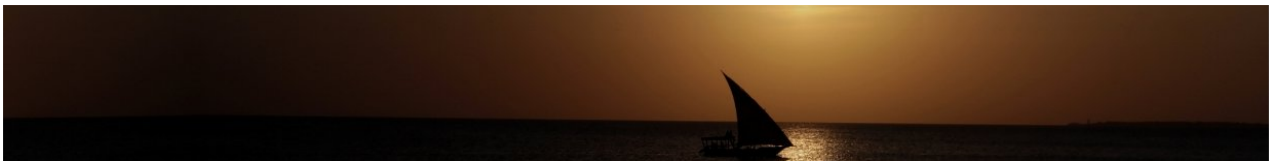

Accounting for risk in capital investments

White paper

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1 Problem statement and introduction

In the financial world it is very common to relate the perceived risk associated with an investment in stocks or bonds to the return rate.

Hypothesis: it would appear that this mental model has been translated to the domain of capital investment projects without full consideration of the ramifications.

As a result, concepts such as variable discount rates, country risk based rate mark-ups etc. have been employed. The implication is that within companies one may observe conflicting practices. There may be guidance which is rooted in the mental model that risk can be unambiguously translated to a discount rate. This may conflict with probabilistic valuation and risk management approaches.

There is no discussion about the discounting principle. The concept of the weighted average cost of capital (WACC) is generally accepted as an appropriate way to set a corporate discount rate. However, the role of the discount rate is primarily aimed at accounting for the **time value of money**. The link to 'risk', whilst present, is less strong. In fact, simply translating the complexity of the (future) business environment, with its inherent risks, into an idiosyncratic discount rate for evaluating investment opportunities reduces the incentive to get to grips with this complexity.

This note aims to explore some of the argumentation around this topic and provides some alternatives.

2 Investing in shares and risk perception

An individual or legal entity who invests in a listed company expects a return that is commensurate with perceived risk. This return consists of periodic dividends and share appreciation. The return can be expressed as a rate and represents the **cost of equity**. Together with the cost of debt, the cost of equity determines the WACC (weighted average cost of capital). Usually a company will use this as the discount rate to evaluate its investment opportunities.

'Risk' in this context is not precisely defined. The perceived risk is likely primarily an expression of the exposure to the downsides associated with exogenous uncertainties such as market conditions, political and macroeconomic developments. However, there is also a component of the aggregate idiosyncratic uncertainties. A company may be assumed to have multiple assets and investment opportunities. The idiosyncratic, endogenous risks of these individual opportunities will on portfolio basis be attenuated (not eliminated, i.e. 'diversified away' as is sometimes thought). It is, however, not very clear if and how investors make a distinction between exogenous and endogenous risks. In other words, the collective risks a company is exposed to are not very well 'observable' to investors.

The cost of equity is usually derived from historic data using the performance of the shares of a set of representative, comparable companies. There is no explicit incorporation of a risk assessment of the future outlook of the company in question except to the extent this has been priced in the share performance in recent years. If such a 'future' element is present, it may be lost in the statistical averaging that is needed to make sense of the historic data.

The asset share performance is not only related to risk perceptions of investors. It also has to do with instantaneous market conditions and the availability of alternative investment opportunities. For example, a low interest rate will have a positive effect on the performance of equities whilst their risk profiles do not change.

Conclusion: although the cost of equity is associated with the risk perception of investors of a company or a sector, it is inappropriate to consider this to be a solid one to one relationship because:

- the risk concept as it would relate to the cost of equity is not precisely defined considering the broad spectrum of endogenous and exogenous risks that a company is exposed to
- there are more factors that drive the cost of equity than only risk
- the cost of equity derived from historic share performance data (to serve as input to the WACC calculation) will only to a limited extent include a forward looking perception of risk.

3 Risk differentiation

In the financial world schemes are proposed (and applied) that further refine the concept of equating risk to rate, detailing this at the opportunity or country level and even at line item level in a valuation model.

The **opportunity cost of capital** is a similar concept as the cost of capital of a company, but then specific for a single opportunity within the portfolio of investment projects. The thought is that opportunities within the portfolio of a company will have different risk profiles. By differentiating the discount rate per opportunity it is assumed that the valuations (NPVs) are better comparable as the risk element has been 'factored in'. Numerical values for discount rates per class of opportunities are obtained by using the share performance data of companies that specialize in that specific class of activities. Some form of weighted average of the discount rates thus allocated across the portfolio must add up to the company WACC.

It is not uncommon for companies to differentiate the discount rate for opportunity evaluation on the basis of the so called **country risk**. The thought is, again, that NPVs should be adjusted in the light of specific risk conditions in a country, related to for example political, economic, social or regulatory issues. Country risk indicators supplied by specialized consultancies may be used to guide the derivation of a mark-up on top of the standard corporate discount rate. This could mean that opportunities in high risk countries are evaluated at for example double the company discount rate.

An example of the line item approach: occasionally one may get into a discussion whether tax repayments from the government (which are assumed to be risk free) should be incorporated in the valuation model using a lower discount rate. Another example is the treatment of leases in valuations.

Discussion

Whilst we have concluded that directly relating the corporate discount rate to risk perception is not without issues, the further differentiation at country or opportunity level will be even more complicated. Apart from the question whether it is the right mental model to directly and fully link risk to discount rate, there will also be operational difficulties in deriving credible discount rate levels for opportunity classes and countries. How realistic is it to find a representative group of companies with sufficient share performance data that specialize in a specific class of investment projects? Is there a credible method to translate country risk indicators to rates? In addition, the problem of how opportunity/country discount rates add up to the corporate discount rate must be solved.

There are two more major issues. Firstly, applying a variable discount rate is a one dimensional approach. Upsides and downsides are not made visible. Secondly, the accounting-for-risk-through-the-discount-rate approach hinges on unspecified risk perceptions of unknown investors (again with caveats as discussed above) and discourages an approach where concrete risks are systematically identified, assessed, quantified and if possible mitigated. And this latter observation may well be the most important argument against variable discount rates.

4 Assertions

1. Whilst the corporate discount rate, based on the WACC, is a useful concept, its derivation relies on historic performance of selected shares and the explicit incorporation of a risk perception is not clear.
2. Considering point 1. above with in addition the practical challenges of deriving numerical rate choices, the differentiation of the discount rate per opportunity or per country is inappropriate.
3. Accounting for risk through the discount rate is one dimensional and does not provide for a natural way to consider upsides and downsides.
4. The most problematic aspect of accounting for risk through the discount rate is that it discourages proper identification, quantification and mitigation of risks.

5 Alternatives

So what is the alternative? The following are pointers indicate what a company can do to get to grips with uncertainty and risk.

1. Investment specific uncertainties/risks can be addressed by using probability distributions for the estimates that are incorporated in the projected cash flow analysis. The analysis is done in a probabilistic way. There are a number of techniques to do this: Monte Carlo simulation, decision trees, analytical methods. In particular the latter can be very efficient and transparent. Such analysis results in **ranges** of the key financial indicators of investments. The extent of such a range is reflective of (some of the) the 'risk' associated with the investment opportunity (e.g. a wide range may imply the risk of the investment having a disappointing outcome).
2. Many companies have established **risk management** practices. These are useful in developing risk mitigation plans but it is also important to integrate the resulting assessments in the probabilistic financial analysis as referred to in point 1. above.
3. For the understanding of the broader future business environment and its inherent risks, **scenario thinking** is powerful. This will guide a disciplined discussion of possible relevant future developments. It is important to link this, to the extent possible, to the financial indicators as discussed in 1. above.

4. If there are multiple investment opportunities to be considered, of course a **portfolio approach** is important. This may be opportunities for risk mitigation across the portfolio. Investment opportunities can be categorized and viewed according to risk profile.

5. In the end, sound **judgement** will always be a crucial element, whatever amount of analysis is done. The quality of this judgement is well served by learnings generated though steps 1 to 4 above.