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Doctoral Dissertation

Essays on Behavioural Finance and Financial Econometrics

Polina Ellina

Limassol, April 2021

CYPRUS UNIVERSITY OF TECHNOLOGY
FACULTY MANAGEMENT AND ECONOMICS
DEPARTMENT COMMERCE, FINANCE AND SHIPPING

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Approval Form

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ABSTRACT

In the academic literature, financial data have been proved to violate the assumption of Normality. For this reason, skewness, and/or kurtosis distributional characteristics are presented in financial series. At the same time, this highlights the importance of using higher moment distributions that take into account these characteristics. Using mathematical and advanced statistical probability theory, this dissertation contributes to the literature by conducting three chapters in which the purpose is to explain and develop models to explore the following financial topics: 1. behavioural finance and more specifically the probabilistic behaviour of psychological biases, 2. the stochastic behaviour of Bitcoin using an asymmetric framework, and 3. the measurement of stock price crash risk using an outlier resistant technique.

The first chapter presents a probabilistic framework to define and analyse the well-known psychological biases of overconfidence, optimism, underconfidence, and pessimism on the perceptions of managers about the mean and risk (overall risk, downside risk, value-at-risk, and expected shortfall) of the economic variables under consideration. Furthermore, the anchoring and adjustment heuristic has been found in the literature to be one of the reasons that overconfidence bias exhibits. This first chapter further investigates the interrelationship between anchoring and overconfidence bias using an adaptation process. Using an analytical generalized two-piece framework showed that anchoring and adjustment and overconfidence bias share an interconnection. The results reveal that overconfident and optimistic managers overestimate their expected value and underestimate their downside risk, value-at-risk and expected shortfall (positively skewed distribution). Overconfident managers also underestimate their overall risk. Underconfident and pessimistic managers underestimate their expected value and overestimate their risk (negatively skewed distribution). The overestimation or underestimation differs depending on the psychological bias. The empirical findings depict that the distribution of professional forecasters is negatively skewed and consequently they are underconfident. Accordingly, they underestimate the nominal and real GDP.

The second chapter analyses the stochastic behaviour of Bitcoin using an asymmetric framework. The extraordinary behaviour of Bitcoin is what makes it unique

and different. This chapter examines the stochastic behaviour of Bitcoin and exchange rates, the mean and volatility spillovers in the presence of asymmetry under a flexible general framework that accounts for skewness/kurtosis price of risk (ST-GJR-GARCH-SGED model), and the forecasting ability of the asymmetric model compared to already existing GARCH models under different probability distributions. The main empirical findings show that the skewness/kurtosis price of risk has an important role in the model. The empirical distribution of Bitcoin's returns exhibits skewness and extreme leptokurtosis. The latter result explains the extraordinary volatility of Bitcoin that leads to a higher peaked probability distribution compared to the rest of the assets. The findings also point out that there is a weak inter-relationship between Bitcoin and exchange rates and that the ST-GJR-GARCH-SGED model outperforms other GARCH specifications.

The third chapter focuses on the investigation of the stock price crashes using an outlier resistant method. Stock price crash risk referred to as the conditional skewness of the distribution of returns. When a negative firm-specific shock becomes public, there is a negative outlier in the return distribution leading to a crash. The residual returns have been taken by regressed the expanded market model since this model screens out the market crashes and only firm-specific events are considered. A binary crash risk measure is used to define crashes. Using the logarithmic transformation of the residual returns, a firm is considered to crash under the binary measure if at least one firm-specific weekly return is falling a threshold point of standard deviation below the mean firm-specific weekly returns. The presence of influential observations in the series may lead to a misestimation of the percentage of crashes due to the standard deviation that is inflated. This chapter develops a crash risk framework based on an outlier resistant method. Also, it proposes that a robust measure without the logarithmic transformation of the residual returns detects accurately the stock price crashes. Monte – Carlo simulations and empirical findings suggest that the robust method detects a higher percentage of crashes compared to the standard OLS methodology. Also, the detection based on the residual un-transform OLS returns leads to a lower percentage of crashes.

Keywords: Behavioural Finance, Psychological Biases, SGED, Conditional Asymmetry, Conditional Kurtosis, Crash Risk, Outliers, Outlier-resistant method.