2$

Back to restriction (1):

$$N(z_2) - N(-z_2) = \delta \Rightarrow 2N(z_2) - 1 = \delta \Rightarrow z_2 = N^{-1}\left(\frac{1+\delta}{2}\right) = z_{1-\frac{\alpha}{2}} = -z_1,$$

Where $\alpha = 1 - \delta$ means the chosen significance ceiling.

Therefore, the confidence interval for V_0 as the following shape (considering a significance ceiling α):

$$\left[E(V_0) - z_{1-\frac{\alpha}{2}} \cdot \sigma(V_0), E(V_0) + z_{1-\frac{\alpha}{2}} \cdot \sigma(V_0)\right]$$

The table below presents confidence intervals for the value of Azomures own capital, for various probabilities δ:

Probability δ	**Low end of confidence interval**	**Higher end of confidence interval**
60%	229,387,866.75	278,282,253.25
65%	216,652,855.08	291,017,264.92
70%	203,232,071.00	304,438,049.00
75%	188,748,934.82	318,921,185.18
80%	172,621,275.89	335,048,844.11
85%	153,822,519.70	353,847,600.30
90%	130,169,391.85	377,500,728.15
95%	95,111,893.30	412,558,226.70
96%	84,899,397.53	422,770,722.47
97%	72,344,432.19	435,325,687.81
98%	55,654,793.15	452,015,326.85
99%	29,349,856.35	478,320,263.65
99.50%	5,275,688.36	502,394,431.64

As expected, the length of the confidence interval becomes higher, as the accuracy of the estimation (δ) grows.

Bibliography:

1. Smithson, C. – “Credit Portfolio Management”, Wiley, 2003;
2. Sondermann, D. – “An introduction to stochastic calculus for finance”, Springer, 2007;
3. Stancu, I. – “Finanţe”, Editura Economică, Bucureşti, 2007;
4. Stancu, I. – “*Finanţe*”, Ediţia a treia, Editura Economică, Bucureşti, 2002;
5. Stancu, I. – “*Finanţe*”, Ediţia a treia, Editura Economică, Bucureşti, 2002;

6. Treynor, Jack – "Market value, time and risk", 1961;
7. Treynor, Jack – "Toward a theory of market value of risky assets", 1962;
8. Van Horne, James – "Financial management and policy", 12th edition, Prentice Hall, 2001;
9. Van Horne, James; Wachowicz, John – "Fundamentals of financial management", 13th edition, Prentice Hall, 2008;
10. Vanini, P.; Vignola, L. – "*Optimal Portfolio Selection*", 2001;
11. Wilmott, P. – "*Derivatives: the theory and practice of financial engineering*", Wiley, 1999;
12. Wilmott, P.; Howison, S.; Dewynne, J. – "*The mathematics of financial derivatives*", Cambridge University Press, 1996.