Since its introduction in 1997, the LMM has experienced an unprecedented raise in popularity and has become the most popular pricing approach among practitioners. The model has, however, been criticized for not being suited to adequately reproduce the market-observed prices of interest-rate derivatives. In particular, the presumption that the LIBOR dynamics can be modeled as diffusion processes with deterministic coefficients has been challenged. In this paper, we present an extension to the original LMM that is suitable to incorporate sudden market shocks into the interest-rate dynamics and, at the same time, accounts for changes in the overall economic climate. We demonstrate how caps/caplets can be priced within our Markov-switching jump diffusion framework and give an idea of how the model can be calibrated to market data.