

Chapter 11

Automatic Trading System Design

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ABSTRACT

This chapter will focus on the problem of design of automatic trading system for futures trading, specifically its design lifecycle. This is a task that can be divided into several phases. In this chapter we focus on the selection of proper environment (i.e. choose the right market and commodity), choosing appropriate set of tools (fundamental or technical analysis indicators) and creating the automatic trading system itself, which has to follow rules of money (risk) management and trading psychology. The chapter stresses the importance of the system's acceptability for the user. The last phase covers the topic of testing and optimization. This chapter provides a general overview of each of these phases together with a discussion of typical issues.

INTRODUCTION

The futures trading became electronic business when widespread use of internet technologies occurred. There exist many electronic markets since 90's and at present day they are equal in both size (quantity) and importance to the traditional trading. When the electronic trading became possible, the computing power of computers allowed many tasks to be automated. It is possible to automatically process market data and to perform the analysis very

quickly, automating part of the decision-making process and leaving only small part of the work to be handled by trader.

From the point of view of electronic trading, it is trading of stocks that are in the centre of interest of scientific community. There are several differences between stock trading and futures trading. Discussion about the differences can be found in e.g. (Williams, 1979, pp. 17-20). But there is much in common for both types of trading and we will not be strictly separating stock trading from commodities (futures) trading. In the following text whenever the notion "trading" is mentioned, it is a

DOI: 10.4018/978-1-60566-996-0.ch012

futures trading that we have in mind. Many (not all) indicators useful for the futures markets are useful for trading stocks as well and vice versa. The principle is usually similar.

This chapter is focused on lifecycle of design of automatic trading system. Its purpose is to present and summarize rules of design, important notes on the topic and discussion of typical issues. No specific automatic trading system will be presented in this text. However, as we hope, it may bring some interesting insights into this problem area.

The investment decision-making process consists basically of two parts. First part of this process is fundamental analysis, second part is technical analysis. For the purpose of automatic trading it is a technical analysis that is more important for us. But best outcome is archived when both parts takes place in the decision-making process. Because this matter will be discussed in the following text for the moment it could be said that fundamental analysis represents the “what”, while technical analysis is the “when”. The concept of fundamental analysis in commodity trading is covered in (Dunsby, 2008). Dunsby (2008) is focused on selected categories of commodities only – energies, grains and oilseeds, livestock, industrial materials, softs. However, this publication gives reader the right perspective of fundamental analysis importance and application on real-life situations.

The cycle of steps of system design is usually done during the mentioned investment decision-making process (IDMP), allowing some part of this process to be automated. It is not necessary to have automated the whole IDMP. An automatic trading system (ATS) may cover only the technical analysis part and provide the best outcome of the applied indicators to the user in order to allow him to make the final decision. It is also possible to leave whole process to the ATS itself, but the former solution is usually preferred by traders.

In the following text, we would refer to trader as to “him”, instead of “him or her”, as it would

be more appropriate. By this, we do not mean any disrespect to female traders. This simplification is used in order to make reading easier.

Futures Market Environment

Before we will discuss the topic of ATS design, it is necessary to provide the explanation of terms and mechanisms used for description of futures market environment. These terms will be used in the following parts of this chapter. Readers already familiarized with the topic may proceed to the next part. The books that stand out as good sources of general information for beginners in the area are (Carter, 2006), (Elder, 1993), (Elder, 2002) or (Williams, 1979).

Futures Contracts

The gain of profit is realized by buying or selling futures contracts. Futures contract is a standardized contract to buy or sell a certain underlying instrument at a certain date in the future at a specified price. Futures contracts (or simply futures) are traded on futures exchange and are exchange traded derivatives. The trade is made with actual, not future, price of the commodity.

For differentiation of trading states we use terms open position and closed position. We are in the “open position” when we are in the middle of the trade. I.e. we have the open position when we have either bought some contract(s) and we are waiting for the right moment to sell them (this is called “long position”) or we have sold some contract(s) and are waiting for the right moment to buy them back (“short position”). In other words: A long (resp. short) position entails the purchase of futures contracts in anticipation of rising (resp. lower) prices. As soon as the long or short position is terminated it is called the “closed position” and the trade is finished.

The standardization of futures contracts ensures liquidity and marketability. Each country has certain supervisory authorities (regulators), for

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