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The usefulness of inaccurate models: Towards an understanding of the emergence of financial risk management

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A B S T R A C T

Is the growth of modern financial risk management a result of the accuracy and reliability of risk models? This paper argues that the remarkable success of today's financial risk management methods should be attributed primarily to their communicative and organizational usefulness and less to the accuracy of the results they produced. This paper traces the intertwined historical paths of financial risk management and financial derivatives markets. Spanning from the late 1960s to the early 1990s, the paper analyses the social, political and organizational factors that underpinned the exponential success of one of today's leading risk management methodologies, the applications based on the Black–Scholes–Merton options pricing model. Using primary documents and interviews, the paper shows how financial risk management became part of central market practices and gained reputation among the different organisational market participants (trading firms, the options clearinghouse and the securities regulator). Ultimately, the events in the aftermath of the market crash of October 1987 showed that the practical usefulness of financial risk management methods overshadowed the fact that when financial risk management was critically needed the risk model was inaccurate.

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Introduction

Financial risk management is one of the fastest growing service industries in the business world. According to the Global Association of Risk Professionals (GARP), one of the leading trade associations in the field, there are currently more than 74,000 financial risk managers in financial institutions.¹ Dozens of academic and professional institutions award degrees and diplomas in financial risk management and these qualifications are gaining recognition by regulators and international certification bodies. At the heart of this body of knowledge and practices (virtually non-existent less than thirty years ago) is a set of financial economic theories, employing a variety of statistical models

to assess and calculate the risks associated with a plethora of financial assets and contracts. Many of these financial risk management systems are proprietary and no reliable statistics are published about their use, but it is estimated that the daily transaction volume of financial products traded in organized exchanges that are managed using such methods exceeds 50 million transactions,² with many more transactions executed in over-the-counter markets. Is this remarkable success an evidence of the predictive powers of modern financial economics? Judging from a brief review of several leading textbook in financial economics (Hull, 2005; McDonald, 2006; Stulz, 2002), the answer to this question is a resounding 'yes': the accuracy and validity of risk models and the applications that use them are said to be tested and re-validated literally millions of times a day in the markets.

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In this paper we aim to show that such a representation is partial at best and that the explosive growth of financial risk management cannot be explained by the accuracy of the models and methods used. This paper traces the growth of financial risk management applications that made use of the options pricing model developed by Black and Scholes (1972, 1973) and Merton (1973), known as the Black–Scholes–Merton model. Arguably, this model is the crowning achievement of modern financial economics and was included in many of the pioneering financial risk management systems.³ The history of the Black–Scholes–Merton model is tightly connected to the first organized exchange for the trading of stock options, the American Chicago Board Options Exchange (CBOE). This historical case was studied previously (MacKenzie & Millo, 2003; MacKenzie, 2006). However, while previous studies focused on the effect that the Black–Scholes–Merton model had on prices in options markets, this paper examines the development of financial risk management. The initial link between practice and model-based prediction is historical-temporal: CBOE began trading options less than two weeks before the mathematical model aiming to predict their prices, the Black–Scholes–Merton model, was published. These two coincident events mark the beginning of an exponential growth curve that traces both the markets for financial derivatives and financial risk management. This growth curve, we argue, was not fuelled simply by actors persuaded by the accuracy of the model. Instead, the *usefulness* of the model-based risk management, which enabled an efficient tackling of a variety of operational, organisational and political challenges, was a crucial factor behind the success of modern financial risk management. Model usefulness has three important organisational manifestations. First, model-based methods allowed clearer communication within trading organisations. It reduced the complexity of financial data and enabled more efficient decision-making (Sections ‘Risk assessment practices in early CBOE’ and ‘The rise of comprehensive risk management systems’). Second, applications based on the model solved the operational challenge of the clearinghouse when calculating the level of risk-based deposits required of traders (Sections ‘Financial risk management off the trading floor: options clearing’ and ‘Financial risk management as useful operational tools’). Third, the growing consensus among market participants around the usefulness of the model became useful in its own right when used by the SEC to legitimise its regulatory decisions (Section ‘Financial risk management and the 1987 market crash’). The accumulating effect of these different manifestations of usefulness contributed to a situation whereby the accuracy of the predictions it produced, even during critical times, was much less salient than one might expect. This approach, it has to be noted, does not aim to provide a definitive analysis of the emergence of financial risk management. Instead, it focuses on the interplay between technological, social and organisational factors and how it brought about the formation of rich interconnectedness among market participants.

³ Merton and Scholes received Nobel Prize in Economics in the 1997 for their work on the model Black died in 1995, but was mentioned as a contributor by the prize committee.

Theoretical approach

Knowledge and practice are fused together within financial risk management through the notion of ‘management’. The etymology of the word management is traced back to the Italian *maneggiare*, which means to “to handle,” and especially “to control a horse” (Barnhart, 1999). Controlling a horse demands both knowledge and the ability to perform that knowledge in real life. Hence, management is dependent on a successful transformation of knowledge from one realm to another: from knowledge that contains descriptions of actions to knowledge that dictates and controls these actions. Power (2007, pp. 24–28), who traced the growth of risk management as an organizational phenomenon claims that the growth of risk management in the last two decades is related to a gradual convergence between risk calculation and risk management. In spite of the fact that Power’s analysis is devoted mainly to corporate risk analysis and does not focus primarily on financial risk management, his general insight is also relevant in this case. As Power demonstrates, the historical process of convergence led eventually to a subsuming of ‘calculation’ into ‘management’. That is, nowadays risk is regarded as a manageable factor rather than merely a measurable, quantifiable and calculable entity. In other words, risk has been ‘internalized’. Organisational market participants re-positioned themselves vis-à-vis risk: they moved from being spectators at an external phenomenon to managers of an increasingly internal institutional resource.

If, as Power claims, a major transformation has turned descriptive knowledge (risk calculation) into (practice-oriented) risk management then an empirical examination would reveal organizational actors that gradually shift resources towards communicating and coordinating action using risk management and pay relatively less attention to merely calculating risk levels. This organisational-communicative aspect of risk management also has reflexive and constitutive implications. Risk management allows market participants to produce a map of risks and opportunities from which a plan of action is then derived. Naturally, any map, be it a geographical map or a risk map, is charted while incorporating a particular perspective. An actor’s point of view is the initial coordination according to which risks are defined and risk assessments are made. Therefore, the way an organizational actor depicts its risks is contingent upon how that actor perceives itself, its goals and its relationships with other actors. Consequently, since risk management is not only a description of a given reality but includes a prediction and is operated upon as a blueprint for action, it includes a constitutive (or performative) element: the way organizations depict their risks has a significant effect on the way they will, eventually, react to events and to other actors. Over time, an influential risk management system will bring about institutionalised patterns of risk embodiment.

To theorize how financial risk management became a dominant factor in financial markets one has to conceptualise markets not as meeting places where abstract forces of supply and demand are represented by traders, but instead as arenas where different strands of knowledge are continually converted into practices which are then tested,

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