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Pertinence and information needs of different subjects on markets and appropriate operative (tactical or strategic) stochastic control approaches

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1. Short introduction

The main idea of this chapter is that it offers an original scientific discussion with a conclusion concerning the relevance of pertinence and information needs of different subjects on markets (as potential traders on various financial markets, stock markets, bond markets, commodity markets, and currency markets, etc.) and the significance of appropriate operative (tactical or strategic) stochastic control approaches.
The organisation of this chapter is very simple. After a short review of sources used and an overview of completed research, chapter parts with some definitions on the main subjects and research areas follow. Following the above stated, there are chapter sections with relatively short research examples of appropriate operative, tactical and strategic stochastic control approaches. All three approaches fits to adequate pertinence and information needs of different subjects on markets (the operative trading concept example, the tactical concept example as a quantitative approach to tactical asset allocation, and strategic concept examples as technical analysis in financial markets or strategic anti-money laundering analysis). The conclusion to this research is contained in the final chapter segment, before the cited references. In conclusion, this paper proposes quantitative and qualitative models for the right perception of adequate pertinence and information needs of different subjects on markets and the significance of appropriate operative (tactical or strategic) stochastic control approaches and expected results.

2. Important concepts

What was the problem? Even pioneers of information science and older authors (Perry et al., 1956; Perry & Kent, 1958; Taube, 1958; Schultz & Luhn, 1968; Mooers, 1976), which are researching problems considering the data, information or knowledge and document collection and retrieving processes in relation to data, information or knowledge processing, determined at the same time that the main focus should be placed on "real information needs". So, in defined period of time and for all different subjects on markets (as potential

traders on various financial markets, stock markets, bond markets, commodity markets, and currency markets, etc.) we may improve and adjust the activities related to data, information or knowledge collection and retrieving, in order to achieve accurate and useful data, information or knowledge appropriate to operative (tactical or strategic) stochastic control approaches to financial and other markets documentation and results. First, here is only short insight in some definitions of the main terms and subjects of researching area (stochastic, stochastic control, probabilistic and stochastic approaches, modern control and conventional control theory, cybernetics and informatics, pertinence and information needs, subjects on stock, bond, commodity, and currency markets, etc.).

Usually any kind of deterministic or essentially probabilistic time development, in relation to data or information and knowledge processing, which is analyzable in terms of probability, deserves the name of stochastic process. In mathematics, especially in probability theory, the field of stochastic processes has been a major area of research, and stochastic matrix is a matrix that has non-negative real entries that sum to one in each row. Stochastic always means random, and where a stochastic process is one whose behavior is non-deterministic in mathematical sense, in that a system's subsequent state is determined both by the process's predictable actions and by a random element. Also, it is well known from literature (Ĺström, 1970; Bertsekas & Shreve, 1996; Bertsekas, 2005; Bertsekas, 2007; Bertsekas & Tsitsiklis, 2008) that stochastic control is only a subfield of control theory which mainly addresses the design of a control methodology to deal with the probability of uncertainty in the data. In a stochastic control problem, the designer usually assumes that random noise and disturbances exist in both subsystems parts (in the model and in the controller), and the control design always must take into account these random deviations. Also, stochastic control aims to predict and to minimize the effects of these random deviations, by optimizing the design of the controller. Applications of stochastic control solutions are very different, like usage of stochastic control in: artificial intelligence, natural sciences (biology, physics, medicine, creativity, and geomorphology), music, social sciences, teaching and learning, language and linguistics, colour reproduction, mathematical theory and practice, business, manufacturing, finance, insurance, etc. For this research, interesting examples are: usage of stochastic control in insurance (Schmidli, 2008), and usage continuous-time stochastic control and optimization with financial applications (Pham, 2009), or usage stochastic optimal control for researching international finance and debt crises (Stein, 2006), etc. The financial markets use stochastic models to represent the seemingly random behaviour of assets such as stocks, commodities and interest rates, but usually these models are then used by quantitative analysts to value options on stock prices, bond prices, and on interest rates, as it can be seen in Markov models examples and many models examples which exist in the heart of the insurance industry (Schmidli, 2008).

When considering the "real informational needs" in context of relatively limited or different acting time and various interests of different subjects on financial and other markets and their appropriate operative (tactical or strategic) stochastic control approaches, the following facts should be noted:

- An informational request is different from an information necessity.
- It is the relevance of the process which connects documents to the informational request.
- It is the pertinence of the process which connects the documents to the informational need.

In today's turbulent market environment we have different subjects on markets (as potential traders on various markets) with similar or different interests and with relatively limited or even different acting time. Consequently, in order to achieve accurate and useful data, information or knowledge, we have to improve and adjust not only the activities related to retrieving and collecting of data (information or knowledge), but also the tools, techniques and methods appropriate to operative (tactical or strategic) stochastic control approaches to deal with all kind of data, information, knowledge (or documentation) about financial and other markets. Of course, one should always have a clear perception of the documents search algorithm tools which are used in any of research and learning processes, and of possible results of the documents (Data, Information and Knowledge, in short "D,I,K") search. The results of the search can always be (Fig. 1.): relevant and pertinent, relevant and non-pertinent and pertinent and irrelevant. Always, the goal is to have relevant and pertinent results, which can be achieved exclusively by knowing the "real information needs" of the persons (or financial subject). Also, when considering the relevance (Table 1.) of the derived documents (D,I,K): all the derived documents are not always relevant, in other words, all the relevant documents are often not found!

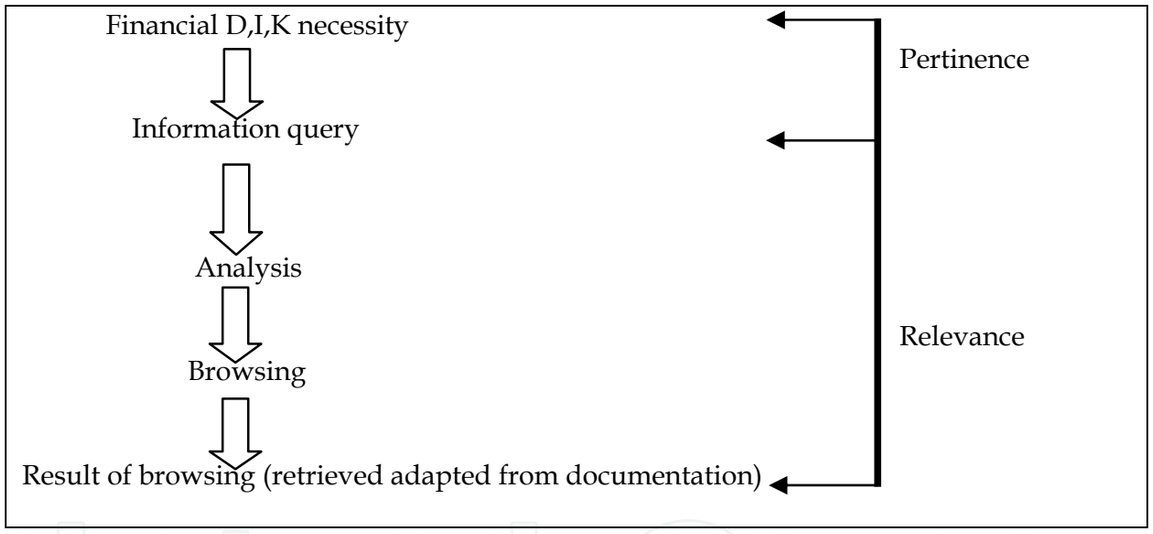


Fig. 1. Algorithm of research of financial documentation (D,I,K), adapted from (Tuđman et al., 1993)

Financial D,I,K	Relevant	Irrelevant	
Found	$\mathbf{R_f}$	I_f	$R_f + I_f$
Not found	R_{nf}	I_{nf}	$R_{nf} + I_{nf}$
	$R_f + R_{nf}$	$I_f + I_{nf}$	

Table 1. The relevance of financial documentation (D,I,K), adapted from (Tuđman et al., 1993)

Relevance can be expressed in percentages (%) through the following terms: exactness or precision, and response or recall. It can also be expressed in the form of the following ratios (Table 2) and equations (1), (2):

Exactness (or precision) = the number of found relevant financial documents (D,I,K) / the number of found financial documents (D,I,K) x 100%
Recall (or response) = the number of found relevant financial documents (D,I,K) / the number of relevant financial documents (D,I,K) in the system x 100%

Table 2. Ratios for exactness or precision, and response or recall

$$E = R_f / N_f \times 100\% \quad (1)$$

where E is exactness (or precision); R_f is the number of found relevant financial documents (D,I,K); N_f is the number of found financial documents (D,I,K), and

$$R = R_f / R_s \times 100\% \quad (2)$$

where R is recall (or response); R_f is the number of found relevant financial documents (D,I,K); R_s is the number of relevant financial documents (D,I,K) in the system.
Following the above stated, there are chapter sections following with short research examples of appropriate operative, tactical and strategic stochastic control approaches.

3. Operative, tactical and strategic research examples of appropriate stochastic control approaches to various markets

3.1 Example of appropriate operative stochastic control approach

In this chapter we give an operative research example as a relatively original and new stochastic control approach to day trading, and through this approach trader eliminate some of the risks of day trading through market specialization. When we have different subjects on markets, as potential traders on various markets, with similar or different interests, with relatively limited or even different acting time, market specialization help us to improve and adjust not only the activities related to retrieving and collecting data, information or knowledge in turbulent market environment, in order to achieve accurate and useful data, information or knowledge, but also the tools, techniques and methods which are appropriate to operative (tactical or strategic) stochastic control approaches (dealing with relevant data, information, knowledge, or documentation about financial and other markets). The goal of this approach to day trading is to have maximum relevant and pertinent results, which can be achieved exclusively by knowing the "real information needs" of the persons (or financial subject) which we know as day traders. When considering the relevance of the derived financial indicators and documents (D,I,K) referenced to day trading we have to know that all the derived documents are not always relevant, and all the relevant documents are often not found. Market specialization and usage of appropriate stochastic control approach, tools and techniques are necessity.
First question is: what we know about different subjects on markets, as potential traders on various markets, with similar or different interests and with relatively limited or even

different acting time needed for proposed market specialization? The operative concept is that the trader on a specific financial market should specialize him/herself in just one (blue-chip) stock and use existing day trading techniques (trend following, playing news, range trading, scalping, technical analysis, covering spreads…) to make money. Although there is no comprehensive empirical evidence available to answer the question whether individual day-traders gain profits, there is a number of studies (Barber et al., 2005) that point out that only a few are able to consistently earn profits sufficient to cover transaction costs and thus make money. Also, after the US market earned strong returns in 2003, day trading made a comeback and once again became a popular trading method among traders. As an operative concept, the day trading concept of buying and selling stocks on margin alone suggests that it is more risky than the usual "going long" way of making profit. The name, day trading, refers to a practice of buying (selling short) and selling (buying to cover) stocks during the day in such manner, that at the end of the day there has been no net change in position; a complete round – trip trade has been made. A primary motivation of this style of trading is to avoid the risks of radical changes in prices that may occur if a stock is held overnight that could lead to large losses. Traders performing such round – trip trades are called day traders. The U.S. Securities and Exchange Commission adopted a new term in the year 2000, "pattern day trader", referring to a customer who places four or more round-trip orders over a five-day period, provided the number of trades is more than six percent in the account for the five day period. On February 27, 2001, the Securities and Exchange Commission (SEC) approved amendments to National Association of Securities Dealers, Inc. (NASD®) Rule 2520 relating to margin requirements for day traders. Under the approved amendments, a pattern day trader would be required to maintain a minimum equity of $25,000 at all times. If the account falls below the $25,000 requirement, the pattern day trader would not be permitted to day trade until the account is restored.

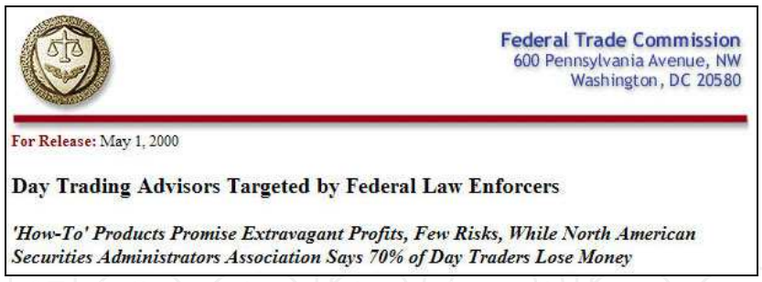
Second question is: what we know about common techniques and methods used by day traders which represent significant part of different subjects on markets, with similar or different interests, with relatively limited or even different acting time needed for proposed market specialization? There are minimally four common techniques used by day traders: trend following, playing news, range trading and scalping. Playing news and trend following are two techniques that are primarily in the realm of a day trader. When a trader is following a trend, he assumes that the stock which had been rising will continue to rise, and vice versa. One could say he is actually following the stocks "momentum". When a trader is playing news, his basic strategy is to buy a stock which has just announced good news, or sell short a stock which has announced bad news. After its boom during the dotcom frenzy of the late 1990s and the loss in popularity after the Internet bubble burst, day trading is making a comeback. After three years of strong stock market performance, a constantly increasing number of investors use day trading techniques to make profit.

In 2006, a search on the Social Science Service Network reports 395 articles on day trading, with over 40% published in the last 3 years. Similar searches on the most popular online bookstore, Amazon result in more than 400 popular books on day trading. In 2006, according to (Alexa Traffic Rankings, 2006), Amazon was the 15th most popular site and the highest ranked online bookstore on the Top 500 site ranking list. Today, according to (Alexa Traffic Rankings, 2010), Amazon site is the global leader with similar popularity and the highest ranked online bookstore on the Top 500 site ranking list. In 2006, many of the popular news agencies and papers report a surge in day trading popularity while some are

also reporting its negative sides. Associated Press reported a centrepiece "In Japan, day trading surges in popularity" on May 10, 2006 (Associated Press, 2006). The Sunday Times published an article "High-risk day trading makes a comeback" on February 26, 2006 (The Sunday Times, 2006). Searching the most popular World Wide Web searching engine, Google, for the term "day trading" results in over 120,000,000 links. In fact, Google was the most popular search engine according to the last Nielsen NetRatings search engine ratings that were published in November of 2005 (Nielsen NetRatings, 2005).

Fig. 2. Examples of the web reports on day trading

After U.S. Federal Trade Commission warning in 2000, the first one of those links redirects a user's browser to a warning about risks involved in day trading published on the homepage of the U.S. Securities and Exchange Commission.


Federal Trade Commission
600 Pennsylvania Avenue, NW
Washington, DC 20580

For Release: May 1, 2000

Day Trading Advisors Targeted by Federal Law Enforcers

'How-To' Products Promise Extravagant Profits, Few Risks, While North American Securities Administrators Association Says 70% of Day Traders Lose Money

Fig. 3. U.S. Federal Trade Commission warning on day trading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U.S. Securities and Exchange Commission

Day Trading

Day traders rapidly buy and sell stocks throughout the day in the hope that their stocks will continue climbing or falling in value for the seconds to minutes they own the stock, allowing them to lock in quick profits. Day trading is extremely risky and can result in substantial financial losses in a very short period of time. If you are a day trader, or are thinking about day trading, read our publication, Day Trading: Your Dollars at Risk. We also have warnings and tips about online trading and day trading.

Under the rules of NYSE and NASD, customers who are deemed "pattern day traders" must have at least $25,000 in their accounts and can only trade in margin accounts. For more information, you can read the NASD's Notice to Members and the New York Stock Exchange's Information Memo.

The Connecticut Council on Problem Gambling has a quiz to help you decide if you are gambling in our markets and where to go for help.

http://www.sec.gov/answers/daytrading.htm

Fig. 4. U.S. Securities and Exchange Commission warning on day trading

New question is: what is the day trading controversy? The day trading controversy is mainly fuelled by its main con, it is risky. The constant usage of margin (borrowed funds) is the strong and the weak point of day trading, because the usage of margin amplifies gains and losses such that substantial losses (and gains) may occur in a short period of time. Because day trading implies a minimum of two trades per business day (buying means selling short, and selling means buying to cover), a part of the day trader's funds are used to pay commissions (the broker's basic fee for purchasing or selling securities as an agent). The higher the number of trades per day is, the bigger the part of day trader's funds is used to pay commissions. Day trading also often requires live quotes which are costly, and therefore also have an impact on the funds of a day trader. For every one of these (main) cons, day trading is, as it was already mentioned, considered risky. An integral part in the day trading controversy is the day trader himself. Claims of easy and fast profits from day trading have attracted a significant number of non experienced and "casual" traders into day trading that do not fully understand the risks they are taking. With its latest comeback, day trading has become a business to people other than traders. Numerous websites offer tips and advices while online bookstores offer books on day trading strategies. With all that in mind, one could wonder do day traders make money. Although that question cannot be answered with certainty, a few existing studies do not paint a pretty picture. A comprehensive analysis of the profitability of all day trading activity in Taiwan over a five year period

(Barber et al., 2005) has shown that in a typical six month period, more than eight out of ten day traders lose money.

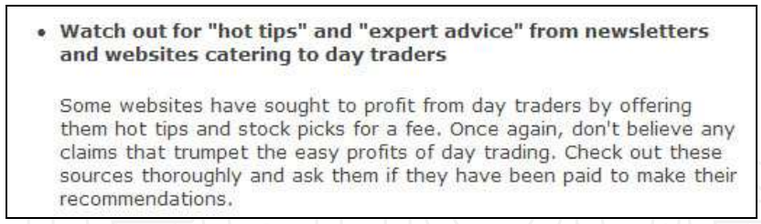

Fig. 5. U.S. Securities and Exchange Commission warning on day trading info

Another question is: what is the main concept of specialized day trading? According to (Simovic & Simovic, 2006), the main goal of specialized day trading is to offer a new approach and technique (or method) to day trading, an approach that would dampen or eliminate some of the negative sides of "regular" day trading. The concept is simple. Instead of using the usual day trading techniques on various types of stocks, the trader should specialize himself in using the same, already mentioned techniques, but with just one (blue chip) stock. A blue chip stock is the stock of a well-established company having stable earnings and no extensive liabilities.

And important question is: what is the main concept of proposed specialization? The main reason why specialization is proposed as new stochastic approach is in the fact that trading with different stocks on a daily basis brings a certain element of uncertainty since the day trader often does not have the time to thoroughly "check up" on a stock he is trading with. Focusing on just one stock eliminates the element of uncertainty and gives the day trader the opportunity, to through time better learn about its "behaviour" and how the selected stock reacts to certain events like splits, earning announcements, general (good or bad) news etc. Also, when considering the relevance of the derived documents (D,I,K) needed for day trading, because all the derived documents are not always relevant, and all the relevant documents are often not found, with blue chip stock (which is the stock of a well-established company having stable earnings and no extensive liabilities) stochastically we have lower level of problem. Suppose that our exactness or precision is not higher (E), because we have the same number of found relevant financial documents (R_f) or D,I,K, in relation to the same number of found financial documents (N_f) or D,I,K. But recall or response (R) have to be significantly better (or higher↑), because it represents ratio between the same R_f and now very small (or lower↓) R_s (where R_s is the number of relevant financial documents or D,I,K in our day trading sub-system). Consequently, better pertinence and relevance can be achieved through constant monitoring with same and better tools and techniques, also. A trader could gain knowledge on how the stock reacts on markets ups and downs, better insight on the meaning of afterhours trading activity or the manner how the company releases announcements (according to (DellaVigna & Pollet, 2005), "do worse announcements get announced on Friday to dampen the short-term response of the trader and thus the market?"), etc.

Fig. 6. NASDAQ (National Association of Securities Dealers Automated Quotations) Composite quote data from 1997 to 2006

Because a blue chip stock is the stock of a well-established company having stable earnings and no extensive liabilities the focus was put on blue chip stocks, and consequently they offer stability, which of course translates into low risk. With day trading blue chip stocks one cannot expect great profit in a single day, but the trade-off is that one cannot expect great loss also. For further stochastic analysis of "behaviour" of the blue chip stocks, we've taken Microsoft as an example. The analysis was based on 3 years (756 working days) of daily data, which were obtained on Nasdaq's website (Nasdaq, 2003), from 07/18/2003 till 07/18/2006. That particular period of time was chosen for our analysis because it consists of newest daily quotes from the last MSFT (Symbol that represents a Microsoft stock) stock split (02/18/2003).

The data is consisted of the opening price (o_i), closing price (c_i), daily low (l_i) and the daily high (h_i). Using the following equations we've calculated the values (percentage) of the daily spreads (S_i) between the opening and the closing price. This was done in order to calculate the average spread (S_{av}) between the two already mentioned values which will help us illustrate the potential of this kind of day trading.

$$\left|\frac{c_i - o_i}{o_i} * 100\right| = S_i \qquad \frac{\sum_{i=1}^{n} S_i}{n} = S_{av} \qquad i \in [1, n] \quad n = 756 \tag{3}$$

The average spread between the opening and the closing price (S_{av}) for a Microsoft stock in that period of time was 0.706059344 % which is a very good indicator of its stability.

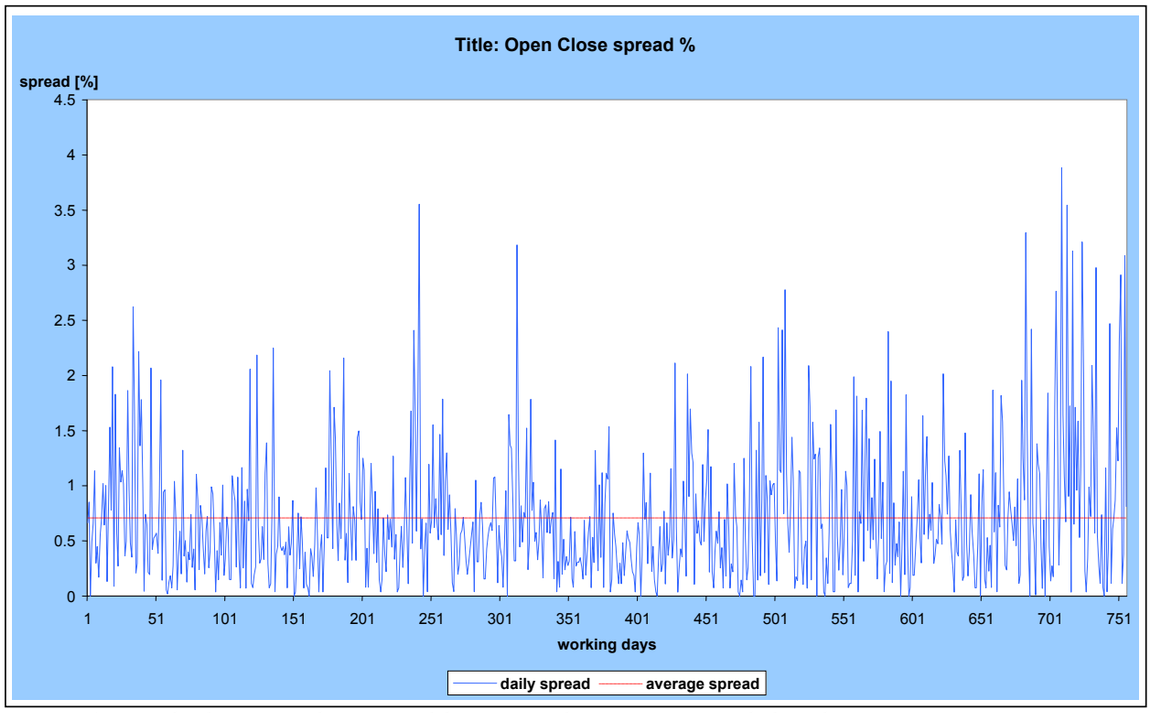

Fig. 7. A graph showing the spread between the opening and the closing price

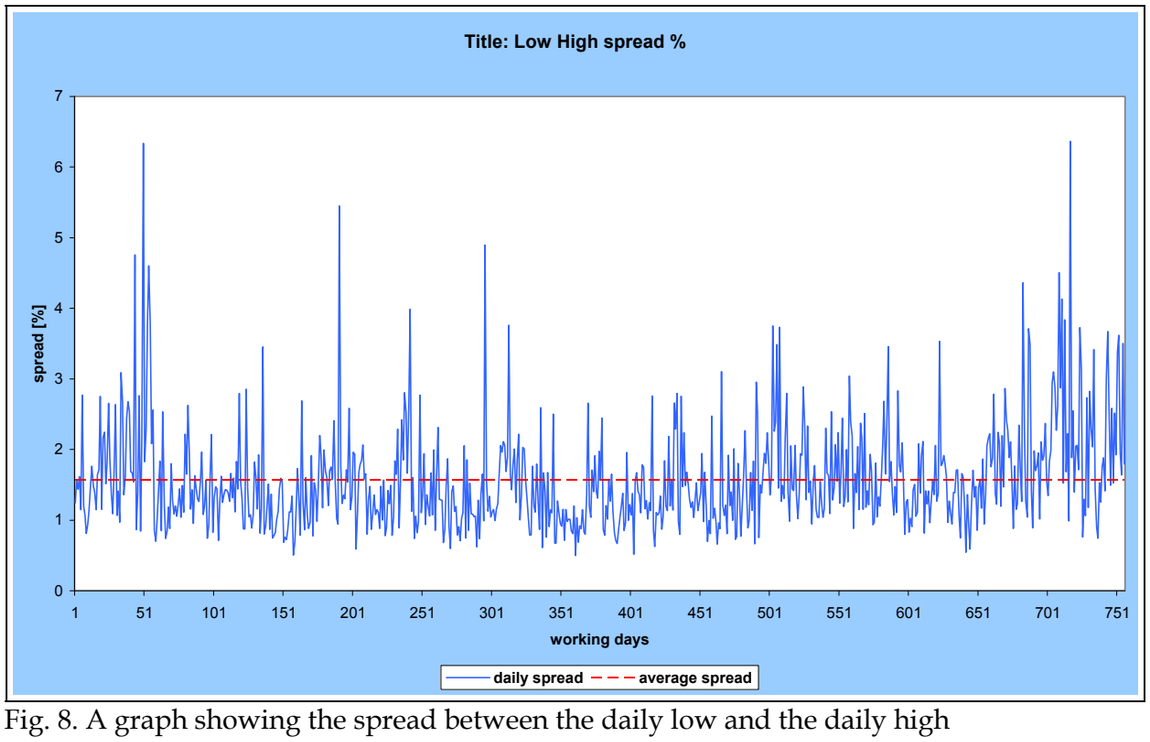

Fig. 8. A graph showing the spread between the daily low and the daily high

Using the exact equations we've also calculated the values (percentage) of the daily spreads (Q_i) between the daily low and the daily high. This was done in order to calculate the

average spread (Q_{av}) between those two values so that we can illustrate the full (but unreachable) potential of this kind of day trading.

$$\left|\frac{h_i - l_i}{l_i} * 100\right| = Q_i \qquad \frac{\sum_{i=1}^{n} Q_i}{n} = Q_{av} \qquad \begin{matrix} i \in [1, n] \\ n = 756 \end{matrix} \tag{4}$$

The average spread between the daily low and the daily high (Q_{av}) for a Microsoft stock in that period of time was 1.57655549 %.
To show the potential profit for this way of day trading we are going to use the following functions with the already calculated average daily spreads. These functions represent the total return (via percentage) in 30 working days of which a certain number (α) had a "positive" (and the rest "negative") trading outcome.

$$\left(1 + \frac{S_{av}}{100}\right)^{\alpha} * \left(1 - \frac{S_{av}}{100}\right)^{30-\alpha} * 100 = S_p \tag{5}$$

$$\left(1 + \frac{Q_{av}}{100}\right)^{\alpha} * \left(1 - \frac{Q_{av}}{100}\right)^{30-\alpha} * 100 = Q_p \tag{6}$$

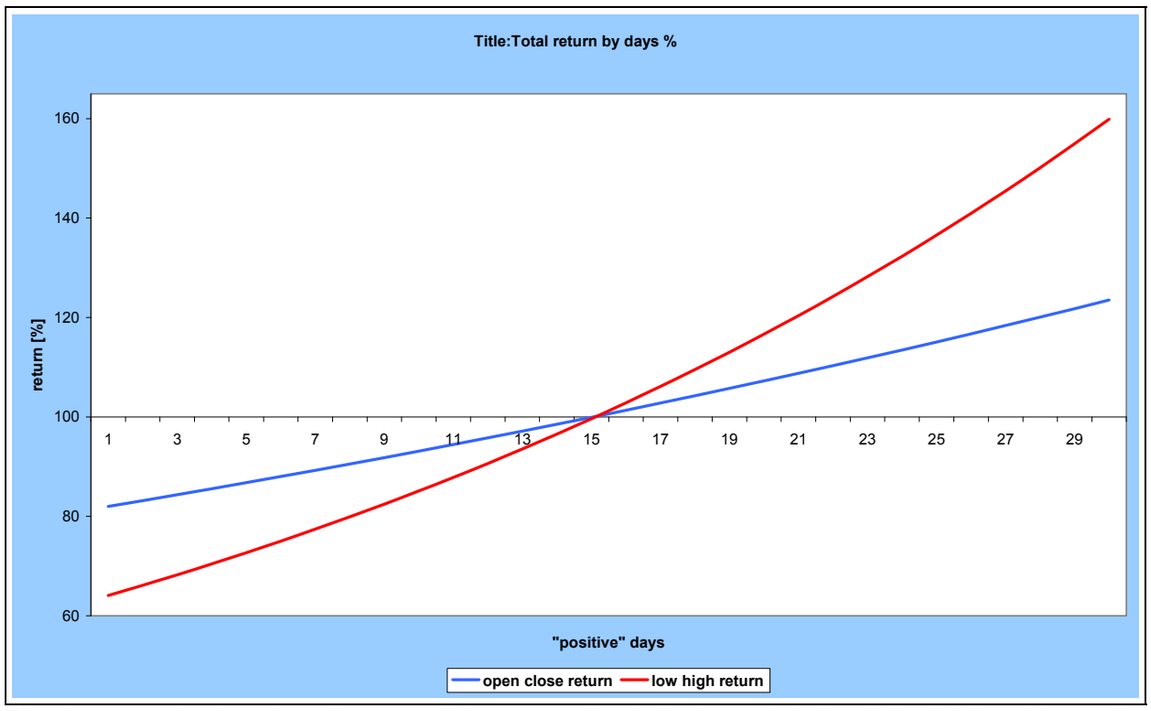

Fig. 9. A graph showing the spread between the daily low and the daily high without the usage of margin

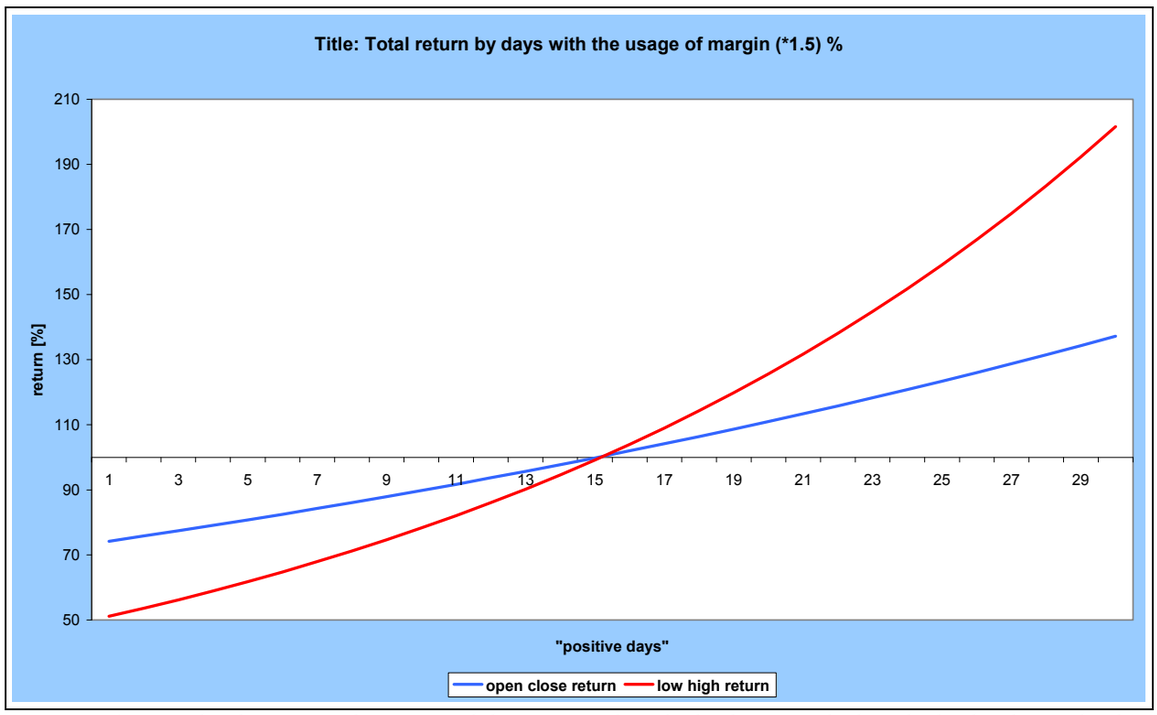

Fig. 10. A graph showing the spread between the daily low and the daily high with the usage of margin

With the usage of margin (M), gains and losses are amplified.

$$\left(1+\frac{S_{av}}{100}*\left(\frac{M}{100}\right)\right)^{\alpha}*\left(1-\frac{S_{av}}{100}*\left(\frac{M}{100}\right)\right)^{30-\alpha}*100=S_{mp} \tag{7}$$

$$\left(1+\frac{Q_{av}}{100}*\left(\frac{M}{100}\right)\right)^{\alpha}*\left(1-\frac{Q_{av}}{100}*\left(\frac{M}{100}\right)\right)^{30-\alpha}*100=Q_{mp} \tag{8}$$

As Wall Street Gordon Gekko says that "information is the most important commodity when trading" (Kuepper, 2010), through specialized day trading example, we've tried to offers a new approach to day trading information and with it eliminate some of the operative risks of day trading, and to show how important is concept of pertinence and relevance. This operative example tried to explain the reasons behind the concept of specialization model in trading in just one (blue chip) stock with the usage of existing day trading techniques and show that the usage of such concept has potential and can be profitable. With some new stochastic control or optimization approaches we can operatively reduce a level of noise from irrelevant D, I, K, about market, in both of our day trading subsystem parts (model and controller). In our stochastic control solution, the designer have to assume that random noise and disturbances exist in both subsystems parts (in the model and in the controller), and consequently the control design always must take into account these random deviations. This is for further researching.

3.2 Examples of appropriate tactical and strategic stochastic control approaches

In this chapter we give two very short research examples (from practice and relevant literature) of appropriate tactical and strategic stochastic control approaches. The tactical model conceptually represents one example of a quantitative approach to tactical asset allocation (Faber, 2009). In tactical example from relevant literature (Faber, 2009) one can see how to create a simple-to-follow model example as a tactical method for managing risk in a single asset class and, by extension, a portfolio of assets. From the available sources, one can conclude that a non-discretionary trend following model acts as a risk-reduction tactical technique with no adverse impact on return. Here we only try to give adequate references (with original comments and models) that utilizing a monthly system and where an investor would have been able to (avoid massive losses) increase risk adjusted returns and sidestep many of the protracted bear markets in various asset classes. Similar to operative example about day trading this tactical example represent reference model how to analyse and research methods that are used in tactical or even strategic stochastic control approach. There are various technical analysis tools available to tactical level investors, and in defined period of tactical time, for different subjects on markets (as potential tactical traders on various financial markets, stock markets, bond markets, commodity markets, and currency markets, etc.) which may improve and adjust the tactical activities related to collection and retrieving D,I,K, in order to achieve accurate and useful D,I,K, appropriate to tactical (or even strategic) stochastic control approaches to financial and other markets. Mainly the tactical methods used to analyze and predict the performance of a company's stock fall into two broad categories: fundamental and technical analysis. Those who use technical analysis (various tactical level investors, etc.) look for peaks, bottoms, trends, patterns and other factors affecting a stocks, bonds, “forex”, futures, options, indexes, currencies and commodities price movement and then make “buy or sell” decisions based on those factors. It is important to notice that this is a tactical level technique many people and companies attempt, but few are truly successful at it. Also, the world of technical analysis is huge because there are literally hundreds of different patterns and indicators that investors and traders claim to have success with.

The main purpose of this tactical example from (Faber, 2009) was to create a simple-to-follow method for managing risk in a single asset class and, by extension, a portfolio of assets. A non-discretionary and trend following model here acts as a risk-reduction tactical technique with no adverse impact on return. Also, notice that when tested on various markets, risk-adjusted returns were almost universally improved, what is tactically and strategically very important. In this example (Faber, 2009) one can see that utilizing a monthly system since 1973, an tactical investor would have been able to increase risk adjusted returns by diversifying portfolio assets and employing a market-timing solution. In addition, the investor would have also been able to sidestep many of the protracted bear markets in various asset classes, and with tactically avoiding these massive losses would have resulted in equity-like returns with bond-like volatility and drawdown.

In this chapter we give a short strategic concept example, because we use specific technical analysis in financial markets as an original strategic concept (with original comments and models) and which can be used for strategic anti-money laundering analysis as another original strategic concept (with original comments and models). What is Technical Analysis (TA)? TA is a tactical and specific strategic method of evaluating the markets value by analyzing statistics generated by market activity, past prices and volume. TA does not

attempt to measure a vehicle's intrinsic value; instead they look at charts for patterns and indicators that will determine future performance. TA has become increasingly popular over the past several years, only when people “believe” that the historical performance is a strong indication of future performance. The use of past performance should come as no surprise, because people (and other market subject) using fundamental analysis have always looked at the past performance of companies by comparing fiscal data from previous quarters and years to determine future growth. The difference lies in the technical analyst's belief that securities move according to very predictable trends and patterns, and that these trends continue until something happens to change the trend, or until this change occurs, price levels are predictable. There are many instances of various investors successfully trading a security using only their past knowledge of the security's chart, without even understanding what the company really does. Although TA is a terrific analytical tool, most of market subjects agree it is much more effective when used in combination with proper money management tools. TA or formula traders on market use mathematical formulae to decide when a stock is going to rise or fall, and most traders use technical indicators; although more experienced traders tend to use fewer of them. Some old traders on market do not even use charts, but buy and sell just from so called approach "reading the tape", that is in fact procedure: watching the bid, then ask and trade with volume numbers from a trading screen. How to “cover spreads” in tactical approach practice? Playing the spread involves buying at the bid price and selling at the ask price, where the numerical difference between these two prices is known as the spread. This procedure allows for profit even when the bid and ask don't move at all, and consequently what the bigger the spread, the more inefficient the market for that particular stock, and the more potential for profit. As opposed to trade commissions, this spread is the mechanism that some large Wall Street firms use to make most of their money since the advent of online discount brokerages.

How to make categorization of tactical and strategic investors and companies by specific trading market? According (Faber, 2009), about 75% of all trades are to the upside - that is, the trader buys an issue hoping its price will rise - because of the stock market's historical tendency to rise and because there are no technical limitations on it. Also, about 25% of equity trades, however, are short sales. The trader borrows stock from his broker and sells the borrowed stock, hoping that the price will fall and he will be able to purchase the shares at a lower price. There are several technical problems with short sales: the broker may not have shares to lend in a specific issue, some short sales can only be made if the stock price or bid has just risen (known as an "uptick"), and the broker can call for return of its shares at any time. When the typical online investor places a market order to buy a stock, his broker submits this order to a market maker (MM), who then fulfills the order at the ask price. Then ask price is the price the MM is asking for the stock, and when the typical online investor places a market order to sell a stock, the broker submits the order to a MM and sells at the bid price, i.e. what the MM is bidding for the stock. Due to the liquidity of the modern market, orders are constantly flowing, and usually a MM will buy a stock just to turn around and sell it to a particular broker. Among all other things one of the main purposes of the MM is to maintain liquidity in the market. How to make categorization of companies by market cap? First, we have to know that market capitalization, often abbreviated to market cap, is a business term that refers to the aggregate value of a firm's outstanding common shares. Market capitalization reflects the total value of a firm's equity currently available on the market, and this measure differs from equity value to the extent that a firm has

outstanding stock options or other securities convertible to common shares. The size and growth of a firm's market cap is often one of the critical measurements of a public company's success or failure. Market cap may increase or decrease for reasons unrelated to performance such as acquisitions, divestitures and stock repurchases, and it is calculated by multiplying the number of outstanding common shares of the firm and the current price of those shares. The term capitalization is sometimes used as a synonym of market cap. It denotes the total amount of funds used to finance a firm's balance sheet and is calculated as market capitalization plus debt, as book or market value, plus preferred stock. The total market cap of all the companies listed on the New York Stock Exchange is greater than the amount of money in the United States. While there are no strong definitions for market cap categorizations, a few terms are frequently used to group companies by capitalization. In the U.S., companies and stocks are often categorized by the following approximate market cap values: micro-cap - market cap under US$100 million; small-cap - market cap below US$1 billion; mid-cap - market cap between US$1 billion and US$5 billion; and large-cap - market cap exceeds US$5 billion. The small-cap definition is far more controversial than those for the mid-cap and large-cap classes. Typical values for the ranges are enumerated and "blue chip" is sometimes used as a synonym for large-cap, while some investors consider any micro-cap or nano-cap issue to be a penny stock, regardless of share price. Examples of share valuation compared to market cap or price, and share ownership, from (Yahoo!® Finance, 2010), and according to: valuation measures and share statistics.

Here is our strategic example. This part is short explanation of the main Operations Research (OR) concepts and results, which are accomplished during the soft computing process (based on fuzzy logic) of the analytical entropy of the modern financial analytical function, what is also a solid base for future simulation modelling works. Here are some remarks about: "soft computing" and "fuzzy logic". The conventional approaches for predicting and understanding the entropy of the modern financial analytical function and the behaviour of various financial markets that are based on well-known analytical techniques can prove to be inadequate. Sometimes, even at the initial stages of establishing an appropriate mathematical model, the computational environment used in such an analytical approach is often too categorical and inflexible in order to cope with the financial intricacy and the complexity of the real world financial systems (like Croatian financial systems and internal financial market are, or can be). The mathematical model of modern financial analytical function is not only based on so called "hard computing" methods (binary logic, crisp systems, numerical analysis, probability theory, differential equations, functional analysis, mathematical programming, approximation theory and crisp software), because the fact that Croatian internal financial market usually has not the attributes of quantitative, precision, formality and categorisation. All mentioned before clearly turns out that in dealing with such systems we have to face with a very high degree of uncertainty and to tolerate very big degree of imprecision. Idea is to exploit a formalisation of the human ability to make rational decision in an uncertain and imprecise environment, also to exploit the soft computing tolerance for imprecision and uncertainty, and to achieve an acceptable model solution at a low cost and tractability. The principle of soft computing, given by Prof. Lotfi A. Zadeh (Zadeh, 1996) is: "Exploit the tolerance for imprecision, uncertainty and partial truth to achieve tractability, robustness, low solution cost and better rapport with reality." Soft computing has the attributes of qualitative, dispositional, approximation, and it is oriented towards the analysis based on fuzzy logic, artificial neural

networks and probabilistic reasoning, including genetic algorithms, chaos theory and parts of machine learning. Fuzzy logic is mainly concerned with imprecision and approximate reasoning, neural-computing mainly with learning and curve fitting, genetic-computing with searching and optimisation, and probabilistic reasoning mainly with uncertainty and propagation of belief. The main constituents of soft computing are complementary rather than competitive elements, and usually it can be more effective to use them in a synergetic combination manner (rather than exclusively). A fusion of all three constituents of soft computing is not very common.

When we think about Business Intelligence (BI) in the context of the entropy of the modern financial analytical function it is very important to understand what BI is. BI is process of collecting various business data (financial and other data) and transforming it to BI information that is used to provide better decisions, which improve the organisation performance. For collecting and managing corporate financial and other data many corporate and financial organizations (governmental or not) have more than one operational system. BI (with data warehousing) system is enabling technology that provides some governmental and financial organizations with end-to-end solutions for managing, organizing and exploiting financial and other data throughout the enterprise. This enabling technology provides tools to bring all the pieces of financial business information together in a single organized data repository that is driven by common set of financial and other business definitions. BI systems are used for exploration, analysis and reporting of trends found in the transactional data. They are designed to process inquiries and are vital to creating strategic competitive advantages that can affect an organizations' short-term and long-term financial profitability. There is an urgent need to collate (financial and other) data and provide financial decision-makers with the facility of additional financial reports, facility to explore and analyse data, in different dimensions and arriving at financial and other decisions, strategic to the governmental and financial organization. During the whole BI process, modern financial analytical function is mainly concerned with process of discovering financial knowledge. Maybe it can be the most significant part for the whole BI process. The financial analytical function of the BI was prepared for investigations of various financial events, financial markets, subjects or entities, and for financial business operations controls methods, etc. An application of this model usually increases the investigation group effectiveness, efficiency, and quality of the operational and strategic financial market investigative operations that are in usage during the whole financial knowledge discovery process. During the strategic BI processes financial "knowledge workers" are usually in situation that they have to work with: data marts (for small areas of financial data analysis) or with data warehouses (for larger areas of financial data analysis). Data marts and data warehouses are data collections produced during the analytical mixing of internal and external financial and other data. The analytical mixing is result of logic process that is prepared with detailed or aggregated view on mixing data. Result is data warehouses with synthetic financial view (detailed and aggregated). Synthetic financial view is producing with processes like the strategic BI visualisation & data drilling up and down through the specific time, financial value, financial service, financial product, financial market or combined dimension.

The basic components of the financial BI solution are: multidimensional (financial and other) data store, data extraction tool and front end tool for analysis. In general, an application of modern financial knowledge discovery model may be accomplished through finalisation of

few financial data mining tasks, which can be classified into two categories: descriptive financial data mining (describes the data set in a concise and summary manner and presents interesting general properties of the financial data), and predictive financial data mining (constructs one or a set of financial & other models, performs inference on the available set of financial & other interesting data, and attempts to predict the behaviour of new financial & other interesting data sets). The fast computerisation of the Croatian financial sector and various impacts of data mining should not be under-estimated with usage of the modern financial analytical function.

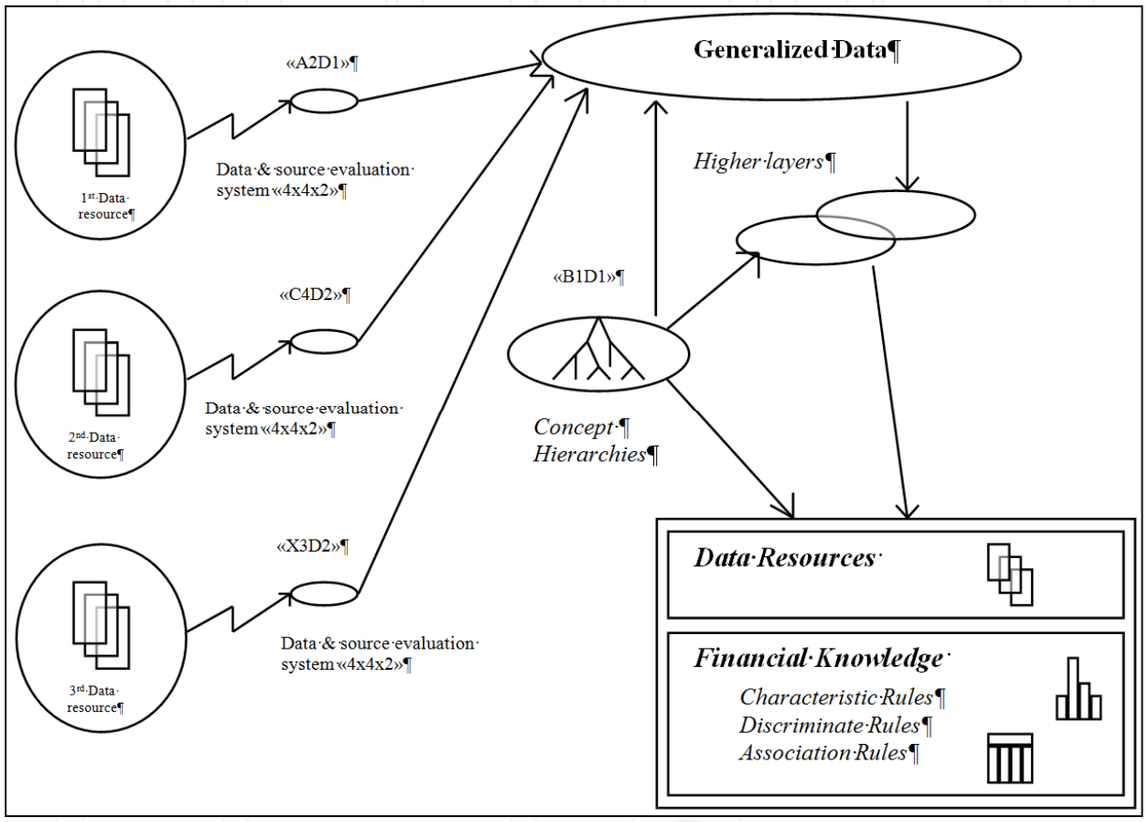

Fig. 11. The BI financial knowledge discovery model

Financial knowledge discovery model is a tool for translating the bits of various (mainly financial) data resources and observations into an understandable pattern of data behaviour (Fig. 11). With application of the financial knowledge discovery model and intelligent software tools in the informational and financial aspects of the BI one can radically change quality of the whole BI process. When a large amount of financial business interrelated data are effectively analysed from different perspectives BI (with data warehousing) system is enabling technology that provides organizations with end-to-end solutions for managing, organizing and exploiting financial and other data. Without BI (& data warehousing) technology this can also pose threats to the goal of protecting data security and guarding against the invasion of financial privacy (throughout the whole enterprise). This enabling technology (BI with data warehousing) provides tools to bring all the pieces of financial business information together in a single security organized data repository that is driven by

common set of financial and other business definitions, which are used for exploration, analysis and reporting of trends found in the transactional data. In the final BI analysis, financial network construction model with financial knowledge discovery concept provides a framework to look at interactions and transactions as a function of both permanent and temporary relations. In an application of profound financial knowledge discovery model dealing with semantic heterogeneity is necessity and only schema level analysis is not sufficient to solve the problem. Because of that the data level analysis with analysis of database (data warehouse) contents in co-operative BI information systems was widely introduced and successfully used. In co-operative BI information systems "On Line Analytical Processing" (OLAM) method/technique is in fact dealing with a multiple-layer database (MLDB) or multidimensional database (MDDB) model and co-operative heterogeneous databases. OLAM deals with generalisation-based financial data mining techniques. For example (Fig. 12), "DBMiner" is a cutting-edge intelligent data mining and data warehousing system and have OLAP and OLAM capabilities (Han, 1999).

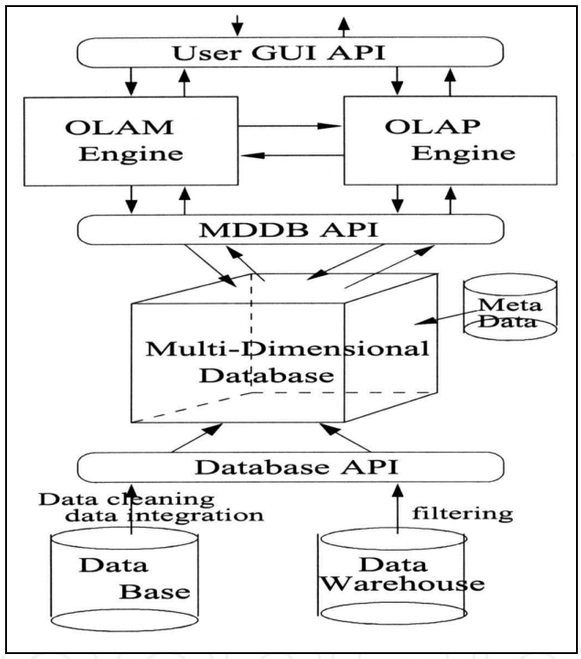

Fig. 12. "DBMiner" software architecture, as integrated OLAM & OLAP architecture (Han, 1999)

Also, BI visualisation techniques (of the modern financial analytical function) are examples that financial data mining is discovery-driven and that financial pattern is automatically extracted from data, what requires substantial search efforts. Prof. Lotfi A. Zadeh founded the soft computing based on fuzzy logic in 1965, with the well-known "theory of fuzzy sets". A fuzzy decision is a special type of fuzzy sets. The decision in a fuzzy environment (depending on the context) can be viewed as the intersection of fuzzy constraints and fuzzy objective function(s), where the fuzzy objective function is characterised by its membership function, and represents constraints. By analogy to no fuzzy environments (where the decision is the selection of activities that simultaneously satisfy objective function(s) and constraints), the decision in a fuzzy environment is defined as the optimal selection of

activities that simultaneously satisfy fuzzy objective function and fuzzy constraints. According to (Simovic et al., 1998), assumptions are that the constraints are no interactive, the logical and corresponds to the intersection. By analogy to crisp (no fuzzy) environments and to crisp decision logic, in fuzzy environments we have slightly different decision logic (usually called "fuzzy decision logic"). A linguistic variable x is a variable whose values are words or sentences in natural or artificial language. For example, if intelligence is interpreted as a linguistic variable, then its term set T(X), as the set of its linguistic values, might be:

T(intelligence) = disinformation + very low information + low information + unknown (or entropy) + high information + very high information + …. ,

where each of the terms in T(intelligence) is a label of fuzzy subset of a universe of discourse, say U = [xmin, xmax], or because of practical reasons usually U = [0, xmax] $\subset$ R. With a linguistic variable are associated two rules: syntactic rule (which defines the well formed sentences in T(X)) and semantic rule (by which the meaning of the terms in T(X) may be determined).

7. Conclusion

In the chapter where we present the conclusion of our research, we also introduce an adequate algorithm (in the form of a graphic and mathematical representation) for the appropriate perception of pertinence and information needs of different subjects on markets. We announce main trends and a great significance of appropriate operative (tactical or strategic) stochastic control (as specific quantitative and qualitative models) approaches in correlation to expected results. Finally, we promote new research areas and suggest future research directions.

8. References

Alexa Traffic Rankings (2006). *http://www.alexa.com/*, (07/18/2006; 04/17/2010), site of The Web Information Company

Associated Press (2006). *http://www.ap.org/*, (05/10/2006; 04/17/2010), site of The Associated Press

Barber, B. M.; Lee, Y. T.; Liu, Y. J. & Odean, T. (2005). Do Individual Day Traders Make Money? Evidence from Taiwan, University of California, Berkeley

Bertsekas, D. P. (2005). *Dynamic Programming and Optimal Control, Vol. I, 3rd Edition*, Athena Scientific, ISBN 1-886529-26-4, Nashua

Bertsekas, D. P. (2007). *Dynamic Programming and Optimal Control, Vol. II, 3rd Edition*, Athena Scientific, ISBN 1-886529-30-2, Nashua

Bertsekas, D. P. & Shreve, S. E. (1996). *Stochastic Optimal Control: The Discrete-Time Case*, Athena Scientific, ISBN 1-886529-03-5, Nashua

Bertsekas, D. P. & Tsitsiklis, J. N. (2008). *Introduction to Probability, 2nd Edition*, Athena Scientific, ISBN 978-1-886529-23-6, Nashua

DellaVigna, S. & Pollet, J. M. (2005). Strategic Release of Information on Friday: Evidence from Earnings Announcements, University of California, Berkeley

Faber, M. T. (2009). A Quantitative Approach to Tactical Asset Allocation, In: *The Journal of Wealth Management*, (February 2009, Update), Institutional Investor Inc, ISSN 1534-7524, New York

Han, J. (1999). Characteristic Rules, DBMiner, In: *Handbook of Data Mining and Knowledge Discovery*, Kloesgen, W.; Zytkow, J. (Eds.), Oxford University Press

Kuepper, J. (2010). A Day Trading: An Introduction, In: *INVESTOPEDIA A Forbes Digital Company: http://www.investopedia.com/articles/trading/05/011705.asp*, (04/17/2010)

Linnainmaa, J. T. (2003). The Anatomy of Day Traders, In: *American Finance Association 2004 San Diego Meetings*, Rene M. Stulz, (Ed.), AFA, University of California, Berkeley

Ĺström, K. J. (1970). *Introduction to Stochastic Control Theory*, Dover Publications, ISBN 0486445313, New York

Mooers, C. N. (1976). Technology of information handling: A pioneer's view. *Bulletin of the American Society for Information Science*, Vol. 2; No. 8, 18-19

Nasdaq (2003). *http://www.nasdaq.com/*, (from 07/18/2003 till 07/18/2006; 04/17/2010), The NASDAQ Stock Market - Official site of The NASDAQ Stock Market

Nielsen NetRatings (2005). *http://en-us.nielsen.com/tab/product_families/nielsen_netratings*, (04/17/2005; 04/17/2010), Online Measurement Services to Understand, Measure and Respond to Online Consumers

Perry, J. W. & Kent, A. (1958). *Tools for machine literature searching*, Interscience Publishers, New York

Perry, J. W.; Kent, A. & Berry, M. M. (1956). *Machine literature searching*, Western Reserve University Press and Interscience Publishers, Cleveland

Pham, H. (2009). *Continuous-time Stochastic Control and Optimization with Financial Applications*, Springer Berlin Heidelberg, ISBN 978-3-540-89499-5, Berlin Heidelberg

Schmidli, H. (2008). *Stochastic Control in Insurance*, Springer London, ISBN 978-1-84800-002-5, London

Schultz, C. K. & Luhn H. P. (1968). *Pioneer of information science - Selected works*, Spartan Books, New York

Simovic, V.; Radic, D. & Zrinusic, Z. (1998). Operational Model for Analysing and Visualisation of the Interesting and Suspicious Financial Transactions, *Proceedings of the 23rd Meeting of the Euro Working Group on Financial Modelling*, pp. 219-229, Kraków, Jun 1998, EWGFM, Kraków

Simovic, V. & Simovic, V. (2006). Specialized Day Trading - A New View of an Old Game, *Pre-Conference Proceedings of the Special Focus Symposium on 4th Catallactics: Quantitative-Behavioural Modelling Of Human Actions And Interactions On Markets*, pp. 49-56, ISBN 953-99326-3-7, Baden-Baden, Germany, August 2006, ECNSI, Zagreb

Stein, J. L. (2006). *Stochastic Optimal Control, International Finance, and Debt Crises*, Oxford University Press, ISBN 0-19-928057-6 978-0-19-928057-5, Oxford

Taube, M., & Wooster, H. (1958). *Information storage and retrieval: Theory, systems, and devices*, Columbia University Press, New York

The Sunday Times (2006). *http://www.timesonline.co.uk/tol/news/*, (02/26/2006; 04/17/2010), site of The Sunday Times

Tuđman, M.; Boras, D. & Dovedan, Z. (1993). *Introduction to information science, Second edition (in Croatian: Uvod u informacijske znanosti, drugo izdanje)*, Školska knjiga, Zagreb

Zadeh, L. A. (1996), Fuzzy logic, Neural Networks and Soft Computing, In: *Computational Intelligence: Soft Computing and Neuro-Fuzzy Integration with Applications*, Kaynak, O.; Zadeh, L. A.; Tuksen, B.; Rudas I. (Eds.), Springer Verlag, NATO ASI Series

Yahoo!® Finance (2010). *http://finance.yahoo.com*, (04/17/2010), site of The Yahoo! Inc.

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Uncertainty presents significant challenges in the reasoning about and controlling of complex dynamical systems. To address this challenge, numerous researchers are developing improved methods for stochastic analysis. This book presents a diverse collection of some of the latest research in this important area. In particular, this book gives an overview of some of the theoretical methods and tools for stochastic analysis, and it presents the applications of these methods to problems in systems theory, science, and economics.

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