Selecting the Optimal Credit Card Portfolio

Final Presentation

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Outline

Recap & Introduction

Recap

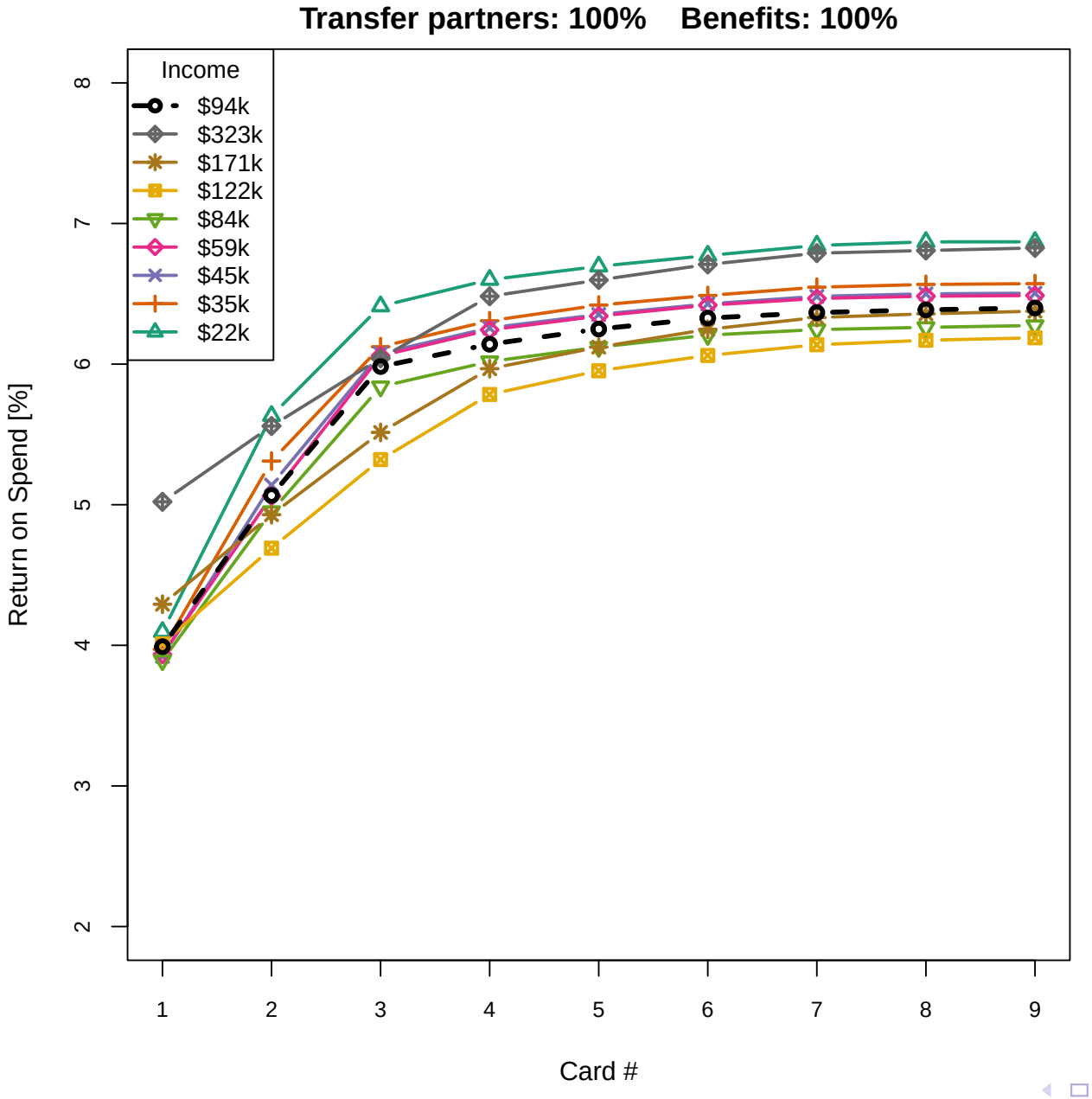
- **Goal**: Recommend users an optimized credit card portfolio, based on income/spend and preferences, and study its properties
- Last four weeks we covered:
  - Literature and financially naïve/sophisticated behavior
  - Credit Cards and Budget Data
  - Algorithm
  - Sensitivity Analysis
- We found that spending on ~5 cards is the sweet spot for most people, with a minimum Return-On-Spend of ~3.2% (and max ~6.5%)

In this final presentation

- Some flaws fixed and visualizations improved
- Monte Carlo Simulations
  - Setup
  - Analysis of the results
- Presentation of the Shiny App
- Future work

Fixed & Improved

Fixed: Single-Use Benefits Stacking

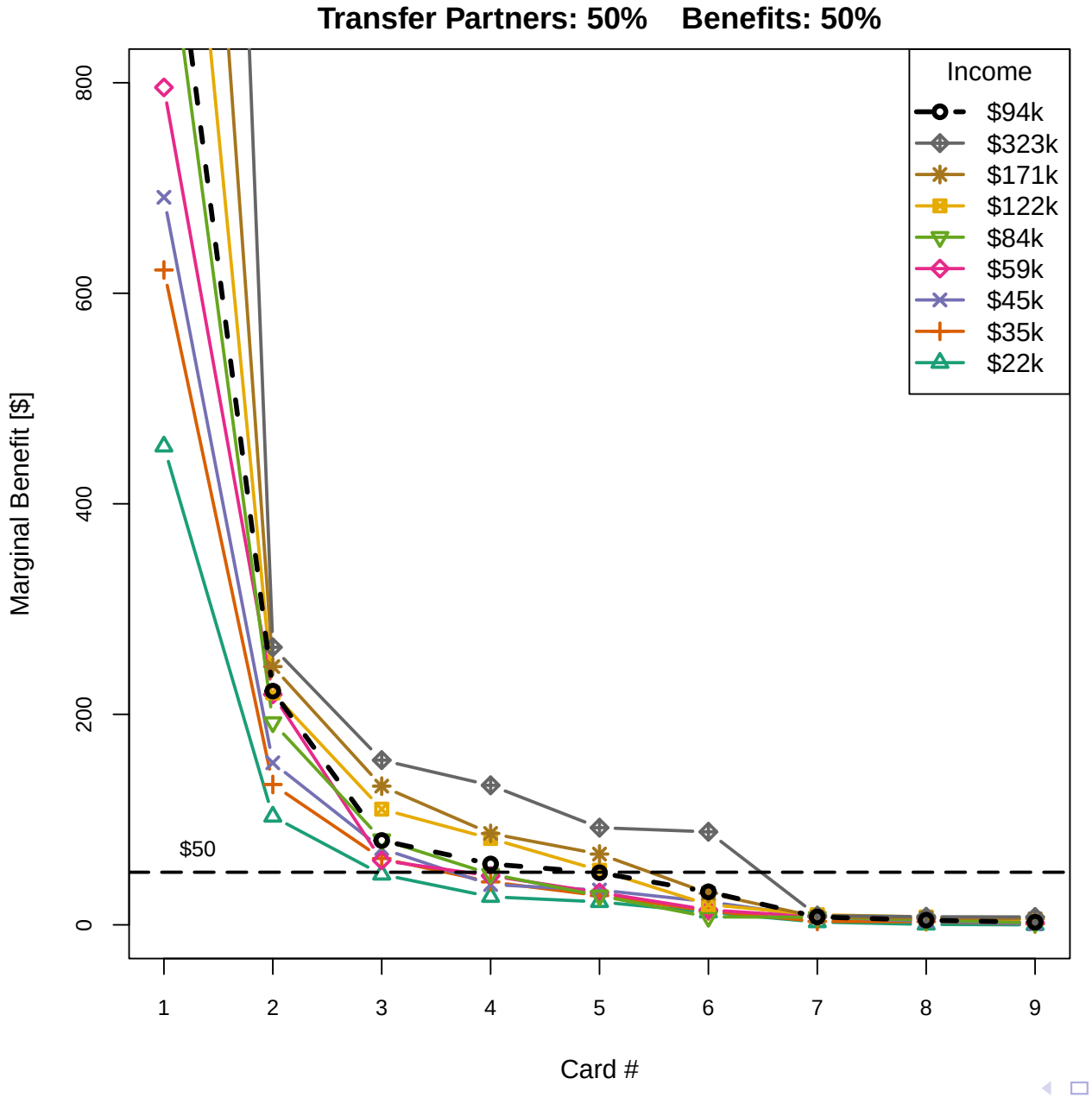


Using a better color scheme, combined with symbols.

Some benefits are now set to 0 after first selection.

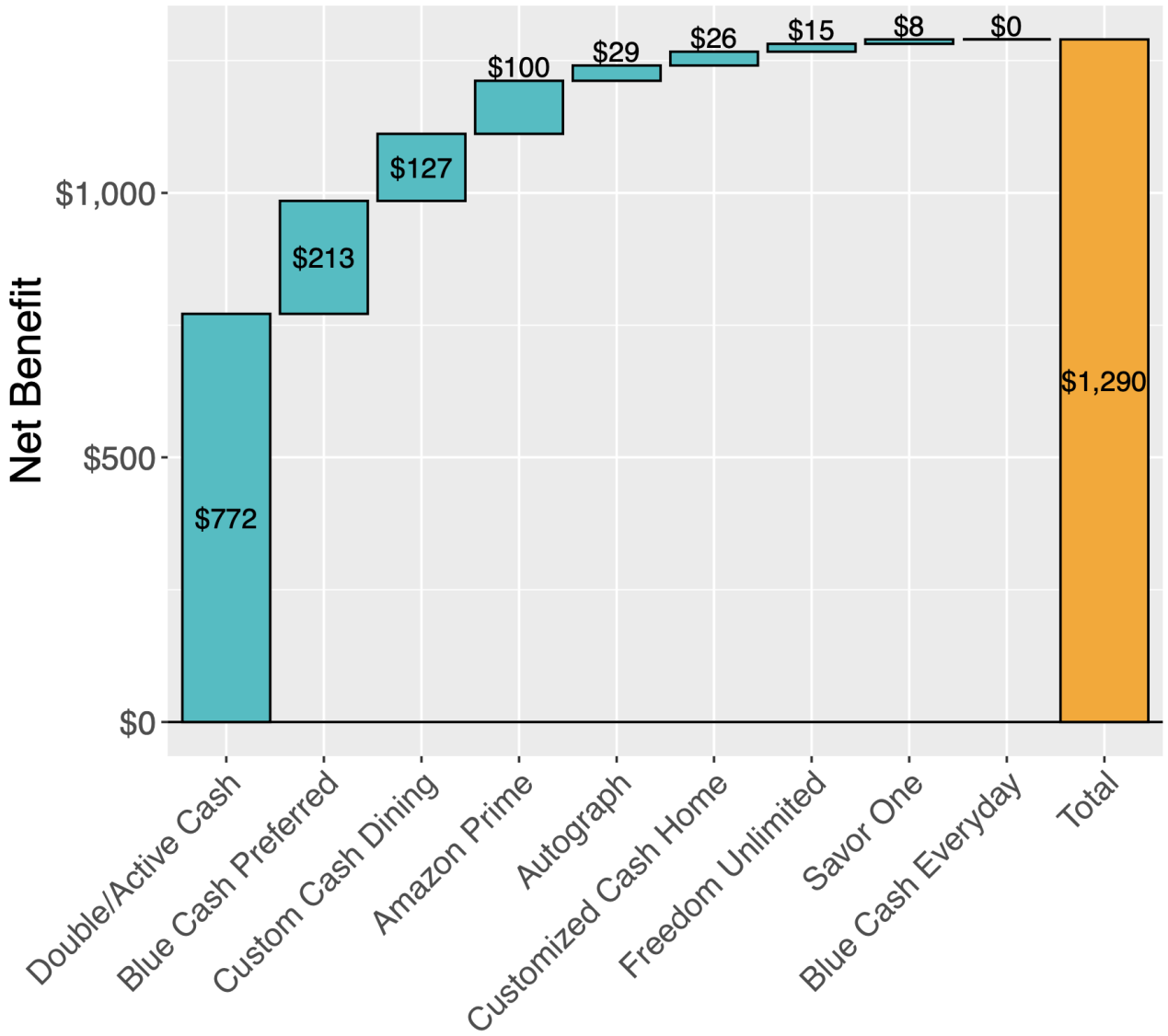
Note: Benefits could still be lucrative for low spenders!

Unchanged: Number of Cards



Four or five cards remains a reasonable choice for most people.

Improved: Portfolio Visualization



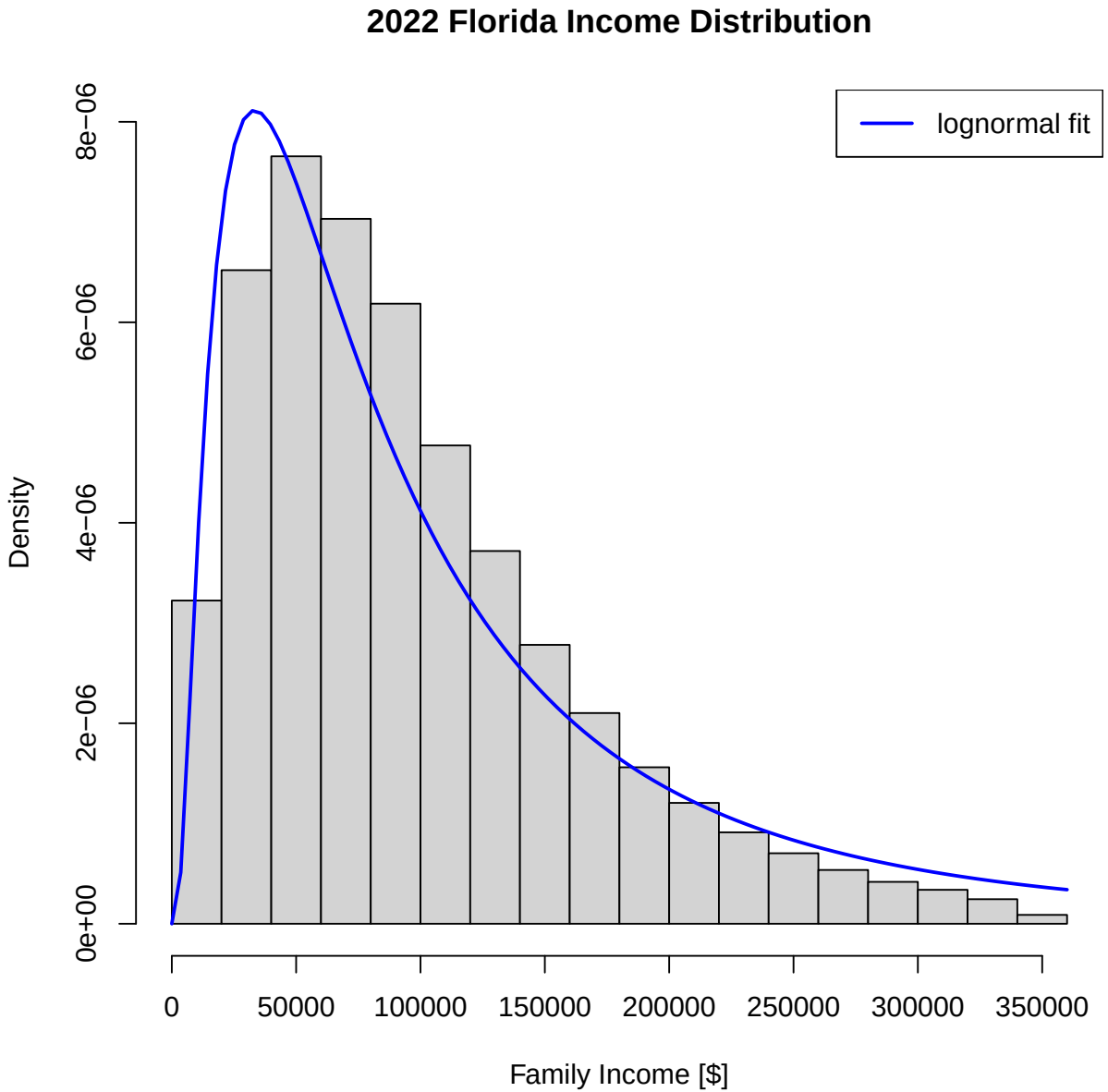
New "waterfall" plot to visualize the portfolio (thanks to Jared).

Monte Carlo Simulations

Monte Carlo Simulation Setup

- By random sampling realistic incomes and preferences, we get a better idea about the average benefits
- Sampled 100,000 times (with replacement):
  - 2022 Florida Family Incomes (ACS Census Microdata)
  - Corresponding budget from BLS CES (9 income bins)
  - Number of cards: 1–8 (uniform)
  - Use of Transfer Partners: fraction 0.0–1.0 (uniform)
  - Use of Benefits: fraction 0.0–1.0 (uniform)
- Sampled 100,000 portfolios, keeping track of Net Benefits, Return on Spend, and (aggregated) count of selected cards (took ~2 hours)
- Saved output to `.csv` files for analysis

Florida Family Income Distribution (observed)

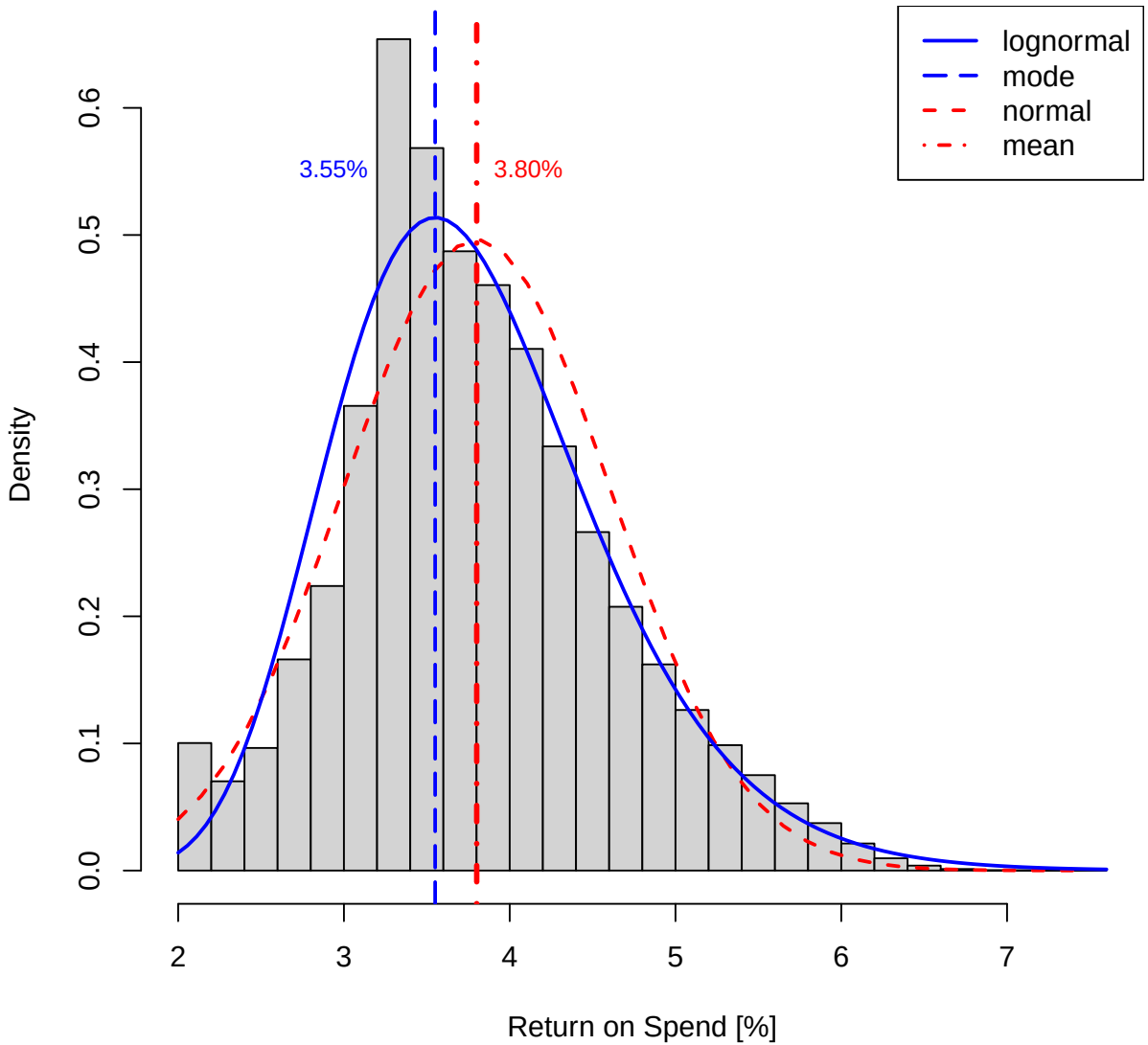


57,005 observations (not showing > $350,000).

Mean: $121,306.
Median: $85,900.

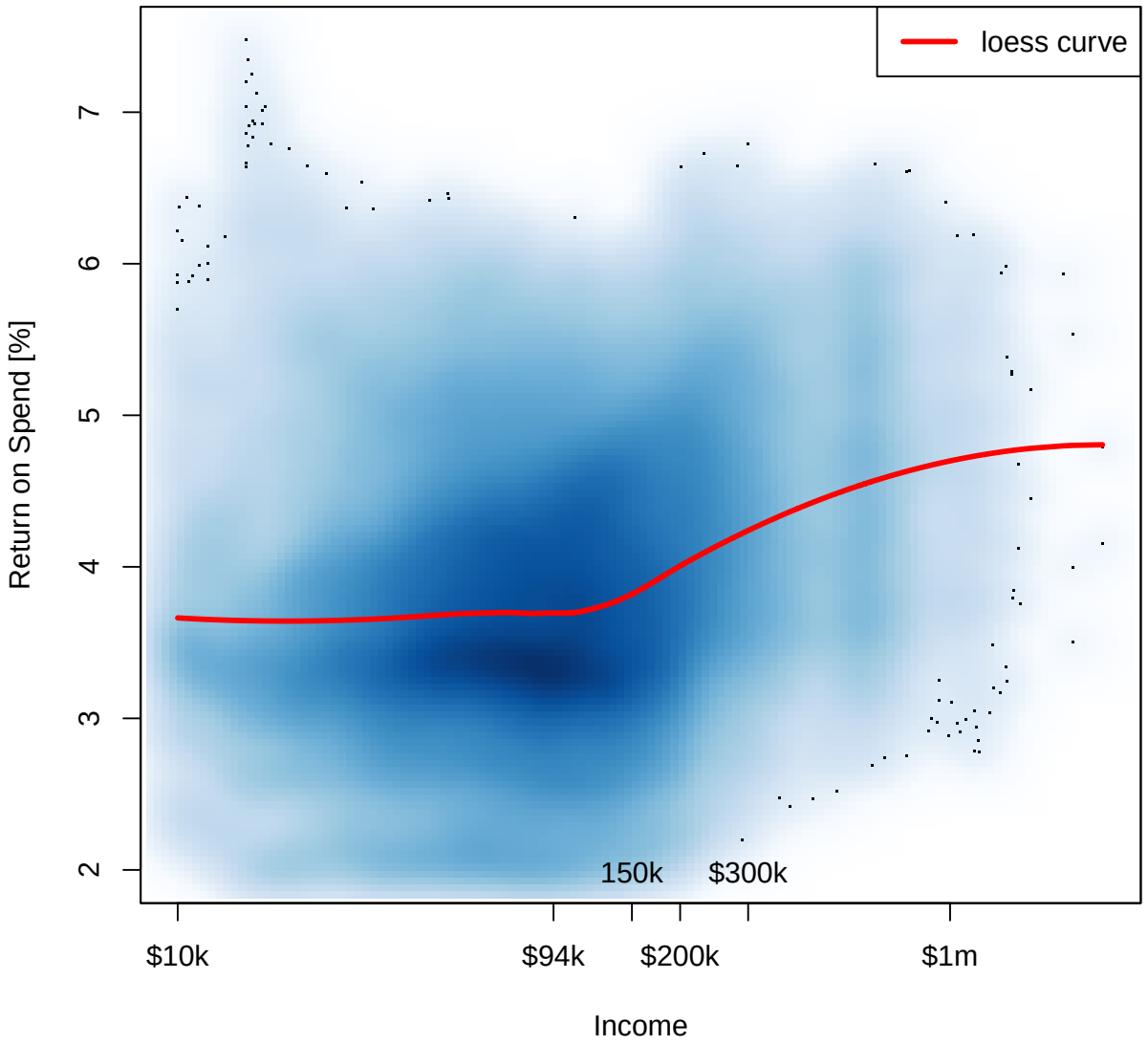
Approximates a lognormal distribution.

Return on Spend Distribution (simulated)



Approximates a lognormal distribution.

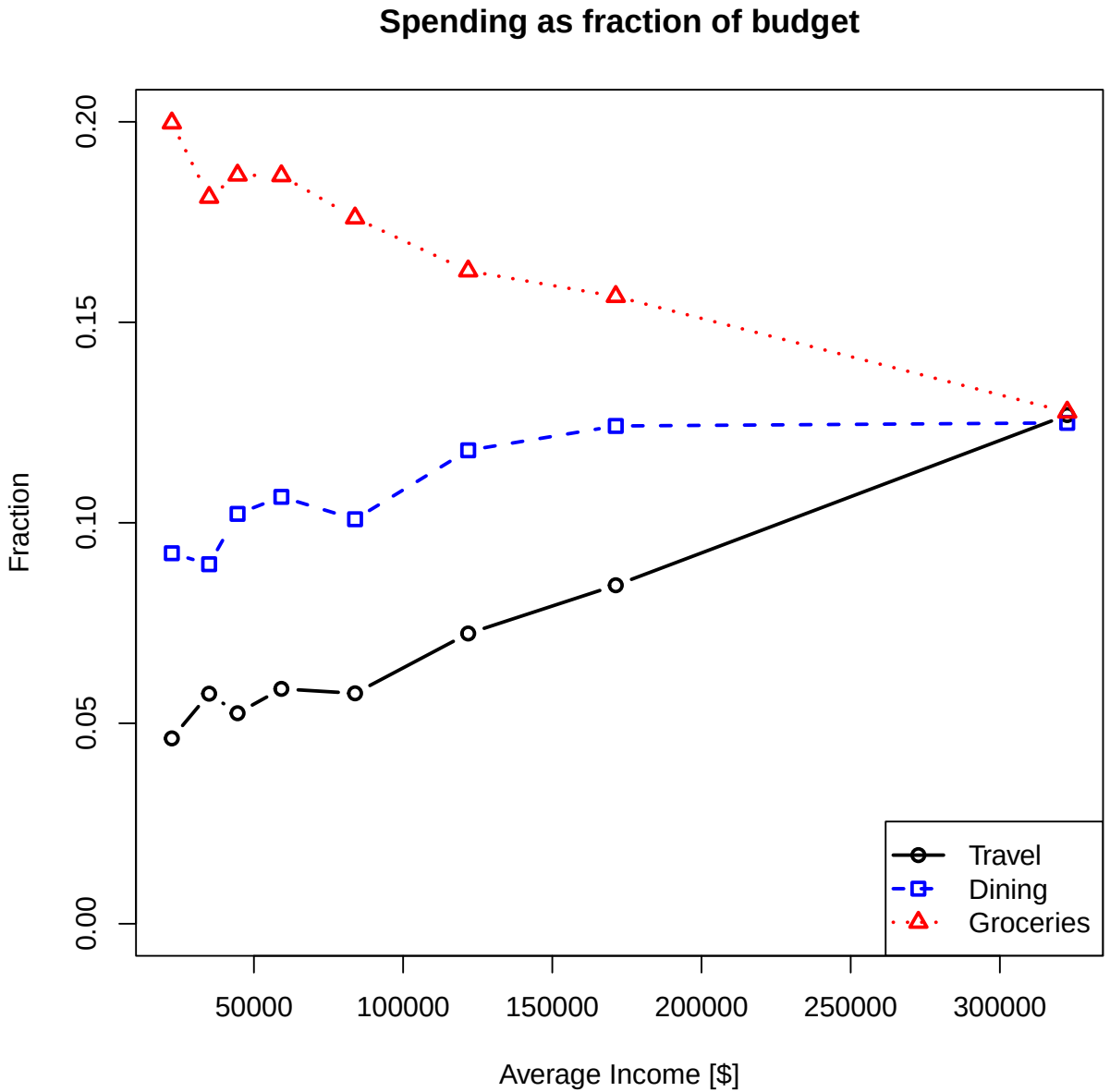
Smoothed Scatterplot (simulated)



Although spending relatively less of their income, above ~$100,000 users benefit more from their credit cards.

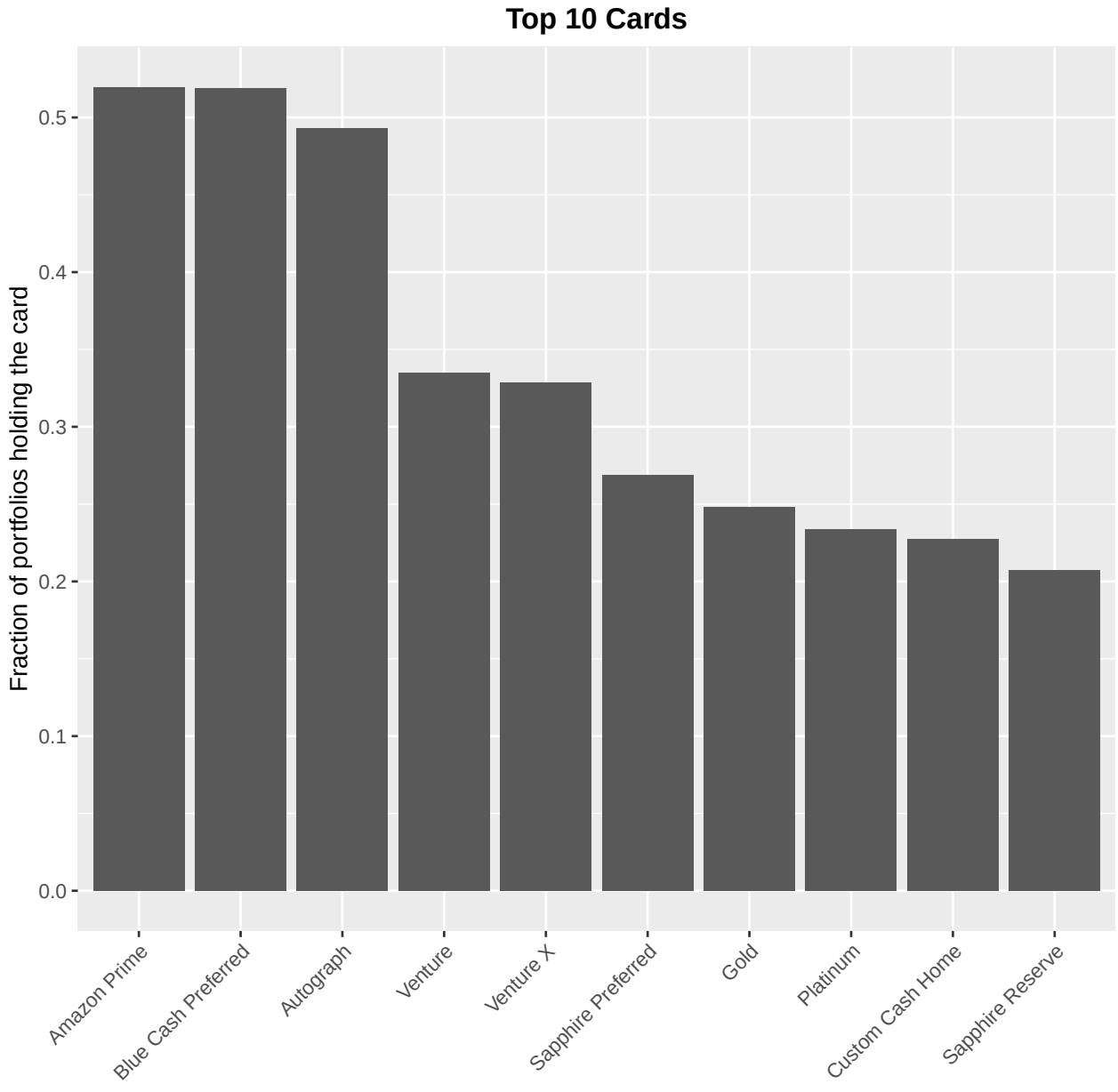
(*note the logarithmic x-axis*)

Shifting Spending Patterns (BLS CES data)



The best rewards are found on travel categories, rewarding higher incomes disproportionally.

Most Recommended Cards



Shiny App

Demonstration!

https://remcoscheepmaker.shinyapps.io/ReMCCO/

ReMCCO – Recommend Me Credit Cards Optimally

Preferences

Number of cards:

1 5 9

1 2 3 4 5 6 7 8 9

Use of Transfer Partners [%]:

0 100

0 10 20 30 40 50 60 70 80 90 100

Use of Benefits [%]:

0 100

0 10 20 30 40 50 60 70 80 90 100

Banks to include:

- [x] Amex
- [x] BoA
- [x] CapOne
- [x] Chase
- [x] Citi
- [x] US Bank
- [x] Wells Fargo

Budget

Average Budget Income [$]:

74,047 350,000

15,000 82,000 149,000 216,000 283,000 350,000

Everything Else: 7153

Groceries: 5901

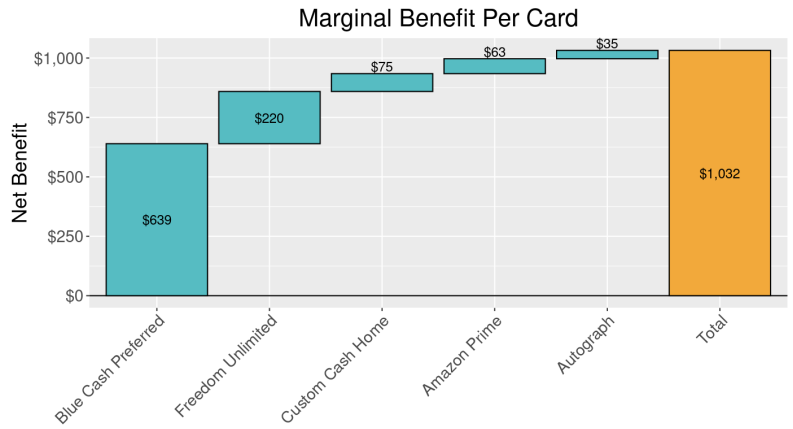
Dining: 3382

Gas: 3110

Utility: 2807

Home Improvement: 2145

Recommended Portfolio



The optimal portfolio has a total benefit of $1032.07 and a return-on-spend of 3.13%.

Card Assignments

Category	Card
Groceries	Blue Cash Preferred
Gas	Blue Cash Preferred
Home Improvement	Custom Cash Home
Online Shopping	Amazon Prime
Travel Other	Autograph

Future Plans

- A card recommendation app is deployed, including a bank filter and customizable budget
- I still aim to make the following upgrades for advanced users (using hidden options or additional panels):
  - Option to customize point valuations per bank
  - Option to customize benefit valuations per travel card
  - This will make the app more useful for Trifecta users or Bank of America Preferred Rewards members
- For future scalability I'm considering moving the data to a SQL database

Summary & Conclusions

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- Financially sophisticated credit card users can benefit from inefficiencies in rewards programs by using the right credit cards
- With some planning (and the use of my app), most Americans should be able to get 3.8 ± 0.8 % back on all their spend by using 4–5 credit cards
- Both (disciplined) low-income and high-income users benefit from credit cards disproportionally
  - Low incomes could use static benefits without spending on the cards (in theory. . .)
  - Banks stimulate travel (overspending), which benefits high incomes (who already travel)

Thank You!