Research Project : Model risk dynamics of term structure construction methods

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1 Motivation and Objective

In Cousin and Niang (2014), we show that the process of curve construction is associated with a significant degree of model risk and we provide a way to derive arbitrage-free bounds for curves which are fully compatible with market data. This framework is generic and can be adapted to many different types of term-structures such as yield curves, OIS discount curves, swap curves, CDS default curves, etc...

The aim of this project is to analyze the dynamic aspects of term-structure uncertainty. The project is divided in three parts : the first part aims at deriving the dynamics of curve arbitrage-free bounds in different contexts : OIS discount curves, swap curves, yield curve and CDS default curves. In the second part, we will study the impact of curve diversity on risk management (pricing, hedging). The third part will specifically study the dynamics aspects of curve uncertainty: are there some particular risk factors which explains this dynamics? Do curve uncertainty is exacerbated in some particular periods ?

The work will be organized as follows :

1. Carefully read the paper by Cousin and Niang (2014), in particular the section about arbitrage-free bounds
2. Given a time series of OIS par rate term-structures, compute the associated time series of discount curve arbitrage-free bounds.
3. Derive arbitrage-free bounds associated with a term-structure of bond prices. Given a time series of bond prices at several maturities, compute the associated time series of yield curve arbitrage-free bounds
4. Given a time series of CDS spreads at several protection maturities, compute the associated time series of default curve arbitrage-free bounds.
5. Exhibit the dynamic key features of bounds term-structure.

References

A. Cousin and I. Niang. On the range of admissible term structures. working paper, 2014.