

1. Introduction to Part I

*Statistical thinking will one day be as necessary
for efficient citizenship as the ability to read and write.*
(Herbert G. Wells, 1951)

Conventional quantitative risk management, characterized by probability-based risk assessment and designed for monitoring and addressing those risks in a way that ensures the firm bears only the risks its management and board want exposure to (Stulz, 2008: 58f.), produces its own risks, generated through an inadequate notion of risk which lacks a proper systemic viewpoint. A culture has emerged in theory (economics and finance) and practice (financial institutions) in which risk modeling is no longer a *functional* tool but has become an end in itself. In particular, a trend towards addressing risk in its extreme form (e.g., Taleb's black swans) by statistical extreme value methods (e.g., McKelvey, 2013: Vol. 5; Bernard et al., 2013; Das et al., 2013; Johansen & Sornette, 2010; Allen & Gale, 2009; Malevergne & Sornette, 2006) can be observed in the aftermath of the financial crisis which crescendoed in 2008 since failure to manage these risks has been witnessed to be extremely costly for the players (Thiagarajan et al., 2015: 113) and for society as a whole (Poledna & Thurner, 2016). Indeed, there are very few trends in the financial world that have proliferated as much as extreme risk management following the global financial crisis (Thiagarajan et al., 2015: 113). Yet, "in the face of crisis and criticism, proponents of 'counting' do not abandon their measurement efforts but, rather, intensify them" (Mikes, 2011: 227; cf. also Power, 2004a).

However, it is high time to acknowledge the quite reasonable ineffectiveness of stochastic methods for dealing with the kind of low-probability, high-impact events that characterize systemic and extreme risk. In this part of the dissertation, we show – from a complexity and systems science perspective – that theoretical quantitative risk assessment and management approaches, which are also used in practice (Mehta et al., 2012), suffer from conceptual weaknesses.

We argue that these caveats are not just minor issues that could be remedied with better models or distributions, but that they form part of a fundamental problem, namely that *probabilistic reasoning is not an adequate foundation for modeling systemic or extreme risk in a banking context*.

After consolidating the relevant literature where some foundational concepts of quantitative risk modeling are restated (Chapter 2) and developing guiding research questions (Chapter 3), we begin by briefly presenting and discussing notions of risk and systemic risk in the realm of banking (Chapter 4). We then argue and emphasize that (private) banks (and not only regulators) should take account of, and try to deal with, systemic risks in the sense which will be espoused in this survey. Moreover, we provide concrete systemic risk scenarios for banks by shedding light on the illustrative case of the rise and fall of Long-Term Capital Management (LTCM) (Chapter 5). Thirdly, in Chapter 6, we propose a specification and characterization of complexity by drawing on the concept of *organized complexity* which was coined by Weaver (1948). This step appears promising because he stipulated that phenomena of organized situations escape statistical or probabilistic approaches. On this basis, we attempt to show that the assessment of extreme and systemic risks can be classified as a case of organized complexity. Yet, this endeavor turns out to be doomed to failure since the (Weaverian) notion of (organized) complexity seems to elude a conceptual analysis and, therefore, remains somehow obfuscatory. A separate argument for deriving the ineffectiveness of conventional risk modeling is required and, indeed, propounded in Chapter 7. Before Part I is closed by detailing lessons learned and a path of inquiry for the remainder (Chapter 8), this Central Argument constitutes a good (and sufficient) reason for declining probability statistics for the modeling of extreme and systemic risks and goes far beyond of what the current state of research considers as obstacles to effective extreme and systemic risk management. Ultimately, statistical thinking is not only about efficient citizenship, but *good* statistical thinking also includes raising awareness for its limitations, and it deals with effectiveness in the first place.

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