Executive Summary

Structured products experienced a great growth story in many countries in the years 2003 to 2007. During the year 2008, however, in the course of the global financial crisis and the subsequent bear market rally, they suffered a downturn in turnover volumes and number of newly issued products. Since April 2009, they have slowly moved back onto the growth path and also regained popularity. In general, structured products are a combination of traditional investment instruments like shares, indices or bonds and at least one derivative. Derivatives are financial instruments, whose value depends on the development of one or multiple other assets, the so-called underlying. Structured products enhance the classical investment opportunities as they offer special payoff structures that can be tailor-made to the investor's preferences and can be used in growing, stagnating or even decreasing financial markets to generate profit. In Switzerland, the range of structured products for retail investors is divided into four categories: leverage products, participation products, yield enhancement products and capital protection products. This paper deals with the class of yield enhancement products wherein the focus is set on products with barriers, namely barrier reverse convertibles. The analysis of this special product is interesting as potential investors need to make estimations about the probability that the underlying hits or not hits the barrier included in the barrier reverse convertible. If during the lifetime of the product a barrier event occurs, its payoff profile changes into a suboptimal scenario for investors.

This thesis contributes to the investigation of optimal product structures of barrier reverse convertibles in special consideration of the probability misestimation of retail investors. The purpose is to reveal which conditions of barrier reverse convertibles – namely which barrier and coupon levels – are most optimal for retail investors. Furthermore and most interestingly, the results of a recent study at the Swiss Banking Institute of the University of Zurich regarding probability misestimation are used. It is investigated if these misestimations of investors influence their perception and their decision for an optimal investment product. Therefore, the Expected Utility Theory of John von Neumann and Oskar Morgenstern is applied to evaluate the utility of an investor's final wealth after having invested into barrier reverse convertibles or directly into the underlying. Especially in the present market environment, which is driven by high volatilities and uncertainty of investors, it is interesting to study the design of optimal structured products with barriers.

The main finding of this thesis is that for rational risk averse investors barrier reverse convertibles with a high barrier and subsequently a high coupon level are more desirable than products with low barriers and accompanied low coupon levels. This result can be explained by the preference of investors for a high secured coupon and hence a certain guaranteed return, instead of a high downside protection. However, if the opportunity to invest directly into the underlying is taken into account, the utility gain through a direct investment exceeds the maximum utility gain through an optimal barrier reverse convertible. Thus, for quite risk averse investors with a concave utility function, an investment directly into the underlying is under normal probabilities always more favorable than an investment into an optimal barrier reverse convertible. The second investigation in this thesis reveals that if the probability misestimation of investors that the underlying hits the barrier and that it lies below the barrier at maturity, is taken into account, the barrier reverse convertible with a high barrier and coupon level all at once offers even a higher expected utility than the direct investment (for $\alpha \leq -3$). This finding is crucial for the explanation of the attractivity of barrier reverse convertibles in the retail market.

The thesis is structured as follows: Chapter 1 gives an introduction to the market of structured products in Switzerland as well as an overview of the current status of research regarding structured products. It is followed by a theoretical description of different decision theories and an in-depth explanation of the fundamentals of barrier reverse convertibles. The valuation model and the specific example analysed within this thesis are illustrated in Chapter 2. Chapter 3 presents the results regarding optimal conditions of barrier reverse convertibles for different probability distributions. Finally, Chapter 4 concludes the thesis by summarizing the derived results and giving an outlook to further research possibilities within the field of optimal structured products.

The quantitative analysis in this thesis uses the model of the Expected Utility Theory which represents arbitrage-free and rational investment decisions. However, retail investors often do not act completely rational, but are driven by emotions and further behavioral biases like overconfidence, loss aversion or hedonic framing. Thus, it is interesting for further research to additionally analyse barrier reverse convertibles with behavioral finance models as, for example, the Prosepect Theory proposed by Daniel Kahneman and Amos Tversky. This may reveal further interesting results in the question of attractivity and optimization of strucutured products with barriers for retail investors. Moreover, there are numerous possibilities to extend the conducted analysis within this thesis by examing other product structures like multi-barrier-reverse convertibles, bonus certificates or the newly developed last-look barrier products.