ALEXANDER SCHIED, University of Waterloo

A central bank strategy for defending a currency target zone

We consider a central bank strategy for maintaining a two-sided currency target zone, in which an exchange rate of two currencies is forced to stay between two thresholds. To keep the exchange rate from breaking the prescribed barriers, the central bank is generating permanent price impact and thereby accumulating inventory in the foreign currency. Historical examples of failed target zones illustrate that this inventory can become problematic, in particular when there is an adverse macroeconomic trend in the market. We model this situation through a continuous-time market impact model of Almgren–Chriss-type with drift, in which the exchange rate is a diffusion process controlled by the price impact of the central bank's intervention strategy. The objective of the central bank is to enforce the target zone through a strategy that minimizes the inventory in foreign currency. We formulate this objective as a stochastic control problem with infinite time horizon. It is solved by reduction to a singular boundary value problem that was solved by Lasry and Lions (1989). Finally, we provide numerical simulations of optimally controlled exchange rate processes and the corresponding evolution of the central bank inventory. Joint work with Eyal Neuman, Chengguo Weng, and Xiaole Xue.