

# FURTHER GENERALIZATION OF FAUSTMANN'S FORMULA FOR STOCHASTIC INTEREST RATES

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Markov decision process (MDP) models generalize Faustmann's formula by recognizing that future stand states, prices, and other variables, including the interest rate, are known only as probabilistic distributions. The objective function is the expected discounted value of returns, over an infinite horizon, in a stochastic environment. It gives, like Faustmann's formula, the land or the forest value (land and initial stock). In MDP models, the laws of motion between states, including the changes in interest rates, are Markov chains. Faustmann's formula is a special case where the probability of movement from one state to another is unity, and where the interest rate is constant. MDP models apply whether the stand state is bare land, or any state with trees, be it even- or uneven-aged and single or multi-species. Decisions that maximize the land or forest value depend only on the current system state, and to each state corresponds one single best decision. Numerical solutions are obtained by dynamic programming, or by linear programming in primal or dual form. An example shows the potential effects of recognizing variations in interest rate on the planned land expectation value, and the cost of ignoring them in management.

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