HANDBOOK OF FINANCIAL DATA AND RISK INFORMATION

Volume II: Software and Data

Risk has always been central to finance, and managing risk depends critically on information. In recent decades, derivative markets for parceling and shifting risks have burgeoned, while computational advances have increased the pace of trading. As evidenced by recent events, the need has never been greater for skills, systems, and methodologies to manage risk information in financial markets. Authored by leading figures in risk management and analysis, this handbook serves as a unique and comprehensive reference for the technical, operational, regulatory, and political issues in collecting, measuring, and managing financial data. It will appeal to a wide range of audiences, from financial industry practitioners and regulators responsible for implementing risk management systems, to system integrators and software firms helping to improve such systems.

Volume I examines the business and regulatory context that makes risk information so important. A vast set of quantitative techniques, internal risk measurement and governance processes, and supervisory reporting rules have grown up over time, all with important implications for modeling and managing risk information. Without an understanding of the broader forces at work, it is all too easy to get lost in the details.

Volume II sets out a detailed structural and operational framework for managing a financial risk data repository. As experience accumulates on managing modern risk systems, the knowledge base of practical lessons grows. Understanding these issues and leading practices may mean the difference between failed and successful implementations of risk systems.

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VOLUME II
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Frontmatter
More Information

Contents

vi   *Contents*

Contents vii

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Preface

On August 9, 2007, a large European bank announced unexpectedly that it could not obtain valuations on subprime securities underlying three of its investment funds. Accumulated anxiety about the quality of the collateral in repurchase agreements (repos) turned into a full-blown panic attack. Lenders withdrew from this market in large numbers, sending dealers on an urgent hunt for new funding. The world was witnessing a full-scale run on the shadow banking system. At that time, the shadow banking system was not well understood by practitioners outside its arcane confines. Yet this episode demonstrated its ability to quickly spread contagion not only across the financial system, but also to the real economy, culminating in the events of the fall of 2008, where extreme measures had to be taken by the US and European governments to stabilize the economy. All told, the failures represented trillions of dollars in assets and hundreds of billions of dollars in losses, with central banks, finance ministries, and the US Treasury piling resources into the breach.

This was all a prelude to the full catastrophe.

In September 2008, a second intense wave of failures and near-failures claimed a number of victims, mostly in the USA, and many supposedly "too big to fail." The episode sent financial markets into a free fall that lasted for six months. The ensuing failures, interventions, conversions, and mergers have permanently and fundamentally altered the financial industry landscape. Much time, effort, and discussion has been devoted to analyzing these events; yet even today, years later, there are several conflicting theories about what exactly happened and who was responsible. It is facile to lay the blame wholly on first-time homebuyers in subprime and Alt-A mortgage markets, as these borrowers represented only one half of a transaction at the front end of a much longer securitization chain. How did loanable funds make their way into these deals? Observers of various persuasions have laid responsibility at the feet of such varied parties as the US and Chinese governments, Government Sponsored Enterprises, investment banks, and credit ratings agencies. In hindsight, one of the surprising things was how

unprepared the world economic community was for the scale and speed of these events.

Anyone who has sat through a college investments course knows that information plays a central role in finance. Markets can be seen as an information-processing system. The Efficient Markets Hypothesis asserts that markets should reliably react and adjust to available information. They may make mistakes for a time, but they should not be wildly or consistently biased. Yet what the events leading up to 2007 showed us was that the markets did not, in fact, properly react to information that was available, and continued to build up stresses. How could sophisticated institutional investors have been so wrong for so long about the values of mortgage-backed securities?

Starting in February 2009 – as the economic situation continued to deteriorate despite extraordinary measures – a small group of academics, supervisors, and financial industry participants began a series of conference calls to discuss the "what happened" question. The initial core group of Professors John Liechty and Arthur Small of Penn State University and Mark Reesor of the University of Western Ontario, Joe Langsam at Morgan Stanley, and Allan Mendelowitz and Mark Flood at the Federal Housing Finance Agency, began soliciting further expertise among their professional networks. Many of the authors and editors of the Handbook you are reading participated in those discussions. Like a garage band, we settled on a name before we learned how to play our instruments: *The Committee to Establish a National Institute of Finance* (CE-NIF, `www.ce-nif.org`). We agreed from the start that a basic problem – although surely not the only challenge – was the supervisors' lack of wherewithal: they simply did not have data of sufficient quantity and quality, nor the analytic capacity required for the scale, pace, and sophistication of modern financial markets. We had the hubris to propose a new federal agency to rectify this shortcoming. The group grew quickly through professional connections. There was never a formal charter, outside funding, or well-defined authority within the CE-NIF. Instead, the incentive structure ensured that the most dedicated participants would take the lead: significant effort was required, with zero remuneration guaranteed and little hope of success or glory.

The idea for a Handbook emerged from the conversations of the Data Subcommittee of the CE-NIF, which assembled a wealth of technical and professional expertise and wisdom. This "data committee" included chief data and technology officers, senior risk managers, and economists, researchers, and engineers from government, industry, and academia. Although the original impetus for the CE-NIF and its data committee was a systemic financial crisis, the discussion quickly moved beyond systemic risk to the broader risk and data management issues in finance. Where economic theory speaks in abstractions about public information sets and conditional

distributions, the data committee discussions focused on more mundane topics and concrete realities such as end-user computing, metadata management, messaging formats, data validation, ISO standards, and semantic modeling.

In sharing ideas and swapping war stories, two themes emerged. The first was the extent of disarray in financial data, not just for supervisors but at financial firms themselves. While it is common in policy and management circles to proclaim that it is the "What" that matters, not the "How," it became abundantly clear that the converse was often true: that the How had in fact influenced the What in a profound way.

The second theme was that we all had a lot to learn from one another. Too many facts and lessons were passed along as oral traditions within subspecialties, or re-learned the hard way by individuals confronting a problem that others had seen before. It was observed repeatedly during these sessions that, "this stuff just isn't written down anywhere."

This Handbook is our attempt to write some of those facts and lessons down. We have in mind the financial economist who needs to know about the main industry messaging standards, the database administrator who wants to learn what "volatility clustering" is and why it is important, the risk manager working with the mortgage supply chain for the first time, and the systems engineer trying to understand bank regulatory reporting. In short, we envisioned this Handbook as a practical companion and reference sitting on desks of the wide range of people who need to come together to solve the problems of information infrastructures in large financial institutions and regulatory organizations

The ambition to collect this much information in such a wide-ranging and fast-moving area in one place creates an inevitable tension between comprehensiveness and timeliness. We hope that the resulting compromises and omissions are at least tolerable, and that the Handbook will achieve its desired status as a dog-eared companion for the reader. We encourage the reader to make liberal use of references and sources provided to extend the lessons provided herein.

The Handbook is presented in two volumes. This satisfies the needs of practicality; two 600-page books are undoubtedly less daunting and more tractable than one 1,200-page book, but there is logic to this as well. Any attempt to address information infrastructure in a large organization (be it commercial or regulatory) must stand on a foundation of requirements. Volume I provides this basis in three parts. Part I provides the context and rationale for the need for financial data, describing the various data needs of risk and regulatory processes. Part II describes the supply-chain of data in the financial markets and the real economy, as well as the intersection and transmission of data across their common boundaries. Part III covers a broad range of topics relating to the use of data by regulators.

Volume II addresses topics that a financial institution or regulator would find necessary to implement change in their infrastructure. Part IV addresses a critical

component of implementation by describing how data emanates and are modified within an organization. Part V addresses various topics relating to the rapid changes in technology for data processing that makes these problems much more tractable. Part VI covers topics relating to the management of data remediation programs and environments.

The Handbook brings together an eclectic range of experts from a wide range of fields, as befits this expansive topic. Early on in its development we felt it would better serve our readers to let the voices of these experts shine through unadulterated by attempts to standardize the presentation across the Handbook. Accordingly, each chapter employs its own presentation style, with the attempts at normalization restricted to the superficial "look-and-feel" of the chapter.

Bringing this Handbook together has been at once a challenging and rewarding task. We hope that you find as much value in reading and referencing the book as we did in putting it together. Nothing would please us more than if this Handbook were to render itself obsolete over time by playing a small part in fixing the present unwieldy information infrastructures in the financial industry.

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