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Financial Innovation, Bank Default Risk and Banking System Stability

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1. Motivation and Research Questions

This project investigates the relationship between the use of new financial instruments by banks on the one hand and the banks' default risk and banking system stability on the other

Several authors, including Rajan (2005) and Schinasi (2006), have argued that derivatives have, together with other types of financial innovation, made the financial system more fragile. To date, despite its significant importance for academic research and public policy, this hypothesis has not been subjected to data. In this research project we therefore propose to address the following question: Is the increasing use of derivatives and securitization by U.S. commercial banks related to banks' (unconditional and conditional) probabilities of default? In other words, has financial innovation increased banks' default risk in particular and banking system stability as a whole?

2. Background

The costs of bank failures for the real economy tend to be rather significant, as shown by Bernanke (1983), and so do the costs of banking instabilities, as argued by Hoggart, Reis, and Saporta (2002) and Rajan (2005). Several authors including De Nicolo and Kwast (2002) and Hartmann, Straetmans, and de Vries (2006) have argued that systemic risk in the U.S. financial system has increased over the last ten years or so. Over the same time period the extent of financial innovation, both in terms of the number of new products introduced and the amount of those products being traded by financial institutions, was enormous. It is therefore interesting to ask whether financial innovation has indeed made financial institutions and financial systems more fragile.

So far, the academic literature on derivatives use by banks has regarded derivatives as hedging instruments employed by banks to reduce, in particular, interest rate and credit risk, as expounded, for example, by Minton, Stulz, andWilliamson (2005), Purnanandam (2007), and Sinkey Jr. and Carter (2000). Some authors, however, including Schrand and Unal (1998), argue contrarily pointing out that banks may use derivatives not only to shed risk but also to allocate capital more precisely. Derivatives thus allow banks to increase their overall exposures to a wide range of risk factors. Importantly, they tend to expose financial institutions both directly and indirectly to counterparty default risk. Direct exposure results from bilateral contracts between the different financial institutions, including derivatives and securitization products, which are subject to counterparty default risk. Indirect exposures exist as a result of common exposures to various financial markets including the default of remote institutions.

One may think that counterparty risk in derivatives contracts and securitizations is eliminated by margin requirements. While margin requirements, by attaching collateral to derivatives positions, do typically reduced default risk (in particular, current exposure), they rarely eliminate it (partly

because potential future exposure on such contracts is huge and collateral in such amounts would be very expensive). Recent events in financial markets have demonstrated that counterparty default risk in derivatives contracts is far from negligible.1

Similarly, one may think that counterparty credit risk in derivatives and securitization products is eliminated by credit derivatives. While credit derivatives enable derivatives markets participants, in general, to insure against counterparty credit risk, they never eliminate it as they are subject to counterparty default risk as well, as recent financial market events vividly demonstrate.

3. Approach

The aim of this project is to investigate to what extent financial innovation has affected both, bank default risk and banking system stability in the U.S. commercial banking system. We will look at two particular but rather important aspects of financial innovation: derivatives and securitization. We expect that an increase in the use of derivatives and securitization by banks increases their probability of default and decreases the stability of the banking system. We use three methodologies to estimate banks' probabilities of default: a structural credit risk model as developed by Merton (1974), equity options prices as described in Camara and Simkins (2007) and credit spread data provided by Moody's.

In the second part of the project we will consider four measures of banking system instability. Our first measure is the correlation of banks' stock returns. De Nicolo and Kwast (2002) argue that correlations of stock returns provide an indicator for banking system instability. Our other three measures for banking system stability will be based on the joint probability of default of the n largest banks in the system, considering values of n from two to five. In other words, we are interested in the probability of the n largest banks defaulting simultaneously. We assume that a joint default of the largest banking organizations will result in severe instability of the banking system, warranting this measure as a proxy for instability.

4. Econometric Issues

We will test our hypotheses using both OLS and panel estimation techniques. We expect our analysis to be complicated by endogeneity. It is conceivable that our our explanatory variables are influenced by the explained variables. Among others, bank managers might watch their bank's probability of default and adjust derivatives positions accordingly. We intend to address this potential issue by using instrumental variables for both, explanatory and explained variables. We expect the choice of instruments to be a major difficulty of this project.

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