An Empirical Investigation of Lending to Small Businesses

by

Kyung-Seol Min

A dissertation submitted to the Graduate Faculty of North Carolina State University in Partial fulfillment of the requirements for the Degree of Doctor of Philosophy

Economics

Raleigh, NC

2008

APPROVED BY:

John S. Lapp

Lee A. Craig

Karlyn Mitchell
(Chair of Advisory Committee)

Douglas K. Pearce
(Chair of Advisory Committee)
Kyung-Seol Min was born in Cheongju-shi, Chungcheongbuk-do, Korea in 1968. He finished his bachelor of Economics from Seoul National University, Seoul, Korea in 1995. After passing the exam to be a higher central government official, he has worked in the Ministry of Finance and Economy ('Ministry of Strategy and Finance' now) in Korea as a deputy director and a senior deputy director. He worked at the bureaus of national economic welfare policy, overall macro-economic policy, and international financial policy in the Ministry. In his job as a government official, he was involved in designing and executing many Korean economic policies. In particular, he played a leading role in setting up Korea Investment Corporation ('KIC'), an investment company which uses $ 20 billion of Korean foreign exchanges for investing in the international financial markets. He was awarded a full scholarship by the Korean government to pursue his graduate studies at North Carolina State University ('NCSU', Raleigh, US). In his graduate studies at NCSU, his major research areas are macro-economics, applied econometrics, and international economics. Upon submission of this dissertation, which was successfully defended in October 2008, Kyung-Seol Min will return to his home country, Korea, to continue his career as a government official in
ABSTRACT

MIN, KYUNG-SEOL, An Empirical Investigation of Lending to Small Businesses. (Under the direction of Douglas K. Pearce and Karlyn Mitchell.)

This dissertation analyzes lenders' two important decisions (loan approval decision and loan rate decision) in their loan evaluation procedures using the SSBF (Survey of Small Business Finances) data sets. First, I examine what factors play important roles in the determination of loan interest rates. In this test procedure, following Vickery (2007), I split the data sets into fixed-rate and variable-rate loans to find systematic differences in the loan rate determination between these two loan types. The regression results of the loan rate model are different from general expectations in many respects. Not many independent variables have significant coefficient estimates. There is little consistency among the three-regression results (2003, 1998, and 1993 SSBF data sets) both in fixed-rate and in variable-rate loans. Wide use of
credit scoring is analyzed to be one explanation of the disappointing results. Lenders evaluate the credit risk of loan applicants with their own credit scoring system, and they mainly use the credit scores in deciding whether to approve the loan, and for the approved loans, the loan rates do not vary much according to their credit scores. Next, the test results of the credit rationing theory by Stiglitz and Weiss (1981) show that in the higher market interest rate period lenders' credit standards get also higher, so they ration credit more than in the lower market interest rate period. Finally, in the analysis of ethnic discrimination, Asians and Hispanics were less discriminated against in 2003 than in 1998, but African-Americans still higher loan denial rate than white applicants. The enhanced objectivity in lenders' loan evaluation procedures by using the credit scoring models might be associated with the decreased ethnic discrimination, but more collection of the SSBF data sets and analyses using these data sets are needed to support this explanation.
the Ministry of Strategy and Finance. He hopes to successfully use his advanced economic knowledge, which he got in his graduate studies, in his job for the development of the Korean economy.
# Table of Contents

List of Tables ........................................................................................................ vii  
List of Figures .......................................................................................................... ix  
List of Appendices ..................................................................................................... x  

**Chapter 1 Introduction** ...................................................................................... 1  
References .............................................................................................................. 7  

**Chapter 2 Survey Data on Small Firm Finances** ........................................... 8  
2.1 Introduction ....................................................................................................... 8  
2.2 Overview of the Survey ................................................................................... 10  
2.3 Details on the Survey Variables ....................................................................... 15  
2.4 Descriptive Statistics ....................................................................................... 25  
2.4.1 Structure of Descriptive Statistics ................................................................. 25  
2.4.2 The Imminent Problem of the Firms ............................................................. 27  
2.4.3 Firm characteristics .................................................................................... 29  
2.4.4 Owner characteristics .................................................................................. 33  
2.4.5 Dealings with the Financial Markets ............................................................ 36  
2.5 References ....................................................................................................... 42  

**Chapter 3 Determinants of Loan Interest Rates** .......................................... 44  
3.1 Literature Review of the Commercial Loan Pricing .................................... 45
Chapter 4 Credit Scoring and Credit Rationing in Small Business Lending

4.1 Introduction .............................................................................. 99
4.2 Credit Scoring and Small Business Loans ......................... 101
  4.2.1 Review of the Credit Scoring System ......................... 101
  4.2.2 Recent Issues about Credit Scoring ......................... 104
  4.2.3 Empirical Test of Credit Scoring ................................. 109
4.3 Credit Rationing in Small Business Loans ......................... 117
  4.3.1 Credit Rationing .......................................................... 119
  4.3.2 Literature Review – Stiglitz and Weiss (1981) ............. 120
  4.3.3 Test of Stiglitz & Weiss's Credit Rationing Theory ........ 123
4.4 Conclusion ................................................................................ 131
4.5 References ................................................................. 135

Chapter 5 A Closer Look at Evidence of Discrimination in the Small Business Loan Market ......................... 140

5.1 Introduction ............................................................. 140
5.2 Some Descriptive Statistics by Racial Category ............... 142
5.3 Model of Loan Application and Loan Decision ................. 146
5.4 Conclusion ............................................................. 154
5.5 References ............................................................. 156

Chapter 6 Conclusions .................................................... 158

6.1 Summary ............................................................. 158
6.2 Contributions and Future Works ..................................... 162
List of Tables

Table 1  Comparison with previous surveys .......................... 15
Table 2  Sample statistics of the 5 implicates .......................... 26
Table 3  The most important problem of small businesses ............... 27
Table 4  Descriptive statistics of firm's characteristics .................. 29
Table 5  Descriptive statistics of owner's characteristics ................. 34
Table 6  Descriptive statistics of the financial market dealings .......... 36
Table 7  Summary of the studies on the loan rate ......................... 53
Table 8  Replication of Blanchflower et al (2003) ....................... 56
Table 9  F-test results of Blanchard et al (2008) ....................... 58
Table 10 Average values of the MRL variables .......................... 60
Table 11 Variable definition of equation (2) .......................... 74
Table 12  F-test results .............................................. 79
Table 13  Regression results of the 2003 data .......................... 80
Table 14  F-test results for each group of 2003 .......................... 80
Table 15  Comparison of regression results for 2003, 1998, 1993
(Fixed-rate loans) .................................................. 89
Table 16  Comparison of regression results for 2003, 1998, 1993
(Variable-rate loans) .................................................. 89
Table 17  F-test results for each group of 2003, 1998, and 1993 ........ 90
Table 18  Comparison of regression results in the credit scoring system (2003, new loans) ........................................... 113
Table 19  Comparison of regression results in the credit scoring system (1998) .................................................... 113
Table 20  Average loan rates and average loan denial rates in the 2003 and 1998 surveys .............................................. 118
Table 21  Statistics of proxy variables in 2003 and 1998 ........... 127
Table 22  Comparison of average loan rate and expected loan rate 130
Table 23  Some descriptive statistics for each racial group ....... 142
Table 24  Test results of joint models ...................................... 149
Table 25  F-test results .......................................................... 152
List of Figures

Figure 1  The sample distribution of total employment ................. 32
Figure 2  The sample distribution of D&B rankings ...................... 37
Figure 3  Expected return of bank with adverse selection ........... 122
List of Appendices

Appendix 1  Descriptive statistics of variables for each sub-division (2003, 1998) ................................................................. 196

Appendix 2  Regression results for the premium model .................... 218

Appendix 3  Comparison of regression results in the credit scoring model (2003, new+renew) ..................................................... 223