

CORPORATE LIFE CYCLE IDENTIFICATION: A MODEL BASED ON RELATIONSHIP BETWEEN RETURN ON EQUITY AND COST OF EQUITY

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Abstract: *The theory of shareholder value maximisation implies that the ultimate aim of each entrepreneur is to increase the market value of the company, i.e. to maximise the wealth of shareholders. This concept assumes that the returns to shareholders should outperform the cost of capital. The higher the spread is, the better the position of shareholders. The capital assets pricing model has been very often used for calculation the cost of equity as implicit costs, where the risk-free rate, the expected return of the market and the premium to operational and financial risks in the form of beta coefficient is considered. Moreover, the return on equity is significantly dependent on the corporate life cycle. The purpose of this paper is to develop an innovative model identifying stages of the corporate life cycle while using two variables: the rate of economic profit and the share of operational and financial risk within the total entrepreneurial risk. The model is verified by using data of a selected company. Identifying stages of the corporate life cycle should simplify the risk management and subsequently raise the capital access.*

Keywords: *cost of equity, financial risks, operational risks, rate of economic profit, return on equity.*

JEL Classification: *D24, G32.*

Introduction

The theory of shareholder value maximisation implies that the ultimate aim of each entrepreneur is to increase the market value of the company, i.e. to maximise the wealth of shareholders. Therefore, generating just an accounting profit is insufficient. Reaching a higher profitability compared to alternative investments projects is expressed by the concept of the economic profit considering opportunity costs. This theory of business income was developed by Edwards and Bell, as reported by Mohiuddin (2014). The concept of economic value added (EVA) developed in the company Stern & Stewart is just one example of measurements based on the idea of the economic profit (Stewart, 2013).

Companies differ in many aspects; thus, any comparison of economic success has to be based rather on relative than absolute metrics. The spread between return on equity and cost of equity might be an example. The risk of a company is incorporated in cost of equity (e.g. the parameter beta used in the capital asset pricing model – CAPM). In sum, the entrepreneurial success should be measured not just by its profitability, but also by the relationship between the profitability and the risk. Moreover, the entrepreneurial success is linked to the corporate life cycle; the identification of the particular stage is another issue, which has been investigated in the academic financial literature.

The purpose of this paper is to develop an innovative model identifying stages of the corporate life cycle while using two variables: the rate of economic profit and the

share of operational and financial risk within the total entrepreneurial risk. This model is intended to be used by financial managers while optimising the risk management and subsequently raising the capital access. The rest of this paper proceeds as follows. First we review the literature on economic profit and corporate life cycle identification. Section 2 provides an overview of the data used and methodological approach. Section 3 presents detailed findings and the last sections discuss and summarise main conclusions.

1 Statement of a problem

Mankiw (2015) defines the economic profit as total revenues minus total cost, including both explicit and implicit costs. Because enterprises differ significantly in size and other aspects, it is a necessity to develop indicators enabling to compare economic profit based on relative metrics. Thus, the relative economic profit is the spread between return on equity and cost of equity, as mentioned by Neumaierová and Neumaier (2005).

The return on equity is a ratio between the accounting profit and the value of equity. There are two basic concepts of the accounting profit (Belkaoui, 2004). According to the transactional approach the total profit is the difference between available cash resources at the moment of ending entrepreneurial activity and available cash resources at the beginning of the investment. Another concept is derived from the idea, that the accounting profit is an effect of changes in assets and liabilities.

The cost of equity can be defined as implicit cost and it is equal to the profitability of an alternative investment, according e.g. to Hořejší *et al.* (2010). If the effectiveness of financial management in a company should be assessed, then the cost of capital will be one of the main parameters as reported by Michalak (2016). The theory of corporate finance developed many concepts how to estimate the cost of equity. The essential approach is the Gordon growth model, mentioned by e.g. Lee *et al.* (2008), which supposes that dividends are paid to shareholders. Therefore, this model is very often unsuitable, because the cost of equity is perceived as explicit cost, which is contrary to the economic profit approach. The cost of equity can be also defined as a surcharge on cost of debt, because shareholders usually bear a higher level of risk than creditors, as recorded by Brigham and Ehrhardt (2008). However, this fact might not be valid during the stages of introduction and decline, as mentioned by Reiners (2004). The most frequently cited model for calculating the cost of equity is the capital asset pricing model (CAPM). This model uses the following formula describing the relationship between risk and expected return (Damodaran, 2006):

$$r_e = r_f + \beta * (r_m - r_f)$$

Explanatory notes:

r_e = cost of equity

r_f = risk-free rate

β = beta coefficient

r_m = expected market return on equity

The CAPM model requires three inputs to compute expected returns – a risk free rate, a beta for an asset and an expected risk premium for the market portfolio. The

beta for an asset can be estimated by regressing the returns on any asset against returns on an index representing the market portfolio, over a reasonable time period. In practice, we face many problems while beta estimating. E. g., there are no indices that measure the market portfolio (Damodaran, 2006). Despite interconnections among economies and capital markets are increasing, as reported by Balcerzak & Pietrzak (2016), Zinecker *et al.* (2016), Fałdziński *et al.* (2016), Pohulak-Żołędowska (2016), and Pietrzak *et al.* (2017), in many emerging markets the indices used tend to be even narrower and include only a few dozen large companies (Damodaran, 2006).

The arbitrage pricing theory, Fama-French three factor model and the Black-Scholes model represent another approaches how to calculate the cost of equity (Brigham and Ehrhardt, 2008; 10. Kislingerová, 2001; Mohiuddin, 2014).

There are several models of the corporate life cycle. As mentioned e. g. by Shirokova (2009), each model uses different number of stages as well as different variables for identifying them. The main issue, which complicates the identification of the stage of the corporate cycle, consists in the fact, that some variables are qualitative, and thus difficult to measure. Some models are based on using just quantitative variables. E. g. Slavičková and Myšková (2016) developed an approach based on a set of criteria for accurate life cycle stage determination, which are quantitative, detectable and suitable for multi criteria evaluation. The model by Dickinson (2011) identifies the phases according to the combination of positive or negative values of cash flow from the operational, investing and financial activity. This model, however, does not respect the fact that cash flows from investing and financial activities can reach zero value. Reiners (2004) suggests using a growth indicator, which consists in average year-on-year change of assets, sales and cash flows. Intervals of values for the identification of individual phases of the corporate life cycle are set. The limitation of this model is the impossibility to identify the phase of introduction. In the model developed by Konečný and Zinecker (2015) the Boston Matrix is applied. In this model the phases of the corporate life cycle are identified according to relative sales growth, where the corporate sales growth is compared to market sales growth, and relative market share, where the market share of the company is compared to share of disposable assets of the company. The Boston Matrix, however, was developed for determination the product life cycle. Therefore, the expectation has to be met that the corporate life cycle is identical to the life cycle of all corporate products in this model.

The profitability measured by return on equity as well as the risk measured by the cost of equity is significantly affected by the corporate life cycle. Kislingerová *et al.* (2010) report that the maximal operational profit is reached during the phase of stabilisation. This might not mean that the return on equity is the highest one just in this phase. The reason consists in the fact that not just the profit, but also the amount of equity can increase during stabilisation.

According to Reiners (2004) the cost of equity has roughly a decreasing trend during the whole corporate life cycle. During the stabilisation, the cost of equity can be slightly higher than during the next phase of decline, when the owners have lost almost all their capital and so they bear just a low risk. This finding is, however, valid only for limited liability companies and joint stock companies. On the contrary, Hasan *et al.* (2015), who identified the life cycle according to model by Dickinson (2011), proved the U-shape of the cost of equity, during the corporate life cycle. The trend of cost of

equity is, according to these authors, similarly the same as the trend of cost of debt and weighted average cost of capital, as mentioned by Reiners (2004).

There are many approaches to the categorisation of entrepreneurial risks influencing the cost of equity. E.g. Myšková and Doupalová (2015) focused on identifying risks that could significantly affect the performance of small enterprises and developed an approach to risk management in a particular company. In this paper we distinguish between the operational (or business) and financial risk as defined by Tiwari and Verma (2011). The operational risk is reflected in the volatility of the expected operating profitability of the company. The level of operational risk is caused by three kinds of factors, namely by macroeconomic factors (e. g. fluctuations in the foreign exchanges, inflation, imports or restrictive regulations), industrial factors (e. g. perspective in the market, sector sensitivity to the economic cycle or rivalry of competitors on the market) and company-specific factors (e. g. human resource management, liquidity, intellectual property management or organizational culture). Financial risk refers, according to these authors, to the variability of the residual income to the equity due to debt. Thus the financial risk depends on the rate of indebtedness.

The level of operational risk can be measured as operating leverage. Miculeac *et al.* (2014) define the operating leverage as the ratio of change in profit to change in sales. Therefore, the operational risk increases with growing operating leverage. The level of financial risk has been estimated by financial leverage - the ratio between debt and equity as reported by Damodaran (2006). Analogously to the operational risk, a higher financial leverage signalizes a higher rate of financial risk.

Li *et al.* (2015) investigated the relations between the business and financial risk. According to the authors, firms with high rate of indebtedness tend to have a higher volatility of future earnings or cash flows. The authors implemented their research on a sample of companies which differ in size, age as well as credit rating for corporate bonds.

Furthermore, Bender and Ward (2009) investigated the relationship between the corporate life cycle and the operational and financial risk. The operational risk decreases steadily, whilst the financial risk has an increasing trend depending on the corporate life cycle. During the phase of stabilisation, both kinds of risk are on the middle level. In sum, the low financial risk in the phase of introduction signalizes the fact, that the companies in this phase cover their activities mostly by using equity. Alternatively, the venture capital can be used in the case of start-ups and companies in the stage of expansion after a crisis as mentioned by Silvola (2008).

However, in a research implemented in Italy by Rocca *et al.* (2011) other findings have been reported. The most important source of financing in the phase of introduction is debt, even though the interest rate is high because of a high risk. The reason is that Italy as well as continental Europe in general is a bank based country where the market with private equity and initial public offerings is rather underdeveloped although the primary capital markets were growing significantly in recent years (Meluzín and Zinecker, 2016) as well as their interrelationships as reported e. g. by Pietrzak *et al.* (2017). During the phases of growth and stabilisation, the companies finance their activities by using internal sources such as profit, financial

reserves and depreciation. External equity has not been used. The lack of start-up equity causes a lower amount of innovative projects and slows down the switch from the phase of introduction to the phase of growth, which is emphasized by Hirsch and Walz (2011).

Faff *et al.* (2016), who also used the model by Dickinson (2011) for identification the corporate life cycle, report, that amount of investments and equity issuance decrease during the corporate life cycle. Simultaneously, debt issuances increase in the phases of introduction and growth and decrease during stabilisation and decline. Moreover, Pashley and Philippatos (1990) mention that companies in the stages of stabilisation and decline keep a higher rate of liquidity as a ratio between current assets and short-term payables.

The secondary research summarised in this theoretical framework proved that profitability as well as cost of equity significantly depend on the corporate life cycle. However, to our knowledge, the previous literature has not developed a model identifying stages of the corporate life cycle using the spread between return on equity and cost of equity, which represents a quantifiable input. We believe that our model helps to fill this gap.

The model is a tool supporting managers in optimising the risk structure and subsequently the rate of economic profit as well as in raising the capital access. We also expect that our findings will be beneficial for a wide range of investors while decision making.

2 Methods

The research approach was developed after an extensive review of profitability, risk structure and corporate life cycle-oriented academic literature. The construction of the innovative model intended to identify individual stages of the corporate life cycle is based on estimating economic profit rates and shares of operational and financial risk that are typical for individual stages.

The rate of economic profit is calculated analogously to model INFA as a difference between return on equity and cost of equity (Neumaierová and Neumaier, 2005). The return on equity is a ratio of earnings after taxes (EAT) to equity. The cost of equity is calculated using the capital asset pricing model (CAPM). The share of operational and financial risk is determined using the unlevered and levered beta, which are variables of capital asset pricing model.

The initial model for calculating cost of equity is modified to distinguish the premium for operational and financial risk. This approach enables us to determine the share of operational and financial risk within the total entrepreneurial risk. Finally, the various combinations of the rate of economic profit and shares of operational and financial risk will be linked to the findings on characteristics of the corporate life cycle to determine its individual stages.

Tab. 1 shows a set of variables having sufficient support in the relevant academic literature applied in our model. The model works with seven variables representing measurements of profitability, beta coefficients, cost of equity and risk. We modified the formula of unlevered beta calculation; the cash flow is divided by total assets, not

by equity as recorded in our previous study (Konečný and Zinecker, 2015). This modification eliminates the impact of different sources of corporate financing.

Tab. 1: Variables used for identification of the corporate life cycle

Variable	Calculation
Return on equity (ROE _{accounting})	$\frac{EAT}{E}$
Unlevered beta ($\beta_{unlevered}$)	$\frac{\sum_{t=1}^n \left[\left(\left(\frac{CF}{A} \right)_{market}^t - \overline{\left(\frac{CF}{A} \right)_{market}} \right) * \left(\left(\frac{CF}{A} \right)_{company}^t - \overline{\left(\frac{CF}{A} \right)_{company}} \right) \right]}{n} \cdot \frac{1}{\frac{\sum_{t=1}^n \left[\left(\frac{CF}{A} \right)_{market}^t - \overline{\left(\frac{CF}{A} \right)_{market}} \right]^2}{n}}$
Levered beta ($\beta_{levered}$)	$\beta_{unlevered} * \left(1 + (1-t) * \left(\frac{D}{E} \right) \right)$
Share of operational risk	$\frac{\beta_{unlevered}}{\beta_{levered}}$
Share of financial risk	$1 - \frac{\beta_{unlevered}}{\beta_{levered}}$
Cost of equity (r_e)	$r_f + \beta_{levered} * (r_m - r_f)$
Rate of economic profit (ROE _{economic})	$ROE_{accounting} - r_e$

Source: (Damodaran, 2006; Konečný and Zinecker, 2015; Reiners, 2004; own processing)

Explanatory notes:

EAT = earnings after taxes

E = equity

CF = cash flow related to the company/market

A = total assets related to the company/market

t = effective tax rate

D = debt

r_m = expected market return on equity

n = number of surveyed periods

The model is verified in a case study. The corporate and market specific data were retrieved from www.justice.cz and www.mpo.cz, respectively. Recommendations related to managing risks are reported.

3 Problem solving

The model identifies the corporate life cycle while using two variables: the rate of economic profit and the share of operational and financial risk within the total entrepreneurial risk. The construction of this model is based on the idea that the

profitability, risk and thus the rate of economic profit as well as the share of risks differs significantly during the whole corporate life cycle.

As mentioned in the theoretical part, the rates of economic profit as well as the risk structure depend on the corporate life cycle. The secondary research proved that the cost of equity has roughly the U-shape across the corporate life cycle, whilst the return on equity is negative during foundation, positive during stabilisation and finally it decreases up to negative values in the stage of decline. From these findings there can be derived that the economic profit is reached during growth or stabilisation, whilst the stages of foundation and decline are connected with economic losses. Furthermore, the operational risk increases across the whole corporate life cycle, whilst the financial risk decreases steadily. These four individual stages of the corporate life cycle can be identified according to the characteristics shown in Tab. 2.

Tab. 2: Corporate life cycle identification based on economic profit and risk structure

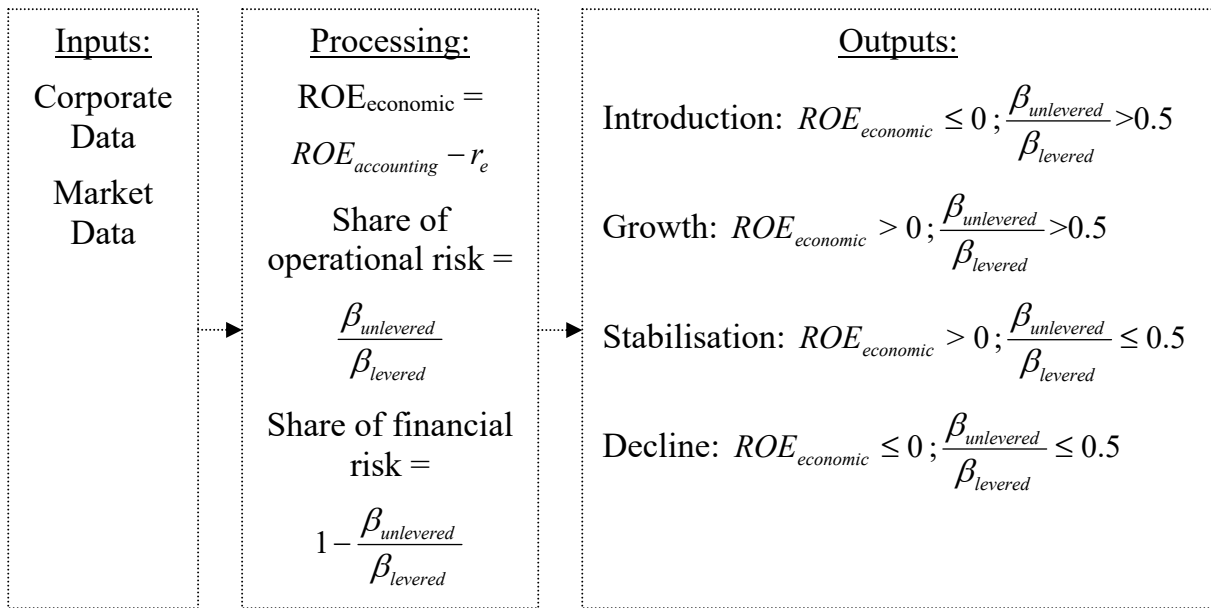
Phase	Rate of economic profit	Share of operational risk	Share of financial risk
Introduction or Re-Introduction	Negative	More than 50 %	Less than 50 %
Growth	Positive	More than 50 %	Less than 50 %
Stabilisation	Positive	Equal to 50 % or less than 50 %	Equal to 50 or more than 50 %
Decline	Negative	Less than 50 %	More than 50 %

Source: (Bender and Ward, 2009; Kislingerová et al., 2010; Reiners, 2004; own processing)

Fig. 1 shows our model proposal. The model works with corporate and market accounting data on assets, cash flow, equity, debt, earnings before taxes and earnings after taxes. The data processing has been performed by calculating the rate of economic profit and shares of operational and financial risk to determine the particular stage of the corporate life cycle.

Furthermore, the model enables financial managers identifying causes of a negative or positive rate of economic profit. If the main cause is a low or even negative return on equity, the most appropriate response should be focused on strengthening strategies in the areas of marketing, cost management and financing. If a high level of cost of equity signaling a high entrepreneurial risk is identified, then there is more suitable to pay attention to reducing either operational or financial risk. The unlevered beta linked to the operational risk should be lower than +1; this means, that the corporate risk of relative cash flow volatility should be lower than the equivalent market risk. The levered beta linked to both operational and financial risk, can be also lower than +1. However, if the effective interest rate on bank loans and corporate bonds is lower than the return on assets (ROA), then using debt raises the return on equity. This effect is usually termed as financial leverage and in such a case using more debt is reasonable. If the low or negative rate of economic profit is affected by the risk, the managers should be focused on reducing either the relative cash flow volatility or the rate of indebtedness.

Fig. 1: Corporate Life Cycle Identification: The Model



Source: own research

Based on the model, there are two essential conditions to reach or raise the rate of economic profit:

$$ROE_{accounting} > r_m$$

$$\beta_{unlevered} < 1$$

3.1 Case study

The case study method was used to systematically verify the model of corporate life cycle identification. We selected a company from the sector of fertilizers and nitrogen compounds manufacturing. It is a joint-stock company with the amount of assets of CZK 300 M, sales CZK 500 M and 75 employees. Tab. 3 reports calculation results of individual variables linked to the risk structure and rate of economic profit. The unlevered beta considers cash flow volatility through the whole investigated period. Its value is fixed. The remaining variables are changing.

The company reached a positive accounting return on equity in all surveyed periods. However, a decreasing trend is obvious. Except to 2008, the levered beta is less than +1, thus investing in this company is less risky compared to the whole market. Furthermore, the levered beta tends to decline. Within the structure of entrepreneurial risks, the operational risk is dominant in all periods (its shares increase continuously). The cost of equity was relatively lower than return on equity, but there is recorded an increasing trend in cost of equity; in 2015 the cost of equity is even higher than return on equity. In the last period, a negative rate of economic profit compared to previous periods is recorded. Our interpretation of the research results is that the surveyed company switched from the stage of growth (between 2008 and 2014) into the stage of re-introduction (in 2015), i.e. company switched into a next corporate life cycle. This switch is caused by the decline of the economic profit to negative values combined with the dominant share of operational risk.

Tab. 3: Model Application

Quantity	Developments in individual years							
	2008	2009	2010	2011	2012	2013	2014	2015
ROE _{accounting} (in %)	35.7	24.9	23.0	22.5	24.9	21.3	13.6	12.2
$\beta_{\text{unlevered}}$	0.619	0.619	0.619	0.619	0.619	0.619	0.619	0.619
β_{levered}	1.024	0.985	0.861	0.831	0.779	0.768	0.724	0.711
Share of operational risk (in %)	60	60	70	70	80	80	90	90
Share of financial risk (in %)	40	40	30	30	20	20	10	10
r_e (in %)	4.5	-1.2	8.7	10.9	9.4	3.9	11.7	15.7
ROE _{economic} (in %)	31.3	26.1	14.3	11.7	15.6	17.4	1.9	-3.5
Stage of the corporate life cycle	Gr.	Gr.	Gr.	Gr.	Gr.	Gr.	Gr.	Intr.

Source: own research

Explanatory notes:

Gr. = phase of growth

Intr. = phase of introduction or re-introduction

The risk considered in the levered beta was reduced and simultaneously the share of operational risk as a proportion of unlevered and levered beta increased. The effect of this development on the accounting return on equity was negative. Furthermore, the cost of equity increased because of a higher risk-free rate or market return on equity and this caused a decreasing trend in the rate of the economic profit reached by the surveyed company. The financial managers should focus on the strategy of financing - using a higher proportion of debt since the first period, even though the levered beta and thus the risk will be higher. There is evidence that a higher risk brings a higher profitability and vice versa.

4 Discussion and conclusions

The model proposed in this study is intended to be a tool supporting managers in identifying stages of the corporate life cycle, optimizing the risk structure and maximizing the rate of economic profit. It is based on recent research, in particular on models developed by Reiners (2004), Kislingerová (2010), Bender and Ward (2009), Damodaran (2006) and Slavíčková and Myšková (2016). The relation between cost of equity and the corporate life cycle was investigated by Reiners (2004). Analogously, Kislingerová (2010) paid attention to profitability during the corporate life cycle. Bender and Ward (2009) were focused on operational and financial risk in individual stages of the corporate life cycle. Damodaran (2006) calculated the unlevered and levered beta to determine the cost of equity. However, to our knowledge, the previous literature has not developed a model identifying stages of the corporate life cycle using the spread between return on equity and cost of equity as well as the share of operational and financial risk. Our contribution consists in developing an innovative model connecting recent knowledge on return on equity, cost of equity and risk structure during the corporate life cycle. Simultaneously, our model works with unlevered and levered betas to calculate the cost of equity as well as to distinguish premiums to operational and financial risk.

The model shows that some companies can reach a higher rate of economic profit in connection with a dominant share of operational risk; otherwise there are companies maximizing the rate of economic profit while the financial risk is dominant within the risk structure. Therefore, it is impossible to determine, which stage of the corporate life cycle is the most favourable from the shareholder value maximisation perspective. The general conclusion is that a positive rate of economic profit is typical either for the stage of growth, or for the stage of stabilisation.

Our outcomes provide valuable implications for companies and investors while formulating innovative financial strategies and incentives how to increase the attractiveness of firms in different stages of their life cycle. There are, however, also some limitations of the proposed model. Firstly, within the stage of introduction companies might finance their entrepreneurial activities by using bank loans or other kinds of debt if a difficult access to external equity such as venture capital or private equity exists (Rocca *et al.*, 2011). In such a case the dominant share of financial risk does not signalize the stages of stabilisation or decline. Next limitation consists in the fact that the calculation of unlevered beta requires historical data series. This means that the operational risk can be measured only within a fixed time interval, whilst the financial risk reflected in levered beta is changing in every moment. Some problems can also occur while matching the company with the correct industry, because activities of many enterprises can vary significantly. Furthermore, the life cycle determination should also reflect qualitative data as reported by Slavíčková and Myšková (2016). Therefore, in an upcoming research, we intend to focus on the issue how to incorporate qualitative data such as automatisisation and digitisation into the model, i.e. how to reflect the impact of these developments on the rate of economic profit and its partial components such as the accounting profit, cost of equity and shares of the operational and financial risk.

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