

KEY INSIGHT. Algorithm Differentiates Risk

Evidence of lower risk lending to parents when School Fee Loans run through EduFinance algorithm

EDUFINANCE CREDIT ALGORITHM

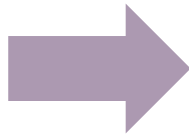
OBJECTIVES:

- Increase financial institutions' (FI) willingness & confidence to **lend to parents**
- Equip FIs to **improve financial sustainability** of EduFinance portfolio
- Accurately identify **high risk clients** to mitigate lending risk
- **Compare** lending decisions & outcomes to scores/predictions (*Pilot Objective*)

PILOT. In 2019, **222 School Fee Loan** applications were submitted through the **EduFinance credit algorithm** by a Uganda partner financial institution conducting the pilot. The financial institution **did not consider** the output scores when making loans for this pilot, enabling EduFinance to compare loan officer decisions to the credit algorithm scores.

KEY RESULT. Credit algorithm successfully differentiates risk

PARENTS apply for **School Fee Loans**



Portfolio at Risk > 7 days

PAR>7
if no algorithm used

3.7%

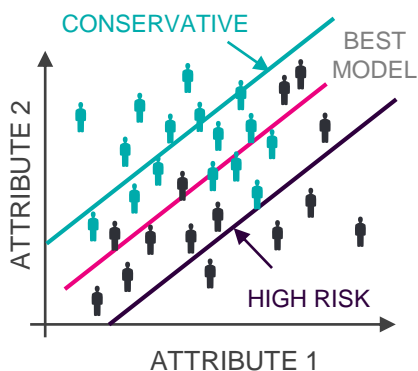
PAR>7
if 15% algorithm threshold used

2.5%

If **school fee loans** were only disbursed to applicants with an **output score of <15%**, **PAR>7 days** would have been **1.2% points lower**

KEY FINDING

Financial institutions could incur savings resulting from **reduced delinquencies** and **reduced manual task load** if the algorithm was used in the approval process:



SET APPROVAL THRESHOLD

Automatic disbursement to applicants that score below threshold (e.g. <15%)



SET MID RANGE FOR REVIEW

Refer decision on applicants scoring within a set range to loan officer (e.g. 15-25%)



SET DECLINE THRESHOLD

Any applicant scoring above top threshold would result in automatic decline (>25%)

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WHY USE A CREDIT ALGORITHM FOR EDUFINANCE LENDING?



Parent Benefits

- **Increased access** to school fee loans for more parents as financial institution grows lending
- **Faster** application processing
- **Equal, objective treatment** of applicants

Financial Institution Benefits

Reduce Risk

- Reduce bad debt
- Reduced exposure to high risk accounts

Increase Efficiency

- Analysts focus on difficult accounts
- Increase volume of accounts with same staff

Increase Sales

- Target credit-worthy customers
- Increase approval rates

Increase Speed

- Quickly handle obvious approvals/declines
- Less data required to make accurate decisions

Increase Consistency

- Consistent, objective decisions
- Equal, objective treatment of applicants

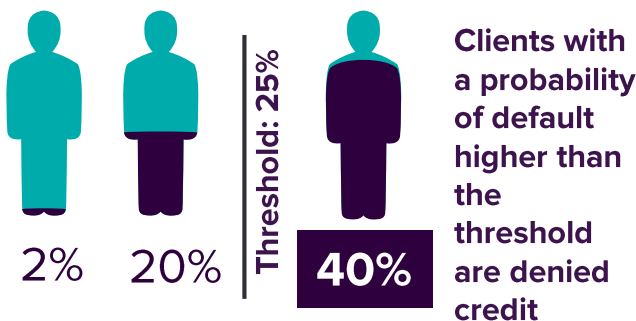
HOW DOES IT WORK?

Sample Output from Scoring



The probability for this application to go more than 7 days past due is 0.046128

X: 0.2 (Average score for loans more than 7 days past due)



KEY: Purple visualizes probability of default based on algorithm score

STEPS TO INPUT LOAN APPLICATION INTO ALGORITHM

1. Loan officer logs into their FI's secure digital platform and **registers the application**
2. Loan officer enters data into variables under **3-4 required categories**; major categories include:
 - Personal Details
 - Loan Details
 - Borrower History Details
 - Employment & Financial Details.
3. Algorithm calculates an output score that ranges between **0.00 (0%) and 1.00 (100%)**

A **lower score** means that the characteristics of the loan application suggest it is **less risky**.

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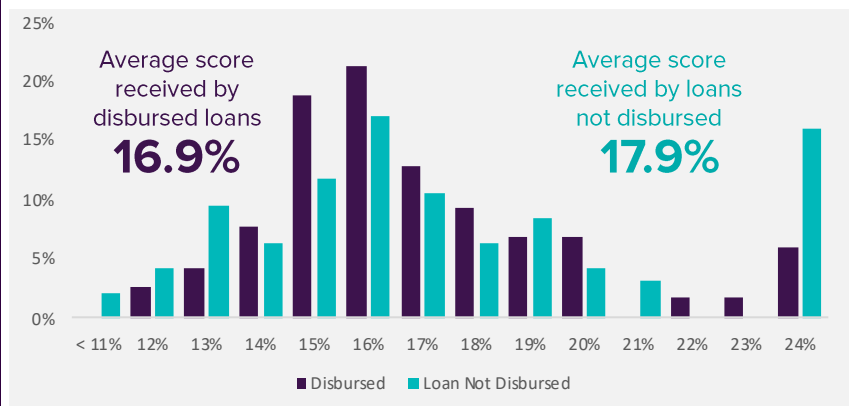
HOW DID LENDING DECISIONS COMPARE TO SCORES?

- From the applications, the lowest algorithm score was **10.2%** and the highest was **41.1%**.
- Of the **222 applications submitted** from the 2019 Uganda pilot:
 - **117 (53%)** resulted in a disbursement, with an average score of **16.9%**.
 - **105 (47%)** applications that were not disbursed averaged a score of **17.9%**

FINDING:

Loan officers approved applicants that scored **less risky** in the algorithm, on average, indicating alignment between loan officer decisions & the algorithm scores*

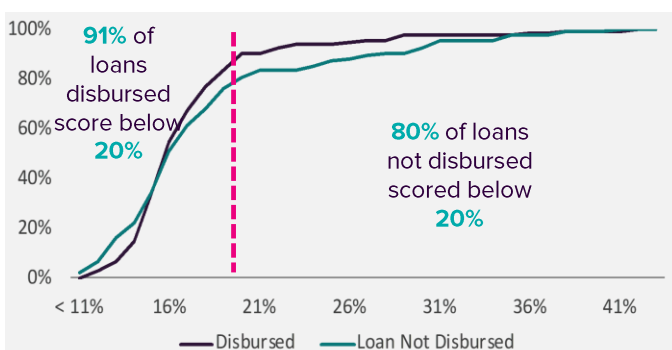
Score Distribution by % of Applications



*REMINDER – Loan Officers did not make disbursement decisions based on algorithm score for pilot; score was calculated after decision was made

- The **average applicant score** for disbursed loans was **16.9%**, compared to **17.9%** for loans that were not disbursed.
- The higher range of scores shows stronger segmentation. For applicants scoring >17%, **32%** were loans disbursed, compared to **54%** that were not disbursed.
- Of applicants scores >30%, only **3** resulted in a disbursement.
- The **median score** for disbursed loans was **15.7%**, compared to **16.0%** for not disbursed.

Score Distribution by % of Applications



FINDING:

Of the applicants scoring higher risk, a greater portion of loans **were not disbursed** than were disbursed, indicating alignment between loan officer decisions & algorithm scores

- Out of the loans that were disbursed, **91%** had a score **below 20%**.
- Of the **94 loans** that were **not disbursed**, **20%** of them received scores **above 20%**.
- Surprisingly, **15 loans** that were not disbursed received scores **below 15%**, compared to **8 loans below 15%** that were disbursed. *The ultimate reason for non-disbursement is not known and score was not a factor.*

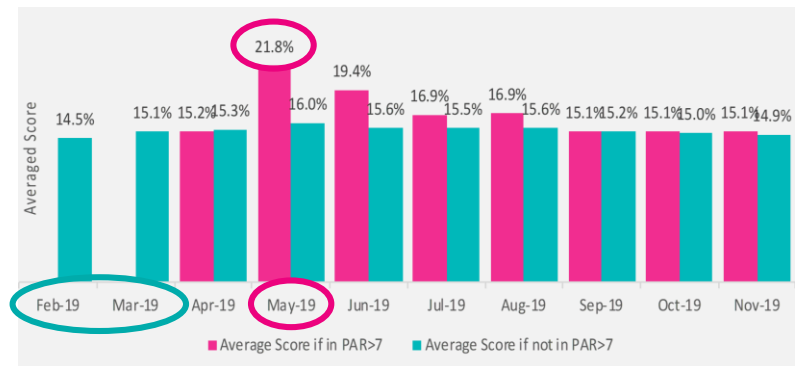
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HOW DID THE ALGORITHM SCORE DISBURSED LOANS?

FINDING:

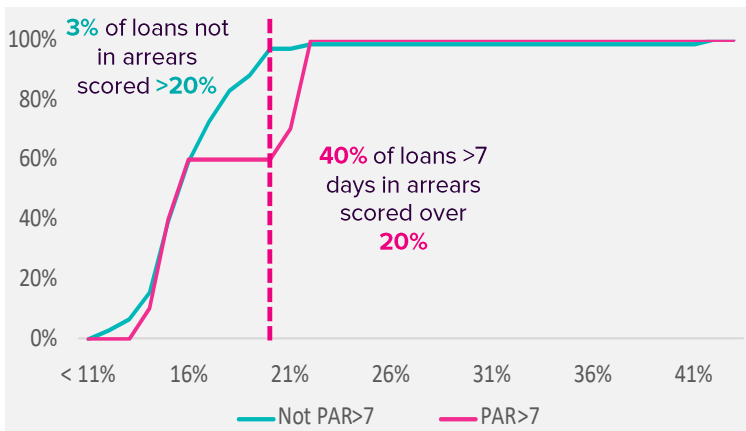
Algorithm had **higher average scores** for loans in arrears 7 of 8 months, demonstrating algorithm can consistently differentiate risk

Average Score for Disbursed Loans based on Risk



- In **February & March**, none of the loans fell into arrears beyond 7 days
- By **May**, PAR>7 peaked with the average score of loans in arrears beyond 7 days receiving a score of **21.8%**
- The algorithm proved to have a higher average score for loans in arrears in **7 out of 8** months.

Score Distribution by % of Applications



FINDING:

Higher scores proved **riskier** in the disbursed school fee loan sample, demonstrating the algorithm can consistently differentiate risk

- The cumulative probability chart shows that the model performs if the **pink line** is below the **teal line**, meaning: **# of loans in arrears more than 7 days < # of loans not in arrears over 7 days**
- Despite a small sample of loans that fell into arrears for more than 7 days, **40%** of those loans scored over **20%**
- Only **3%** of loans that did not fall into arrears scored higher than **20%**

Opportunity EduFinance has developed **school fee loan** and **school improvement loan** credit algorithms. These are the first results for school fee loans in Uganda. As more data improves the quality of the EduFinance credit algorithm and it is implemented in additional countries and used for both loan products, EduFinance will continue to evaluate the success of the models.