
Non-Traditional Market Making

&
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Credit Risk Modeling
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Consumer Credit - Lending Club



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).



What's the Risk?



Risk

- Over exposure in a single loan
- Early payment reduces interest received
- Illiquid – notes are 36-60 months

- Default – debtors that stop paying

Mitigation

- Diversify – Do not fund more than \$25 on a single loan
- Monitor & re-invest monthly
- Buy notes with 36m horizons

- Model the probability of default

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What's the Reward?



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



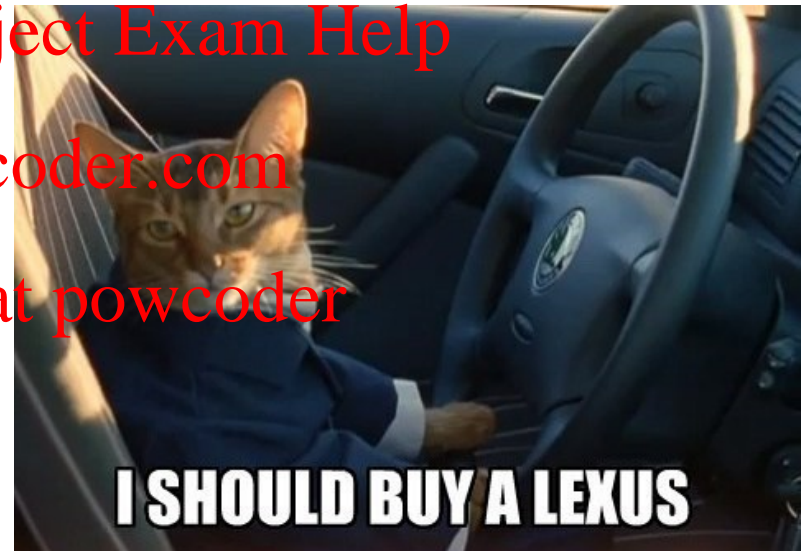
Erin decides to buy a car. Instead of a traditional loan she applies at LC.

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- Erin applies for a \$10k car loan
- LC assesses her creditworthiness & posts a \$10k loan @ 6% interest on the investor site.
- Trish & hundreds of other LC investors fund the loan in \$25 increments called "notes"

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Each month Erin pays her loan, LC takes 1% and the investors make 5% on their outstanding notes.

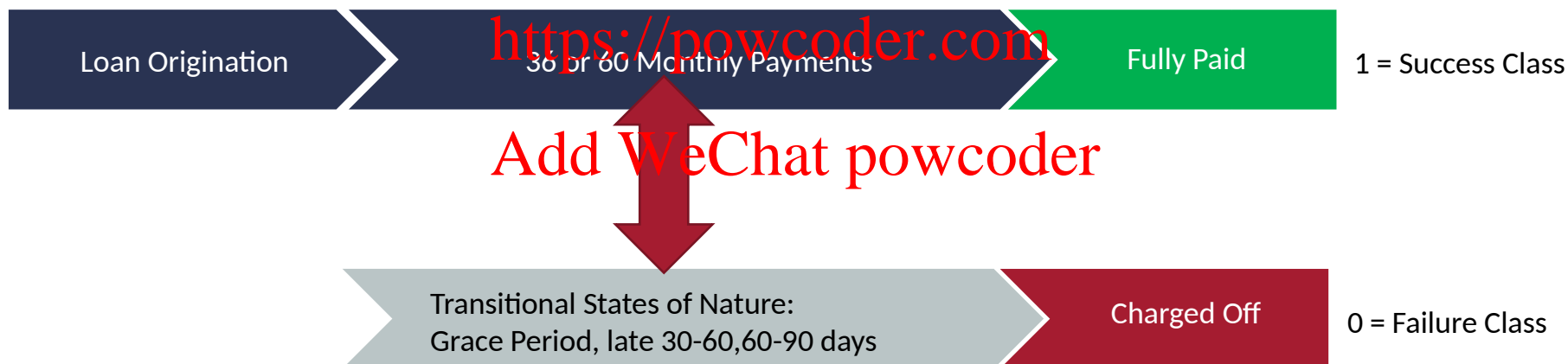
Example



- **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 or charged off state; when doing it for real use more data

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

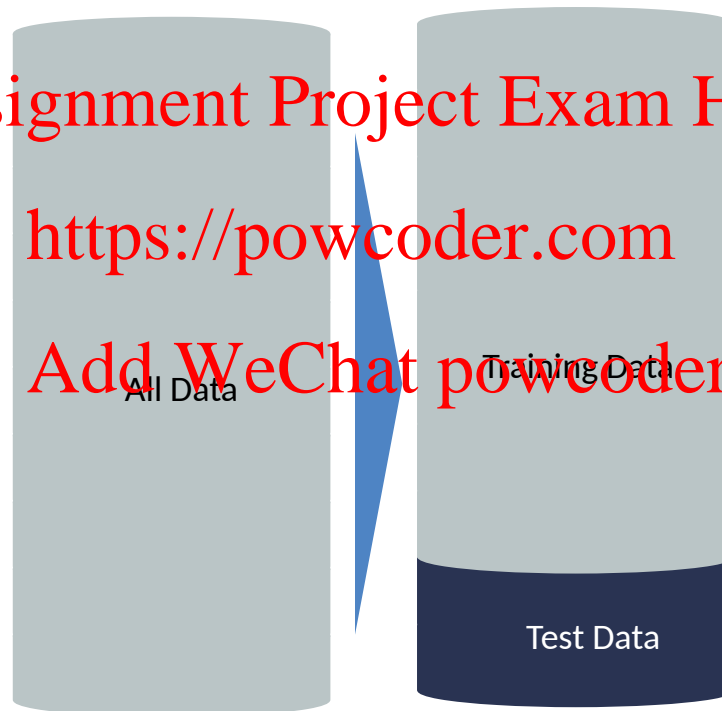
What is cross – validation?

This is a typical partitioning schema to avoid overfitting.

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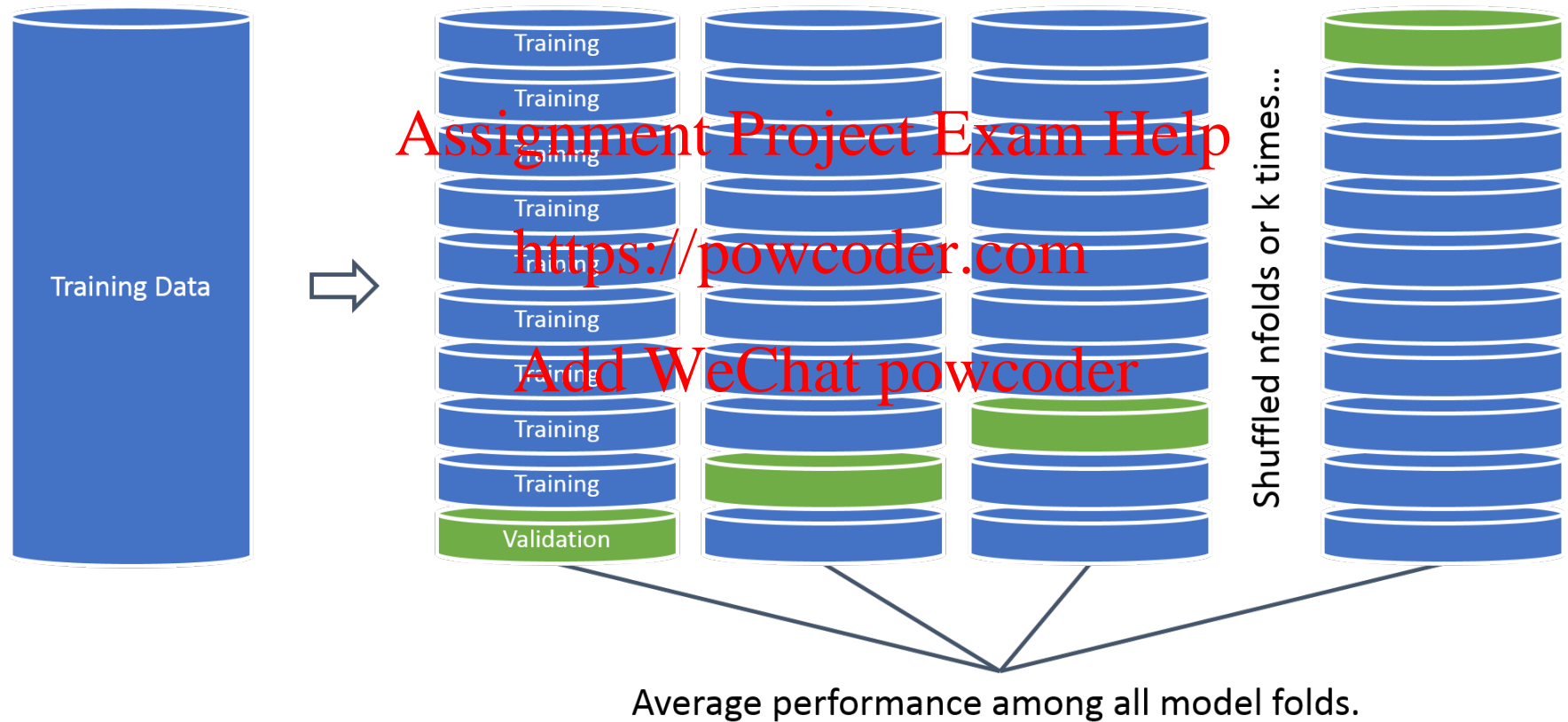
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What is cross – validation?

In this example we will perform cross validation because the data set is only 20k records.



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Learning Objective:

- 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

Topic VI

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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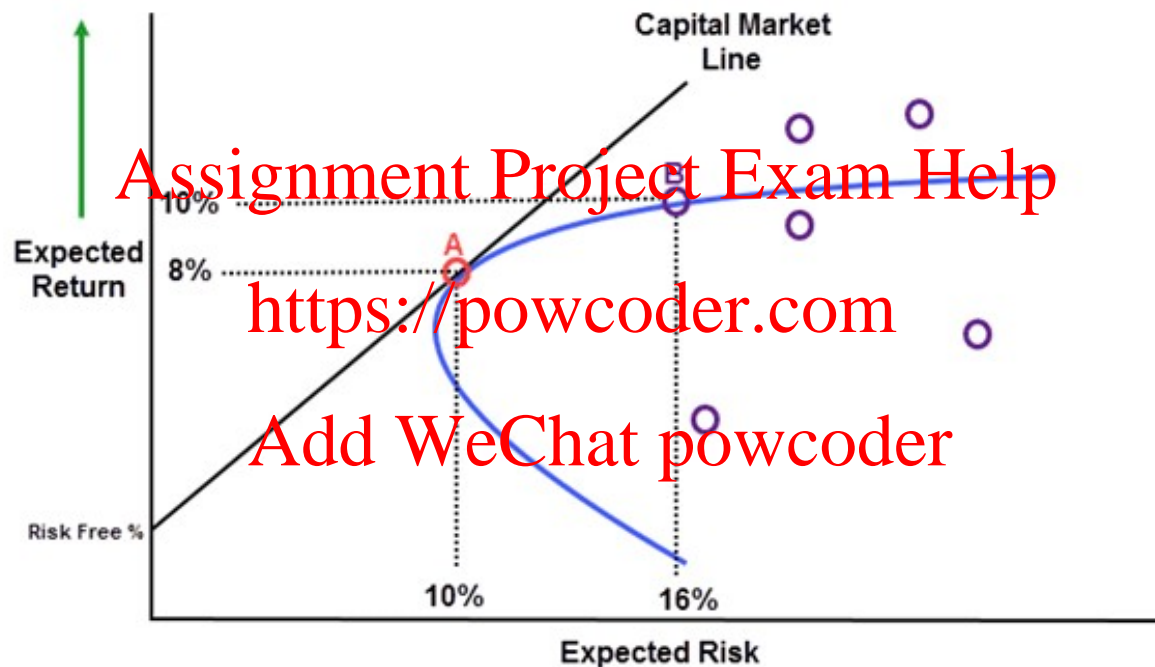
Cutoff Threshold

Is 0.50 the optimal cutoff?

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- Should we be equally weighted? <https://powcoder.com>
- Do we care equally about picking paying notes and charged off loans? [Add WeChat](#) [powcoder](#)

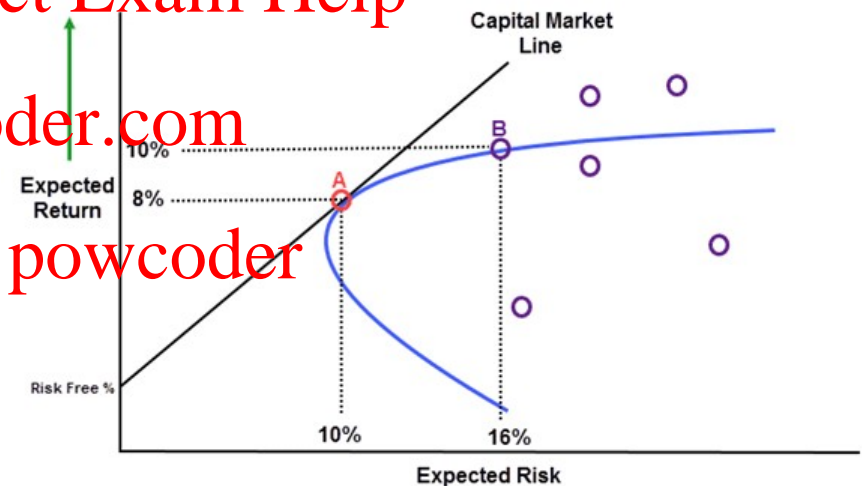
Making a CAPM style plot



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Learning Objective:

- Score notes
- Make a plot similar to CAPM & identify top loans to fund



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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.

A Non-Traditional Mkt...



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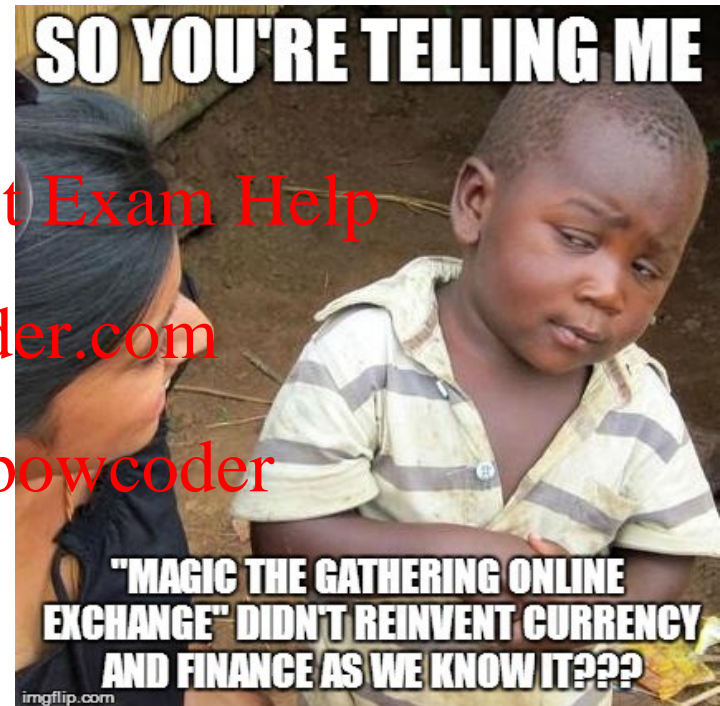
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Another non-traditional Market Example

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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.

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.

Magic The Gathering



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The cards have limited print runs & varying rarities

And that's why it's a market...

Karn, Scion of Urza  Dominaria



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

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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

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.

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- For \$19

You could buy Karn from an online marketplace.

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- For \$3

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

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- 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.

People Speculate as Supply Diminishes

	<p>Vintage Magic Factory Sealed Arabian Nights Booster Box Juzam/Bazaar/Library</p> <p>Pre-Owned</p> <p>\$199,999.88 or Best Offer Free Shipping 98 Watching</p> <p>FAST 'N FREE Estimated delivery Tue, Jun 26</p>
	<p>ENGLISH Pk Portal Three Kingdoms</p> <p>Brand New</p> <p>\$30,000.00 Buy It Now Free Shipping 29 Watching</p>
	<p>Magic MTG 3rd Revised Edition NEW</p> <p>Brand New</p> <p>\$20,000.00 Buy It Now Free Shipping 102 Watching</p>

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New set characteristics



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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.

Modeling a new set according to risk & reward

When you open a pack:

Risk:

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

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Reward:

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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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