

1 Introduction

Financial volatility enjoys increasing relevance in risk managers' daily business. According to the fifth annual survey of emerging risks, carried out in 2012 by the Society of Actuaries, Casualty Actuarial Society and the Canadian Institute of Actuaries, financial volatility was cited as the highest emerging risk with 68% of the respondents declaring it as one of their top three concerns (Ladd 2012). Another research highlighting the importance of volatility risk management was conducted by the Association of Corporate Treasurers and Barclays in 2012. The study reports the management views and practices of more than 100 treasury chiefs coming from a wide range of industries in the United Kingdom, the rest of Europe, the Middle East, Africa, Asia-Pacific and North America. The results show that the reduction of earnings volatility is one of the top three risk management objectives for 92% of the respondents and for 41% of the participants it is even the top risk management priority (Sawers 2012). These surveys are just a small sample of studies that demonstrate the enormous relevance of volatility management for financial professionals.

Consequently, understanding and predicting future market volatility is a fundamental desire for researchers and practitioners as it is highly relevant for decision making in several areas, such as security valuation, investment, risk management, monetary policy making, etc. To be specific, volatility is often used as a crude measure of the total risk of financial assets and hence, forecasts of stock market volatility are fundamental in the timing of investment decisions (Majmudar and Banerjee 2004, Chen 1997). Moreover, the expected future volatility plays an essential role in the risk assessment of portfolios and is an important input in portfolio selection models and dynamic diversification techniques (Blenman and Wang 2012, Chen 1997). Additionally, a measure of volatility is important in the derivative securities pricing theory and a key input in the pricing of contingent claims such as stock options. When pricing stock options for instance, a forecast of the future volatility of the underlying asset is needed for the time period until option expiry (Chen 1997). In addition, there are also instruments that offer a direct exposure to volatility as an investment, including derivative products such as variance swaps, forward variance swaps and VIX futures. As a consequence, accurate predictions are once again necessary to offer the investor the potential to make more direct profit (Warren 2012). In summary, with regards to the high relevance of this topic for practitioners and the various applications where volatility is a fundamental input, how to accurately predict or at least estimate future volatility is crucial in many financial decision-making situations.

1.1 Problem Statement

In order to provide a benchmark of expected short-term market volatility, the Chicago Board Options Exchange (CBOE) introduced the VIX Index in 1993 (Whaley 2008). According to some researchers such as Nwogugu (2012), however, the VIX is not only inaccurate and inefficient, but it is also based on an incorrect and misleading formula of computation consequently resulting in a biased VIX level. Other scientists indicate that volatility predictability in general may be scrutinized, because it is highly dependent on factors such as, for instance, the data frequency and the chosen forecasting horizon and hence decays quickly with an increasing time frame (Christoffersen and Diebold 2000). To date, much has been studied on the correlation between the SPX (Standard & Poor's 500 Index) and the VIX Index and has been well documented in academic journals. There has also been a great deal of research focusing on the analysis of the VIX and its derivative products, but regarding the causation of the SPX and the VIX Index and the related opportunity of index forecastability, a very limited amount of research has been carried out. In other words, there are many open questions concerning the controversies within research regarding the critical analysis of the VIX Index, volatility forecasting and the causation of the SPX and/or the VIX Index.

1.2 Research Objective

In consideration of the critical opinions about volatility prediction and the VIX Index mentioned above, the purpose of the literature review of this research paper is to analyse the weaknesses and sources of criticism concerning volatility forecasting and in particular the VIX Index. Furthermore, the influence of behavioural finance (hereinafter BF) on financial market volatility will be examined. The empirical analysis of this research paper aims to contribute to the existing literature about the VIX Index and volatility predictability by investigating the causation of the SPX and the VIX, of which very limited research exists. Moreover, the aim is to analyse whether there is any difference between the causal relationship in times of economic booms and recessions. In doing so, three research questions will be answered in this master thesis. Firstly, the causal relationship will be addressed in order to clarify whether the SPX Granger causes the VIX Index and/or vice-versa. Secondly, the predictability of the future movements of the SPX and the VIX will be examined and finally, the contradictions and similarities regarding volatility management and forecasting between theory and practice will be discussed. The result of this is a research gap being closed in various dimensions, including index causation, volatility forecastability and behavioral influence.

1.3 Research Structure

The literature review has been organized as follows: first, the theoretical dimensions of this research will be laid out, with a focus on risk and emotions and on financial market volatility. In doing so, the questions of the real definition of volatility, whether it can be predicted at all and how it can be measured are going to be answered by reviewing the existing literature. Regarding the forecastability of future volatility, the research of Christoffersen and Diebold (2000), in which they analysed the appropriate time horizon for volatility prediction, will be of importance. In addition, various volatility measures and forecasting models will be analysed concerning their predictive abilities, mainly by referring to Poon and Granger (2003), whose research is well-known in this regard. In the second part, the influence of behavioural finance on price movements and financial market volatility will be analysed in order to assess, whether volatility is exclusively rooted in rational behaviour, as is stated in the Efficient Market Hypothesis (hereinafter EMH), or whether prices are also influenced by the emotionality of market participants. In discussing these aspects, the academic works of Olsen (1998), Shiller (2003), Zouaoui, Nouyrigat and Beer (2011) and Howard (2013) will be highly relevant. In the next part, this research paper will give a brief overview of the VIX Index, its history, the purpose behind the introduction, the computation formula and its various applications in practice. Moreover, some strategies of VIX application will be presented and critical opinions about the VIX's historical performance will be addressed.

Regarding the empirical part of this research paper, both a quantitative and a qualitative analysis have been included. Thereby, a triangulation of empirical methods and an opportunity to cross-check research results is established. In the beginning, there will be a descriptive analysis with the aim of exploring the normal distribution of the data to assess the need for data transformation regarding the skewness and kurtosis levels. Next, the correlation between the SPX and the VIX Index will be proven. The causal relationship between the two indexes will then be analysed by conducting a Granger's test for causality in order to examine whether the SPX Granger causes the VIX Index and/or vice-versa. In doing so, the dependence of the index causality on the current state of the economy (recession or boom) will also be explored. Using the causal relationship obtained, the predictability of the future index movement (direction and/or extent) of the SPX and/or the VIX will be assessed. Following this, the propositions derived from the literature review and the findings of the quantitative research part are discussed in semi-structured interviews with financial market experts. Finally, the last section concludes the paper with a summary of the research findings, a discussion of these findings in order to reflect them theoretically and the conclusion. In addition, the limits of this study and potential opportunities for further research will be presented in the conclusion of this master thesis.

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VIX Index

Critical Analysis of Financial Market Volatility and Its
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