Chapter 4
The Effects of Prudential Supervision on Bank Resiliency and Profits in a Multi-Agent Setting

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ABSTRACT

This chapter utilizes multi-agent modeling to study the effects of prudential supervision on bank resiliency and profitability within a simulated environment of persistent crisis conditions. It focuses on the stabilizing effect of prudential supervision introduced alongside three "traditional" regulatory instruments: a norm, a market-based CDS insurance mechanism and a tax in the form of a bail-in instrument. The results show that: (1) supervision enhances the regulatory instruments' efficiency, (2) the regulatory norm can postpone the bank's default, but not avoid it, (3) the CDS mechanism only produces positive results on resiliency and profitability if the regulator supervises, and (4) the tax bail-in instrument is the most powerful tool in the regulator's arsenal as it potentiates profitable bank operation under long-lasting crisis conditions.

CHAPTER OVERVIEW

The severe economic recession of 2008 led to an increased focus on the importance of banking sector regulation in preventing crises. The downturn revealed that traditional theoretical and empirical models were ill adapted to crisis conditions and produced flawed results especially at turning points in the economic cycle. As such, the very methodology used in constructing theoretical models came under attack for not having been able to predict or measure the extent of the crisis. Increased attention was therefore devoted to finding alternative methodologies capable of more accurately determining the evolution of macroeconomic indicators.

DOI: 10.4018/978-1-5225-0959-2.ch004

Multi-agent modeling is a relatively new but rapidly growing programming methodology that allows researchers to create virtual economies in which economic agents of various types (customers, enterprises, banks, governments and regulators) are created and interact. In this simulative environment, micro-founded macro-economic aggregates emerge as a result of agent interactions. Since the dissection of the causes leading to the 2008 financial crisis indicated a deficiency in the functioning of prudential instruments, it is of interest to consider the role that irrationality plays in the decisions taken by agents (as the theoretical literature suggests that during crises agent behavior may not be completely rational). Given that traditional modeling techniques cannot incorporate irrationally into the analysis, it is beneficial to perform the analysis in a multi-agent environment which allows for limited rationality and complex behavior such as "sunspots" and "herd instincts".

Furthermore, multi-agent modeling allows different types of reactions (or behaviors) to be assigned to agents based on various criteria thereby allowing for a study of the possible responses to the crisis and a comparison of their efficiency. It is possible to include learning algorithms that allow the agents to improve their decision-making abilities or become better at performing pre-defined tasks. Concurrently, agents can be programmed to change their behavior in innovative (and unscripted) ways to respond to the environmental stimuli that they receive.

In general, multi-agent models comprise a number of strengths over other modeling techniques, the most pertinent ones to our study of the financial sector being: the ability to incorporate individual characteristics within agent groups, to study the interactions between agents within a competitive environment and the possibility of performing robustness checks in the presence of randomness. These advantages allow for a richer analysis than what would be possible in a purely representative agent model.

Within this chapter we will utilize multi-agent modeling to perform an analysis of the effects of prudential supervision on bank resiliency to shocks and the profitability of the bank within different regulatory set-ups. At first, we look at the main reasons leading to the 2008 crisis and present references to the existing literature. We then describe the model, its purpose, structure, agents, their affiliations and accounts. Since this is a programming methodology, we also present the order in which events are executed and in which agents make their decisions. Finally, we delve into analyzing the different regulatory instruments implemented in the presence (and, if appropriate, absence) of regulatory supervision and their effectiveness at preventing the bank's default and ensuring its long-term profitability. We describe in each section the functioning of the instrument and how it is implemented in our model.

At the end, we provide a comparison of the instruments and offer concluding remarks as to the best suited tools for regulating the banking system in conditions of long-lasting crises and elaborate on the bank's adaptation to such harsh operating environments. We also discuss the side-effects of implementing each one of the instruments in the presence and absence of supervision.

1. INTRODUCTION

From a prudential perspective, the 2008 financial crisis highlighted the weakness of the deregulated financial system within an environment of growing risk and convoluted market instruments that failed to achieve their objective of risk diversification. As a consequence of the severe economic recession that followed the 2008 crisis, regulators in western economies and the United States concentrated their focus on the re-regulation of the financial sector. The theoretical and empirical literature largely followed suit. Whereas some researchers focused their attention on traditional prudential tools such as capital