

## **Abstract**

This thesis characterizes the return experience of investors on the SMI. On average a CHF 1 investment in 1988 results in 7.12 CHF by December 2017. On the Swiss stock market 49% of the total return is due to dividends and 51% is due to capital gains. It is striking that periods of international market turmoil are also associated with large volatility in the Swiss stock market. Sorting portfolios according to volatility indicates that on the monthly basis investors require significant extra returns for bearing risk. On the daily and weekly basis no such relation is found in the data.

## **Keywords:**

Swiss stock market; Risk and return; Value weighted portfolio; Equal weighted portfolio; Stock market volatility; Dividend reinvestment

# Executive Summary

## Hypothesis

The fundamental relationship between return and risk in the field of finance was already examined for its properties by several well-known researchers in the middle of the 20th century. The latter were able to observe a positive relation between risk and return which is now the basis for the most commonly used models in finance. This includes the development of the Modern Portfolio Theory and the Capital Asset Pricing Model. Recent research, however, has published a number of studies that questioned this positive relation. Since most of these studies are based on data from the US market, the aim of this study is to examine the return and risk relation for the Swiss stock market based on the assumption that taking on more risk leads to a higher expected return. For this purpose, first of all the total return in the Swiss stock market is determined and then it is examined whether a higher return has been achieved due to taking on a higher risk.

## Methodology

The thesis uses data from stocks contained in the SMI over the period from 30 June 1988 to 31 December 2017 where prices, dividend yields and market capitalization were collected on a daily, weekly and monthly basis. In addition, the historical prices of the SMI Price Index and the SMI Total Return Index were collected for comparison purposes. All the data described was obtained from Thomson Reuters Datastream. In a first step, the prices of the individual stocks were calculated with reinvested dividends, as these could not be obtained from Datastream. Two portfolios were subsequently formed, an equal-weighted as well as a value-weighted portfolio. These two portfolios illustrated the return on an investment of CHF 1 in the Swiss stock market. Whereby for each of these two portfolios a version without reinvested dividends and a version with reinvested dividends has been calculated for demonstrating the importance of reinvested dividends. In a second step, new quintile portfolios were formed to investigate the return-risk relation in the Swiss stock market. The five different portfolios were assigned different stocks based on their volatility as of  $t-1$ . Volatility was calculated using the rolling standard deviation over the previous 60 periods (daily, weekly and monthly). Thereafter, the average return over the observation period was calculated for all five newly created portfolios in order to investigate whether taking on more risk leads to a higher expected return. Finally, a T-test was used to check if the results obtained were statistically significant.

## Results

The equal weighted Portfolio excluding reinvested dividends achieved an average return of 8.64% based on daily returns, 8.21% for weekly returns and 7.91% for monthly returns over the period from 30 June 1998 to 31 December 2017, while the value weighted portfolio has outperformed the equal weighted portfolio in all cases with 8.58% for daily returns, 8.33% for weekly returns and 8.13% for monthly returns. Looking at the return with reinvested dividends, the equal-weighted portfolio (10.63%, 10.62% and 10.27%) as well as the value-weighted portfolio (11.08%, 10.82% and 10.60%) performed significantly better. This also became evident when the performance of a CHF 1 investment from 30 June 1988 to 31 December 2017 was observed. The equal-weighted portfolio without reinvested dividends reached a final value of CHF 5.77 and CHF 10.96 with reinvested dividends based on monthly returns. In this case, the dividends were thus responsible for 47% of the total return. On the other hand, dividends in the value-weighted portfolio accounted for around 49% of the total return. Thus, an investment of CHF 1 achieved a final value of CHF 7.12 excluding dividends and CHF 13.91 including reinvested dividends based on monthly returns.

For the five portfolios, which are based on the volatility as of  $t-1$ , a significant positive risk-return relationship could only be observed for monthly returns. The difference between the least volatile portfolio and the most volatile portfolio is particularly striking. While the portfolio with the lowest volatility reached a final value of CHF 3.18, an investment of CHF 1 in the most volatile portfolio was rewarded with a total value of CHF 15.28 on 31 December 2018. For the daily and weekly returns, however, a non-significant negative relation has been identified.

## Conclusion

The results obtained in this thesis support the results of previous studies since the results of this study, to some extent, were controversial as well. While a negative risk-return relation was observed for daily and weekly returns, which does not appear to be significant, a significant positive relation was observed for monthly returns. This is in line with the controversial discussion whether the higher risks taken will also be rewarded with higher returns. While this can be partly explained for the daily returns with the gathered prices of Datastream, which unfortunately also had a value for bank holidays in the daily returns and thus biased the result, this cannot really be explained for the weekly returns.

In addition, the chosen risk measure needs to be examined which in the case of the standard deviation is very naive and in the event of the rolling standard deviation is also strongly based on assumptions and decisions made, such as the choice of the number of previous periods.

Finally, it is also quite possible that the past volatility, such as the standard deviation or the

variance, is simply not a good indicator for the expected return of a stock or a portfolio. However, the already well known Beta may be a better alternative to determine the expected return based on historical data given that the Beta is slightly more complex and contains a historical as well as a more recent component.

On the other hand, the importance of reinvested dividends could also undoubtedly be observed in this study. This is not surprising, as the existing literature also unambiguously assumes that a higher return can be achieved with the reinvestment of dividends.