

## **Chapter II**

### **Literature Review**

Although the transaction of foreign exchange market has very developed with electronic system, the theory of foreign exchange arbitrage still heritage the triangular arbitrage theory in 1970s and takes no further step for many years. Recently, Bollard and Connor(1996) adapt Kalman filter to filter tick data, copy with the erratic arrival of observation and produce estimates of all the arbitrage prices on every time step. The filter produces estimates of the arbitrage price for all exchange rates on every second, increasing both the speed and efficiency of arbitrage identification. Mao-cheng Cai and Xiaotie Deng (2003) study the computational complexity of arbitrage in frictional foreign exchange markets with bid-ask spread, bound and integrality constraints. Contrast to the complexity calculation of papers above, Ming Ma (2004) applies matrix to his analysis, in his paper, the arbitrage-free benchmark matrix  $B$  is constructed from real forex matrix  $A$ , matrix  $C$  reveals measures for deviation of each currency from its benchmark value which indicates the possibly optimal arbitrage path.