

How Capable is an Applicant of Repaying a Loan?

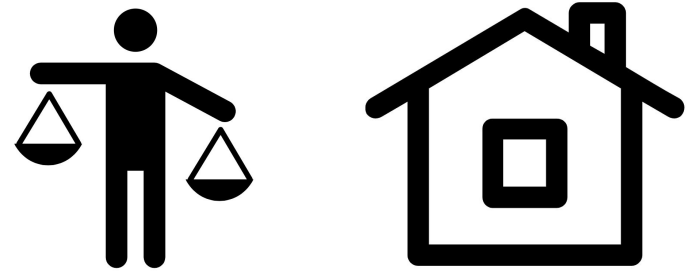
Home Credit Default Risk Results

Laura Cattaneo, Callie Page, Max Traub, Cathy Zheng



Roadmap

1. Key Takeaways
2. Risk and Consequences of Low Credit
3. Analysis Overview
 - a. Data sources
 - b. Model results
4. Conclusion



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CREDIT**



Key Takeaways



We help people with poor credit history enter the credit market



We help Home Credit ensure they maximize their business potential

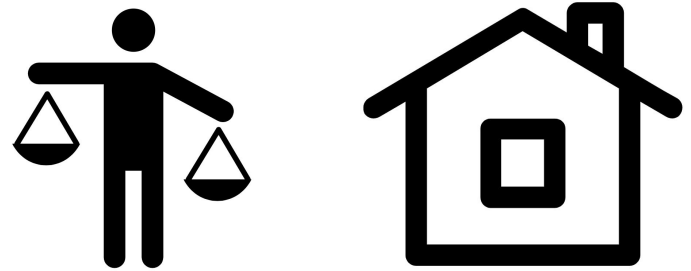


Home Credit can expect a 4.4% increase in profit after implementing the model - which translates to \$8.8 million annually



Roadmap

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Almost 1 in 9 americans struggle to get a home loan

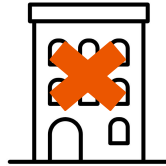
$$\begin{array}{ccccc} 26 & & 10 & & 36 \\ \text{million} & + & \text{million} & = & \text{million} \end{array}$$

Are credit **invisible** ¹

Have insufficient credit
to get a loan ¹

Struggle to get a home loan

Extensive consequences of invisible and bad credit





Extensive consequences of invisible and bad credit

\$ 300,000
30 year loan



\$ > 110,000
over loan lifetime



Increased risk of falling to predatory lenders

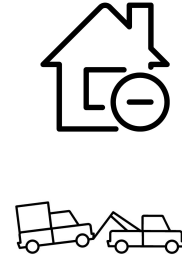
Unfair and abusive lenders profit from loan terms



High late fees



Penalty interest

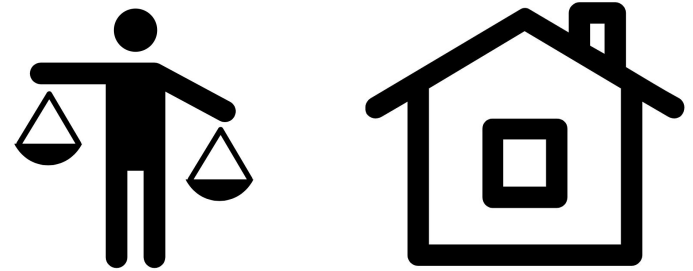


Collateral



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Home Credit uses alternative data to predict repayment abilities

8 datasets

#1, 2 Application Train and Test

- Main table including the target variable (whether or not the client has payment difficulties)

#3 Bureau Data

- Data on previous loans a client received

#4 Bureau Balance Data

- Monthly balance of credits in the Bureau
- Gives insight into client's behavior



Home Credit uses alternative data to predict repayment abilities

8 datasets

#5 Previous Application

→ Client's previous loan applications with Home Credit

#6 Cash Balance

→ Client's loan repayment history

#7 Instalments Payments

→ Payment data for each instalment of credit

#8 Credit Card Balance

→ Monthly balance of credit card loans



We take their variables and engineer more powerful new ones

220 columns provided

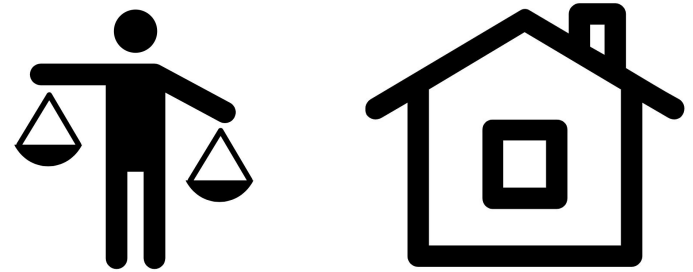
We engineer new features and
include

1057 in our modeling



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We try various models to help Home Credit maximize their predictive power

We tried the following models:

- Decision Tree
 - K-NN
 - Logistic Regression
 - SVM
- 

None perform as well as:

LightGBM



**We help Home Credit unlock their full potential by
creating the best model**

LightGBM model

AUC: 0.664

recall: 0.452

**best performer
in MSBA history**



Model Limits Cost of Mortgage Defaults

| | Member can pay | Member will have difficulty paying |
|----------------------------------|----------------|------------------------------------|
| Model predicts member can pay | \$4,548 | -\$26,895 |
| Model predicts member cannot pay | -\$1,000 | \$0 |

When evaluating the expected benefit from the model, we create a matrix associating the cost or benefit of each potential outcome.

Sources:

1. Goodman, L., & Zhu, J. (2015, February). *Loss Severity on Residential Mortgages* [PDF]. Washington, DC: Urban Institute.
2. Olick, D. (2020, September 10). Mortgage lenders just saw record profit, and expect to do better in the next quarter. Retrieved from <https://www.cnn.com/2020/09/10/mortgage-lenders-just-saw-record-profit-and-expect-to-do-better-in-the-next-quarter.html>



Model Limits Cost of Mortgage Defaults

| | | | | | |
|---------------------|-----------------------------|-----------|---|-----------------------|------|
| Expected Value = | Costs or Benefit of Outcome | | X | Likelihood of Outcome | |
| | \$4,548 | -\$26,895 | | 91.6% | 0.3% |
| | -\$1,000 | \$0 | | 7.7% | 0.4% |



Model Limits Cost of Mortgage Defaults

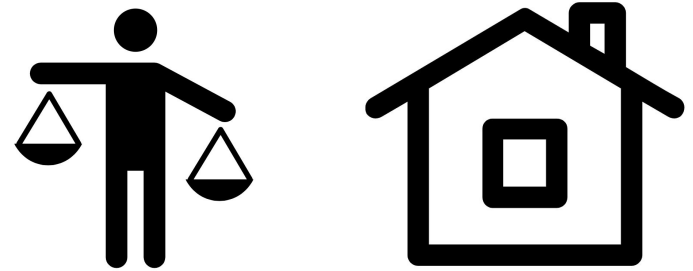
| Type of Classifier | Expected Value Per 100,000 Customer | Improvement with Model |
|--------------------------|-------------------------------------|------------------------|
| Best Model | \$2,078.82 | -- |
| Give Everyone a Mortgage | \$1,990.75 | 4.4% |

If 100,000 customers are served annually by Home Credit, the additional profit each year would be \$8,810,000.



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Results with an Emphasis on Business Value

\$8.8 Million

Help people who are usually not able
to enter the credit market do so



Ensure Home Credit reaches
their maximum potential





Thank you for your attention. Questions?



Laura Cattaneo
catta008@umn.edu



Callie Page
page0268@umn.edu



Max Traub
traub015@umn.edu



Cathy Zheng
zheng465@umn.edu

For more technical details, check out our [GitHub](#)