

The Volatility Surface Arbitrage in Stress Testing Framework: Review and Current Practice

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Abstract. This article reviews existing problems in the modelling of a volatility surface. The review is the combination of theoretical and practical knowledge used in practice. Theoretical part discuss the evolution of the volatility surface modelling approaches. We review different types of volatility surfaces such as constant, local and stochastic volatility. We give a brief overlook at existing models, their benefits and disadvantages. We pinpoint the definition of volatility surface arbitrage and the conditions that have to be satisfied in order to eliminate arbitrage. We study different approaches to a volatility surface parametrisation and possible risks arise with the parametrisation. Secondly, we discuss the impacts of volatility surface models on the current market risk capital framework (FRTB). The FRTB framework defines risk capital regulations and the way how banks have to attribute their profits. The profit account attribution requires them to produce stresses to the market data. We discuss the volatility surface stresses, stress market data model validation and the risks linked to this exercise.

Keywords: volatility modelling, volatility surface, stress market data model validation