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# Banking Regulation and the Financial Crisis

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# Banking Regulation and the Financial Crisis

This book is a review on the economic theories of systemic risks in the financial market and the topics in constructing the macroprudential framework for banking regulation in the future. It explains the reasons why the traditional microprudential regulatory framework missed its target in stabilizing the market and preventing the crisis, and discusses the principles and instruments for designing macroprudential rules.

The first part of this book is dedicated to the analysis of systemic risks, which were largely missing in the design of traditional banking regulation. It shows how financial instability emerges from the changing intermediation structure and increasing product complexities, and how systemic risks arise from the banks' endogenous collective risk taking. It explains how market stress is amplified through the damaging leverage cycle, the network effects, and the feedback with the real economy. The book argues that the future banking regulation should be based on the macroprudential approach that takes into account the systemic risks as well as the feedback mechanism between the regulated institutions and the regulatory policies, and provides a framework for efficiency analysis.

This book takes the endogenous approach to better understanding the sources of the systemic risks in the financial market, the origin of the financial crisis, and the failure of traditional framework of banking regulation in maintaining financial stability. It emphasizes the strategic responses of the financial institutions to regulatory policies, and contributes to the construction of macroprudential rules for managing systemic risks.

**Jin Cao** is an Advisor of the Research Department, Financial Stability Wing of Norges Bank, Oslo.

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# Preface

This book is a review on the economic theories of systemic risks in the financial market, and topics in constructing the macroprudential framework for banking regulation. I hope this book can shed some light on the recent debates of reconstructing finance, but I am also fully aware of my limit: there are fast increasing theoretical findings on the legacy of the recent global financial crisis, and the effort in building up the new global standard in banking regulation just took off. Therefore, I am very looking forward to the constructive critiques from the readers.

In writing this book, I owe much debt to my advisor and co-author, Professor Gerhard Illing, for his enormous effort in teaching, guidance, and discussions. I thank my co-advisor, Professor Ted Temzelides, who made many insightful comments on the early drafts of several chapters. I owe many thanks to Douglas Gale, Antoine Martin, Tommaso Monacelli, Lars Norden, Rafael Repullo, Jean-Charles Rochet, Marti G. Subrahmanyam, and Uwe Vollmer, among many others, for very useful comments on some chapters in various seminars and conferences. I thank my former colleagues in the Department of Economics, University of Munich, and my colleagues in Norges Bank, for their numerous very helpful discussions and suggestions during writing this book. I gratefully acknowledge financial support at the Munich Graduate School of Economics (MGSE) from the German Research Foundation (DFG) through GRK 801. The views expressed in this book are completely from myself, and should not be interpreted as reflecting those of Norges Bank.

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Jin Cao
Oslo, Norway

# Abbreviations

| | |
|---|---|
| ABS | asset-backed securities |
| AIG | American International Group |
| CDO | collateralized debt obligations |
| CDS | credit default swaps |
| CoCo | contingent convertible debt |
| CoVaR | Conditional/Contributing Value-at-Risk |
| DSGE | dynamic stochastic general equilibrium |
| ECB | European Central Bank |
| ES | expected shortfall |
| FDA | Food and Drug Administration |
| MBS | mortgage-backed securities |
| MES | marginal expected shortfall |
| SES | systemic expected shortfall |
| SPV | special purpose vehicle |
| *VaR* | Value-at-Risk |

# Contents

# Introduction

In 2007–2009 the world has seen the severest financial crisis since the Great Depression. The crisis erupted after years of lax monetary policy, financial deregulation, global imbalance, and financial innovation, which made more households and entrepreneurs accessible to cheap credit and share the prosperity of the Great Moderation, while the financial institutions more exposed to each other and vulnerable to aggregate shocks. The crisis started from the bursting of housing bubbles, liquidity dried up nearly completely as a response to doubts about the quality of subprime mortgage-backed securities. Despite massive central bank interventions, the liquidity freeze did not melt away, but rather spread slowly to other markets such as those for auction rate bonds, commercial paper, and money market mutual funds. At its peak, the collapse of big financial giants such as Lehman Brothers and American International Group (AIG) brought the global financial market into a systemic meltdown, and the bailout effort cost the taxpayers hundreds of billions of dollars. In the beginning of 2010, when the world economy just started to see some signs of recovery, several European economies slipped into another quagmire of public debt crisis. From the numerous US foreclosed homes to the nearly bankrupted arctic Norwegian towns, the mess left by the crisis needs to be cleaned up for many years to come.

Although history repeats, it is much too simple to conclude that the financial practitioners, regulators, and researchers were completely unconscious about the risks in the market and the crisis just happened to everyone's surprise. The fragility of the financial system, the principle–agent problems inherent in the market structure, the regulatory arbitrage that helps the banks get rid of the restrictions, had been intensively studied, and rich lessons had been taught by the previous crises. As early as the virtues of financial deregulation and innovation got their momentum and started to be triumphed all over the world, Minsky (1986) already warned of the devastating instabilities the Wall Street revolution brought. Many episodes in the classic on financial crash and failure, Kindleberger and Aliber (2005), much resemble the stories in the current world crisis. Taleb (2004, 2007) argued that the seemingly highly improbable disasters may actually easily arise in the contemporary financial system. Goodhart and Illing (2002) selected the studies on the sources of systemic risk and the central bank's role in mitigating the market stress. Allen and Gale (2007) is an excellent survey on how far researchers have understood the cause of financial crises; Rochet (2008) is a collection of the author's comprehensive studies on market failure, showing why the market discipline is not sufficient to maintain the financial stability and the system needs better regulation in an era of global deregulation. Had these voices been carefully listened to, the system stability could have been well maintained and the financial turbulence could have been controlled at a much lower cost.

Since the eruption of the crisis, there has been a wide variety of literature on the origin of the crisis and the lessons people can learn. Reinhart and Rogoff (2009) present the regularities of financial crises in the history: crises are usually companied by soaring pre-crisis credit expansion, government default, currency crises, and so on. Akerlof and Shiller (2009) tries to understand the origin of financial crisis from human behavior, a field that has been long neglected in financial economics. Brunnermeier (2009) shows how the "originate and distribute" banking model led to the explosion of credit, followed by the implosion of the banking system. Cooper (2008) argues that the financial bubbles before the crisis were much fueled by the central bank's too loose interest rate policy and light-touch regulation based on the belief of efficient market. Duffie (2011) presents the key role the big dealer banks played in the crisis and calls for better regulation on these systemically important institutions. Gorton (2008, 2009) rebuild the timeline of the crisis, showing how subprime lending changed the entire financial system and sowed the seeds of the Great Recession. Gorton (2010) explains what makes the current crisis different: the market turbulence and lending freeze much happened in the rather invisible shadow banking system which has gained the pivotal role in financial firms' funding in the past decade. A case study on the failure of Northern Rock, Shin (2009) unveiled the cause that is different from the media coverage: instead of being too much involved in securitization, the bank's difficulty much came from its strong reliance on short-term borrowing. Tirole (2009) examines all the myths of liquidity – the origin, the demand and supply of liquidity, and liquidity in the crisis – and provides the reasons why liquidity disappeared suddenly when the panic started. Besides studying any specific institutional failure, a lot of recent work also questions the entire financial system at work, such as Krugman (2009), Lewis (2010), Posner (2009), Rajan (2010), Roubini and Mihm (2010), Sinn (2010), Stiglitz (2010), just name a few.

The crisis also stimulated the fast growing literature on rebuilding the financial system out of the debris. Wolf (2008), the Geneva Report (Brunnermeier *et al.*, 2009), the NYU Reports (Acharya and Richardson, 2009, Acharya *et al.*, 2010a, 2011), the LSE Report (Turner *et al.*, 2010), the Squam Lake Report (French *et al.*, 2010), Blinder (2010), among the others, already build comprehensive frameworks and key principles for restructuring the financial system and regulating the financial market. Shin and Morris (2008) shows how regulatory rules can serve as equilibrium selection devices for the desirable outcomes. Rochet (2010) suggests that the current crisis implies both philosophical and methodological changes, from a microprudential toward a more macroprudential perspective in the future regulation. Bank of England (2009) poses the thoughts of using capital or taxation surcharges to tame the systemically important institutions. Tirole *et al.* (2010) investigate the incentive problems in the financial sector, raising proposals for better capital structure and corporate governance in the banks.

This book is not written as a complete review on the origin of financial crises and the tools for banking regulation. Rather, the author attempts to summarize the new developments in economic theories for better understanding the new concerns on financial stability, and the lessons the regulators can learn from the current crisis. In the first part of this book, we present the systemic risks arising from the fast changing financial market structure and examine to what extent the existing economic theories explain the new features in the recent crisis. Especially, we focus on the externalities, network effects, procyclical leverage fluctuations, etc. – the flaws that the financial market fails to correct by itself and need to be fixed by external disciplines and rules. Based on these findings, the second part of this book is dedicated to the discussions on the new challenges for better banking regulation.

Compared with the idiosyncratic risk in an individual financial firm, that is often easily identified and managed, the systemic risk – which is somewhat hidden but brings out devastating consequence when it gets revealed – has become a major concern for both practitioners and regulators in the past decade, and the recent crisis just demonstrated how poorly the policy maker knew about it. Although the term "systemic risk" now frequently appears in mass media, policy debates, as well as academic research, there is still no widely accepted definition for it. Various working definitions are listed in Dwyer (2009): although these definitions describe the phenomenon from different angles, they all point to some unique features of such risk; the risk inherent in the entire financial system is related to some common factor of the financial institutions, which is hardly identified merely on the micro level of the firms, while the comovement of the financial market after some trigger event causes the disruption and dysfunction of the system. As is perceived by the practitioners as well as documented both by researchers and by supervisory authorities, the structural changes in the modern financial system have been raising the systemic risks; however, the fact was largely neglected by the regulatory agencies before the crisis. Since the identification of such risk relies on the systematic analysis and the market discipline based solution to minimize such risk is hardly available, there is a challenge for the regulators to switch their focus, from only monitoring the individual financial firm's health to having more weight on the stability of the entire financial system.

Systemic risk is more easily recognized at the time when it gets revealed than at the stage when it has been built up. Probably the best known revelation of the coordinated systemic disruption is the bank run phenomenon, which has existed throughout the entire history of banking. Chapter 1 reviews the classical textbook theory of bank run, but points out that in modern finance the run happens in a quite different manner. First, the phenomenon becomes universal to financial intermediaries of all categories, as long as the potential liquidity problem lives on the maturity mismatch – a fact that financial intermediaries finance their risky long-term assets by short-term borrowing. In this book, financial intermediaries are sometimes referred to as "banks" for simplicity. Second, the fact that modern banks rely more on the extremely short-term funding from the interbank market, an institution designed to avoid individual liquidity shortage, in fact increases the likelihood of a systemic liquidity dry-up, putting the entire financial system to a halt. The liquidity dry-up causes the fire sale of assets across the market, and to avoid such costly liquidation is therefore one of the key values of maintaining financial stability.

The systemic risk in the financial market is built up through the externalities, the network effects, etc., which are imposed on the system from the financial firms' behavior and not internalized in any individual financial institution's profit maximization calculus. Modern banks are highly interconnected through the financial network, making it much easier for a small ripple to propagate into a financial tsunami. Chapter 2 investigates several channels through which financial interconnectedness increases systemic risk. Local liquidity stress can spread through the market via lifting the overall borrowing cost in the interbank market or through the web of claims such that the counter parties in the network have to restructure their balance sheets which increases the probability of bank failure in the other part of the network. The chapter also addresses the increasing concern on the banks' "too-interconnected-to-fail" problem, where the banks *ex ante* intentionally build up connections as a bargaining chip against supervisory and regulatory authorities in the crisis – the moral hazard endogenously arising from the banking network.

A big part of bank run and banking network literature focuses on the evolution of bank failure; therefore, it is sufficient to model the financial intermediaries in a partial equilibrium framework where the banks' exposure to liquidity risks is taken as given. However, the partial equilibrium approach is much silent about the source of financial instability, since systemic risk arises as a result of the banks' coordinative failure to hedge against the aggregate shocks. Therefore, one can only uncover the root of systemic risk by endogenizing the banks' exposure in a general equilibrium framework. Only in the case where the market discipline and market mechanism fail to incentivize the banks to internalize the cost of maintaining the system stability, is there a role for the regulator to step in and intervene. A theory of the banks' endogenous exposure to systemic liquidity risk is presented in Chapter 3. The banking competition forces the banks to chase for yields, generating the incentive for some banks to free-ride on the other banks' provision of liquidity. The excessive risk taking raises the expected return for the banks in the orderly time, while leads to a complete liquidity dry-out in the downturn.

The modern financial system is also blamed as too complicated to penetrate. In the past decade, the growing complexity in the intermediation chain as well as the financial products substantially improved the market efficiency, made the