

Executive Summary

Introduction

Structured products have two or more components and one of them should be a derivative. These products are very popular, especially in Switzerland, where the total market is approx. CHF 200 billion. Multiple types of structured products exist and of them are Multi-Asset Barrier Reverse Convertibles (MBRCs). Their working principle is very similar to conventional bonds, but with two differences. Similar to bonds the owner of the long position receives his coupon every period of time, whereas the main difference is observed by the termination of the contract. In the case of conventional bonds, the nominal price is being received, whereas in the case of MBRCs the final payoff depends on the development of an underlying. Additionally, this product has insurance which is called a barrier. This barrier protects the buyer from market fluctuations leading to a less risky asset. The main problem of MBRCs is a missing closed-end pricing method, which makes it difficult to check whether the product is priced fairly. One of the methods suggested by Lindauer and Seiz (2008) uses the Monte Carlo simulation. This method is implemented and certain *ceteris paribus* effects are measured.

Pricing Method

Stock prices follow a stochastic process, which is called *Geometric Brownian Motion*. This process depends on multiple parameters such as volatility, maturity, risk-free rate, dividend yield, and a stochastic element. The stochastic element is some randomly generated number that follows a standard normal distribution. This process allows simulating a path of any stock price. In the case of MBRCs, since more than one underlying is involved another parameter needs to be implemented, which is the correlation. Usually by creating a portfolio investors try to find less correlated stocks to minimize the risk, whereas in the case of MBRCs positively correlated stocks are preferred, since the final valuation depends only on a worst-performing underlying. The paths are simulated 3000 times and their average payoff is calculated. This average payoff is afterward used to determine a fair coupon in a risk-neutral world.

Influencing Factors

As mentioned above, different *ceteris paribus* effects are measured. The duration has a non-linear influence on the fair coupon. While increasing the duration the fair coupon increases as well and a concave function can be observed. An increment in volatility increases the fair coupon since additional risk should be compensated. American MBRCs have a higher fair coupon compared to European MBRCs and their functions are parallel to each other. The relationship between dividend yield and risk-free is not entirely clear. Some trends could have been observed, but this is a question for further studies.