Master Thesis

February 16, 2024

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Title

Swaptions pricing

Thesis statement

In this thesis, I will investigate asset allocation with respect to swaptions and the affect different swaptions strategies has. This analysis receivers a model selection to price swaptions and the different strategies will be back tasted on data.

Structure

1 Asset allocation

- Write about different assets.
- drawdown plot on some equites, bonds and implied volatility
- inflation plot on the same equites, bonds and implied volatility

The idea is to give a motivation for swaptions as derivative in asset allocation.

2 Swaptions

Introduction to swaptions

3 Pricing swaptions

Setup the framework for what is need to price swaptions. Theory on pricig a swaption

4 risk neutral pricing

Introduce risk neutral pricing, so in the end it is possible to price swaptions

5 Black model

Theory of the Black model. In the Black model the sigma is constant. Comment on there is a sigma - volatility, and what should this sigma be. Transition to introducing the SABR model.

6 SABR model - implied volatility

Theory of the SABR model

Given market data on ATM volatility such as 10Y10Y ATM NORMAL EUR, we will calibrate the parameters in the SABR model. Then the calibrated parameters can be used to find the "sigma" the implied volatility, This "sigma" can be used in the Black model to price swaptions.

7 Risk premium

Introduce how risk premium are calculated, we can perform two different swaptions strategies

Risk premium = expected return - risk-free rate

8 Two strategies

10Y 10Y ATM EUR swaption - 20 years data and 3M 3M ATM EUR swaption - 20 years data Maybe also for USD swaptions The goals is to find that swaption make good sense when you have a strategy when the swaptions has a long duration.

9 Data

volatility - given in BPS/DAY

- 10Y 10Y EUR normal vol
- 20Y 10Y EUR normal vol
- 3M 3M EUR normal vol
- 1Y 1Y EUR normal vol
- 10Y 10Y USD normal vol
- 20Y 10Y USD normal vol
- 3M 3M USD normal vol
- 1Y 1Y USD normal vol

risk-free rates - given i BPS/ANNUM

- 10Y 10Y EUR normal annual RFR vol
- 20Y 10Y EUR normal annual RFR vol
- 3M 3M EUR normal annual RFR vol
- 1Y 1Y EUR normal annual RFR vol
- 10Y 10Y USD normal annual RFR vol
- 20Y 10Y USD normal annual RFR vol
- 3M 3M USD normal annual RFR vol
- 1Y 1Y USD normal annual RFR vol