

# Chapter 13

## Machine Learning Techniques and Risk Management: Application to the Banking Sector During Crisis

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### **ABSTRACT**

*Crises around the world reveal a generally unstable environment in the last decades within which banks and financial institutions operate. Risk is an inherent characteristic of financial institutions and is a multifaceted phenomenon. Everyday business practice involves decisions, which requires the use of information regarding various types of threats involved together with an evaluation of their impact on future performance, concluding to combinations of types of risks and projected returns for decision makers to choose from. Moreover, financial institutions process a massive amount of data, collected either internally or externally, in an effort to continuously analyse trends of the economy they operate in and decode global economic conditions. Even though research has been performed in the field of accounting and finance, the authors explore the application of machine learning techniques to facilitate decision making by top management of contemporary financial institutions improving the quality of their accounting disclosure.*

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## **INTRODUCTION**

Financial crises around the world in the last decades reveal a generally instability of the banking system. Risk is an inherent characteristic of financial institutions and is multifaceted phenomenon. Everyday business practice involves decisions, which requires the use of information regarding various types of risk involved together with an evaluation of their impact on future performance, concluding to combinations of risks and projected outcomes for decision-makers to choose from.

Scenarios of different levels of constructing a number of scenarios involve a level of risk. This chapter focuses on various types of risk that financial institutions face, presents the various ways to measure them and discusses how these risks are managed.

Accounting scandals and financial crisis of 2008-2009 highlighted the need for advanced analysis and improvement to methods of risk identification and risk management applicable to various types of organizations and especially to financial institutions due to the role they play in the contemporary global trading environment. In line with the above, business entities should adopt risk-reporting practices aiming to the improvement of the quality of financial reporting. Interestingly enough, Singleton-Green (2012) pointed the ineffectiveness of financial reporting practices to provide a signal on risks having a potential amplifying effect on financial crisis. The Financial Stability Institute (2015) identified inappropriate implementation of corporate governance and risk management practices adopted by financial institutions. Bank of England raised concerns about potential negative implications of consumer credit growth on financial stability as ratio of debt to income for the private sector reached historical highs (Glover, 2017). Thus, there is increased need for additional research on real-life cases to explore and understand risk management practices by financial institutions has been acknowledged too (Van der Stede, 2011).

Numerous accounting and corporate governance scandals and the subsequent financial crisis of 2008-2009 highlighted the need for advanced analysis and improvement to methods of risk identification and risk management applicable to assorted types of organizations, especially to financial institutions, due to the role they play in the contemporary global trading environment. In line with the above, business entities should adopt risk-reporting practices aiming to the improvement of the quality of their financial reports. Furthermore, effective risk management techniques should be depicted to the published financial statements an annual reports improving the quality of information provided to their numerous stakeholders highlighting the actions taken to prevent from the severity of risks with the subsequent amplifying effects on the burst of global financial crisis. Under such circumstances, the Financial Stability Institute identified the inappropriate implementation of corporate governance and risk management practices adopted by financial institutions, whereas Bank of England raised concerns about potential negative implications of consumer credit growth on financial stability as ratio of debt to income for the private sector had reached historical highs.

Machine Learning Techniques (MLT's) have been extensively utilized in business to facilitate decision making from various stakeholders. In the aftermath of global crisis, MLT's have attracted more attention by research community as a potentially effective tool towards the identification of alternative sources of risk and gaps for fraudulent actions. Never ending socioeconomic changes influence both internal and external business environment, within which financial institutions operate. Taking advantage of contemporary technological advancements in software and hardware, MLT's sound promising to the development of more reliable and accurate risk assessment models with considerably higher predictive power. In an era of increased business complexity, it is stimulating to explore if these techniques could contribute to accurate forecasting. Even though research has been performed in the field of accounting

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