Non-Traditional Market Making
&
Credit Risk Modeling

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Consumer Credit - Lending Club

LendingClub

Consumers apply for loans & instead of bank funding, other consumers fund the loan by purchasing "notes" to receive the interest.

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- Peer to Peer funding for
  - Personal Loans
  - Auto Loans
  - Small Business Loans
  - Medical Loans

- **Everyday investors can accept the loan risk – making it a new banking distribution model**

Consumer credit is a traditional market. There are defined inputs (credit score), consumer protections (usury laws), and established distribution (credit applications).

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What's the Risk?

LendingClub

Risk	Mitigation
• Over exposure in a single loan	• Diversify – Do not fund more than $25 on a single loan
• Early payment reduces interest received	• Monitor & re-invest monthly
• Illiquid – notes are 36-60 months	• Buy notes with 36m horizons
• Default – debtors that stop paying	• Model the probability of default

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What's the Reward?

LendingClub

Reward
• Interest is imposed by LC
• Usually lower rates for the applicant
• LC takes 1% of interest
• Remaining interest is paid monthly to note holders.

| Result |
|---|
| • Investors have no input to the % amount |
| • Lower capital cost for debtor |
| • Reduces reward incentive for investor |
| • Investors act as banks & receive consistent returns |

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Example

LendingClub

Erin decides to buy a car. Instead of a traditional loan she applies at LC.

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- Erin applies for a $10k car loan

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- LC assesses her creditworthiness & posts a $10k loan @ 6% interest on the investor site.

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- Trish & hundreds of other LC investors fund the loan in $25 increments called "notes"

I SHOULD BUY A LEXUS
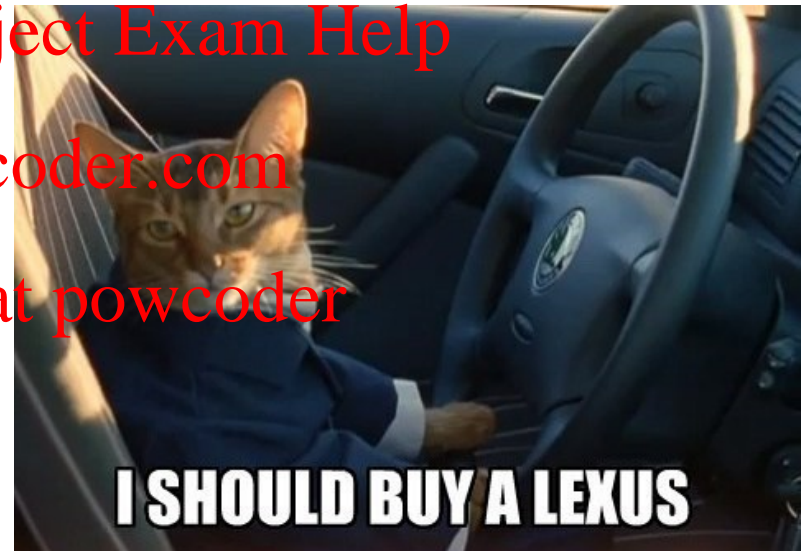
Each month Erin pays her loan, LC takes 1% and the investors make 5% on their outstanding notes.
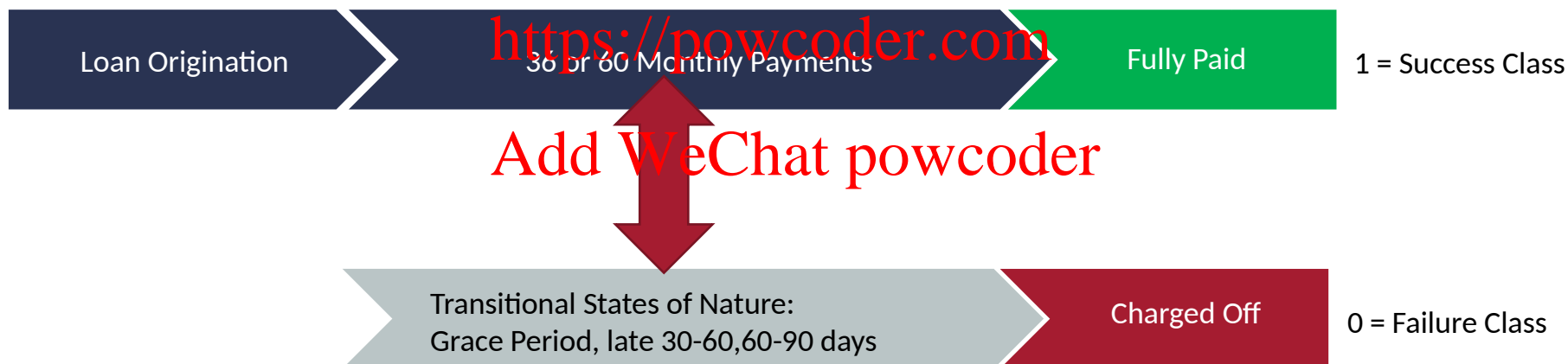
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Example

LendingClub

- **11 yrs of historical performance – Over 1M notes publicly available**
  - Some platform changes in that time
  - Datasets are updated monthly
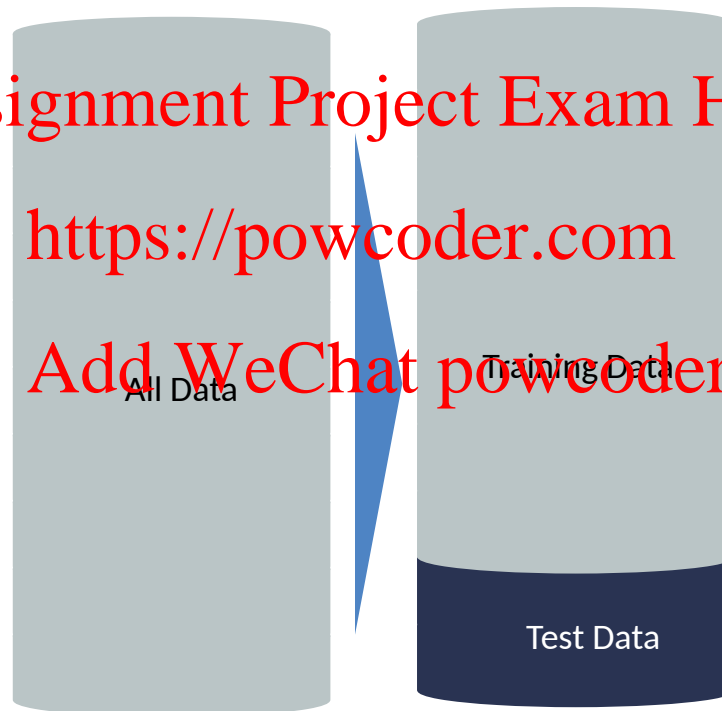 - Sampled to 20k – either in fully paid of charged off state; when doing it for real use more data

| Loan Origination | 36 or 60 Monthly Payments | Fully Paid | 1 = Success Class |
| Transitional States of Nature: Grace Period, late 30-60,60-90 days | | Charged Off | 0 = Failure Class |

https://www.lendingclub.com/info/download-data.action

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What is cross – validation?

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All Data

Training Data

Test Data

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What is cross – validation?

Training Data

Training
Training
Training
Training
Training
Training
Training
Validation

Shuffled nfolds or k times...

Average performance among all model folds.

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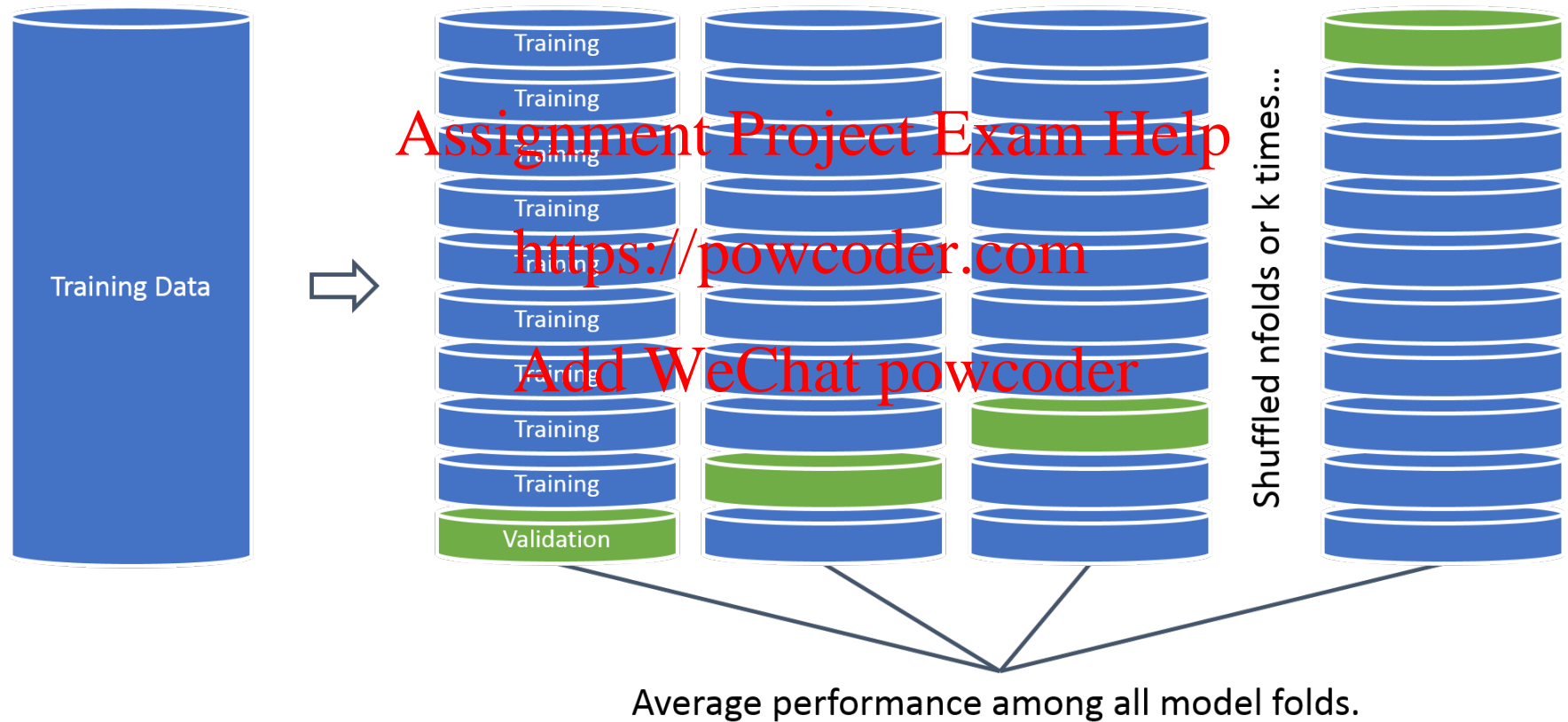
Open 2_ConsumerCreditTraining.R

<u>Learning Objective:</u>

- Load in real lending club data
- Treat the variables for modeling
- Build a cross validated logistic regression with caret
- Save model object & variable treatment plan

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Agenda

Predicting Loan Defaults
- Lending Club Information
- Fit a model to the loan data & save as an example
- Fit a more validated model with new loans
- Visualize the loans in a dynamic plot
- Q & A

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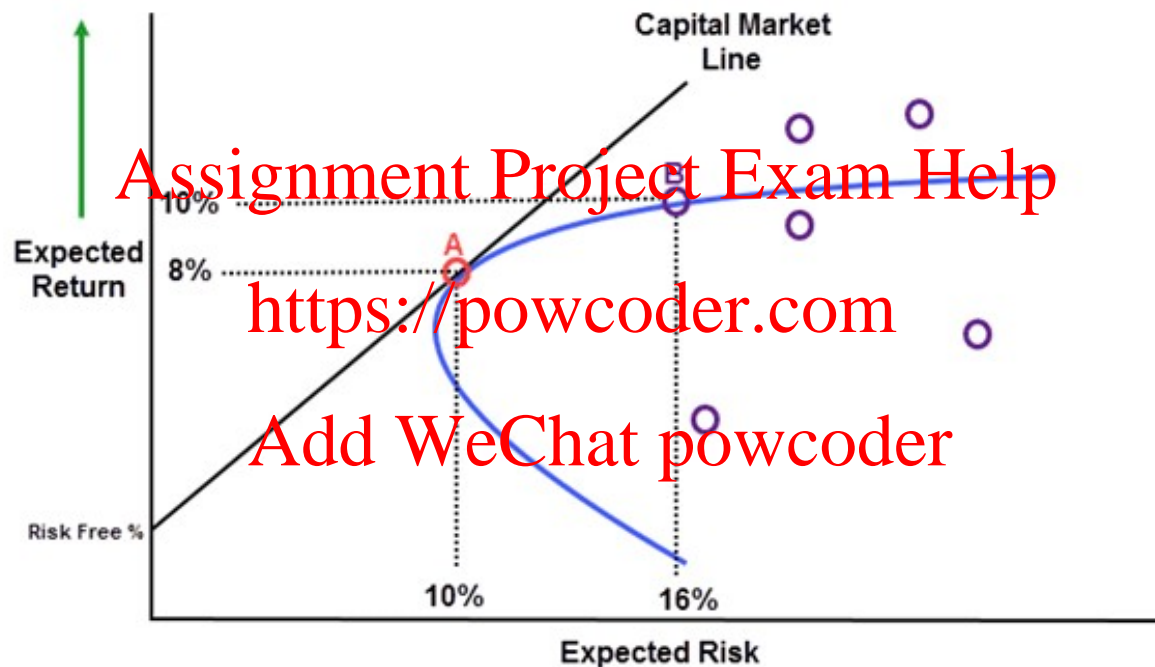
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Cutoff Threshold

Is 0.50 the optimal cutoff?

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- Should we be equally weighted?

- Do we care equally about picking paying voters and charged off loans?

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Making a CAPM style plot

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Learning Objective:

- Score notes Assignment Project Exam Help
- Make a plot similar to CAPM & identify top loans to fund.

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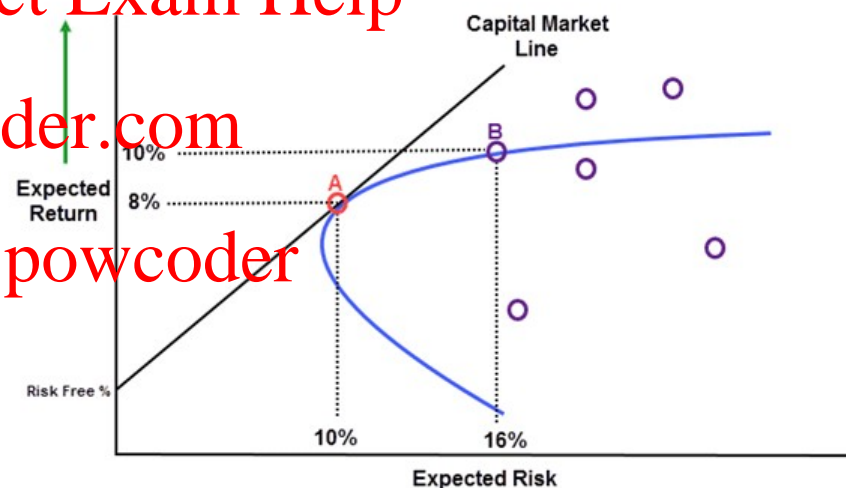
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Agenda

Topic VII

Simulating a Non-Traditional Mkt Opportunity
- Review the trading card market as an investment vehicle
- Structure problem for analysis
- Sample with probability & simulate mkt buying to quantify risk
- Q & A

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Non-Traditional Markets

Traditional

- Stock Markets
- Bond Markets
- Housing/Mortgages
- Commodities – Gold, Silver etc.
- Crop Futures
- Consumer Credit

Non-Traditional

- Crypto-currencies
- Beanie Babies
- Derivatives (originally)
- Web Domains & Blogs
- Shoes https://stockx.com/
- …

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In contrast to traditional markets, emerging or non traditional markets lack transparency, regulations and can often be manipulated more easily.
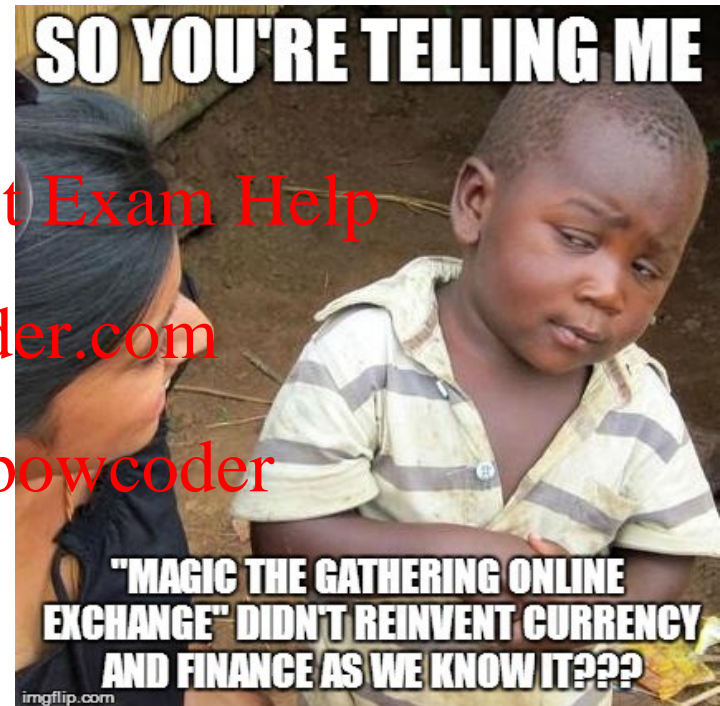
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A Non-Traditional Mkt...

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Another non-traditional Market Example

SO YOU'RE TELLING ME

"MAGIC THE GATHERING ONLINE EXCHANGE" DIDN'T REINVENT CURRENCY AND FINANCE AS WE KNOW IT???

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Owned by Hasbro, MTG is a 25 year old collectible trading card game. It is estimated that there are 8-12million players worldwide. Thus is it popular and has demonstrated longevity unlike other non-traditional markets.

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Magic The Gathering

Players create 60 card decks with cards of different abilities for a duel. Cards are fantasy based with creatures, sorceries, and mythical artifacts.

Kwartler CSCI 96

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Magic The Gathering

The cards have limited print runs & varying rarities

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And that's why it's a market…

Karn, Scion of Urza ⬡ Dominaria

Started out good in the game, but wasn't!

Sword of Light and Shadow ⬢ Darksteel
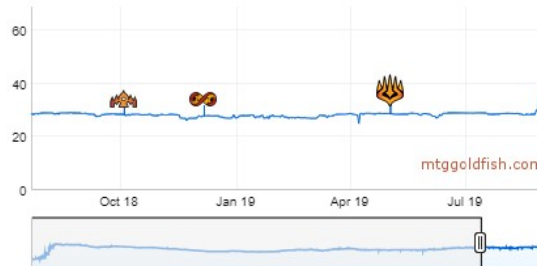
A new card came out, making this one much more powerful in combination!

Some cards go up and others down at sites like mtggoldfish.com and mtgstocks.com

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So how do you get cards?

When Karn Scion of Urza came out it was a $40 card. At the time you could get it in an number of ways.

- **For $19**

You could buy Karn from an online marketplace.

- **For $3**

You can open a booster pack from the appropriate expansion set and hope you get it.

- **For $90**

You can buy a booster box of 36 packs from the set and increase your odds of getting it while also getting many other potential valuable cards.

- **For $540**

You can buy 6 of the booster boxes in a case.

Say you are a player that needs to get Karn, Scion of Urza to complete a deck.

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People Speculate as Supply Diminishes

Vintage Magic | Factory Sealed Arabian Nights Booster Box | Juzam/Bazaar/Library
Pre-Owned
$199,999.88
or Best Offer
Free Shipping
98 Watching

FAST 'N FREE
Estimated delivery Tue, Jun 26

ENGLISH P3k Portal Three Kingdoms
Brand New
$30,000.00
Buy It Now
Free Shipping
29 Watching

Magic MTG 3rd Revised Edition NEW
Brand New
$20,000.00
Buy It Now
Free Shipping
102 Watching

THE SPECULATION
IS TOO DAMN HIGH
DIYLOL.COM

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New set characteristics

Usually a pack contains

- 11 Commons

- 3 Uncommons

- 1 Rare

  - 1 in 8 packs will replace the rare with a mythic

- 1 in 6 packs will have a random premium foil card replacing a common.

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Modeling a new set according to risk & reward

When you open a pack:

Risk:
Each expansion set has varying prices. Some cards are worthless while other cards can be expensive.

Reward:
Some packs will contain expensive cards which you can immediately sell for more than the cost of the pack.

Since we know the cards in a set, their prices, and the probabilities of getting specific cards, we can simulate pack openings.

Keep in mind there are friction costs, shipping a physical good takes time and money.

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Open 3_A_NonTraditionalMkts.R

Learning Objective:

• Simulate opening to analyze a non-traditional market

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