

Chapter 1

Information Technology and Financial Markets: Risk, Volatility and the Quants

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ABSTRACT

Much has been written about information technology and its role in reinventing financial markets. Today's markets are truly global, and the interconnectedness is the result of information and communication technologies (ICT) providing the necessary infrastructure. A financial crisis in any part of the world can cause widespread disruptions due to this interconnectedness. Clearly, the Asian crisis in the late 1990s, the sub-prime mortgage loan issues in 2006 and 2007, and the problems occurring in Greece and the U.S. "Flash Crash" in 2010 were exacerbated by the ability of technology to allow financial markets to instantaneously respond in a negative fashion.

INTRODUCTION

While ICT provides the necessary infrastructure to bring together financial markets throughout the world, it also increases the volatility of such markets. As a result, nations and other world bodies have a responsibility to insure that such financial meltdowns and catastrophes do not take place. Given that global financial markets are relatively new, adequate safeguards have not

been put in place, as evident by the happenings and the regulatory efforts of recent years.

ICT has played another role these past thirty year which has increased volatility and risk. Advanced high-powered computing techniques allow traders and others to find patterns in financial instrument data facilitating speculation on short-term market trends. Coupled with the creation of many different financial instruments, including derivatives, these techniques allow actions to be taken without any human intervention. While these techniques are indeed very powerful,

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certain incidents including the collapse of financial markets in 2007 and the “Flash Crash” of 2010 clearly show the risk and volatility associated with such trading. The demise of the hedge fund, Long-Term Capital, in 1998, is an example of what can occur when computerized quantitative techniques do not anticipate certain market patterns and human behavior.

This chapter will analyze how ICT contributes to the volatility of global markets. The chapter will begin with a history of the exchanges and the emergence of technology and its influence on trading. Secondly, the chapter will explore the impact of sophisticated quantitative techniques empowered by ICT on financial markets. The birth of the Quants and the origins of such techniques in the 1980s will be discussed. Since that time, the ability to model and simulate market actions has progressed so that only a few high-level quantitative types can now understand the complexity of the models and the simulation programs that are employed. Today, these Quants use the techniques of value at risk (VaR) to simplify financial markets to patterns of data providing instantaneous snap shots. While VaR approaches are facilitated by the use of quantitative analysis and ICT, they are criticized for inspiring false confidence by relying totally on untested quantitative models and technologies that tend to dismiss the effects of human behavior.

The chapter will conclude with some recommendations to address the above issues. While global financial markets should respond to the ups and downs of markets, there need to be safeguards, some of which have already been put in place, to mitigate overreaction. In addition, sophisticated financial analysis assumes markets are behaving as they have in the past, as if governed by some physical law. As has been seen, the human response to certain events is not representative of any such law. Markets must be able to insure that such responses do not result in financial catastrophe.

HISTORY

What is known today as the New York Stock Exchange (NYSE) came into existence in 1792, when a group of 24 men signed the “Buttonwood Agreement” under a Buttonwood Tree which stood just outside where the NYSE now sits on Broad Street in New York City (Wright, 2002, p. 11). Today the Buttonwood tree is still the symbol of the NYSE. In those early days of trading, less seasoned stocks were relegated to being traded in areas by the horses’ hitching post or the curb. These stocks were later morphed into the American Stock Exchange (ASE), which was originally known as the New York Curb Exchange or ‘The Curb’.

Information technology first came to the NYSE during the 19th century, with the arrival of the ticker in 1867 and the installation of the first telephone in 1878 (Mehta, et. al, 2010, pgs. 50-51). The ticker, which became symbolic of Wall Street, was invented by Edward A. Calahan and delivered the latest stock prices to investors removed from Wall Street. The reach of the NYSE had been extended.

The NYSE grew consistently in stature and size throughout the 20th century, but in a controlled fashion. The 20th century also saw the NYSE endure its greatest crisis, the stock market crash of 1929 and the great depression. A major development which grew out of the great depression was The Securities Exchange Act of 1934, which established the Securities Exchange Commission (SEC) to oversee Wall Street, the NYSE and other exchanges. The market did not return to 1929 pre-crash levels until the 1960s.

On April 1, 1968 the NYSE trading volume reached a record 17.7 million, exceeding the previous all-time high of 16.4 million shares recorded on that infamous day, Black Tuesday, October 29, 1929 (Wright, 2002, p. 52-53). This volume is somewhat miniscule when compared to over 2.5 billion shares traded today. During the early 1960s, while computers were being introduced, trades on the NYSE were still manually written

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