**Loan Approval Risk Simulation   
for an Aging Population**  
  
*Explores how loan approval outcomes and financial risk evolve as populations age*

MIHRET TESFAYE (LEAD)  
JOSHUA DAVIS

2025

**Project Title: Loan Approval Risk Simulation for an Aging Population**

1. **Problem Background**

Our project explores how loan approval outcomes and financial risk evolve as the population ages, especially focusing on individuals aged 50 to 70. Over a 50-year simulation horizon, we target to understand how borrower characteristics, approval policies, and economic conditions interrelate to influence loan profitability and default rates. The primary question we ask is: How will lending outcomes change for older borrowers as their population share increases over time?

We plan to use a Monte Carlo simulation to model individual borrowers and their outcomes under varying credit policies. In addition, we are exploring the integration of a risk scoring model to support more realistic decision-making.

1. **Simulation & Design Methods**

We are building a simulation that reflects both borrower-level uncertainty (income, health, credit score) and macro-level changes (aging trend, market interest rates). The simulation is designed to model

1. **Results & Interpretation**

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| --- | --- | --- |
| Variable | Distribution Type | Explanation |
| Income | Normal | Simulated using a normal distribution centered around $40,000 with a standard deviation $5000 to reflect modest variation in applicant income levels |
| Expenses | Normal | Model using a normal distribution (mean=$25,000, SD=$4,000) to capture living costs and personal financial burden |
| Life Expectancy | Uniform | Drawn from a uniform distribution between ages 70 and 95. |
| Age (optional extension) | Normal (shift in mean) | It could be added later to model the aging population trend. This would allow the simulation of demographic change over time |

1. **Limitations & Possible Extensions**

* Basic simulation function completed
* 50-year loop and full population simulation in progress
* Risk score logic under testing for realistic behavior
* Initial plotting underway

**Appendix A: Artificial Intelligence (AI) Log**

For this project, the software is currently broken down into 4 source files:

**Appendix B: Tools Used**

OpenAI. (2025). *ChatGPT: Language model (July 2025 version)* [Large language model]. <https://chat.openai.com>