# Chapter 8
# Survey of Trading Systems for Individual Investors

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## ABSTRACT

*Trading decisions in financial markets can be supported by the use of trading algorithms. To evaluate trading algorithms and to generate orders to be executed on the stock exchange trading systems are used. In this chapter, we define the individual investors' requirements on a trading system, and analyze 17 trading systems from an individual investor's point of view. The results of our study point out that the best alternative for an individual investor is not one single trading system, but a combination of two different classes of trading systems.*

## INTRODUCTION

The objective of investors in financial markets is to buy at low prices and sell at high prices. This objective is supported by *trading algorithms*. Trading algorithms are used to calculate buy and sell signals in order to carry out buying and selling transactions. Every trading algorithm is represented by statements specifying when to buy or sell an asset. With this information orders are created and executed on the stock exchange. To prevent that the investor must constantly observe

stock price movements, it would be advantageous to generate these signals automatically, and to carry out orders also automatically. This problem is solved by *trading systems*.

In the following an overview on trading systems, their functionality and costs is given. Further, 17 of the most important trading systems available on the market are examined and analyzed. The analyzed trading systems refer to target groups which range from the (private) individual investor to the professional institutional investor. *Individual investors* are non-professional investors which usually invest smaller amounts than professional institutional investors. We analyze the trading

systems with regard to the requirements of an individual investor. In addition, a short overview on trading algorithms as a component of trading systems is given.

The remainder of this chapter is organized as follows. In the next section trading algorithms and their different characteristics are introduced. Section 3 gives an overview of the components of trading systems. In Section 4 the approach to the analysis of the trading systems is given. The results of our study on trading systems are presented in Section 5. We finish with some conclusions in the last section.

## TRADING ALGORITHMS

Trading algorithms are used to automatically determine market entry and exit points, i.e. trading algorithms generate buy and sell signals on the basis of historical prices or real-time prices. Historical prices are used to evaluate the quality of trading algorithms. In the real-time case the signals from the trading algorithms are transformed into orders which are executed on the stock exchange.

## Trading Rules

Trading algorithms consists basically of instructions, so-called trading rules. In general there is at least one trading rule which specifies the condition when to buy an asset and one trading rule which specifies the condition when to sell an asset, i.e. a trading rule is a statement specifying the exact market entry or exit point. Trading rules are usually defined in IF-THEN-(ELSE)

form. Brock, Lakonishok and LeBaron (1992) presented some standard trading algorithms which were evaluated in many scientific papers during the following years. As an example to show the structure of trading rules, we will present one of these trading algorithms by Brock et al. (1992): *Variable Moving Average* (*VMA*).

Buy and sell signals are generated by two (simple) moving averages (SMA) [1], i.e. a short-period SMA and a long-period SMA. A buy signal at time $t$ is generated when the short-period SMA crosses the long-period SMA from below and a sell signal at time $t$ is generated when the long-period SMA crosses the long-period SMA from above. These two trading rules can be formulated in IF-THEN form as follows with a short-period SMA of 5 days and a long-period SMA of 150 days (Box 1).

These trading rules are applied on day $t$ at price $q_t$ and when the condition of one of the two trading rules are fulfilled, a buy or sell signal is generated.

Simple trading algorithms which consist only of a few trading rules can be executed manually. However, more complex trading algorithms can only be executed by computer programs.

On the one hand, trading algorithms can be defined with a "wizard". A wizard is a tool to develop trading rules in an easy way. The advantage of such wizards is that the user does not have to worry about the syntactic correctness of the trading rules. For instance, the components of the trading rules can be put together by Drag-and-Drop.

On the other hand, trading algorithms are developed by programming. Two types of programming languages can be distinguished:

*Box 1. Buy and Sell Rule for VMA*

| | |
|---|---|
| IF<br>    SMA(5,t) > SMA(150,t)<br>    AND<br>    SMA(5,t-1) ≤ SMA(150,t-1)<br>THEN<br>    BUY | IF<br>    SMA(5,t) ≤ SMA(150,t)<br>    AND<br>    SMA(5,t-1) > SMA(150,t-1)<br>THEN<br>    SELL |

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