An Introduction to the Special Issue on Computational Techniques for Trading Systems, Time Series Forecasting, Stock Market Modeling, Financial Assets Modeling

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The aim of the special Issue "*Computational Techniques for Trading Systems, Time Series Forecasting, Stock Market Modeling, Financial Assets Modeling*" is to present some of the latest research carried out in the field of computational finance.

Financial time series modelling is regarded as one of the most challenging forecasting problems due to the fact that financial time series are inherently noisy, non-stationary and deterministically chaotic. This is strongly associated with the heterogeneous characteristics of traders (e.g. fundamentalist vs. technical analysts). Using the traditional computational techniques, it has been not possible to model the large proportion of noise and the changing distribution in financial data, respectively. Therefore, novel computational methods have emerged recently to bridge this gap. Various variants of GARCH models, neural networks, machine learning methods, fuzzy rule-based systems, agent-based models, and non-linear dynamical systems have been successfully applied in financial time series modelling. The importance of these computational methods grew as financial researchers and practitioners realized that additional variance in complex financial data can be explained. A large body of the literature has focused on evaluating the forecast accuracy of financial return and volatility, respectively. The purpose of the models is to model and predict the return and risk of financial assets in order to optimize the investment decision process through automated trading systems.

In this editorial introduction, we provide a short overview of the papers contained in this special issue.

Prof. Wei et al. investigate the leverage effect from the sector-specific point of view. Using the ARMA-GARCH model on CSI 300 sub-indices reflecting specific sectors, the empirical results of this study indicate that the GARCH (1,1) model is capable of explaining the fluctuations in the industry there are persistent. Additionally, TARCH (1,1) and EGARCH (1,1) models were used to examine the leverage effect of external factors and information asymmetry effect in various sectors. The results illustrate the existence of significant leverage effect between industries. Specifically, the so-called "Lee bad news" produce stronger fluctuations than the same amount of "good news". The leverage effect was considerably large especially in the case of consumer industry index.

Prof. Huang et al. analyse liquidity risk premium in corporate bond spread. The panel data of corporate bonds from the Shenzhen Stock Exchange and Shanghai Stock Exchange were used to demonstrate that bond age is the most important determinant of liquidity risk premium. Other proxies of liquidity risk (squared price return, issued amount, volume and trading turnover) have also shown significant impact on liquidity risk premium. Specifically, liquidity risk premium was positively correlated with squared price return, bond age, and bond volume, respectively, but negatively correlated with issued amount. The random effect model employed for the analysis has shown promising results as it explained more than 30 % of the variance in liquidity risk premium.

Prof. Wang et al. study the dynamics between stock index and stock index futures returns. Using 1-min high-frequency data, this paper investigates intraday return dynamics between CSI 300 and corresponding index futures. Such an approach is unique for emerging markets. Both spot and futures return series have shown stationarity and a cointegration relationship between spot price and futures price have been observed. Employing a wide range of models (VAR model, VECM, Granger causality test, variance decomposition, and impulse response function) the findings demonstrate that the newly established stock index futures markets in

China play a dominant role in the price discovery process. In addition, there seems to be bidirectional Granger causality between futures and spot market. According to the authors, this causality appears to be associated with high barriers to entry and investors' habits. These findings may have important implications especially for the traders implementing arbitrage and hedging.

Prof. Chang investigates the effects of ownership and capital structure on environmental information disclosure. The empirical results show that state legal-person ownership, non-state ownership, ownership concentration, financial leverage, long-term debts and short-term debts have significantly positive impacts on environmental information disclosure. Firms with higher state ownership, higher ownership concentration and financial leverage, respectively, tend to disclose more environmental information in an active and voluntary behaviour. This is helpful for stakeholders to reducing environmental and financial risks. The authors propose several policies to improve environmental information disclosure, namely strengthening the control capacity of state-owned assets, strictly carrying out environmental regulation policies, providing green financing policies, etc.

Prof. Huang et al. design a term structure affine model of corporate bond yields. The uniqueness of this approach lies in the fact that the parameters of the developed models were estimated using Kalman filtering. The models were tested empirically on weekly average corporate bond yields data from the Shanghai Stock Exchange and Shenzhen Stock Exchange, respectively. The results show that both the one-factor model and two-factor model perform one-step forward forecasting well, but could not be able to fit the real data. The three-factor model seems to be suitable to fit the observable data well.

Prof. Wang et al. further examine the relationship between return (volatility) and open interest in CSI 300 index futures market in China using 1-min data set. The results indicate that both return and open interest series are stationary. In addition, LB-Q and ARCH-LM statistics of return series confirmed volatility clustering and time-vary volatility. The impact of open interest on volatility was tested using the ARMA(2,2)-EGARCH(1,1) model. Both current and lagged open interests seem to provide useful information to explain GARCH effect. The results also suggest that open interest does not cause futures return, while futures return causes open interest. To sum up, the information of open interest seems to be helpful to predict volatility but not to predict return in index futures market in China.

Finally, Prof. Hajek et al. employ qualitative information in addition to quantitative information in their stock price forecasting model. The authors demonstrate that sentiment information hidden in corporate annual reports can be successfully used to predict long-run stock price returns. Neural networks and machine learning methods were employed to model the complexity in the stock price data on U.S. companies. As a result, the yearly change in the stock price was better forecasted by the non-linear methods when compared with linear regression models. Thus, the results show that the use of neural networks and machine learning methods is fully justifiable especially when developing complex models including the sentiment information from annual reports. The results also illustrate that the change in the sentiment of annual reports seems to be an important determinant of long-run stock price change. In addition to profitability and technical analysis ratios, the negative and uncertainty categories of terms appear to be important factors of the one-year stock price return.

The research presented in the special issue shows that there have been several striking findings that shed new light on some contemporary computational finance issues. However, it has been also demonstrated that the contributions in the special issue have thrown up many questions in need of further investigation. We wish the reader an interesting reading of the special issue.