



Decameron Technologies

Case Study: Applications for Life Insurance Companies

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Introduction

This note discusses particular advantages of the Decameron yield curve system as relates to the portfolios of insurance companies and other asset managers with long maturity exposure. In particular, recent volatility and market disruptions demonstrate the necessity of having a thoroughly tested and robust analytic system form the basis of yield curve portfolio management, and highlights the difficulties of obtaining such a system from larger incumbent analytics providers.

Asset Liability Matching Challenges Amid Volatility

The surge in inflation over the past several years, and the corresponding aggressive response of the global central banks to address these economic pressures caused volatility in markets not seen for some time. In particular, the yield curve was, and continues to be, subject to violent movements and reshaping, which are causing severe dislocations across the entire curve. Coupled with very poor liquidity, even in US Treasuries, this has created a difficult environment for portfolio managers.

Of particular concern for insurance companies and others with considerable long end exposure, the valuation and risk of longer dated assets must be robust and reliable because of the requirement for asset liability matching and the long duration of many insurance liabilities. Specifically for insurance companies, many liabilities can extend beyond the 30-year maximum maturity of US Treasury securities, as well as beyond the maximum maturity of liquid interest rate swaps. Therefore, yield curve analytics must properly deal with these ultra-long maturities in a sound way, so as to insure economically reasonable valuations and asset liability hedging.

Dangers of Extrapolation

However, this exact issue presents considerable difficulties for many commercial curve analytics providers, including the largest and most well-known. Given recent severe irregularities in the long end of the US Treasury curve, unreasonable valuations and risks can easily be generated if naive or simplistic approaches are taken. In a recent period, for example, many well-known commercial models implied 50-year par yields that were considerably lower than 30-year rates, with corresponding values of risk that were similarly unreasonable. Extensions out to 100 years were even more unreasonable.

This occurred because a long end inversion in the yield curve and persistent cheapness in the 20-year sector caused models to simply extrapolate to long durations. Cheapness in the 20-year sector is mostly attributable to technical factors, so there is

no sound economic basis for projecting these conditions to the extreme long end, such as at 50-year maturity point. Furthermore, the valuations and risks projected by these models swung violently as the market itself changed, causing large idiosyncratic swings in asset liability matching strategies that were clearly not economically sound.

The Importance of Economically Motivated Models

Proper modeling of the extreme long end requires a long-term view of both valuation and risk. The Decameron system does this on the basis of an 'equilibrium' curve: This equilibrium presumes a situation where relevant market forces come into balance, where short term market dislocations are resolved, and the yield curve reaches a slowly evolving arbitrage free state.

Furthermore, this state is specified by an economically well motivated and structured model that was used successfully in various forms for over 30 years. In this situation, a projection of the model to the extreme long end implies rates and measures of risk that are not affected by market dislocations and short-term volatility, and that are specified on an economically sound basis. Importantly, this ensures stability in long term asset liability matching strategies and for portfolios that are evaluated on a long-term basis.

For example, during the dislocation period described above, the Decameron system projected a yield on the 50-year point not far below that of the 30-year yield, and the duration, as well as other measures of interest risk, represented reasonable projections. This reflects a stable and economically sound extension of the yield curve to the extreme long end. Indeed, such a method can be extended to even longer maturities with similarly satisfactory results. Insurance related portfolios, especially those portions required for asset liability matching strategies, are particularly suited use cases for this set of 'equilibrium' models.

Tools for Both Long and Short Horizon Strategies

In addition to the above 'equilibrium' models, Decameron also has a set of models that are appropriate for portfolio management needs given prevailing market conditions, whatever they happen to be, including short-term dislocations and idiosyncrasies. These 'market' models use the same underlying dynamic factor-based arbitrage free interest rate models as in the equilibrium case as a theoretical basis for analysis. However, factors and parameters are adjusted to reflect prevailing market

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conditions. The valuations and risk measures that are computed in this way are correspondingly useful for any purpose, including hedging and valuation, that has a more short-term horizon.

Examples of uses for this 'market' set of models can include hedging assets for a short period of time where what is relevant is the way the asset is trading in that short time frame and model valuation of an illiquid asset where the valuation needs to reflect current market conditions as much as possible. Both of these use cases are also of need to any portfolio manager, including those dealing with insurance related assets.

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