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Market dependent fees for GMMB and GMDB riders

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Guaranteed minimum maturity benefit (GMMB) riders can be seen as a put option on the fund value of a variable annuity. Typically, this guarantee is paid for by a continuous fee that is set as a fixed percentage of the fund value. In order to make the GMMB more attractive, some insurers may want to deduct the fee only when the option is in the money. In this presentation, we suppose that the fund follows a geometric Brownian motion and we obtain the fair fee in the case where this fee is paid only when the option is in the money. Strong model assumptions are needed to solve for the fair rate but the problem can be solved using Monte Carlo techniques under fairly general assumptions. In a numerical example, we compare the fee obtained to the one deducted throughout the contract. We also extend the example to GMDB riders.