



“U.S. Banks Artificial Intelligence and Small Business Lending: Evidence from the Census Bureau’s Technology Survey”

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Summary

Research Question: How does U.S. banks' adoption of artificial intelligence (AI) impact their small business lending?

Takeaway: AI enables banks to:

1. Supply more credit to distant small business borrowers
2. Identify distant borrowers with higher quality credit at loan originations





Small Business Lending

- **Small businesses are important to U.S. economy**
 - Account for 44% of U.S. GDP and 63% of new job creation (U.S. Chamber of Commerce 2023)
 - 85% face financial challenges, yet only **42%** have their financing needs met (Federal Reserve Banks 2022)
- **Issue:** Small businesses provide little public information
 - Opaque information environments → Difficulty in assessing their credit risk
- **Conventional Solution:**
 - Collect “soft” information through local interactions with borrowers
 - Restrict lending to borrowers who are geographically proximate to bank branches





AI Transforming the Banking Industry

- **AI could create value for the banking industry**
 - AI has the potential to generate **\$1 trillion** in annual value for the banking industry (McKinsey 2021)
 - “AI could be as transformative as electricity or the internet” (Jamie Dimon, J.P. Morgan’s CEO)
- **Potential usefulness of AI in small business lending**
 - Analyze large volumes of alternative data (Dryer 2018)
 - Identify nonlinear relationships (Gargano 2024)
 - Help banks collect more borrowers’ information (e.g., image recognition, NLP) (Crosman 2024)





Anecdotal Evidence



- ✓ Use AI-powered software to review commercial loan contracts
- ✓ 360,000 hours of manual work finished in seconds



- ✓ Use AI platform to monitor cash flow health, credit risk, and lending opportunities
- ✓ Enhance risk management and lending strategies



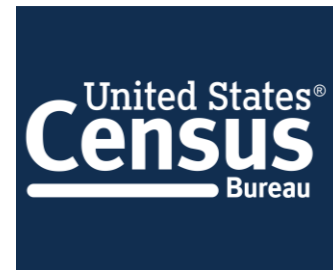
- ✓ Partner with JUDI.AI to simplify small business lending process
- ✓ Streamline loan applications and speed up credit decisions





Our Focus

- **Little empirical evidence on the adoption and impact of AI on banks' lending practice**
 - Due to lack of systematic data on firms' AI usage (Seamans and Raj 2018)
- **Microdata from the Census' Technology Survey**
 - "one of the largest and most up-to-date data set available on advanced technology adoption in the world" (Zolas et al. 2020)
- **Advantages:**
 - Asks about specific technologies (vs. overall tech investment)
 - Direct measure of AI use (vs. in-house AI experts)
 - Mandated response (vs. voluntary disclosure)
 - Private and public companies (vs. public firms)





Sample Survey

SECTION E: TECHNOLOGY AND INTELLECTUAL PROPERTY

The following section collects information on intellectual property and technology use for the business.

Technology related questions in this section asks about the following technologies:

Artificial Intelligence: Artificial intelligence is a branch of computer science and engineering devoted to making machines intelligent. Intelligence is that quality that enables an entity to perceive, analyze, determine response and act appropriately in its environment.

← Specifically defines AI

E.3 Production Technology for Goods and Services

During the three years 2016 to 2018, to what extent did this business use the following technologies in production processes for goods or services?

Artificial Intelligence

- | | |
|---|---------------------------------------|
| ☐ Did not use | ☐ Moderate use |
| ☐ Tested, but did not use in production or service | ☐ High use |
| ☐ Low use | ☐ Don't know |

← Asks the extent of AI usage





Trend in AI Adoption



***Percentage of Banks with AI Usage**





What drives banks' adoption of AI

- **Question:** Do bank characteristics explain banks' adoption of AI?
- **Findings:**
 - Larger banks are significantly more likely to adopt AI
 - We do not find evidence that AI adoption is associated with other bank characteristics
 - e.g., public status, leverage, profitability, liquidity, securities investment, loans, deposits, loan composition, derivatives





AI and Credit Supply

- **Data: Community Reinvestment Act (CRA) data from FFIEC**
 - All commercial banks regulated by OCC, FDIC and Federal Reserve above assets threshold
- **Focus: Small business loan *originations* at the *bank-county-year* level**
 - e.g., the *number of* and *total amount* of small business loans by Bank of America, N.A. in St. Louis County, Missouri
- **Findings: Banks with greater AI usage lend significantly more to distant borrowers**
 - No similar effects for other types of advanced technologies (e.g., cloud systems, other software)
 - AI's effect on distant lending is stronger in areas with less bank presence (underserved areas)





AI and Loan Performance

- **Technological advancements do not necessarily improve loan performance**
 - Technological improvements between 1970s and 1990s → higher default rates (Petersen and Rajan 2002; Berger et al. 2005; DeYoung et al. 2008)
- **Data: Small Business Administration (SBA) 7(a) loan-level dataset**
 - Detailed loan-level information (e.g., maturity, spread, principal amount, loan charge-off)
 - Borrower information (e.g., industry, street address)
- **Focus: Loan default**
 - Amount charged-off scaled by the loan's principal amount
- **Finding:**
 - Banks with greater AI usage experience lower default rates among distant borrowers





AI and Risk Assessment

- **The effect of AI on loan pricing is ambiguous**
 - Identify high-quality borrowers → lower loan spread
 - Spatially discriminate distant borrowers (e.g., Degryse and Ongena 2005) → higher loan spread
- **Focus: Interest spread**
 - Interest rate at loan origination minus risk-free rate
- **Finding:**
 - Banks with greater AI usage charge distant borrowers lower interest rates at loan origination





Policy Implications

- **Community banks make 37% of small loans to businesses and 63% of agricultural loans**
 - In one quarter of our counties, a community bank is the only physical banking presence
- **“Effective incorporation of new technologies is crucial”** (Brandon Milhorn, President & CEO of CSBS)
 - “Reach new depositors, cut operational costs, reduce the cost of financial products, and access previously underserved communities”
- **We show AI could be particularly helpful for community banks in small business lending**
 - Extend outreach to distant borrowers, particularly in underserved areas
 - Supply credit to high-quality borrowers with lower costs





Thank You!

