

THE DIFFUSION OF FINANCIAL INNOVATIONS:
AN EXAMINATION OF THE ADOPTION OF SMALL BUSINESS
CREDIT SCORING BY LARGE BANKING ORGANIZATIONS

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Motivation

- It is widely recognized that innovation is an important driver of productivity.
- Innovation in the financial services sector is particularly important because of this sector's role in facilitating commerce.
- The number of quantitative studies of financial innovation is modest in comparison to its perceived importance.
- Quantitative studies of how financial innovations diffuse through the economy are limited.
 - Hannan and McDowell (1984, 1987)
 - Saloner and Shepherd (1995)
 - Jagtiani, Saunders, and Udell (1995)
 - Molyneux and Shamaroukh (1996)
- We contribute to this literature by using new survey data on the adoption of credit scoring models for underwriting small business loans.

What is Credit Scoring?

- Credit scoring is a process used by lenders to assign a single quantitative measure (score) to a potential borrower that represents an estimate of the borrower's future loan performance.
- These scores are most often derived using statistical models of borrower default, where the estimated regression parameters (e.g., income, debt-to-income ratio, delinquencies) are interpreted as risk weights.
- Specifically, borrower data are gathered from loan applications and credit reports and run through the fitted default regressions.
- Credit scoring has been widely used for consumer credit decisions (automobile, credit card, and mortgage loans) for several years. However, it only began being applied to small business loans during the last decade.

Potential Implications of Credit Scoring

- Credit scoring has the potential to significantly alter small business credit markets.
- The interaction between borrowers and lenders may become less formal and non-local; credit scoring may reduce the importance of lending relationships.
- Implications
 - Reduced underwriting costs and/or improved risk evaluation.
 - Increased credit availability because of reduced costs and informational opacity.
 - Risk-based pricing is more easily introduced because of a common metric.
- Three studies have examined economic effects of small business credit scoring (SBCS). Taken together, SBCS appears to be associated with increased lending, higher average prices, and greater risk levels.
 - Frame, Srinivasan, and Woosley (2001)
 - Frame, Padhi, and Woosley (2001)
 - Berger, Frame, and Miller (2002)
- In this paper, we examine a related question: what factors influence the probability and timing of large banking organizations adopting new technologies like SBCS.

Variables of Interest

- Market Concentration
 - Herfindahl-Hirschman Index (HHI);
- Geographic Clustering
 - Indicator of headquarters in the New York or San Francisco Federal Reserve districts (NEWYORK, SANFRAN);
- Banking Organization Size
 - Natural logarithm of total domestic banking assets (LNASSETS);
- Small Business Lending Focus
 - Total small business loans as a percent of domestic banking assets (SBLRATIO);
- Organizational structure
 - Number of subsidiary banks (BANKS);
 - Number of bank branches (BRANCHES);
- Profitability
 - Return on equity (ROE);
- Innovativeness
 - Non-Interest Income (NIINCOME)
- CEO Tenure
 - Years that CEO has been in office (CEOTEN);
- CEO Education
 - Indicator of whether CEO holds an Advanced Degree (ADVDEG).

Data

- Data from a telephone survey of the 200 largest U.S. banking organizations as measured by total domestic banking assets as of June 1997. Surveys were completed by 99 institutions and indicated the month and year that each adopted SBCS.
- June Call Report data for 1993-1997.
- CEO information (collected primarily from Forbes magazine).

-- Because CEO information was lacking for four of our sample institutions (all foreign-owned), we analyze 95 large banking organizations.

Tests and Results

Hazard with Weibull Distribution, 1993- 1997

- The dependent variable is the natural logarithm of the number of sample years until adoption occurs. For example, 1993 is coded as sample year 1, while 1997 is coded as sample year 5. Banks adopting SBCS during the period exit the sample, while non-adopters are censored at sample year 5.
- The probability of not adopting SBCS is negatively related to bank size and the bank being headquartered in the New York Federal Reserve district.
 - Consistent with prior research that there are economies of scale for technology adoption and that there is some geographic dependence in the diffusion of new technologies.

Tobit, 1997

- The dependent variable in the tobit model is the number of years that the banking organization has been using SBCS (as of June 1997).
- Consistent with the hazard results, YEARS is positively related to bank size and to the bank's being located in the New York Federal Reserve district (11% Level).
- YEARS is also positively related to the number of bank branches (14% level) and negatively related to the number of subsidiary banks.
 - Consistent with theories about the relationship between bank organizational structure and lending style.

Conclusions

- Larger banks and those located in the New York Federal Reserve district adopted SBCS before their peers;
- The tobit analysis also indicates that the likelihood of adopting SBCS was positively related to the size of the branching network and negatively related to the number of bank charters.
- CEO characteristics did not have significant explanatory power.