1. Introduction

Today's financial market participants seem to be madly in love with models and algorithms. The recent McKinsey report (Crespo et al. 2017) suggests that the number of models used by banks to make various decisions is rising by 10 to 25 per cent annually. Quantitative model-based investing is growing fast: quantitative hedge funds are prospering; exchange-traded fund (ETFs) and other forms of passive, index-based investing are booming. JP Morgan estimates that only about 10 per cent of recent trading volume in stocks is generated by old-fashioned fundamental investors (Cheng 2017). The jobs of active fund managers, security analysts and financial advisors seem to be threatened by machines. Recently, BlackRock, one of the biggest fund companies in the world, announced that it will merge some of its expensive stock pickers into the quant department and lay the rest of them off. The newspaper headlines on the day of this announcement read: “Robots Are Replacing Humans” (Shen 2017). There are also reports on security analysis becoming increasingly computer-based and “virtual” in order to conquer the subjectivity and emotionality of human analysts (Wigglesworth 2017a). Robo-advising – when algorithms instead of humans provide investment advice – is on the rise. Finally, algorithmic trading is on everyone’s lips because, according to various estimates, 50–70 per cent of the equity trading in the world is computer-based today. It seems that modern financial markets are all about models, algorithms, big data and artificial intelligence.

At the same time, this “love affair” with formal technologies is often discussed with scepticism, and gives rise to worry and anxiety. Models can be dangerous because they might not sufficiently help people make sound investment decisions. This was the gist of the sweeping criticism of financial models in the aftermath of the 2008 crisis. Models were accused of causing the turmoil or, at least, of failing to give advance warning.

The arguments behind these accusations are familiar: financial models are abstract and unworldly constructs, so their users are predestined to be misguided. Thus, the argument goes, as insufficient models became widespread tools for decision-making in financial markets, the vast majority of market participants were seduced by their mathematical sophistication and followed them towards alleged safety. Love is blind (and stupid), which
Financial models and society

is why model users in financial markets are frequently described as “F9 model monkeys” (Tett and Thal Larsen 2005) who confuse “illusion with reality” (as the title of the 2011 book about financial models written by the famous quant turned publicist and educator Emanuel Derman suggests).

The general problem related to this blindness is so-called “model-based herding”: widespread use of similar models can lead market participants to behave similarly. Indeed, if investors were to use formal models in the same way, they would make similar decisions. This means that all of them would favour the same side of the market; in other words, they would want only to buy or only to sell at the same time. Markets would start to move in resonance (Beunza and Stark 2012) and such a development could threaten the markets’ stability, causing bubbles and crashes. One recalls discussions about the so-called “quant crisis” in August 2007 which was explained by the similarity of quantitative strategies used across hedge funds (Tett and Gangahar 2007). In this debate, financial models were portrayed as a time bomb, as highly explosive, dangerous stuff that possesses the power to severely damage economic and financial systems.

For example, if every risk manager were to use the Value at Risk model (VaR), then he or she would inevitably underestimate risks in unusual (extraordinary) situations (when liquidity is scarce, interbank funding is hardly available and the correlations between assets are high). This underestimation would encourage users to take more risks; thus, too many risks would be taken in the entire financial system, leading to catastrophe (Nocera 2009; Croft 2009). This critique of VaR in the context of the 2008 crisis was aptly summarized in a book with the telling title The Number That Killed Us by veteran derivative trader Pablo Triana (2011). Famously, Nassim Taleb also blames risk models for increasing “risk exposure instead of limiting it”; these models, he says, “can be worse than nothing, the equivalent of a dangerous operation on a patient who would stand a better chance if left untreated” (Economist 2010). The Gaussian copula formula – which was used to assess the probability distribution of possible losses for structured products such as collateralized debt obligations (CDOs) that were at the core of the 2008 crisis – was discussed in the press with similarly strong wording as “The formula that killed Wall Street” (Salmon 2009). This discussion frequently boils down to the idea that we should “kill the quants and their technology before they kill us” (Brodie 2012).

While following this “sanguinary” debate, a serene observer might wonder how financial markets manage to survive at all. The question arises as to why we still experience “normal”, boring days without wild volatility and turmoil. In other words, why do markets continue to function and prosper even though they are dominated by models? Maybe financial
models are not as dangerous as some of their critics believe. On the contrary, it seems that markets manage to generate enough diversity to stay alive precisely due to the widespread use of models. This book deals with the question of how this diversity in model-driven markets is produced.

Generally, I claim that the discussion about dangers induced by financial models is based on the principal misunderstanding of models’ roles in markets. The aforementioned accusations are rooted in a conceptualization of models as “calculative tools” which directly guide investment decisions. In other words, there is an implied assumption that models tell people what to do and that the latter blindly follow models’ advice. However, this book suggests – and demonstrates using various empirical examples – that financial models do not ultimately determine investors’ decisions and actions. The role of models is more subtle: they do not dictate financial decisions but make them possible. Models help bridge genuine non-knowledge and uncertainty, which are characteristic of financial decision-making, and, thus, help solve the central problem of financial markets – the problem of investability. In other words, models assist investment professionals in “overlooking” uncertainties and in generating willingness to invest. To do this, models do not have to be perfect representations of reality; in fact, the inevitably insufficient models are used as one of many resources in the multifaceted decision-making practices of financial markets. Let me explain what I mean by this.

Financial decision-making is characterized by radical uncertainty which is not calculable. Thus, calculations provided by models are unable to grasp the ever-changing, uncertain reality of markets. In other words, there is always a gap between models and (market) reality. This gap is characteristic of all models used in science or elsewhere. All models are “wrong” in the sense that they do not perfectly represent reality and are merely imperfect idealizations. However, while scientists generally can live with this gap – and this is a crucial difference – financial market participants cannot allow themselves to be detached from the markets. They are a part of the markets themselves and, thus, their decisions cannot be based on model calculations only: that is, on calculations that leave out expectations, emotions, stories, judgments and – importantly – the modelling efforts of other market participants.

In this book, I suggest understanding financial decision-making as action-like decision-making which implies that more than calculation is required in the always incomplete situation of markets. Action-like decision-making overcomes the traditional dichotomy between action and decision, and involves engaging with the world by simultaneously observing, deciding and taking actions that have severe consequences (are fateful).
Models constantly matter for this kind of decision-making in markets. Calculations are “effected” (Derrida 1994) and “done and undone” (Kalthoff 2011); they are combined with judgment, market observations, news, stories, rumours and so on. This book will show that this “calculation” (Cochoy 2008) happens in various ways and styles. There are manifold cultures of model use, that is, specific practices of integrating models into financial decision-making and combining them with emotions, views and stories of their users. The social studies of finance (SSF), an emerging interdisciplinary field that applies the findings and the methodological apparatus of various social sciences to the analysis of financial markets, has pioneered the investigation of financial models’ applications in the practice of markets. It has provided numerous empirical descriptions of cultures of model use which I will use and further develop in this book. Nevertheless, there is a lot more to be done.

Careful analysis of the styles of applying financial models helps us realize that the general claim that financial markets have become a purely analytical and quantitative place might be exaggerated. Human influence has not disappeared; rather, it unfolds in the multifaceted interplay between users and models in the practice of markets. Investors might use their formal tools but ignore the tools’ recommendations in the very process of decision-making; they might not use models at all or “overlay” the decisions models prescribe. Thus, the book demonstrates that, in many cases, financial models do not provide direct prescriptions for decisions; and, therefore, the link between models, decision-making and market events is not as straightforward as the ongoing critique of financial models indicates. We find large “pockets” where human judgment and stories are as important as the complicated formulas and algorithms.

This is an experience that many novices encounter when they first arrive in financial markets. It also happened to me. After graduation, I started working as a portfolio manager in a big investment bank in Frankfurt. On my first day, I was very nervous but kept telling myself that I would be okay. At university, I had spent most of my time calculating models and shifting very complicated formulas, so, I reassured myself, I should be very well equipped for the job. But from the beginning it seemed that my mathematical skills were less in demand than I expected. “Forget those models. Now you should learn how to invest,” one of my colleagues told me, and gave me a book by the famous stock-picker Peter Lynch to read. Another colleague said, “You should understand how markets work”, and recommended reading the novel Money by Zola. I was perplexed: Had I joined a literature club? Is investing not about maths? I wanted to do “the real stuff”. It was only a while later that I realized that doing “the real stuff” in markets involves far more than calculation.
Of course, things have changed since I went through the revolving door of the investment bank in Frankfurt for the first time. However, also today, we are far from a situation of “financial singularity” in which powerful computers and sophisticated algorithms have fully replaced human intelligence. “Human judgment, good and bad, will drive investment decisions and financial-market outcomes for the rest of our lives and beyond,” said the Nobel Prize winner Robert Shiller (2015). Although the role of stories in investment decisions has been prominently highlighted recently (Beckert 2016; Tuckett 2012; Chong and Tuckett 2015) and I tune into that debate with this book, my goal is not to claim that models are unimportant and that judgment dominates the markets. The book strives to provide a subtler picture, and argues that we should pay more attention to how models are used in – not always purely calculative – decision-making; how human judgment and stories are formed with models; and how models and judgment together matter for what happens in financial markets. Again, the picture I present in the book does not boil down to a bunch of wild stories and rumours that circulate in the markets and render models unimportant.

What we find in financial markets today is not an “either judgment or model” dilemma; there are various regimes of combining models with judgment, regimes that ensure a diversity of views and decisions in markets. In some situations, models determine the actions; sometimes, however, judgment and stories dominate the decision-making process. This book is the first step towards better understanding this interplay and demonstrating its non-uniformity. There is no general way of talking about model use in markets, and thus no general way of voicing (blanket) critique of financial models.

Indeed, markets are characterized by a huge diversity of financial models, goals and styles of model use – depending on who uses them and how they are used. In order to paint a picture of this non-uniform landscape, one could conceptualize markets as an investment chain, as “the sets of intermediaries that ‘sit between’ savers and companies/governments, along with the links among those intermediaries” (Arjaliès et al. 2017: 4). Indeed, money, information and decision-making today “flow” through such a chain (from savers to money managers to brokers and traders) and are distributed among its intermediaries. Nowadays, all market participants in the investment chain use models to make decisions; however, those models vary and are used for diverse purposes (for example asset allocation, stock-picking, risk management, trading and so on) and a varying amount of importance is attached to them. Figure 1.1 maps the major groups of market participants and the models they use which will be discussed in this book.
The differences in the purposes of model use within the chain should be particularly highlighted. Some professionals (for example investment managers and traders) are focused on financial decision-making (selling or buying), while others (for example security analysts and economists) are primarily involved in gathering and interpreting information, giving advice and making clients invest; in other words, their domain is rather decision-selling. In Chapter 4, I will particularly focus on several styles of model use for decision-making; that is, I will focus on how models are applied to

**Figure 1.1 Investment chain: financial models and their users**

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overcome uncertainty and to make investment decisions possible for model users, whereas in Chapter 5 I will analyse model use for decision-selling, exploring how models are utilized to justify decisions and convince others to invest. Hence, I will demonstrate that financial models are applied not only to make decisions but also to provide legitimacy for decisions, perform impression management, reach a consensus and so on. These secondary functions can overlay the primary goals of model use (that is, calculation) and render models less important for immediate decision-making.

The variety and mediating nature of cultures of model use presented in this study has consequences for the question of whether models are villains or scapegoats; in other words, the question of whether they are truly dangerous and have the power to destroy markets or whether they are just harmless camouflage which is frequently used to hide risks emerging somewhere else.

My argument is that it is exactly because the styles of model use vary that there is no way that different users derive the same results from their models and make the same decisions. As empirical studies in the book will demonstrate, financial models are used by market participants to disagree with the market or, at least, to question the market’s views. Thus, the various strategies of model use do not automatically promote a particular behaviour in financial markets, but enforce disagreement and support “dissonant” tendencies. In other words, models as time bombs are defused through the various practices of their use.

The analysis of cultures of model use also suggests that model users are by no means “model dopes”, people who “unthinkingly accept the outputs of a model”; there is not enough “empirical evidence of them” (MacKenzie and Spears 2014b: 419). Noticeably, of all people, practitioners demonstrate a particular awareness of models’ deficiencies and limitations (Triana 2009; Derman 2011). Recently, model insufficiencies were prominently acknowledged by one of the highest financial authorities, the Bank of England. Monetary policy committee member Gertjan Vlieghe told MPs “that central banks’ financial models ‘are just not that good’ for predicting even a recession” (Guardian 2017). Extensive empirical analyses presented in this book demonstrate that the users of financial models are aware of model limitations and account for them in the process of model use. They do not “blind out” model deficiencies, but rather consciously make “insufficient” models work. The central goal of the book is to show that practitioners in financial markets use their models very tentatively. It seems that the ostensible “love affair” with models is in fact “a marriage of convenience”. Hence, the general designation of financial models as the ultimate villains is questionable because their influence on markets is clearly mediated by the practices of their use.
CONTRIBUTIONS TO THE LITERATURE

This book aims to advance research on modelling within the social studies of finance. The social studies of finance emerged as an independent discipline from science and technology studies (STS) as well as from sociology of knowledge at the turn of the millennium and, as already mentioned, has made first important steps in investigating practices of model use in financial decision-making. Still, those practices widely remain a “black box”. Remarkably, there are plenty of books and articles on financial mathematics and finance that discuss models as theoretical constructs; that is, they discuss models’ assumptions, mathematical structures and largely theoretical potential applications. However, the literature on why and how models are used in the practice of markets, particularly in financial decision-making, remains limited. This book aims to close that gap.

At the same time, there has been extensive research on model use in science. Indeed, until recently models have predominantly been analysed as instruments of scientific inquiry in the philosophy of science and in STS. Undeniably, this research has provided important insights into how models are used in various scientific disciplines (I will outline the most important accounts in Chapter 3). However, as models have increasingly been incorporated into practical decision-making (for instance, in financial markets), the need to understand how they structure decisions and actions in the actual practice of investing and trading has become very pressing. Financial models are applied in the context of markets which are not purely epistemic. Here, the goal is not knowledge production (explanation, understanding or representation) but successful decision-making (which ultimately leads to making money). Thus, although I do not deny that there is an epistemic dimension in the work of investment professionals, it is not my focus. Rather, I claim that the goals and ways of model use in science and in financial markets are fundamentally different, and address those differences in detail.

Moreover, pointing to the origins of the social studies of finance in science studies, this book suggests going beyond the traditional understanding of modelling practices in financial markets as “calculative practices” and “epistemic cultures”. In the book, financial models are conceptualized not as “knowledge devices” but as practical decision-making instruments. Re-focusing on the practices of model use in decision-making and on non-epistemic aspects of model applications helps overcome the overemphasis on knowledge in the social studies of finance. This step allows us to conceptualize financial markets as markets of nobody knows and decision-making as action-like decision-making. I consider these concepts to be important contributions to the field.
Furthermore, using various empirical accounts, the book fills concepts of non-analytical decision-making such as “qualculation” (Cochoy 2008), heuristics (Gigerenzer 2007) and “acting sensibly” (Smith 2011) with life. While opening the black box of model use in financial markets, I stress that there is no separation between models, markets and users. Models are not “outside” market reality; they are involved in the decision-making situation, are part of it, and are analysed as such in this book.

The idea of the book is to show what happens within some boxes of the investment chain in more empirical detail; that is, to show how models, users and markets are interrelated in the processes of decision-making and decision-selling. Notably, until now, the social studies of finance has provided some insightful, yet isolated, investigations of how models are used by various intermediaries such as security analysts, traders and fund managers. This book represents the first attempt to place these accounts alongside each other in order to identify regularities and common paths of model use. Thus, it provides a classification and systematization of distinctive styles of model applications observed in modern markets. Particularly, I identify three major patterns of model use in financial decision-making – “qualitative overlay”, “backing out/implied modelling” and models as “opinion proclaimers” – and highlight the major commonalities and differences between them. This systematization is an important novelty of the book.

Finally, the book furthers our understanding of financial models’ influence on markets and society more broadly. This issue is related to the question of societal model risks. The insights set out in the book suggest that the image of financial models as brutal “killers” of markets should be relativized. They are rather scapegoats that are made responsible for what goes wrong in the complex, empirically “messy” decision-making processes in financial markets. The book demonstrates that models very often do not even get a chance to shape market events because various other factors play into decisions and “overlay” models. Model influence is mediated by the practices of model use and their elements (e.g. the institutional environment, selling considerations, political interests and the power of the involved actors, etc.). Understanding the interplay of models and various auxiliary factors is crucial for producing a valid account of the financial crisis and, more generally, for understanding what happens in markets today. It seems that excessive trust in models and their extensive use were not the cause of the last financial crisis, but rather the opaque interplay between models and human judgment within financial organizations.

This book supports the view expressed by Engelen et al. (2012: 373) that the fundamental problem is not the extinction of practical tacit knowledge due to increased formalization of financial markets but, on the contrary,
overreliance on the informal, interpersonal knowledge that often accompanies the application of models. For example, when rating agencies use their models to get the results they “want” to get (e.g. higher ratings for particular clients) or when executives in risk management departments decide to simply ignore the warnings of models that have been specifically installed to warn them, models can hardly be blamed. What happens \textit{around the models} or how models are actually involved in decision-making is crucial. Thus, the book contributes towards understanding how this “around the models” functions, and shows that the radical, general accusations directed at models are not justified.

METHODOLOGY AND DATA

A concept that facilitates the investigation of cultures of model use is “the notion of practical action” (Stark 2009: 165), which is central to the social studies of finance. Consequently, adopting the social studies of finance perspective for this book implies the application of a particular methodology – that is, decision-making in incomplete and problematic “situations must be investigated in situ” (Stark 2011: 336). This is the only way of overcoming the traditional economists’ dichotomy between actions and decisions with respect to choice – as represented by the Savage matrix (1954) – and of efficiently analysing alternative concepts of decision-making, such as action-like decision-making or acting sensibly, for example. It is why Stark (2011: 336) pleads for “methodological situationalism”:

\begin{quote}
Situations occur in practical settings. They can be a fleeting event or they can have longer duration. But we know what is meant when someone says, “We have a situation here.” It suggests that something is problematic. Indeed, it is almost redundant to say that a situation is perplexing or troubling. Situations are methodologically privileged because they are moments when the open-ended character of the world is revealed.
\end{quote}

If one aims to investigate action-like decision-making in markets \textit{in situ}, a methodological shift towards analysing the practical situation in detail becomes necessary, and the ethnographical apparatus becomes indispensable. Recently, in-depth semi-structured interviews have been successfully applied to investigate financial decision-making (Tuckett 2011, 2012). Following this example, this book utilizes ethnographical methodology to investigate patterns of model use in decision-making under uncertainty among various groups of market participants.

My original research, however, focused on one particular group of
Investment professionals, namely fund managers. The data were collected using primarily the ethnographical apparatus of interviews and participant observations. More precisely, the research drew on three sets of interviews. The first set was conducted in the context of the DFG project “Economic Calculations: Creation of the Calculative Realities in the Financial Markets” in 2007–08. The overall aim of the project was to understand how formal financial models are created and used, and how these processes of model creation and application influence economic reality. Hence, one part of the project was dedicated to the development of financial mathematical formulas in science, and the other was concerned with the application of models in the practice of markets.

Thus, the data pool for the analysis initially encompassed eight semi-structured, in-depth interviews with financial mathematicians at universities in Munich, Frankfurt/Main, Kaiserslautern and Zurich. Seven of the mathematicians held the title of professor and were established figures in the field; one interviewee was a junior professor. With one of the interviewees (in Kaiserslautern), a follow-up interview was conducted in 2014.

The second set of interviews (with financial market practitioners) encompassed 28 semi-structured interviews in several German and Swiss asset management companies and banks. The respondents were employed as fund managers in Frankfurt and Zurich, and generally pursued an active investment strategy. Six of the respondents were responsible for European blue-chip portfolios; two for European small- and mid-caps; four for emerging markets; two for tactical asset allocation; two for bond investments; and three for structured products. Three fund managers were responsible for quantitative investments. One informant was a financial advisor who owned an independent investment company. Follow-up interviews were performed with several informants.

Within the same project, the interviews were complemented by a three-month participant observation, conducted in the portfolio management department of a private Swiss investment bank in Zurich (henceforth referred to as a Swiss bank). I performed certain portfolio management tasks to gain first-hand experience of the department’s daily practices. Participation in verbal discussions – such as internal and external investment meetings, morning meetings, informal talks on the floor, and the creation of spreadsheets and presentations – provided additional insights into the investors’ practices. Furthermore, I observed how fund managers use models while making forecasts and decisions, and thus investigated the roles that models play in the investment process.

The third set of interviews was conducted later, in 2014, in the initial explorative phase of the EU project “Evaluation Practices in Financial Markets” (EPIFM). Twelve semi-structured, in-depth interviews were
conducted with financial market professionals in Germany. Nine respondents managed equity and bond funds as well as balanced portfolios in leading German asset-management companies; they were responsible for both mutual funds and clients’ money. One respondent was the head of credits in a big investment company; another was responsible for a rather small equity fund in an investment boutique. Another important interview partner was Ralf Frank, the Chief Executive of the German Association for Financial Analysis and Asset Management (DVFA).

Most interviews were performed in person, and only one was conducted by telephone. The interviews lasted between 45 minutes and two hours. The interview guidelines, which were established in advance, focused on the processes of individual and organizational decision-making and the use of financial models in those processes. All the interviews were digitally recorded and transcribed.

The evaluation of the interview transcripts, the observation protocols and field journals included manual coding and categorization and subsequent qualitative interpretation according to Corbin and Strauss (2008). These empirical materials served as a basis for several studies that I had previously authored and used in this book.

However, in order to go beyond the field of fund management, I drew extensively on empirical studies on other participants of the investment chain performed within the social studies of finance, as well as on practitioners’ literature. The utilization of this research allowed me to compare and classify cultures of model use in the fields of security analysis, merger arbitrage, option trading and others.

**READERSHIP**

This book addresses multiple audiences: academics, students and practitioners. By highlighting the alternative functions of models in decision-making as well as providing practical examples and case studies of model use, this book opens up novel perspectives and delivers useful materials for academics in social studies of finance as well as economic sociologists; scholars in studies of science and technology; philosophers of science (especially philosophy of economics); economists; and, in particular, financial mathematicians and finance scientists. Particularly by analyzing the use of models in financial decision-making, I hope to support the still nearly non-existent conversations of economists and economic sociologists/social studies of finance scholars: Decision-making might indeed provide a common platform for fruitful exchange across disciplines.

As the book provides a thorough overview of the basic concepts of SSF,
Introduction

it can be considered as an introduction to the field, and might be of interest not only to academic specialists but also to advanced undergraduate and graduate students. The book can be used in graduate courses not only in STS, economic sociology and the philosophy of science, but also in basic finance courses and courses on financial modelling. I personally consider the latter to be particularly important because consideration of how financial models are used in investment practices is usually not part of standard finance modules, but is essential for future investment professionals. The book might prevent finance students from becoming “model dopes” already at university and, not much later, in their jobs. Also, it needs to be stressed that the social studies of finance is currently being established as a scientific discipline – dedicated modules are already taught, for example, at the London School of Economics (LSE) and the University of Leicester; for students on these programmes, this research could serve as a textbook.

Furthermore, the book might be of interest to the large group of practitioners who design and apply models in various fields of financial markets. Particularly, it addresses open-minded professional investors who are interested in the latest developments in scientific debates on modelling and who welcome thoughtful reflection on their own everyday work. The book will provide them with insights into the benefits and limitations of models, as well as opening up the black box of model use in decision-making. Consideration of the risks models pose to society at large, particularly to herding, might be considered helpful by regulators and policy-makers.

ORGANIZATION OF THE BOOK

The structure of the book is very straightforward: In Chapters 2 and 3, the theoretical basis is provided for the empirical discussion that follows in Chapters 4 and 5. In Chapter 2, in particular, financial decision-making is conceptualized as action-like decision-making in markets of nobody knows – that is, as a practice of decision-making under conditions of radical uncertainty and symmetrical ignorance. This concept suggests that the existing accounts of model use are insufficient as they particularly focus on scientific practices and ignore the specific, not solely epistemic, nature of financial markets.

To further this critique, in Chapter 3 I provide an overview of the existing accounts of model use in the philosophy of science (with a focus on economic modelling) and STS. I particularly highlight the pragmatic turn in modelling research that has taken place in these disciplines since the mid-1990s. Models are no longer considered by philosophers and STS scholars to be purely theoretical and abstract entities; rather, they are
considered “dirty” and insecure tools that must be manipulated and “made to count” *in situ* in order to produce knowledge. The pragmatic accounts argue that the gap between models and reality can be closed in the process of model construction and model use by means of pre-formulating the anticipated results, narratives, interpretations, power relations and the audience. In other words, it has become clear that the social contexts of model use are crucial for the very understanding of the models’ nature. In the chapter, I show how the social studies of finance have pursued research in this field, focusing on the pragmatic practices of modelling and model use in financial markets. The performativity account is also discussed here, and a plea made for the “emancipation” of the social studies of finance from its heritage – that is, from science studies and, particularly, from understanding models as purely “epistemic tools”. I argue that further steps are necessary to properly understand the specifics of model use in action-like decision-making in financial markets.

Following this theoretical discussion, I present numerous empirical accounts of financial model use in decision-making (Chapter 4) and decision-selling (Chapter 5). Here, I classify and compare various patterns of model use in financial markets, and discuss in detail the different latent functions of models. I show that, as models are combined with, overlaid and influenced by judgment, stories, emotions and the institutional environment in which they are applied, they are far less omnipotent than one might expect. The related *model risks* are also discussed in detail.

The concluding chapter considers implications of the book’s findings for further research in decision-making theory, economics, valuation studies, ignorance studies and the ethics of financial markets.