Empirical Case Study of Binary Options Trading: An Interdisciplinary Application of Telecommunications Methodology to Financial Economics

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ABSTRACT

This paper presents an interdisciplinary application of information & communication methodology to financial economics. The empirical case study reported in this contribution consists of a preliminary example of binary options stock trading. The authors have investigated the performance of a simple algorithm which includes one buy/sell order per week. They have analyzed real sets of historical stock quotes, evidencing the asymmetry of achievable economic returns. In fact, the devised algorithm has denoted a (simulated) overall trading gain in the 87% of cases. A discussion, correlating such trend to the typical behavior of occasional traders, is finally reported.

Keywords: Binary Options Stock Trading, Emerging Telecommunications Applications, Financial Data Extrapolation, Financial Engineering, Network Platforms for Internet Banking, Statistical Analysis

INTRODUCTION AND MOTIVATIONS

In the last years, there has been an explosive growth in the research area relating economics and mathematical modeling (Gradojevic & Gencay, 2011; Bekiros, 2011), especially in the fields of business and banking researches and applications (Nair et al., 2010; Liu & Xiao, 2009; Taskaya & Ahmad, 2003; Nuti et al., 2011). However, it is more important to dynamically follow the non-stationary processes’ fluctuations to provide optimal information for automatic trading, than statistically modeling data sequences (Ehlers, 2001; Zhang & Kedmey, 2011). In fact, stock traders usually try to profit from short-term price volatility with trades lasting anywhere, from several seconds to several weeks (Wikipedia, 2012a).
The increasing development of on-line trading and Internet banking have boosted the growth of proprietary methods (Slamka et al., in press). In this sense and according to (Tsakalozos et al., 2011), we do not know what we do not know. Among the proprietary algorithms based on heuristic concepts, one popular trading strategy is binary option trading (Raw, 2008). In finance, a binary option is a type of option where the payoff is either some fixed amount of some asset or nothing at all (Wikipedia, 2012b).

We have searched through the literature and we have found that a Google search with the queries “Telecommunications” + “binary option” returns zero results (Google, 2012). In most specific database of IEEE Xplore, there are two papers found with the query “binary options” (IEEE, 2012): namely Wang et al. (1998) and Yuan and Xiao (2011). But the paper (Wang et al., 1998) deals with binary options meaning the classical binary hypothesis testing. Hence, Yuan and Xiao (2011) is the only paper about binary options from the economic viewpoint, in the IEEE database. In particular, the authors in Yuan and Xiao (2011) present a new numerical method for pricing binary options, showing with numerical examples that the proposed algorithm is conditional stable and convergent. The binary options trading is becoming more and more popular because it provides easy indications to operate in a dynamic manner, and suited to occasional operators that usually trade by their remote Internet on-line platforms.

This paper aims to highlight the huge possibility in exploiting telecommunication methodologies in synergy with stock trading, showing an empirical case study. We propose to exploit the hidden market trends of stock prices (Drakakis, 2009) for application to stock trading. In particular, our case study consists of a preliminary example of trading stocks with a simple algorithm for binary options, which includes one buy / sell order for week of a fixed amount of cash (or exchange equivalent) to limit the maximum risk of the investment to that fixed amount. The advantage of using a simple trading model reflects in the fact that the performance evaluation is straightforwardly based on the return in terms of cash and stock portfolios at the end of the trading session.

The remainder of this work is organized as follows. First we detail the proposed data processing technique for financial stock trading, and then we discuss a case study reported along with the results’ discussion. Our discussion and conclusions are finally depicted in the last section.

**DATA PROCESSING ALGORITHM FOR FINANCIAL STOCK TRADING**

In this section, we explain the data processing methodology we have applied on financial signals. First of all, we have analyzed financial stocks using different data processing techniques, typical of telecommunications signals, to extrapolate the hidden periodicities. In particular, we have exploited cumbersome methods, such as the multiple signal classification (MUSIC) (Kay & Demeure, 1984), Pisarenko, and Prony algorithms (Kay & Marple, 1981), as well as simpler techniques such as statistical correlation / covariance analysis, and Fourier transform-based methods (periodogram) (Oppenheim & Schafer, 1975). Each of the previous-mentioned techniques has been applied to different ensembles of financial stocks and we have observed the same trend: there is a positive correlation with a distance of 1 day and a negative correlation with a distance of 1 week from the maximum. Other correlations exist but they are random and characterized by more non-stationarity. In a recent development, an interesting technique was proposed and applied on financial signals to capture the sign of the increment of the signal instead of the exact future value (Tsakalozos et al., 2011).

The authors in Tsakalozos et al. (2011) use the Empirical Mode Decomposition (EMD), which offers a Fourier series-like expansion of any...
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