

# Catalyst / PAYgo Lab: Reducing risks associated with PAYGo Solar business model

## Key objectives

From an industry standpoint, this project provided our team with a solid understanding of the challenges associated with energy access, particularly in the context of PayGo Solar Home Systems. Our team mostly concentrated on creating or enhancing data-based tools that would help companies improve their credit performance. As researchers, we did this in multiple ways:

- By offering a broader view of the quality of their portfolio (estimating defaults, etc.)
- By better identifying which customers require follow-up
- By improving the estimation of which products are affordable for a given customer

The primary objective was to develop models and tools that can function across various companies, geographical locations, and products. Small companies often lack sufficient data to create "company-specific" models, yet they are the ones who need them the most. We were able to leverage data from "larger companies" to build universal tools for different “cohort”, or “clusters” of customers.

## Tools we used



### Default Prediction Tool

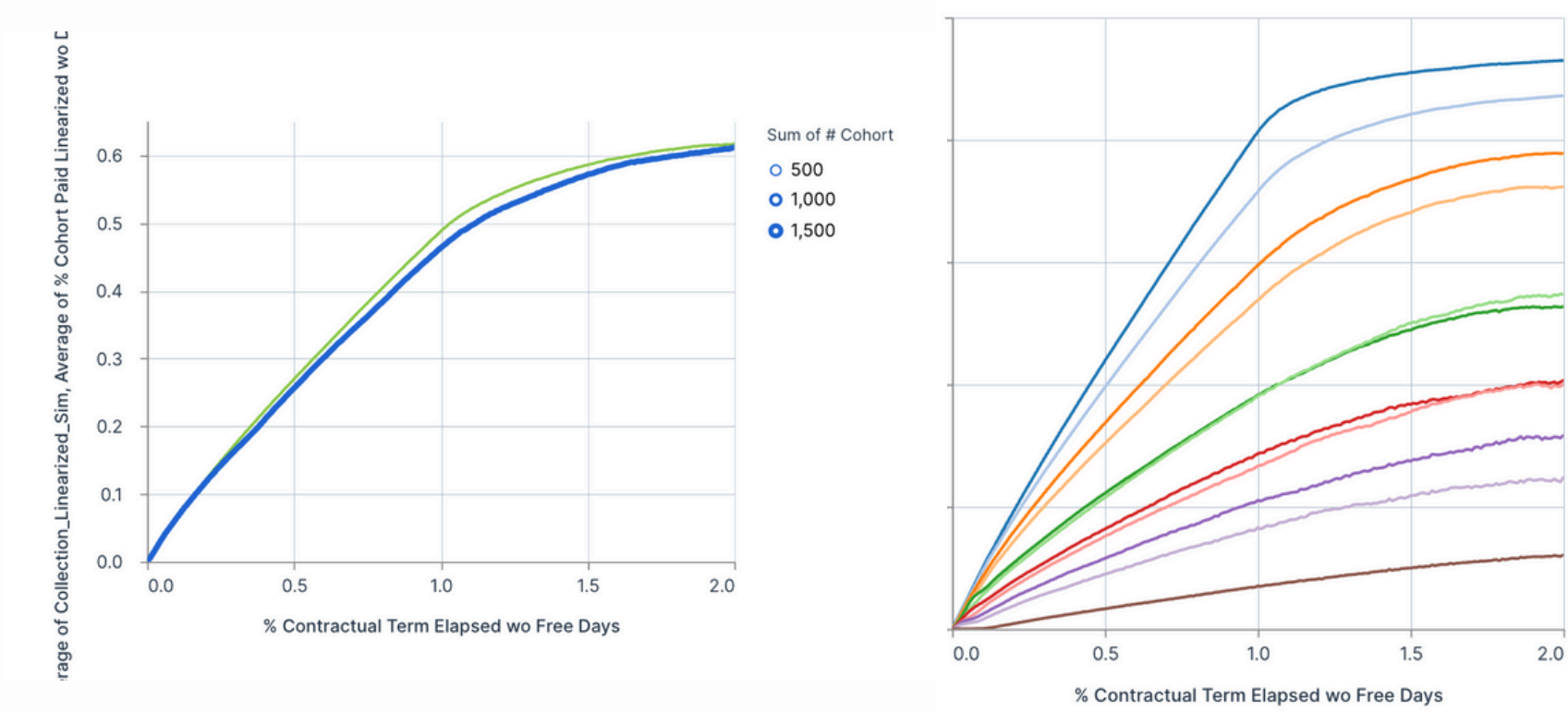
#### Description

Repayment trends are vital for a company's unit economics calculation and cash flow simulations. Early forecasting allows companies to assess risks and identify potential issues arising from products, payment plans, regions, new policies, the general economic situation, and more. We seek to generate repayment curves using deterministic data science approaches, examining the applicability of curves designed for specific products and geographies in diverse contexts.

First, we created a function, that takes in company, country, product group, minimum year, and maximum year, as paramaters, to create base curves which measure the percentage of linearized cohort payments and contractual term elapsed. Then, using the base curves, we created a function to “simulate” a cohort, and later scored the performance of the simulation.

#### Steps

- Understand Snowflake and Deepnote Architecture
- Clean dataset
- Explore method from deepnote
- Create Functions to create base curves, simulate a new cohort, and score simulations
- Simultaneously package into functions so performance test can be run for any slice
- Test performance across product, companies, geography



### Feature Engineering: Identify Early Warning Signs of Default

#### Description

Many customers fail to complete their repayments, leading to loan defaults. However, the flexible nature of the PAYGO system allows others to lag behind schedule while still receiving light upon making payments, ultimately completing their loans later than anticipated. Distinguishing between these categories is crucial to enabling companies to prioritize their customer experience actions and support those in most need.

We aim to design a deterministic model for identifying early warning signs of default for both new and existing customers. This includes forecasting the probability of default and assessing applicability across various product types and geographical regions.

#### Steps

- Explore Roll Rates approach
- Do feature engineering to implement new features
- Check sensitivity of each feature on default
- Create a basic deterministic default model on one company and one country
- Check if applicable across product & countries & companies
- Implement model in retool app

