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Value-Based Corporate Risk Management

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Abstract: Managing risks does not necessarily mean reducing risks but weighing up these risks against the profits and considering the impacts on the equity capital needed to cover the risk (and on the cost of capital). Risk analysis and risk aggregation are necessary tasks of a value-based management as they help to assess the well-funded goodwill of a company. An important widening can be made in taking into account the systematic as well as the idiosyncratic risks. In doing so, the management can quantify the effects of a risk reduction (e.g. by transferring it) on the value of a company. Alternatively to the Capital-Asset-Pricing-Model the capital costs in imperfect markets can be determined in dependence to the own capital funds needed, which is analyzed by the aggregation of all risks in the context of planning.

1. Introduction

Future means uncertainty. Every entrepreneurial activity – and in particular every long-term strategic decision – involves risks. Anyone who wishes to assert himself in the market on a long-term basis has to master one vital challenge: coping with risks in a dynamic environment through proactive planning and focussing on his targets. Since the introduction of the Act for Control and Transparency in the Corporate Sector (KonTraG) in Germany in 1998, the boards of public limited companies (Aktiengesellschaft) have been obliged by law to set up a risk management system *"which identifies at an early stage any developments which threaten the continuation of the compan*y".

A further increase in the importance of risk management is caused by the fact that in the future, because of the Basle II agreement of banks, the provision of credit lines and credit conditions depends on a corporate rating. This rating is de-

cisively determined by the risk perceived by the financing credit institute for its own credit involvement. Therefore, it depends on the potential for success, the risk position of the company, and the functional capability and credibility of existing corporate management systems such as controlling, risk management system, and the handling of the Balanced Scorecard. But risk management offers far more opportunities than transparency of the risk situation: systematic management of all significant risks paves the way to value-based corporate management.

Apart from these challenges of practice, risk management stands also from a scientific perspective before new challenges, which are touched on in this technical paper. According to the well-known approach of Modigliani and Miller (1958) there is no necessity for Risk management, because this - similarly as for changes of the debt ratio - does not have effects on the enterprise value. Both in the Capital Asset Pricing model (see Sharpe, 1964, Lintner, 1965, Mossin, 1966) and in the Arbitrage Pricing Theory (see Ross, 1976) the expected net yields (capital-cost-rates) are only described in dependence of systematic risks, what from diversification and arbitrage considerations can be derived. Only including market imperfections, like information asymmetries or bankruptcy costs, the added value of a corporate risk management can be proved. The meaning of such a corporate risk management is supported in particular by the following lines of argumentation:

1. costs of transaction (see i.a. Fite D, Pfleiderer P, 1995)
2. costs of financial distress (see i.a. Warner J, 1977, Levi M, Serçu P 1991)
3. Agency Costs (see. i.a. Schnabel J, Roumi E 1989, Fite D, Pfleiderer P 1995)
4. equilibrium of investment demand and liquidity offer (see Froot K, Scharfstein D, Stein J 1994)

The explanation approaches and publications indicated supply sound reasons for the relevance and the potential value contribution of risk management. However they offer no comprehensive, closed approach, with whose assistance the gap between individual risks and risk mastering procedures on the one hand and the capital cost rates and the enterprise value on the other hand can be closed. Such a closed solution represent the risk-oriented approaches for the determination of the capital costs, which is predicated on a simulation-based analysis of the business planning and the risks connected with the planning and represented in the following.

First still some introducing explanations follow to the developments of the capital market theory. The development of a new theoretical foundation for the risk management in the last two decades is driven thereby from very different currents.

1. Advancement on basis of the acceptance of efficient markets:

Into this group belong first the real option models, which show a positive effect of the risk on the market value of own capital funds (at expense of the outside capital givers) (see i.a. Culp 2002). Also advancements of the CAPM like the M CAPM, which is based also on option-theoretical bases and use a Black Scholes option price rating (see Sharpe 1977, Black/Scholes 1973), are to be mentioned here. It is common to both advancements that apart from the systematic risks also unsystematic risks are estimated here as evaluation relevant. This applies also to the Rating, standing with the risk management in a close rela-

tionship, as you recognize e.g. by the Merton approach (1974), which likewise the total risk extent (asset volatility) considered. In the science research results were strongly considered, according to which the expected net yield is to be explained in dependence of other risk metrics than the beta factor. Here the much considered work of Fama and French (1992) must be pointed out, according to those the expected net yield is dependent from the business size and the ratio of book value and market price.

2. Explanation approaches under the hypothesis of inefficient markets:

A justification for risk management results in particular, if from inefficient markets can be proceeded (see above). Special publicity won the Behavioral Finance theory, which offers the reasons for deviations of the share prices from its fundamental values (see e.g. Shefrin 2000, Shleifer 2000 as well as Barberis et al. 1989). Contrary to the Behavioral Finance which is based on the methodological individualism stands the so-called "New Finance" (Haugen 2000 and 2004). Also these New Finance proceeds from inefficient capital markets and looks for indicators, with whose assistance future yields on shares can be prognosticated. One micro-economically or psychological founding is however rejected. The Uniqueness of the individuals as well as the dynamics of the interactions is indicated as reasons for this procedure (see e.g. Haugen 2004, p. 123). Inefficiencies of the market open in principle perspectives for a worth-increasing risk management of the enterprises, because all risk-reducing activities of an enterprise cannot be copied by their shareholder. Besides the hypothesis is given up here, according to which the management can learn something by an analysis of capital market information (as during the derivative of the beta factor) over the risk profile of the self-enterprise. Empirical investigations, which show systematic errors with analyst forecasts, are an additional indication for the necessity of the internal recruitment of the relevant information especially with risks (see La Porta 1996).

3. Approaches on basis of enterprise-internal risk information:

Both under (1.) and (2.) mentioned approaches derive the expected net yields from capital market information, which is interpreted however only partial (as with Fama and French) as factors of risk. These expected net yields form the basis for the calculation of capital cost rates, which affect then for example again investment decisions. A direct effect of activities of the risk management for capital-cost-rates and enterprise value is not recognizable in both cases, because there no reference to original enterprise risks. The third approach for the justification of the value contribution of the risk management, which is more precise described in this technical paper, aims at the direct derivative of capital cost rates from enterprise-internal information about the risks. The total risk extent relevant in inefficient markets for the enterprise value is determined by help of aggregation of risks in the context of the business planning (see Gleißner 2002). Capital market information is not needed for the determination of the risk extent (e.g. in the sense of a beta factor), but only for the regulation of risk premiums for certain risks or factors of risk. (see chapter 3)

In the following section 2 first tasks and elements of the risk management are described. The following third section describes deepening the methods of the accomplishment of these tasks, particularly the derivative of the capital costs.

2. Tasks and Elements of Corporate Risk Management – Overview

A systematic to a risk management concept should include the following elements:

- Identification and evaluation of risks (risk analysis)
- Risk aggregation and calculation of costs of capital
- Coping with risks
- Organizational design of risk management systems and monitoring.

With these elements risk management can offer a methodical addition for value based to management and strategic management.

2.1 From Risk Management to Value-Based Management and Strategic Management

Future includes threats and opportunities. Besides the prompt identification of hazards, innovative risk management also considers the perspectives of a company. This promising approach examines exposures and opportunities coevally, weighs them up against each other, and pushes the long-term success – the value – of a company.

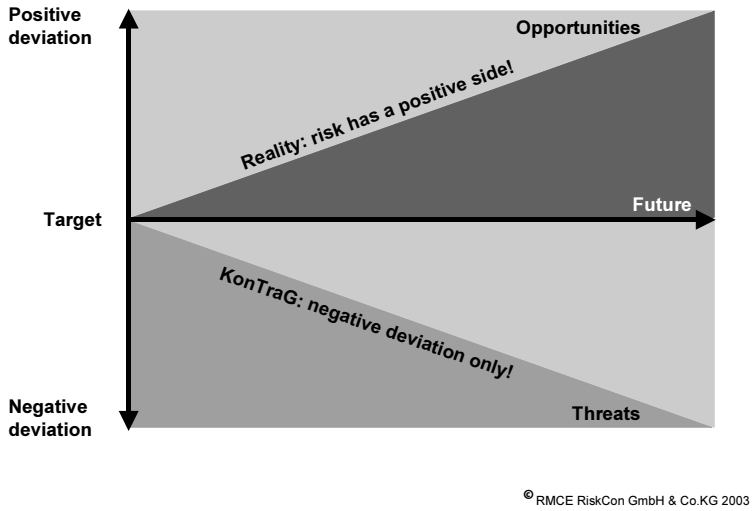

Fig. 1. Future means uncertainty

For this reason, we define the term “risk” as *"the possibility arising from the unpredictability of the future of deviating from a planned target"*, which includes opportunities as well as threats. From a controlling perspective, risk management can thus also be interpreted as the proactive management of potential "deviations from plan". Thus, risk management becomes an instrument of safe-guarding the potential for success, for improving the quality of planning in the company and finally for creating added corporate value (Fig. 1.).

Since the value of a company – as an important touchstone of success – hinges both on expected future earnings and on the risks involved in this (or the capital costs resulting from this), total and integrated risk management is an essential component of future-oriented management. Corporate management in such an integrated manner requires a critical examination of strategic and operative risks. Finally, risk should not hinder entrepreneurial innovation and growth but rather provide assistance for a realistic estimation of the potential for profit and should help to realize it. Understanding and adapting risk management in such a way will:

- Reduce the probability of crises,
- Improve the credit standing (the rating) and thus reduce the costs of capital
- Strengthen competitiveness, and finally increase the value of the company.

The integration of risks into corporate planning allows to visualize the imponderability of the future. If the overall risk position of the company appears to be too high the risks are optimized by a skilful and nimble mix of task handling. The corporate result can be planned more precisely and far-sightedly and unexpected deviations are kept within tolerable limits. While marketing management and cost

management deal with the improvement of expected profits or cash flow, risk management contributes towards governing the volatility of expected corporate results.

In order to safeguard and expand the potentials for success, companies have to take risks - e.g. in product development - in a focused manner. Shareholders precisely expect the corporate management to take those risks consciously, which contribute towards the expansion of competitive advantages and thus increase the corporate value. Strategic risk management examines risks regarding their significance for future prospects and their overall value for the company. Profitability of capital must be higher than the risk-dependent rate of the cost of capital so that growth increases the corporate value. Risk management creates this foundation for value-increasing growth (see chapter 3).

Such a strategic risk management must be able to answer the following questions:

1. What are the threats to the success factors of the company?
2. Which "core risks" will the company necessarily have to bear itself?
3. What is the risk-adjusted performance measure that serves as the basis for controlling the company?
4. Does the existing shareholder equity provide sufficient potential to cover risk?

2.2 Analyzing Risks

With the analysis of risks all individual risks affecting the company are systematically identified and then evaluated with regard to the probability of their occurrence and with regard to quantitative effects. In doing so, the following areas of risk should be considered:

- **Strategic risks** e.g. threats to competitive advantages or through new competitors
- **Market risks** e.g. fluctuations in turnover and in material costs due to economic cycle
- **Financial market risks** e.g. changes in interest rates and currencies
- **Legal and political risks** e.g. changes in legislation
- **Risks from corporate governance** e.g. unregulated management responsibilities cause fluctuations of personnel costs.
- **Performance risks,** e.g. loss of production because of damage to machinery.

2.3 Aggregating Risks: Definition of Total Risk Volume

The objective of risk aggregation is to determine the scope of the overall risk exposure of a company based on the risk analysis and the relative importance of individual risks (Fig. 3.). Since all risks are interlinked and effects on earnings and shareholders equity result from the combinations of single risks, such an aggrega-

tion of risks is crucial. The correlation of risks – which can be modeled by risk simulation procedures– have explicitly to be taken into account. In this approach, the effects of individual risks are integrated into planning models used in the company. This enables to allocate effects on single positions of the balance sheet and combining risk management aspects with "traditional" corporate planning.

The most suitable risk accumulation procedure is the simulation of risks (Monte Carlo simulation) (see Fig. 2.). A mathematical model is set up in which the effects of the individual risks are mapped to the corresponding items in a P&L statement or a balance sheet. These effects are described in terms of probability distributions. A business year is simulated several thousand times, using random figures, each time leading to a P&L statement or balance sheet (see Fig. 4. and Gleißner 2001).

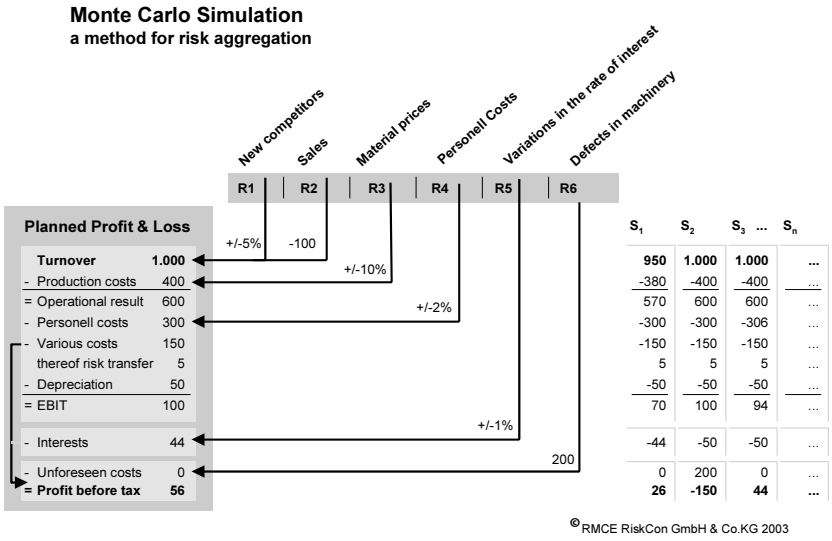

Fig. 2. Integration of risk into the business plan

Each simulation run produces a value for the profit or cash flow. The identified instances of the target variables lead to accumulated probability distributions which serve as the basis for the value at risk as a maximum loss. There is a probability of, for instance, 95 or 99 per cent that this figure will not be exceeded. For the quantification and description of individual risks as well as to the Monte Carlo simulation see Alexander (2001).

The aggregation results shows the "scatter bands" caused by risks of future profits and cash-flows, which in the final analysis contribute towards a well-founded evaluation of the reliability of the planning. In particular, the requirement for capital of each area of the company (“risk-adjusted capital”, RAC) necessary for the calculation of the costs of capital which is derived directly from its exposure can

be determined: capital (shareholders equity) in this sense is a "potential risk-cover“ and is thus required to cover at least the possible losses of the aggregated risk effects. Risk aggregation therefore creates the foundations for calculating the individual contribution of value for each area within a company and of each investment. This is necessary for a, value-based corporate management.

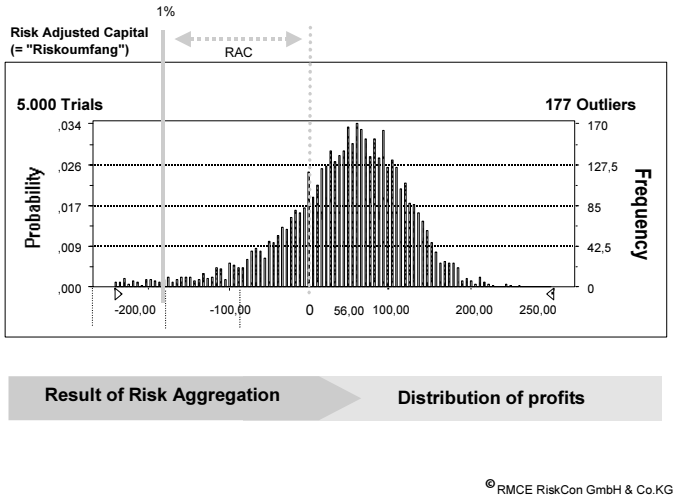

Fig. 3. Risk as a Distribution of Profits

2.4 Coping with Risks

The aggregation of individual risks provides the basis for determining the optimal risk position of the company. This does not automatically mean minimizing each risk as much as possible – because this would also reduce opportunities for profit. Coping with risks means to find a balanced mix of instruments for managing risks. The decisive criterion is: does the defined strategy for coping with the explicit risk actually increase the overall value of the company? It is easy to see that the yield is diminished by the costs for the instruments for coping with risk. However, even then a major benefit is the optimized risk position of the company with a lower equity requirement and consequently a lower rate of costs of capital.

2.5 Designing Risk Management Systems and Monitoring

Effective corporate risk management has to involve entire staff. It must be firmly anchored in all business processes, because due to the constantly changing envi-

ronment of a company also the risk situation of the company is constantly changing.

The risk management system has to ensure “through the organizational set-up” that risks are identified at an early stage and monitored on a regular basis. In addition, the reporting channels to top management have to be determined.

The elements of a "risk manual" summarizing the necessary organizational arrangements for the risk management system, are typically the following:

- Corporate risk policy and limit system
- Responsibilities within risk management
- The process of risk identification
- The process of risk evaluation and risk monitoring
- The reporting function

3. Risk, Cost of Capital and Shareholder Value

3.1 Introducing Considerations, the Shareholder Value

On the stock exchange, the entire expected future earnings of a company are expressed in its stock price or its goodwill. It seems sensible to use the shareholder value, which comprises the company’s entire future prospects, rather than its latest accounting profits, as a yardstick for assessing the company’s success and individual entrepreneurial activities. This approach, which is known as the Shareholder Value Concept[1], involves looking at a company from the viewpoint of an investor who is merely interested in increasing the value of his or her capital investment – the “enterprise” – similar to a shareholder expecting increasing stock prices.

The shareholder value of an enterprise, in particular, depends on two company-specific factors: expected earnings and risks. As capital investors are risk-averse, they are only prepared to give a higher rating to a high-risk enterprise than to a low-risk enterprise if the earnings are higher.

It is useful to base the valuation of an enterprise on its so-called “free cash flow”, the funds that can be distributed to equity suppliers and third-party lenders. It can be calculated as an operative corporate result (i.e. before the deduction of interest expenses), after any taxes that are payable by the company, plus adjustments for non-cash items (particularly depreciation), minus investments in tangible assets and working capital (accounts receivable from delivery and performance, and stock). This takes account of the fact that a certain portion of profits has to stay in the company for investment purposes, in order to ensure long-term earnings. The funds that are necessarily payable for this purpose are not available to the lenders.

[1] See Rappaport A 1986.

Mathematically, the shareholder value of a company is defined as the present value of all future free cash flow, less the value of debt. As the value of a company can be increased through the reduction of risks that affects the cost of capital (risk-adjusted rate of interest).

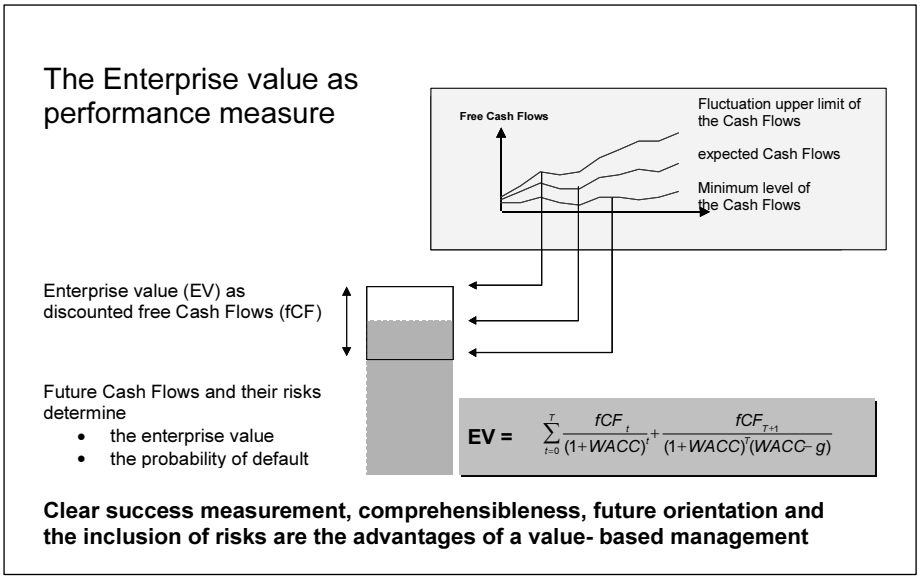

Fig. 4. Enterprise Value

3.2 Enterprise Value and Capital Costs in Efficient Markets

A business segment or an investment can only make a positive contribution to the goodwill of a company if its returns are greater than its risk-dependent cost of capital. The contribution of a corporate activity to the company's value can be stated as the "economic value added" (EVA), which depends on the difference between returns and cost of capital:

EVA = capital employed x (return on capital employed –cost of capital) (1)

An investment or a business segment (CE) is financed through either equity capital (EC) or loan capital (LC). It follows that cost of capital is the average value of cost of loan capital C_L (cost of debt) and the cost of equity C_E, where the tax rate T expresses the tax benefits of the loan capital. Instead of cost of capital we also talk about "weighted average cost of capital" (WACC):

$$WACC = \left((1-T)\ x\ LC\ x\ C_L + EC\ x\ C_E\right) : CE \quad (2)$$

The equity requirements of a business segment – and thus the cost of capital and the EVA – depend on the risk. If a company has several business segments with differing risks it is possible to determine the required equity capital (EC) (risk cover potential) of each business segment with the extent of the risk (RAC) and then derive its cost of capital and value contribution (EVA) (see also the risk accumulation method, chapter 2.3). One way of determining the cost of equity C_E is through Sharpe's Capital Asset Pricing Model (CAPM):

$$C_E = E_O + (E_m - E_O) \times \beta \quad (3)$$

β stands for the "systematic risk" – the effects of all non-company-specific influences on profitability (such as economic and interest developments). ß arises from the quotient of the covariance between net yield of a share and a market net yield for the variance of the market net yield. The variable E_O stands for risk-free interest rate, E_m is the average market interest for risk-prone capital investment, such as shares.

This practice is amplified below.

Here, only the systematic risk is regarded as relevant for the cost of capital, as it cannot be removed through diversification, i.e. the consolidation of different projects or investments in a portfolio. Bowman provides a theoretical basis for empirical research into the relationship between risk and financial (accounting) variables. He shows, that there is a theoretical relationship between systematic risk (Beta) and the firms leverage and accounting beta. He demonstrates also that systematic risk is not a function of earnings volatility, grow, size or dividend policy.

However, the existence of bankruptcy costs, agency costs, asymmetric distribution of information and the limited access of many companies to capital markets show that even idiosyncratic risks are relevant to a company's value[2]. And equity capital (EC) and loan capital (LC) are used at market values. But we do not have perfect efficient markets.[3]

3.3 Model Criticism

Obviously the risk-dependent capital-cost-rates (WACC) rely on the real extent of risk in a company and therefore on the planning security of the future yields respectively on the cash flows subordinated in the assessment of the company value.[4] A risk analysis should supply exactly this Information (respectively by the risk management). The often made detour to specify the capital-cost-rates by using primarily the information of the capital market (like beta factors) instead of internal enterprise data is hardly convincing. Among the various theoretical and em-

2 See Pritsch and Hommel 1997, p. 672-693 and Froot et al. 1994 p.91-102.

3 See Haugen 2002 and Shleifer 2000.

4 Apart from the systematic (cross firm) risks there are quite good reasons and empirical vouchers for the importance of the idiosyncratic (company individual) risks in imperfect markets, see Amit and Wernerfelt 1990, pp. 520-533.

pirical criticism of the Capital-Asset-Pricing-Model (CAPM)[5] and similar approaches for the derivation of capital-cost-rates an assumption stands out: The CAPM assumes efficient capital markets, which means above all, that all capital market participants can estimate the risk situation of the enterprise just as like as the management. This acceptance is surely hardly stable. Reliably, it is useful to presume the assumption that the enterprise can estimate its risk situation and the possible changes of the risk situation by planned activities better than the capital market (information asymmetry)[6]. Therefore, the enterprises should derive the capital-cost-rates for their value based control systems based on the cognition of the risk management. It solves two problems: Enterprise value (Discounted free Cash Flow) or EVA[7] is calculated on the basis of the capital-cost-rates, which reflect the actual risk situation of the firm, and over the way of the capital-cost-rates the insights of the risk management flow directly into business decisions. This way first made the founded weighting of expected yields and the associated risks by important decisions actually possible.

In the way, the functional chain element becomes directly clear: A reduction of the risk extent (e.g. by closure of insurance) affects directly the quantity of expensive equity capital which is necessary for loss covering. Each action can be judged now on the one hand regarding the effects on the expected yields and on the other hand regarding the effects on the risk extent and thus (over the level of the capital-cost-rates) also regarding the effects on the enterprise value. For the reasons specified in section 1 (e.g. insufficient diversification) here also the unsystematical risks are relevant.

3.4 Deriving Realistic Cost of Capital Rates[8]

As reality shows, there is a need of methods which also take into account the idiosyncratic risks and the possibility of inefficient markets. This would mean whatever a company's individual (non-systematic) risks are, the capital markets would only look at the systematic risks and not value a company's policy of coping or reducing risks[9]. Obviously, the risk-adjusted cost of capital rates must be depend-

5 For the CAPM approach and the model criticism see Haugen 2002, Shleifer 2000, Ulschmid 1994, for Analysis of CAPM and of APT for the German stock market see Steiner and Uhlir 2000 and Fama and French, 1992, S.427-465.

6 For value-oriented control systems see Gleißner 2004 pp. 105-134, and the criticism of Hering 1999.

7 Economic Value Added see Stern et al. 2001.

8 An overview of different forms for the derivation of cost of capital rates can be found in Gleißner 2004 pp. 111-116; for an example of a concrete derivation of the capital costs for a company see Gleißner and Berger 2004.

9 Supplement for the meaning of unsystematical risks see i.a. Goyal and Santa-Clara 2003. Considering partial quite rational reasons for a limited diversification in the private Portfolios this is also intuitively easily comprehensible. Hubbert 1998.

ent on the risk exposure of a company (idiosyncratic risk); otherwise the cost of capital rates would not be well-funded[10]. How can this information be gathered?

As stated above, the risk aggregation shows the capital requirements of a company to cover at least the possible losses of the aggregated risks. As a result of the aggregation, a highly capable system will provide the capital requirements, expressed as Risk Adjusted Capital (RAC) for a given level, mostly the 95%- or 99%-level (quantile). These capital requirements can be seen as an expression of the risk of a company. This number can be used to get the cost of capital rate, by inserting this data into the above-mentioned WACC formula replacing Equity Capital with the Risk Adjusted Capital (as the Equity Capital needed to cover the risks). The known formula with EC being replaced by RAC:

$$WACC = \left((1-T)\ x\ (LC + EC - RAC) * C_{:} + RAC * C_{E}\right) : CE \qquad (4)$$

The formula clearly shows that it is now possible to determine the cost of capital rate from the equity capital needed (RAC) to cover the risks. It can be said that – ceteris paribus- a company can reduce its cost of capital by reducing its risk exposure e.g. by transferring risks. This is due to the fact that a company with higher risks needs more equity capital to cover possible losses than a more risk-averse company and thus has a higher cost of capital as equity capital is more expensive than loan capital.

With the concept of EVA, it is now possible to assess the value of a company, based on realistic cost of capital rates. This allows determining the goodwill of a company by taking into account the undertaken risks. As higher risks will lead to a higher level of RAC –and to an increase of the cost of capital (WACC) – these risks have to have a higher profit rate to have a positive impact on the goodwill of a company. Both components are now tied-up: the systematic (market) risk and the idiosyncratic (individual) risk. This is necessary because of the inefficiency of the markets.

3.5 Further Consequences of Inefficient Capital Markets

Which consequences and future challenges result from the past considerations? The management of an enterprise should consider the following aspects, if it proceeds from inefficient capital markets:

1. Because of asymmetrically distributed information, bankruptcy costs and psychologically caused anomalies of evaluation at the stock markets the risk extent, the own capital funds need, the capital-cost-rates and enterprise value (apart from the enterprise-independent risk premiums) should be derived exclusively from enterprise-internal data. Both systematic and unsystematic risks are relevant.
2. Investment decision and financing are dependent from each other. A reduction of the available cash-flow limits the investment possibilities. A Stabilization of the future cash-flow by risk management helps the management to

[10] See e.g. Amit and Wernerfelt 1990, pp. 520-533.

be able to realize all interesting investment possibilities (see Fazzari et al. 1988 as well as Froot et al. 1994).
3. The possibility of an over- or an underestimation of shares compared with its fundamental value causes that by a skillful timing by capital increase or share buy back enterprise value can be created.
4. A Performance Measurement with EVA (or similar key data) must always seize also the change of the costs of capital (and/or the risk extent). An adjustment of the WACC e.g. for one year or the derivative from models like the CAPM leads to distorted results regarding to the created enterprise value.

4. Conclusion

Subsuming we can see that risk analysis and risk aggregation are necessary tasks of a value-oriented management, which help to estimate the value of the enterprise well founded and comprehensible. Thus the data pool must contain the individual enterprise risks, which determine the planning security of the future yields respectively cash flows. Also the value contribution of strategic options (or e.g. also of insurance solutions) can be quantified this way - over the effect of yield and risk.

In the context of value-based management, coping with individual risks still plays the central role. If the mix of measures is precisely tuned to the individual company, this has a direct effect on the relationship between costs of capital and the cash flow of single areas within the company - in other words: on the value of the company. In principle a company should concentrate on the strategically important "core risks" and only tie up equity for these risks. Every value-based management needs a risk management, as the costs of capital are determined by the aggregated quantity of risks. In the real world, we have to look at all kinds of risk - systematic and idiosyncratic.

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