Executive Summary

Problem

Calculating the cost of capital is important for companies worldwide. In practice, these capital costs are calculated using the Capital Asset Pricing Model (CAPM) as well as a raw beta estimator is used often. Unfortunately, that it has been shown that the beta is not stable over time. Therefore, the future beta should be adjusted or calculated in another way.

Method

The data set consists of the shares of the Swiss Market Index (SMI). The data set covers the SMI from the beginning in 1988 to the end of 2017. The market was calculated as an equally weighted market and with market capitalization. In the first place, the annual ordinary-least-square (OLS) betas for each firm of the SMI is going to be calculated. Secondly, the SMI beta will be calculated as a weighted average. An equally weighted market as well as a market with market capitalization are assumed. Third, the Vasicek Beta needs to be calculated based on the OLS betas. Fourth, different methods for the regression of the time series are going to be tested. The following equation shows the method:

$$\beta_y = \gamma_0 + \gamma_1 \cdot \beta_{y-1} + \epsilon \tag{1}$$

where β_y is the beta which is calculated for year y and β_{y-1} is the last year beta. γ_1 shows how dependent the future beta is on the past beta.

The OLS beta or the Vasicek beta can be predicted. The OLS, Vasicek or both betas can also be chosen as the basis. In a first step the time series alpha, beta and R squared (R^2) without adjustments will be calculated. In a second step, the first year of the sample will get removed for the analysis and a minimal number of data points per year will be fixed. In the last step the calculated betas will no longer be calculated annually but there is set a period of three or five years, to give it a check.

Results

The results were compared using the adjusted R^2. The results have been very different. There is a possibility to achieve a good prediction with several methods while it is impossible to get an appropriate prediction with other methods. The adjusted R^2 for the SMI Beta range is between -0.0771 and 0.4002. Whether adjustments should be made depends on the choice of time period (daily, weekly or monthly). Whether OLS beta or Vasicek beta is chosen depends on the time period chosen and whether the market is equally weighted or it is a market based on market capitalization.

The company beta will also be calculated. The prediction is also in this case difficult. There is no model that makes a good prediction for all companies. However, some betas can be predicted well. These companies have nothing in common. For example, the beta of Asea Brown Boveri (ABB) can be well predicted. The R^2 ranges between -0.0473 and 0.4000.

It is noticeable that the γ_0 is higher than the γ_0 which **?** calculated in their paper. This indicates that the past beta in Switzerland has less influence on the future beta than the market beta.

Evaluation

The SMI includes only a fraction of the companies listed on the Swiss stock exchange. For the Swiss market, an analysis of the Swiss Performance Index would certainly make sense. The data set should contain a larger time span, that a well-founded statement can be made. In this thesis only a calculation over thirty years can be made as a longer period is currently impossible due to the reason that the SMI was founded in 1988. Furthermore, one could examine whether a shortening of the period (instead of thirty years only five or ten years) would bring an improvement. In practice the CAPM is applied. Often a period of two, three or five years with monthly data is used to estimate the future beta. For this reason, it would be interesting to compare the results shown here with the methods commonly used in practice.