

# American Foreign Exchange Option in Time-Dependent One-Dimensional Diffusion Model for Exchange Rate

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## **Abstract.**

The classical Garman-Kohlhagen model for the currency exchange assumes that the domestic and foreign currency risk-free interest rates are constant and the exchange rate follows a log-normal diffusion process. In this talk we consider the general case, when exchange rate evolves according to arbitrary one-dimensional diffusion process with local volatility that is the function of time and the current exchange rate and where the domestic and foreign currency risk-free interest rates may be arbitrary continuous functions of time. We give a mathematically rigorous and transparent derivation of the significant early exercise premium representation for the value function of the American foreign exchange put option as the sum of the European put option value function and the early exercise premium. The proof essentially relies on the particular property of the stochastic integral with respect to arbitrary continuous semimartingale over the predictable subsets of its zeros.

**Keywords** American put option; Optimal exercise boundary; Optimal Stopping; Snell envelope