

# Chapter 4

## Algorithmic Trading Strategy Making: Algorithms and Applications

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### ABSTRACT

*Algorithmic trading strategy making is a very important research issue which attracts more and more people's interests. This chapter will introduce several principal algorithms for algorithmic trading strategy making. How to design a trading strategy will also be discussed. Some latest research achievements on the algorithmic trading strategy making will be given with some examples and application results.*

### INTRODUCTION

Since the floating exchange rates began in the early 1970s, technical trading has become widespread in the stock market as well as the foreign exchange markets. With the development of IT technology and the emergence of Internet, the trend in the financial markets industry in general is the increased automation of the trading, so called algorithmic trading (AT). Algorithmic trading is most widely used by large institutional investors owing to the huge amount of shares they purchase every day.

Without dramatically affecting the stock's price, complex algorithms permit these investors to get the best possible price that they can as well as increase purchase costs.

Algorithmic trading strategies are automated defining a sequence of instructions executed by a computer based on sets of algorithms. A good trading strategy should be profitable which includes identification of what to trade and how to trade. Algorithmic trading strategy making has been an important issue in current financial markets. There has been a vast array of algorithms developed across financial markets in order to achieve

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different trading strategies. In this chapter, we will introduce several principal algorithms for algorithmic trading strategy making. Particular attention will be paid to methodology design with comparisons with other trading methodologies. We will also describe our latest research achievements on this issue. Examples and some applications results will also be given with the algorithmic explanation.

## **ARBITRAGE STRATEGY**

Arbitrage is an activity which traders or investors take advantage of the disequilibrium existed in the financial market to benefit themselves. It widely exists in the modern financial economy. The existence of the disequilibrium implies that the market goes against the law of one price, and as a matter of fact, arbitrage is a process which arbitragers make use of these opportunities and make the market move to equilibrium. The disequilibrium of financial market has many types of arbitrage. The exchange arbitrage involves the simultaneous purchase and sale of a currency in different foreign exchange markets. Arbitrage becomes profitable whenever the price of a currency in one market differs from that in another market. In order to keep the equilibrium of the exchange rate trading market, arbitrage is not available or taken as a close position.

In this section, we will discuss three kinds of arbitrage in the current market. One is the exchange arbitrage based on covered interest parity. The second one is statistical arbitrage. The third one is information arbitrage.

### **Exchange Arbitrage**

The disequilibrium of financial market has many types of arbitrage. The exchange arbitrage involves the simultaneous purchase and sale of a currency in different foreign exchange markets. Foreign exchange rate market is one of the most

important financial markets. Recently, the foreign exchange rate market has undergone many structural changes. Those changes which emphasize on institutional developments and technological advances have a significant impact on various dimensions of the market, such as the mechanic of trading, the size of the market, and the efficiency of the market. Arbitrage becomes profitable whenever the price of a currency in one market differs from that in another market. In order to keep the equilibrium of the exchange rate trading market, arbitrage is not allowed to exist.

### **Covered Interest Arbitrage in Forecasting Exchange Market**

In an efficient market, prices can fully and instantaneously reflect all available relevant information. Hence, the traders in an efficient market cannot make profits at no risk by exploiting current information. Exchange market efficiency has attracted more and more attention in recent years. Frenkel and Levich (1975) studied the covered interest arbitrage and demonstrated that it does not entail unexploited profit opportunities. Taylor (1987, 1989) suggested that profitable deviations from the covered interest parity represent riskless arbitrage opportunities and so indicate market inefficiency. Namely, no arbitrage opportunities exist if the market is considered as an efficient market.

### **Covered Interest Arbitrage without Transaction Costs**

It is widely believed that the interest rates are the most important variables determining the exchange rates. And the interest arbitrage is caused by the transfer of funds from one currency to another by taking advantage of higher interest rates of return. If the interest rates of two currencies are not suitable to their current exchange rates, it might have interest arbitrage opportunities in the market. The covered interest parity (CIP), which ensures that equilibrium prices in forward

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