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Have It Both Ways? A Tale of the Speed-Accuracy Trade-Off in the Valuation of Guaranteed Minimum Withdrawal Benefit

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In recent years, the North American insurance industry gradually adopted new standards and practice on the stochastic modeling of equity-linking insurance products. It has been reported in recent industrial publications [1,2] that in many cases the new practice of the valuation and profitability tests based on Monte Carlo simulations can be very time-consuming and costly.

It appears that practitioners often have to struggle with a trade-off between accuracy, efficiency and timeliness of the delivery of results. One of such examples can be seen with the valuation of the variable annuity guaranteed minimum withdrawal benefit (GMWB). In the recent work [3], we used a combination of several analytical methods to find closed-form solutions to the embedded options of the plain-vanilla GMWB rider, which leads to a very fast algorithm of determining the rider charges. In the Black-Scholes equity return model, our numerical experiments have shown that these analytical methods are much more efficient and accurate than the Monte Carlo simulations. However, it is yet to be studied whether such analytical methods can be extended in more complex product design and more general equity models.