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ANALYSIS OF THE CAPITAL COST IMPACT ON SHARE VALUE

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Abstract. One of the most important business management tasks for enterprises is the calculation of an appropriate rate of return for invested capital or cost of capital. The article presents a theoretical and practical analysis of four of the most commonly used capital cost evaluation models. Based on the results, the two most suitable capital cost evaluation models that can be used under the prevailing conditions in Lithuania are identified. The analysis of the influence of the cost of capital on share values revealed the factual influence of the valuation models on share values. Thus, based on the research results, the authors recommend that under the current conditions, the Capital Asset Pricing Model and the Fama-French model can be applied in the share valuation process.

Keywords: Business valuation, business value, weighted average cost of capital (WACC), capital asset pricing models, cost of capital, factors affecting business value, sensitivity analysis.

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1. Introduction

One of the most important business management tasks for enterprises is the calculation of an appropriate weighted average cost of capital (WACC). Weighted average cost of capital is the expression of the cost of equity and the cost of debt as a percentage proportional to the total enterprise capital structure. Cost of debt is the rate of interest at which an enterprise can borrow capital in the market, adjusted for any expenses associated with the borrowing. Cost of equity is the rate of return demanded by investors and shareholders who entrust their capital towards the development of the company. It is in fact the latter part of the weighted average cost of capital calculation that is most subjective and requires the most attention in business valuation.

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Cost of equity is a fundamental although especially complicated valuation variable in the field of business valuation. In principle, cost of equity consists of the risk free rate of return and the premium expected for risk which investors could incur when investing in company's equity. Problems of risk level integral estimation are regularly discussed in economic literature (Vlasenko and Kozlov 2009; Ponikvar *et al.* 2009; Rutkauskas 2008; Rutkauskas *et al.* 2008; Ginevičius and Podvezko 2008; Ustinovichius *et al.* 2006). Looking from business valuation perspective the main problem arising in Lithuania is the application of suitable methods. The lack of statistical data poses problems in the emerging market environment that exists in Lithuania.

2. Capital asset pricing models and their application

The most popular model used by shareholders to assess risk and the expected rate of return on capital is the **Capital Asset Pricing Model** (**CAPM**). When applying the CAPM, the expected cost of capital equals the rate on a long term risk free security plus a market risk premium, multiplied by the enterprise's systematic risk coefficient, beta (Copeland *et al.* 2000). The model is popular due to its simplicity and easy access to the required data in established markets. The data identifying risk premiums on equity and risk free rate of return on shares can be easily sourced in financial publications or calculated from share market information.

The equation for valuing cost of equity is presented below:

$$R_e = R_f + \beta(R_m - R_f), \quad (1)$$

where: R_e – cost of equity, %; R_f – risk-free rate of return, %; R_m – average market return on shares, %; $R_m - R_f$ – risk premium (the difference between the expected market rate of return and the risk-free rate of return), %; β – beta, systematic risk measurement that reflects the sensitivity, or degree of risk of a particular enterprise or sector of the economy compared to other companies in the market.

Cost of equity and systematic risk, beta, are directly dependent on one another. The beta coefficient of a portfolio consisting of all market shares is equal to 1. The beta of individual enterprises usually varies between 0.3 and 2.

Michael Annin argued in his research that the CAPM is not precise when valuing the cost of equity for small capitalization companies. Comparing the returns for large and small capitalization companies and the CAPM generated cost of equity and the beta coefficient, Annin found that the usual CAPM does not evaluate the risk factor of such (small) companies. Calculating the beta coefficient for companies of various degrees of capitalization, Annin noticed that the beta coefficient of small companies fluctuates much more over time than it does for large companies (Annin 1997).

This is the reason why, when valuing the risk premium using the CAPM, it is possible not to evaluate the risk of small capitalization companies. The smaller the capitalization of a company, the greater the variation in beta over time.

In order to resolve this problem, in 1995 Fama and French suggested upgrading the CAPM to include factors concerning the scale of capitalization of companies. The authors recommended to also value portfolio or share performance compared to the rate of return based on the company‘s capitalization and *BV/P* (book value / price) market indicator. The **Fama-French model** formula (Fama and French 1998):

$$R_{pt} = R_f + \beta\left[(R_{mt}) - R_f\right] + s_p(S) + h_p(H) + \varepsilon_{pt}, \quad (2)$$

where: R_{pt} – weighted return rate over time (t), %; R_{mt} – average return of the whole share market over time (t), %; R_f – risk free rate of return, %; β_p – systematic risk coefficient, indicating the risk of the portfolio or shares compared to the market; s_p – systematic risk coefficient, indicating portfolio or share performance in relation to the *S*; *S* – the difference in return between small and large market capitalization companies (small minus big), %; h_p – systematic risk coefficient, indicating portfolio or share performance in relation to the *H*; *H* – the difference in return between companies with a high *BV/P* and those with a low *BV/P* (high minus low), %; ε_{pt} – intercept from regression.

To test the reliability of their model, Fama and French conducted a comparative analysis of the returns of companies listed in foreign stock markets. The authors ranked all the shares in a given market according to the share price and book value ratio. The shares with the highest *BV/P* were classified as "value" shares, and those with the lowest – "growth" shares. Historical market data indicated that returns on "value" shares in 12 of the 13 developed countries was greater than on "growth" shares. The only country where "growth" shares outperformed "value" shares was Italy, however, during the analysis period, the stability of its financial system was not the best, thereby explaining why the results were different (Fama and French 1998).

The **arbitrage pricing model** (**APM**) is defined as a variant of the CAPM which takes into account many variable factors (Kazlauskienė and Christauskas 2007). The CAPM evaluates the change in profitability of a portfolio and shares as a function dependent on one variable, known as the market index, and usually defines the return on a well diversified portfolio. The APM is different in that it allows the evaluation of many variables. The cost of capital is defined according to the following formula (Copeland *et al.* 2000):

$$k_s = R_f + \sum_{j=1}^{k} \beta_j (R_j), \quad (3)$$

where: R_f – risk free rate, %; β_j – systematic risk beta of the chosen economical (*j*) variable; R_j – the risk premium of the shares or portfolio, compared to the chosen (*j*) variable‘s economic fluctuation, %.

Instead of one systematic risk measurement, the APM factors in many variables. Every expression on beta indicates the sensitivity of the return on shares for each economic factor.

The empirical data analysis conducted by Copeland *et al.* (2000) showed that there are five most important fundamental factors that influence changes in share value:

- Industrial Production Index – a measurement indicating the strength of the economy, measuring its real production output;
- Real short term interest rates, which are equal to the difference between percentage returns on short term treasury bills and the consumer price index;

– Short term inflation, which is measured in terms of consumer price index fluctuations;
– Long term inflation, which describes the difference between long term and short term returns on government bonds before redemption;
– Default risk (the possibility that a bond issuer will default, by failing to repay principal and interest in a timely manner), which is described as the difference between the corporate bond percentage returns of companies holding long term Aaa and Baa ratings.

The empirical data analysis also proved that the APM gives a better indication of return on assets than the CAPM, as it also takes into consideration the important risks present in the economic environment (Snieška *et al.* 2008; Teresienė *et al.* 2008).

The axes in the graph (Fig. 1) depict two fundamental variables – the Industrial Production Index and short term inflation. The transverse lines illustrate the combination of fixed returns with different risk factors.

The portfolio at point F is independent of external variables, and therefore earns risk free returns r_f. At point G its inflation related systematic risk grows, yet it is compensated by the risk reduction in the Industrial Production Index. The end result is that at point G, the portfolio earns risk free returns, as it does at point F, however, it is exposed to risk from other variables affecting the portfolio.

Portfolios A, M and B, which earn returns generated by the CAPM, $E(r_m)$ can be similarly described, yet they are exposed to short term inflation and fluctuations in the Industrial Production Index.

Although the Capital Asset Pricing Model (CAPM) is the one most commonly used in business valuation practice, it does harbour an inherent problem of not valuing risk for small capitalization companies. In addition, companies with high price-to-earnings ratios earn less

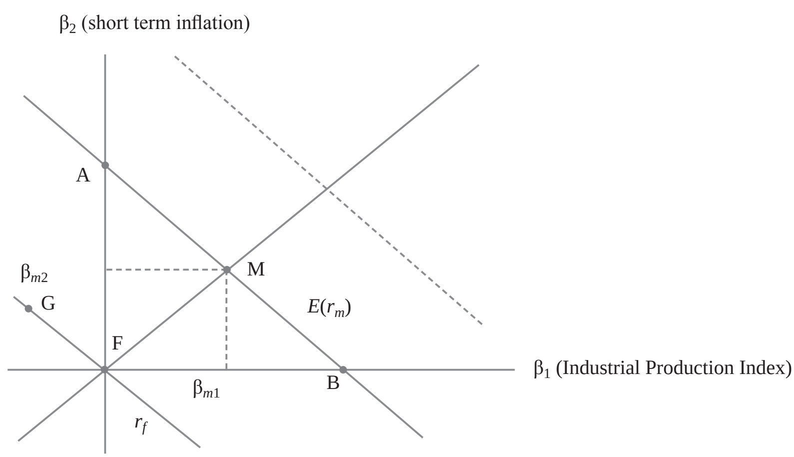

Fig. 1. Arbitrary pricing model (Based on Copeland *et al.* 2000)

returns than indicated by the CAPM. The arbitrary pricing model or the Fama-French model may therefore be used as alternatives.

It is difficult to say with certainty which of the risk premium valuation models is most appropriate for Lithuanian conditions. On the one hand, the Lithuanian share market operator NASDAQ OMX has data only from 2000, therefore determining risk premiums from historical results would not be very accurate, as the only major correction that adjusted the impressive market growth during 2000–2007 occurred in 2008. On the other hand, expected risk premium calculation is based on the assumption that the market values companies correctly. However, if in fact most companies are over-valued in the market, risk premium calculation will be incorrect.

Risk premiums are predicted using developed markets, such as the US share market history, but in addition, a country‘s risk premium should also be factored in (Brukštaitienė and Eiva 1999). This capital asset pricing model is often used in countries with an emerging capital market. It is assumed that two factors make up the risk premium for cost of equity when investing in a particular country: the risk premium in a developed capital market (US) and the other country‘s risk premium.

$$R_c = V_c \cdot \frac{\sigma_{stock\ market}}{\sigma_{bonds}}, \tag{4}$$

where: R_c – Country risk premium, %; V_c – Country rating value, describes the risk premium depending on the rating given to a country, %; $\sigma_{stock\ market}$ – standard deviation of the stock market return in the country where the company operates; σ_{bonds} – standard deviation of the return on bonds in the country where the company operates.

Beta valuing risk in financial models can have two main characteristics. The first shows risk which affects a diversified portfolio. A very likely situation may be where individual investment risk is high, while at the same time, market risk is low. The second shows relative asset risk and applies specifically to a particular asset only. Weighted market capitalization beta for all investments using the CAPM should equal 1. Beta must maintain these characteristics in all multi-factored models.

Beta can be calculated in these ways:

- Applying the regression equation using historical share market returns;
- Separating a company‘s activities into individual activities and setting beta for each.

Damodaran (1994) recommends calculating beta using a linear equation comparing company returns with the market index which best describes the market portfolio. The regression equation for calculating beta is below:

$$R_j = a + \beta R_m, \tag{5}$$

where: R_j – return on investment, %; a – intercept; R_m – market return, %; β – beta.

Another method to evaluate the beta coefficient is based on the ratio of the covariance of the share‘s profitability in terms of the market and the dispersion of the market‘s return (Obi 1999):

$$\beta = \frac{\mathrm{cov}\,ariance\,(R_j; R_m)}{dispersion\,(R_m)}, \tag{6}$$

where: R_j – historical specific share returns, %; R_m – historical market index returns, %.

In the following cost of capital calculations, the beta value will be set using a linear equation, and the reliability of the results will be tested using equation 6.

In addition, as historical beta shows only a company's historical reaction to market fluctuations, and that it is expected that in the future, a company's beta will shift towards the market average, it is predicted that beta should undergo adjustment.

When conducting beta calculation, Bloomberg makes an additional adjustment using the following formula (BU Libraries):

$$\beta_{adj} = \beta_h\,(0.67) + 1.0\,(0.33), \tag{7}$$

where: β_{adj} – adjusted beta; β_h – historical beta.

Thus, the final calculations will use beta adjusted according to this formula.

3. Example of cost of capital calculation for the company TEO LT, AB

In order to evaluate the most appropriate capital asset pricing model for use given Lithuanian conditions, the stable, long-lived Lithuanian telecommunications company TEO LT, AB was chosen. The market data used in the analysis spans the period from January 1, 2000 to December 31, 2008. It should be noted that analysis results have been rounded-up, while in the calculations, the whole value was used.

As the company operates in Lithuania, valuing its **risk free rate of return** meant looking at the average yield of eight year maturity Lithuanian government bonds between January 2008 and December 2008, which reached $R_f = 0.0606$ or 6.06% (Lietuvos bankas). This year-long period was chosen due to the recent strong fluctuations in yield which are taking place mainly because of the global financial crisis.

The **company's beta value** was attained comparing fluctuations in TEO LT, AB shares with fluctuations in the OMX Vilnius index. The OMX Vilnius index encompasses all the shares listed in the Main and Secondary lists in the Vilnius share market, except for those companies where one shareholder controls 90% or more of the company shares. The base date of the OMXV index is December 31, 1999, and the base value is 100 points (NASDAQ OMX).

In order to conduct the dependency analysis, the period selected was from the date TEO LT, AB shares were first listed on the market, June 12, 2000, until December 31, 2008. Dependency is illustrated in Figure 2.

TEO LT, AB beta is equal to the gradient, $\beta_{linear.} = 0.7535$ (5).

Testing the linear beta value involved calculating beta for the covariance in fluctuations of TEO LT, AB shares and the OMX Vilnius index, with dispersion of the OMX Vilnius index. The resulting TEO LT, AB systematic risk of $\beta_{cov.} = 0.7462$ (6) with a minor error confirms the correctness of $\beta_{linear.}$ Further calculations will use $\beta_{linear.} = 0.7535$.

Historical beta indicates the company's historical reaction to market fluctuations. It is expected that in the future, the company's beta will shift towards the market average, thus the future beta will need to be adjusted.

Thus, the adjusted TEO LT, AB beta is equal to 0.8348. A beta indicator less than 1 indicates that the company's share price fluctuations are less than the whole market's fluctuations.

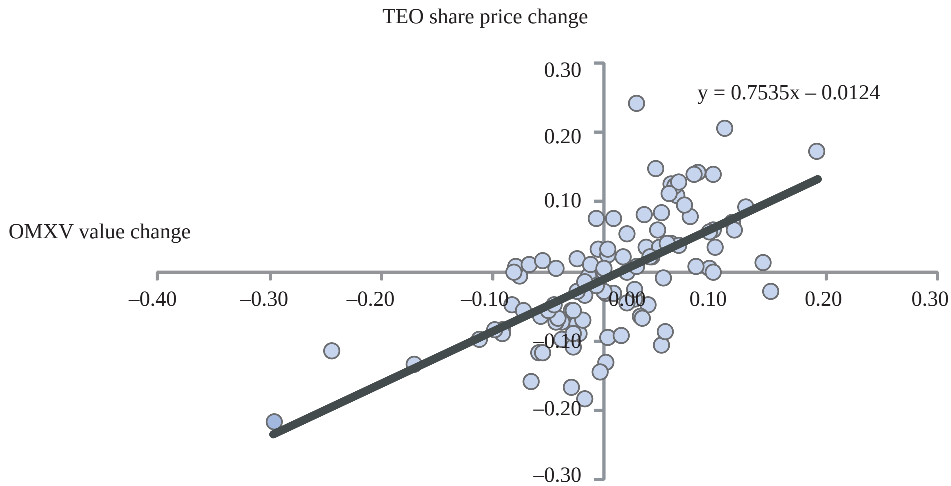

Fig. 2. Finding historical beta using a linear equation

Capital asset pricing model (CAPM)

Data for the capital asset pricing model was collected from the NASDAQ OMX database. Average share return was calculated based on the annual fluctuations of the OMX Vilnius index. The results are presented in the Table 1.

Table 1. Average OMX Vilnius index annual return

Year	OMX Vilnius value	Average share return, %
2000	92.7	–6.5
2001	75.56	–18.5
2002	84.78	12.2
2003	174.48	105.8
2004	293.44	68.2
2005	448.76	52.9
2006	492.65	9.8
2007	514.23	4.4
2008	179.25	–65.1
Average annual return		**18.1**

(Compiled using Nasdaq OMX share market data)

Based on the market data, cost of equity according to the capital asset pricing model is equal to: $R_e = 0.0606 + 0.83(0.181 - 0.0606) = 0.1614$ or 16.14% (a comparison and summary of the results is presented in the conclusions).

Fama-French capital asset pricing model

When using the Fama-French model to value cost of equity, the dependency of TEO LT, AB shares on the returns of large and small capitalization companies is also valued, as well as on the returns of companies with a high and low *BV/P*.

As part of the analysis, all companies operating in Lithuania whose shares are traded on the market were categorized according to their scale of capitalization and their *BV/P*.

H is an indicator which shows the difference in returns between companies with a high and a low *BV/P*. For the analysis of companies listed on the OMX Vilnius index, the chosen breaking point was the average company *BV/P* of 2.56 (the results are presented in Table 2).

Table 2. Average company *BV/P* in the market on 31/12/2008

Average company ***BV/P*** in the market, 2.56			
Year	**Average return of companies with a low *BV/P* (<2.56), %**	**Average return of companies with a high *BV/P* (>2.56), %**	***H*, %**
2000	1.2	–12.3	–13.5
2001	–16.2	18.8	35.0
2002	23.6	36.8	13.2
2003	99.1	141.7	42.6
2004	100.7	45.7	–55.0
2005	57.5	115.7	58.2
2006	1.8	–11.0	–12.8
2007	12.7	–10.6	–23.3
2008	–57.6	–78.4	–20.8
Average	**24.8**	**27.4**	**2.6**

(Compiled using Nasdaq OMX market data)

S indicates the difference in returns between companies with large capitalization and small capitalization. For the results analysis of companies listed on the OMX Vilnius index, the breaking point for calculating the *S* indicator was an average company capitalization equal to 219618807 LTL. (results are presented in Table 3).

Table 3. Average company capitalization in the market on 31/12/2008

Average company capitalization in the market – 219,618,807 LTL			
Year	**Average return of companies with small capitalization (< 219,618,807 LTL), %**	**Average return of companies with large capitalization (> 219,618,807 LTL), %**	***S*, %**
2000	–4.7	–11.1	6.4
2001	12.1	–44.1	56.2
2002	40.7	–8.5	49.1
2003	110.9	132.4	–21.5
2004	55.4	144.9	–89.5
2005	92.5	50.4	42.0
2006	–7.7	8.3	–16.0
2007	–11.4	45.2	–56.6
2008	–69.5	–55.2	–14.3
Average	**24.3**	**29.2**	**–4.9**

(Compiled using Nasdaq OMX market data)

According to the principle described above, the results have been grouped and are presented in Table 4.

Table 4. Historical stock market results for the Fama-French model

Year	TEO LT returns, %	OMXV returns, %	*S*, %	*H*, %
2000	–34	–6	6	–13
2001	–40	–18	56	35
2002	–28	12	49	13
2003	74	106	–21	43
2004	37	68	–89	–55
2005	26	53	42	58
2006	2	10	–16	–13
2007	–14	4	–57	–23
2008	–51	–65	–14	–21
Average	**–3.2**	**18.1**	**–4.9**	**2.6**

(Compiled using Nasdaq OMX market data)

The Fama-French model uses beta which show the reaction of TEO LT, AB share prices towards market fluctuations (OMXV), company return according to their capitalization variance (*S*), and the ratio of company return according to their share price with variance in the book value of shares (*H*).

Beta was calculated using Microsoft Excel‘s data analysis package for regression. The results are presented in Table 5.

Table 5. Regression results for the Fama-French model

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.98
R Square	0.97
Adjusted R Square	0.95
Standard Error	0.09
Observations	9.00

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	3	1.35	0.45	50.49	0.00
Residual	5	0.04	0.01		
Total	8	1.39			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	–0.2	0.0	–5.1	0.0	–0.3	–0.1	–0.3	–0.1
OMXV returns	0.6	0.1	5.6	0.0	0.3	0.8	0.3	0.8
SMB	–0.4	0.2	–2.7	0.0	–0.8	0.0	–0.8	0.0
HML	0.5	0.2	2.2	0.1	–0.1	1.0	–0.1	1.0

Using the above results and applying the Fama-French model, cost of equity is equal to: $R_{pt} = 0.0606 + 0.6(0.181 - 0.0606) + (-0.4)(-0.049) + (0.5)(0.026) + (-0.2)/100 = 0.1626$ or 16.26% (a comparison and summary of results will be presented in the conclusions)

Arbitrary pricing model

When applying the arbitrary pricing model to calculate cost of equity for TEO LT, AB, additional market economic indicators were also considered: industrial production, short term inflation, real short term interest rates, and long term inflation. The average monthly fluctuation of these indicators and the risk premium they generate is presented in the Table 6 below:

Table 6. Average monthly fluctuation from June, 2000 to December, 2008

	Fluctuation in value of TEO shares, %	**CPI (short term inflation), %**	**Industrial production, %**	**Real short term interest rates, %**	**Long term inflation, %**
Average monthly Change	–0.60	0.26	0.33	3.54	1.37
Risk premium compared to economic variables	–	–0.86	–0.93	–4.14	–1.97

(Compiled using data from Nasdaq OMX and the Lithuanian Department of Statistics)

Calculation of the change in industrial production and short term inflation (CPI index) used information from the Lithuanian Department of Statistics database (Lietuvos statistikos departamentas). Real short term interest rates were calculated to be the difference between average treasury bill interest rates and short term inflation. Long term inflation was calculated to be the difference in average returns on government bonds and treasury bills.

Microsoft Excel‘s data analysis regression package was used to calculate the beta indicator. The results are presented below.

Table 7. Regression results for the arbitrary pricing model

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.40
R Square	0.16
Adjusted R Square	0.13
Standard Error	0.08
Observations	103.00

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	4	0.12	0.03	4.71	0.00
Residual	98	0.65	0.01		
Total	102	0.77			

Continuation of **Table 7**

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	0.08	0.02	3.44	0.00	0.03	0.12	0.03	0.12
CPI (short term inflation)	−3.10	1.82	−1.71	0.09	−6.71	0.50	−6.71	0.50
Industrial production index	−1.39	0.77	−1.80	0.07	−2.92	0.14	−2.92	0.14
Real short term interest rates	−1.71	0.50	−3.41	0.00	−2.71	−0.72	−2.71	−0.72
Long term inflation	−0.85	0.99	−0.86	0.39	−2.80	1.11	−2.80	1.11

Using the results, cost of equity based on the arbitrary pricing model is equal to:

$R_e = 0.0606 + (-3.1)(-0.0086) + (-1.39)(-0.0093) + (-1.71)(-0.0414) + (-0.85)(-0.0197) + 0.08/100 = 0.1887$ or 18.87% (results comparison and summary will be in the conclusions)

Cost of capital calculation evaluating country risk premium

Using this pricing model, the cost of equity risk premium is valued based on the risk premium of corporate bonds, and the fluctuations of the share market and the return on government bonds. The risk premium of government bonds is calculated based on the country rating conversion into a risk premium, as devised by Damodaran. See Table 8.

Table 8. Rating conversion table

Rating	Government bonds, %	Corporate bonds, %
Aaa	0.15	0.50
Aa1	0.30	0.80
Aa2	0.60	1.10
Aa3	0.80	1.20
A1	1.00	1.35
A2	1.30	1.45
A3	1.40	1.50
Baa1	1.70	1.70
Baa2	2.00	2.00
Baa3	2.25	2.60
Ba1	2.50	3.20
Ba2	3.00	3.50
Ba3	3.25	4.00
B1	3.50	4.50
B2	4.25	5.50
B3	5.00	6.50
Caa1	6.00	7.00
Caa2	6.75	9.00
Caa3	7.50	11.00

(Compiled based on Damodaran)

From country ratings it is possible to gain the impression about external environment risks (Voronova 2008). In the end of 2008, ratings agencies had given Lithuania an average rating of A3 – a higher investment credit rating (Ministry of Finance). According to Table 8, the risk premium of Lithuanian government bonds is equal to 1.40%.

Based on formula 4 by Damodaran, the country risk premium should also be adjusted in line with the standard deviation of the country‘s share market and government bonds.

For this evaluation, the returns statistics of government bonds were provided by the Bank of Lithuania, and returns statistics of the share market were sourced from the NASDAQ OMX internet database from, January 1, 2000 to December 31, 2008.

$$R_c = 0.014 \cdot 0.0749/\ 0.0214 = 0.049 \text{ or } 4.9\%.$$

Where the US risk premium is equal to 5.65% (Historical Returns on Stocks, Bonds and Bills – United States), the cost of equity risk premium in Lithuania is equal to 10.54%.

Using these results, cost of equity based on the country risk premium is equal to:

$R_e = 0.0606 + 0.83(0.1054) = 0.1486$ or 14.86% (results comparison and summary will be in the conclusions).

4. Sensitivity analysis of cost of capital models

In order to conduct a valuation of TEO LT, AB shares and a sensitivity analysis, a business forecast for the company was made for 2009–2013. The company‘s business forecast used the main business forecast stages: past results analysis, future activities forecast, determination of discount norms, activities succession identification (Dzikevičius *et al.* 2008). The results are presented in Table 9 (1 € = 3.4528 LTL).

Table 9. Valuation results for TEO LT, AB, thousand LTL

	2005	2006	2007	2008	2009	2010	2011	2012	2013
Operating profit	105.763	158.461	185.468	182.238	191.375	207.838	199.093	218.230	225.446
Taxes	−24.964	−30.291	−33.317	−29.592	−39.434	−42.553	−40.628	−44.251	−45.576
Net profit	84.073	130.549	162.830	159.908	157.734	170.213	162.510	177.004	182.305
Depreciation	247.970	193.500	166.696	166.833	172.559	171.938	171.468	171.112	170.842
Changes in working capital	25.512	−120.474	132.634	14.870	−5.320	−6.397	−3.064	−8.914	−6.010
Change in long term assets	−261.429	−85.471	9.903	23.600	−2.559	−1.938	−1.468	−1.112	−842
Investments in long term assets	−13.459	108.029	176.599	190.433	170.000	170.000	170.000	170.000	170.000
FCFE	319.990	336.494	20.293	121.438	165.613	178.548	167.042	187.030	189.157
FCFF	316.716	334.115	9.614	114.176	159.820	173.620	162.998	184.004	186.721
Dividends	102.372	124.291	201.973	194.204	178.668	173.508	187.234	178.761	185.855

Share valuation was conducted using three different methods – discounting the free cash flow to equity (FCFE), discounting the free cash flow to firm (FCFF), and dividends.

The discount norm for the stock and dividend valuation methods used a cost of equity of R_e = 16.14% as found using the capital asset pricing model. The discount norms for the business valuation method used weighted average cost of capital (*WACC* = 16.09%), which was found using the formula:

$$WACC = R_e(E/(E + D)) + R_d(D/(E + D)) = 16.09\%,$$

where: R_e – cost of equity, %; E – company's equity, LTL; D – company's debt, LTL; R_d – cost of debt, %.

The share valuation results are presented in Fig. 3.

Having conducted a business valuation of TEO LT, AB using different discount methods, a share value fluctuation between 1.48 and 1.51 LTL was determined. The highest yielding cash flow that the company generates for shareholders is dividends, as they are paid out regularly every year. This is why a sensitivity analysis was conducted for the dividend discount model.

The **sensitivity analysis** shows that a reduction in cost of capital of 1% (from 16.14% to 15.14%), the company's predicted share value will increase more than 7% and grow from 1.51 LTL to 1.62 LTL. Thus, cost of capital is a very important factor influencing share price value. The sensitivity analysis is presented in Table 10.

Another important factor in share valuation is the prediction of long term stable free cash flow, or in this case, dividend growth rate. When valuing TEO LT, AB, a growth rate of 1% from 2013 was set. As can be seen in the sensitivity analysis, with a long term stable growth rate increase of 1% (from 1% to 2%), share value increases 4%, from 1.51 LTL to 1.57 LTL. Thus, this factor also strongly influences share value.

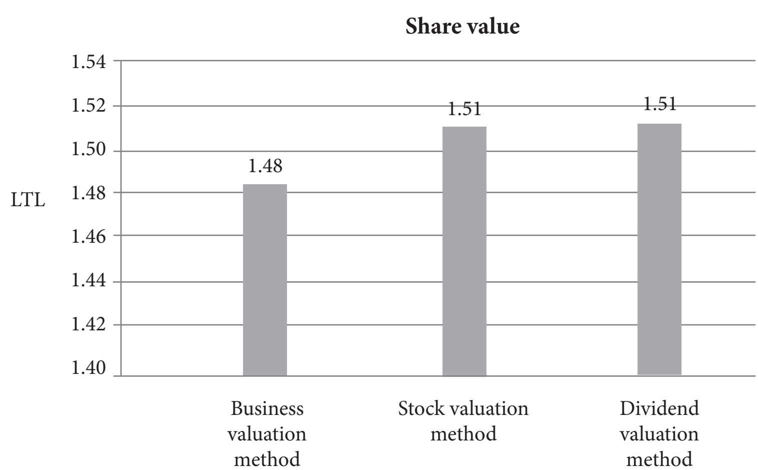

Fig. 3. TEO LT, AB share valuation results

Table 10. Sensitivity analysis of the dividend valuation method

		Long term stable growth norm					
		0.5%	***1.0%***	**1.5%**	**2.0%**	**2.5%**	**3.0%**
Cost of capital	**19.14%**	1.24 Lt	1.26 Lt	1.28 Lt	1.30 Lt	1.32 Lt	1.34 Lt
	18.14%	1.32 Lt	1.34 Lt	1.36 Lt	1.38 Lt	1.40 Lt	1.43 Lt
	17.14%	1.40 Lt	1.42 Lt	1.44 Lt	1.47 Lt	1.50 Lt	1.53 Lt
	16.14%	1.49 Lt	***1.51 Lt***	1.54 Lt	1.57 Lt	1.61 Lt	1.65 Lt
	15.14%	1.59 Lt	1.62 Lt	1.66 Lt	1.69 Lt	1.73 Lt	1.78 Lt
	14.14%	1.70 Lt	1. 74 Lt	1.79 Lt	1.83 Lt	1.88 Lt	1.94 Lt
	13.14%	1.84 Lt	1.89 Lt	1.94 Lt	2.00 Lt	2.06 Lt	2.13 Lt

If these main factors are not considered, company shares can be over-valued. Using a unjustifiably low discount norm and high long term growth rate leads to share value inflation.

5. Conclusions and discussions

Share capital risk premiums in the models varies quite significantly, and selecting the appropriate indicator depends on the point of the valuation, the period of analysis, and on which period the forecast is made for.

Share capital costs were valued using four models. The greatest returns on cost of equity were generated by the arbitrary pricing model. This particular model was used to analyze TEO LT, AB share dependency on economic indicators, such as change in industrial production, short term inflation, real short term interest rates, and long term inflation. The regression results of the arbitrary pricing model presented in Table 7 which shows that the dependency of TEO LT, AB share fluctuation is very small and can be explained by economic variables. The determination coefficient (R square) in this case is equal to 0.16, meaning only 16% of TEO LT, AB share fluctuation can be explained by economic variables. This leads to the conclusion that for cost of capital valuation for TEO LT, AB, the arbitrary pricing model is not appropriate, and that cost of equity may be over-valued.

The smallest cost of equity value was generated by the country risk premium valuation model. Country risk premium based on the risk premium of Lithuanian government bonds was valued using the risk premium conversion indicators devised by Damodaran, which are difficult to test. It should be noted that the country risk premium model did not value share market returns directly but analyze only the standard deviation of share market returns. Thus, the conclusion may be made that these models avoided over-valuing the risk premium due to the atypical share market returns in financial markets (from 2000 to 2007, the average monthly OMX Vilnius returns were 28.5%). However, the correction that occurred in 2008, the greatest in the market‘s history, returned market yield back within acceptable boundaries for analysis, which during this year reaches on average 18.1%. Thus, the results should be looked at more closely when analyzing the actual returns on cost of equity for TEO LT, AB.

As opposed to the arbitrary pricing model, with the Fama-French model regression explains a much greater change in the portion of TEO LT, AB shares. Regression results are presented in Table 5. Analyzing the results, it can be seen that the determination coefficient is equal to 0.97, or a fluctuation in 97% of TEO LT shares can be explained by fluctuations in returns of companies analyzed by its capitalization and share yield over time.

The cost of capital indicated using the capital asset pricing model (CAPM) differed 0.12% from the results gained using the Fama-French model. In order to substantiate the correctness of the results, they should be compared to the return on equity (ROE) generated by TEO LT, AB.

Return on equity for TEO LT, AB in 2007 reached 15.3% and 15.7% in 2008 (based on the company‘s financial report, consolidated annual report and an independent auditor‘s conclusions for the year ending December 31, 2008). These results were confirmed by the results of the capital asset pricing model and the Fama-French pricing model.

Having analyzed the results, it can be concluded that after the correction in the NASDAQ OMX Vilnius exchange there was a normalization of monthly share returns, and subsequently, the capital asset pricing model and the Fama-French model became the most appropriate models to use for cost of capital valuation. Thus, it is recommended that at present, these two models are applied in cost of capital valuation in Lithuania.

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KAPITALO SANAUDŲ ĮTAKOS AKCIJŲ VERTEI ANALIZĖ

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Santrauka

Vienas svarbiausių įmonės verslo vertinimo uždavinių – tinkamas rizikos ir investuoto kapitalo grąžos įvertinimas. Straipsnyje pateikiama keturių dažniausiai praktikoje taikomų kapitalo sąnaudų vertinimo modelių teorinė ir praktinė analizė. Remiantis gautais rezultatais išskiriami du tinkamiausi modeliai kapitalo sąnaudoms vertinti Lietuvos sąlygomis. Atlikta kapitalo sąnaudų įtakos akcijų vertei analizė parodė faktinę vertinimo metodo įtaką prognozuojamai akcijų vertei. Remdamiesi tyrimo rezultatais autoriai siūlo šiuo metu akcijų vertinimo procese taikyti kapitalo aktyvų vertinimo modelį bei Fama ir French modelį.

Reikšminiai žodžiai: verslo vertinimas, verslo vertė, vidutinės svertinės kapitalo sąnaudos, kapitalo sąnaudų vertinimo modelis, kapitalo sąnaudos, verslo vertę veikiantys veiksniai, jautrumo analizė.

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