Annihilation Rate of Limit Orders in Foreign Exchange Market

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Recent proliferation of automated traders increases significantly the reaction speed of financial markets, and the field of Econophysics emerged to focus on market microstructure using physics methodology especially to describe order book fluctuation [1]. Cancellation of orders play a major role in market fluctuation and an increasing number of researches study this subject [2]. Our research mainly focuses on describing the annihilation rate of limit orders for both cancelled and executed orders in Foreign Currency Market.

We use a precise database of Electronic Broking System (EBS) which contains identification of every order. The database is composed of three weeks in 2011. It contains information about injected and annihilated orders with minimal tick time of one millisecond. This database incorporates forty-eight currencies but our study mainly focuses on USD/JPY, EUR/USD and EUR/JPY currency pairs.

Theoretically we assume that the market price moves randomly following a normal random walk with the diffusion coefficient D. Then, we apply the first-passage time theory to replicate cancellation and execution orders in financial markets and compare those theoretical results with empirical market characteristics. Deviations from the theory are discusses in connection with participants' strategy.

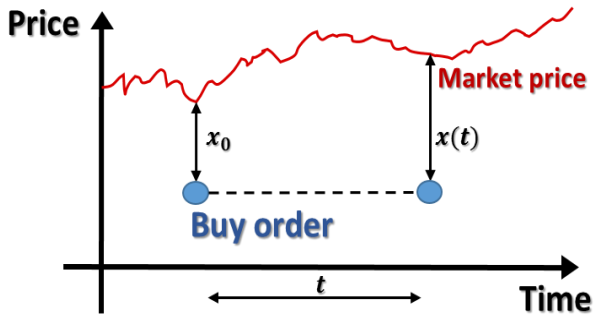

Figure 1: A schematic time series composed of a buying order injected at distance x_0 from the market price. After time *t*, the updated distance is $x(t)$.

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