

# **Traditional investing: risk vs reward**

**DATA-DRIVEN DECISION MAKING FOR BUSINESS**



**Ted Kwartler**

Data Dude

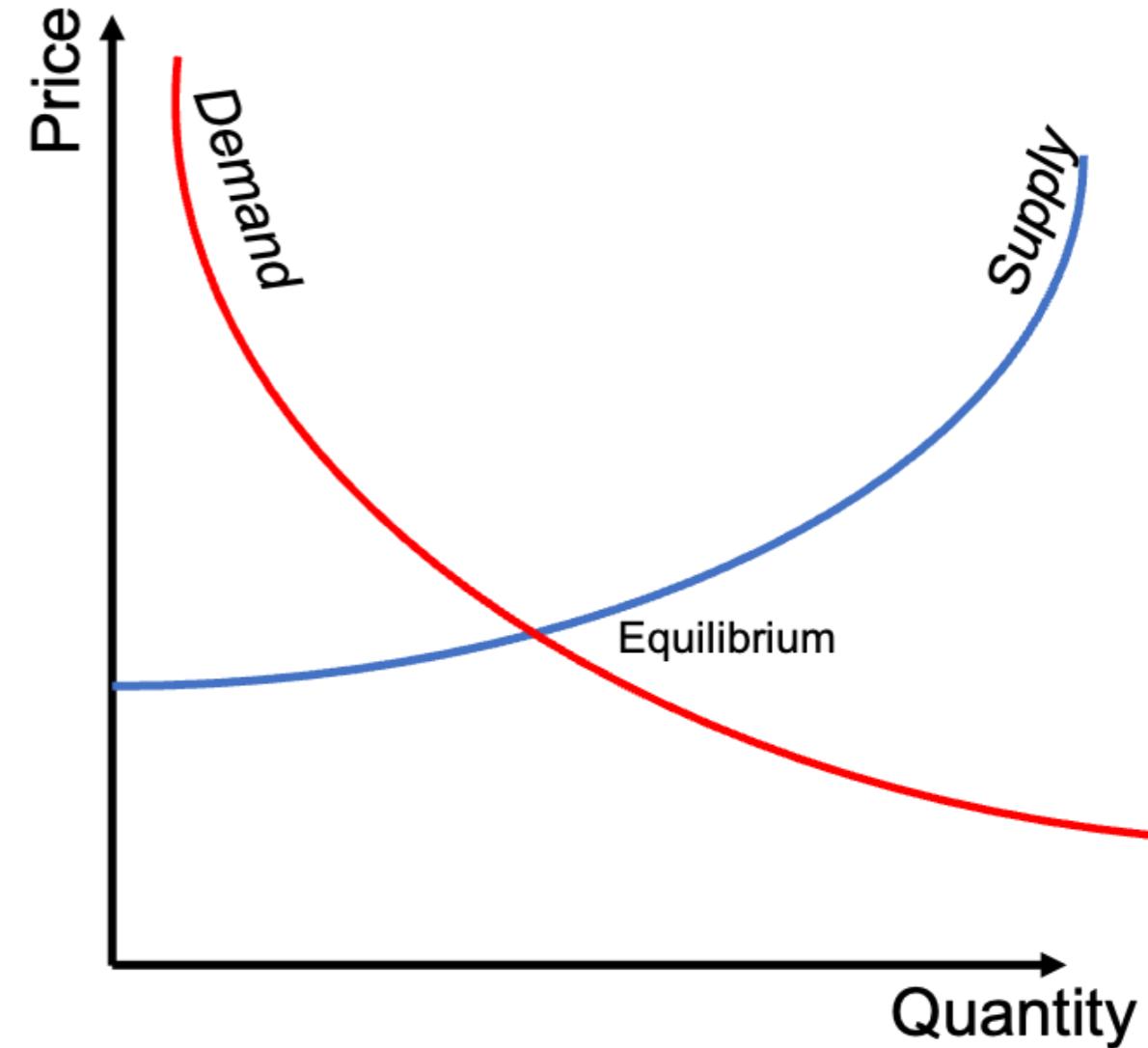
# What is a market?

## Traditional markets

*Infrastructure where parties exchange goods*

- Stock Markets
- Bond Markets
- Housing/Mortgages
- Commodities: gold/silver etc
- Crop Futures: corn/soybean
- Consumer Credit

## Supply and demand



# Investment strategies

- Belief-based investing
- High-frequency trading
- Financial fundamentals
- Technical trading rules

# Belief-based investing



Buy the companies you *believe* will perform well or want to support

- "I bought stock in my favorite streaming service"
- "It was so busy last time I was there, I bought stock in my favorite fast food restaurant"
- "I won't buy stocks that produce tobacco"

# High-frequency trading (HFT)

Providing liquidity or taking advantage?

- Highly automated
- No human in the loop
- Need speed, volume, and volatility to succeed
- Jump you in line and make money on your stock order
- Requires servers close to the market's data centers



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# Financial fundamentals

Buy the companies demonstrating financial indicator strength

- "I bought stock X because they have excellent **revenue** growth"
- "I don't care if they are gun manufacturer, their **dividend** is high."



# Technical trading rules (TTR)



Trade based on mathematical indications

- "The **MACD crossover** is positive for this stock so I bought it"
- "The **relative strength indicator** shows a stock is overbought, so I decided to sell"

# Capital Asset Pricing Model (CAPM)

Expected return of investment (ER) =

Risk free rate + (Beta \* (Expected market return - Risk free rate))

- **Beta** (risk of the investment): how a stock moves with respect to the market
  - Beta between 0-1: stock is less volatile than the market
  - Beta > 1: stock is more volatile than the market
- **Risk free rate**: rate of return for an investment that never defaults
  - In practice: 3-month US Treasury bill's interest rate minus inflation

# Capital Asset Pricing Model (CAPM)

Expected return of investment (ER) =

Risk free rate + (Beta \* (Expected market return - Risk free rate))

## Example

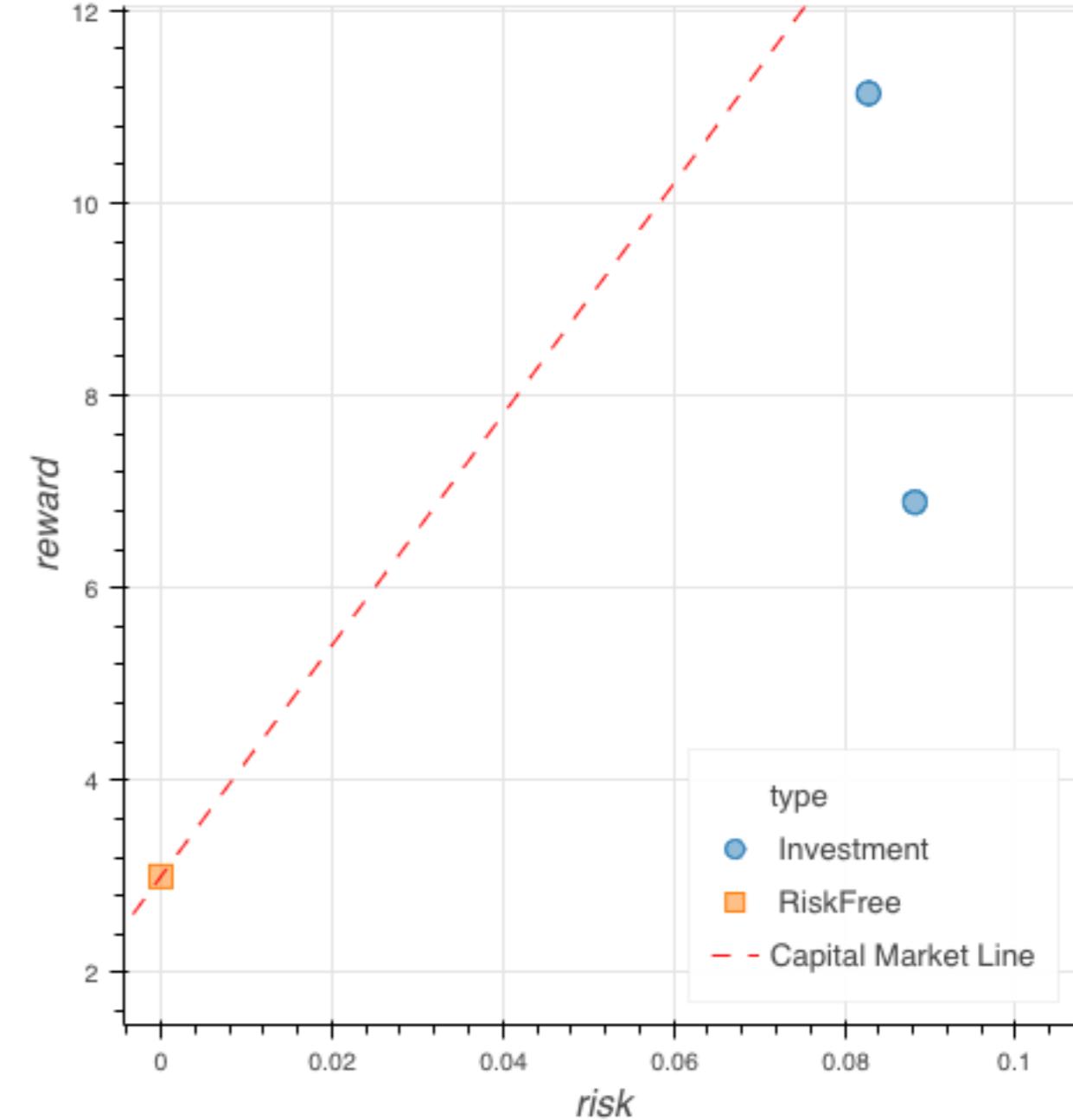
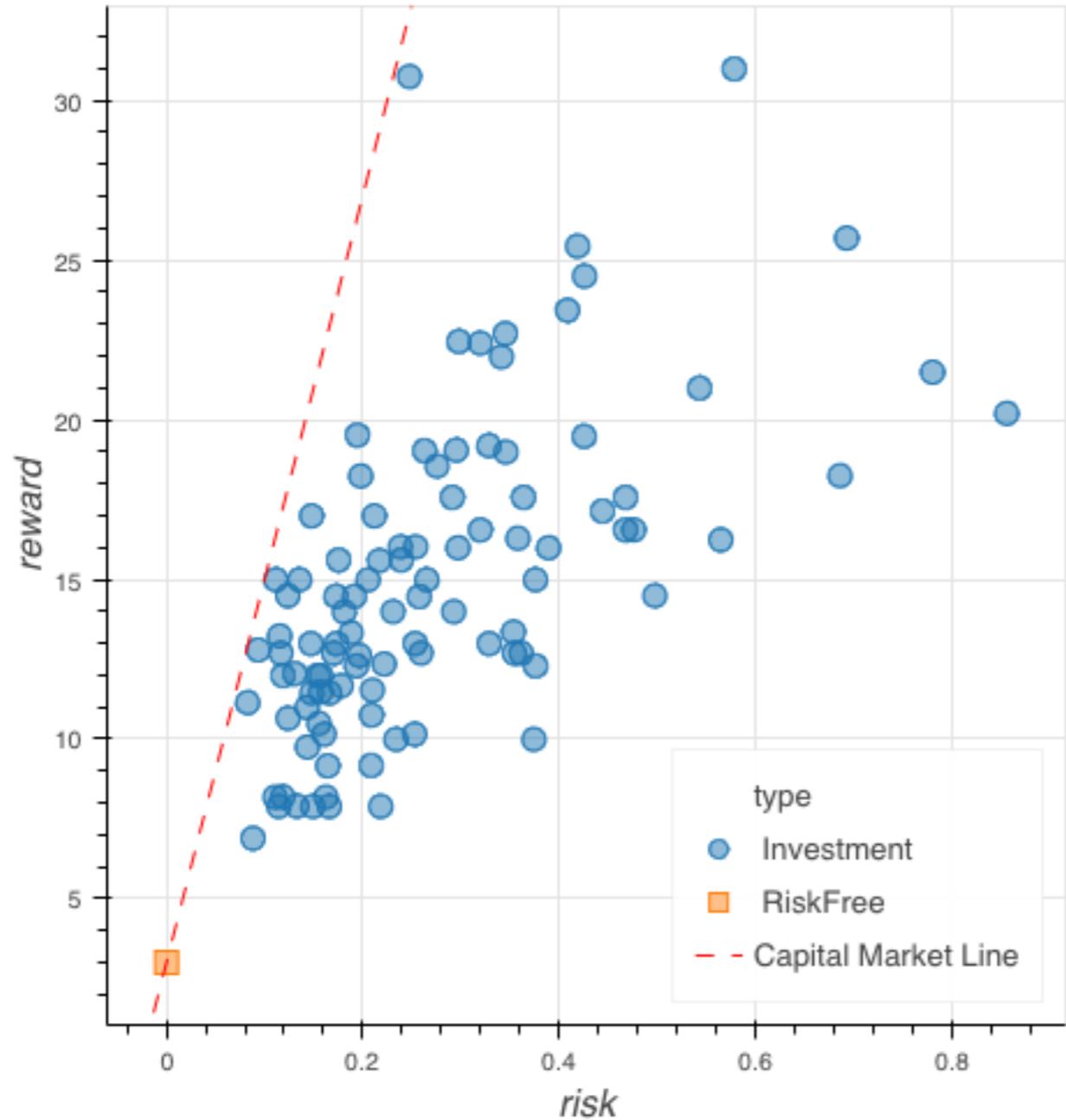
- Risk free rate = 0.03
- Expected market return = 0.09
- Beta of stock X = 0.5

$$ER = .03 + .5(.09 - .03)$$

$$ER = .03 + .5(.06)$$

$$ER = .03 + .03 = 0.06$$

# Interpreting a CAPM chart



<sup>1</sup> <https://www.investopedia.com/terms/c/capm.asp>

# **Data-driven investing!**

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# Other traditional asset investing

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# Investing in a vacation condo



Month	Occupied Nights	Avg Per Night
Jan-21	6	\$53
Feb-21	12	\$95
Mar-21	18	\$134

# Money coming in

Month	Occupied Nights	Avg Per Night
Jan-21	6	\$53
Feb-21	12	\$95
Mar-21	18	\$134

# Total money coming in

Month	Occupied Nights	Avg Per Night	Gross Income
Jan-21	6	\$53	\$795
Feb-21	12	\$95	\$1140
Mar-21	18	\$134	\$2412

## Gross Income

- 6 nights \* \$53 = 795
- 12 nights \* \$95 = 1140
- 18 nights \* \$134 = 2412

# Money going out

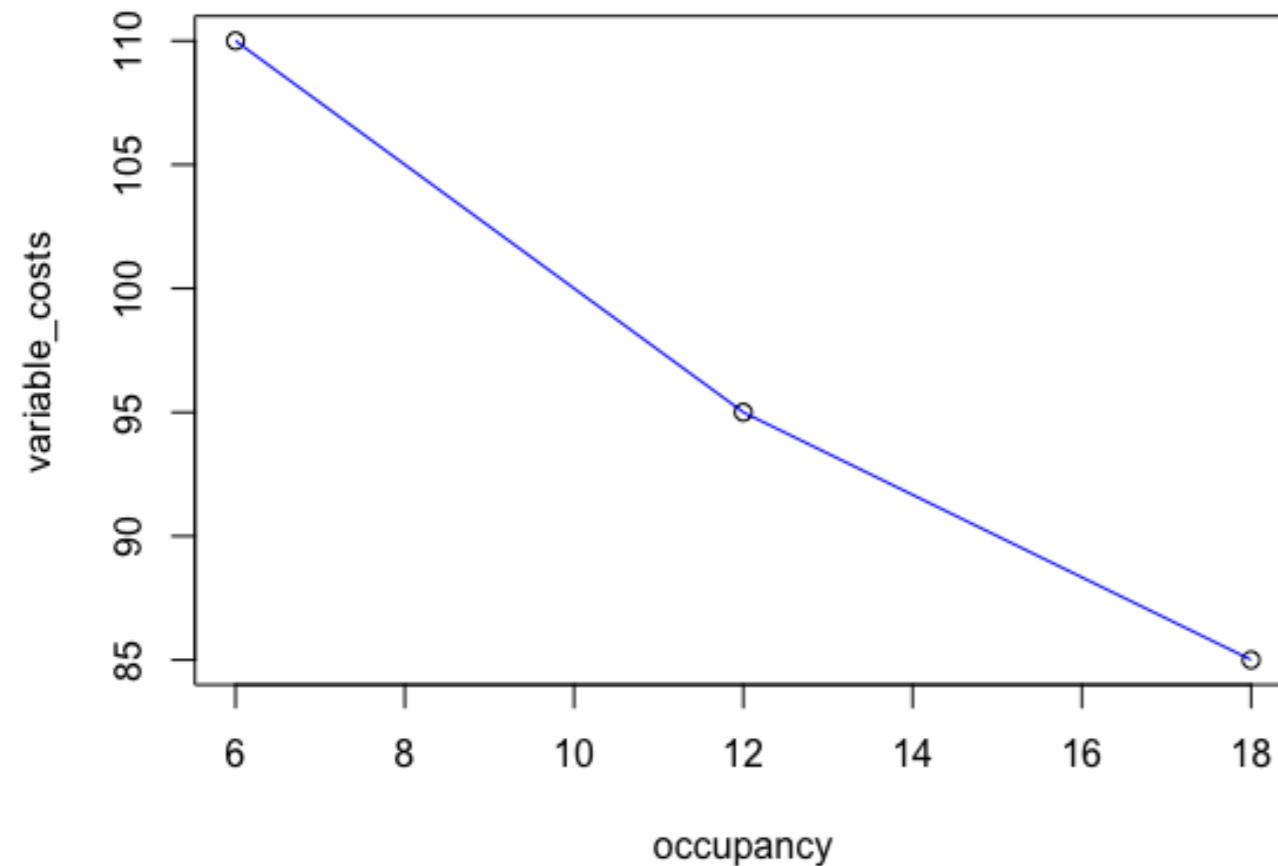
Fixed Cost	Variable Costs	Occupied Nights	Total Costs
\$100	\$110	6	\$760
\$100	\$95	12	\$1240
\$100	\$85	18	\$1630

Fixed Cost + Variable Costs = Total Costs

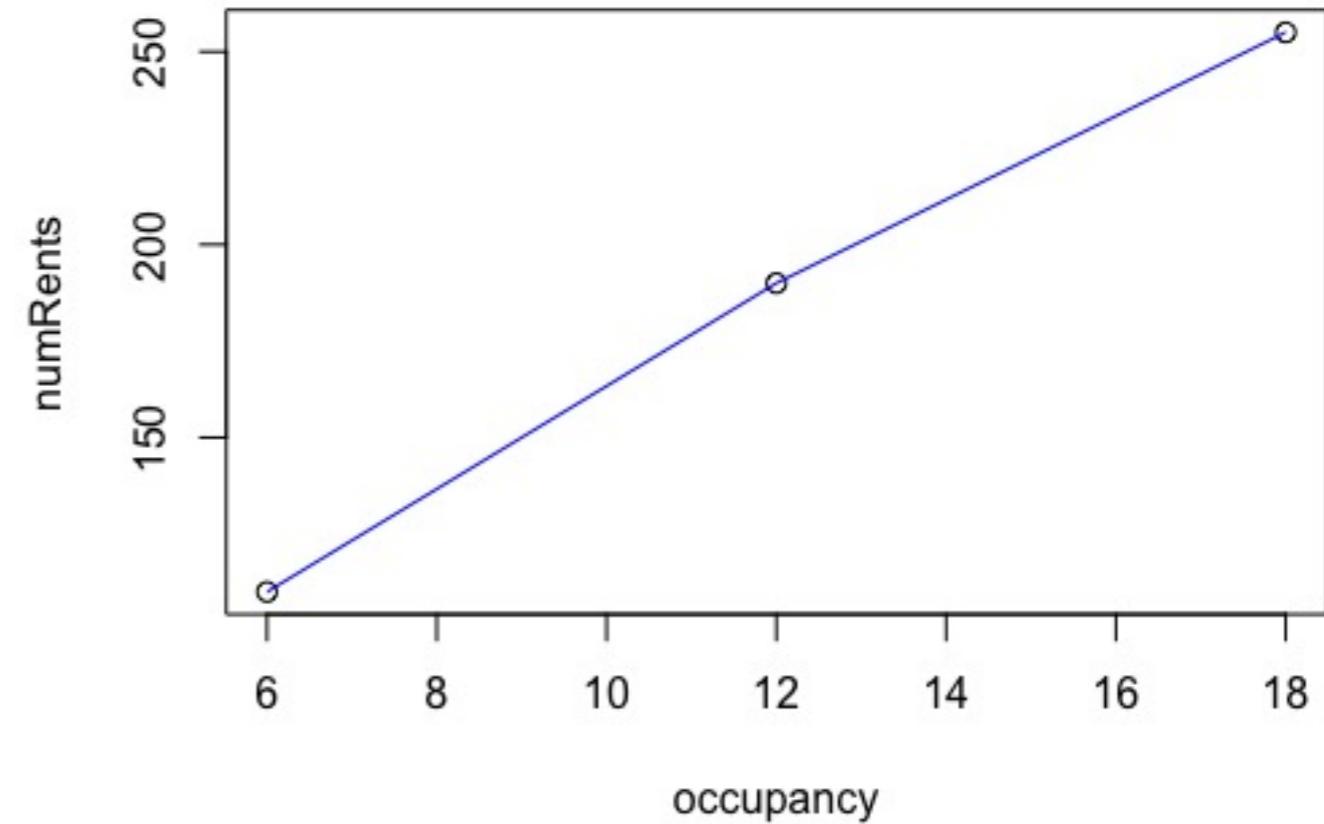
- $100 + (\$110 * 6 \text{ nights occupied}) = 760$
- $100 + (\$95 * 12 \text{ nights occupied}) = 1240$
- $100 + (\$85 * 18 \text{ nights occupied}) = 1630$

# How should variable costs behave?

Var Cost \*per night\* decreases the more rented nights



With more rented nights the overall expense increases



# Calculating the operating expense ratio (OER)

Month	Occupied Nights	Avg Per Night	Gross Income	Total Costs	Income - Costs	OER
Jan-21	6	\$53	795	760	35	0.955
Feb-21	12	\$95	1140	1240	-100	1.087
Mar-21	18	\$134	2412	1630	782	0.675

Operating Expense Ratio: Total Costs / Gross Income

- $760 / 795 = 0.955$
- $1240 / 1140 = 1.087$
- $1630 / 2412 = 0.675$

# Summarizing OER

Month	Occupied Nights	Avg Per Night	Gross Income	Total Costs	Income - Costs	OER
Jan-21	6	\$53	795	760	35	0.955
Feb-21	12	\$95	1140	1240	-100	1.087
Mar-21	18	\$134	2412	1630	782	0.675

1. OER = (0.955, 1.087, 0.675)

2. Weights:

- (6 Jan nights / 36 total nights) = 0.167
- (12 Feb nights / 36 total nights) = 0.33
- (16 Mar nights / 36 total nights) = 0.67

3. Weighted avg = (0.955 \* .167) + (1.087\*.33) + (.675\*.5) = 0.859

# Another investing ratio: cap rate

Month	gross_income	total_costs	net
Jan-21	\$795	760	35
Feb-21	\$1140	1240	-100
Mar-21	\$1340	1300	40
Apr-21	\$1850	1350	500
May-21	\$5000	2000	3000
Jun-21	\$7000	2200	4800
...	...	...	...
Dec-21	\$850	950	-100

Cap Rate: Net Income / Total Cost

- Assume the annual net income = \$20,000

net\_income = (\$35 - 100 + 782 + ... - 100) = 20000

- Assume the purchase price = \$100,000

purchase\_price = 100000

- Sum annual net income / total cost of the property

cap\_rate = 20000 / 100000 = .20

# Comparing properties

ID	Beds	Baths	Square Feet	OER	Cap Rate
Property_1	2	1	750	0.86	0.2
Property_2	3	1.5	1250	1.05	0.27
Property_3	3	2	1500	0.75	0.33
Property_4	2	1.5	1100	1.23	0.11
Property_5	4	2	2000	0.68	0.13

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- Keep only OER < 1

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- Keep only OER < 1
- Maximize cap rate

# **Let's practice!**

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# Non-traditional investing: Magic the Gathering

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Ted Kwartler  
Instructor

# What is a non-traditional market?

## Traditional

- Stock market
- Housing market



## Non-traditional

- Crypto currencies (although it's changing)



<sup>1</sup> [https://www.huffpost.com/entry/beanie-baby-fever-in-1999\\_n\\_58af7d12e4b060480e0661fe](https://www.huffpost.com/entry/beanie-baby-fever-in-1999_n_58af7d12e4b060480e0661fe)

# Introducing Magic The Gathering



<sup>1</sup> [https://magic.wizards.com/en/products/core2021?source=MX\\_Nav2020](https://magic.wizards.com/en/products/core2021?source=MX_Nav2020)

# The need for more power

- The market for these cards changes often
- Speculation



# Many places to purchase cards



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

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ENGLISH P3K Portal Three Kingdoms Booster Box 60 Packs Portal 3  
Kingdoms  
Brand New  
**\$30,000.00**  
Buy It Now  
Free Shipping  
29 Watching

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Magic MTG 3rd Revised Edition Booster Pack Box FACTORY SEALED  
NEW  
Brand New  
**\$20,000.00**  
Buy It Now  
Free Shipping  
102 Watching

# Booster packs

## Booster Card Pack Contents

Rarity	Likelihood
Mythic	1 in 8 packs
Rare	1 per pack unless there is a mythic
Common	3 per pack
Uncommon	11 per pack

\* 1 in 6 packs will replace a random card with a foil, limited edition version

If you want a specific card

- Pay premium to buy a single card from another player
- Purchase a booster pack

# Buy an individual card or take your chances opening a pack?



**RISK** Each booster pack will have worthless cards from the set.

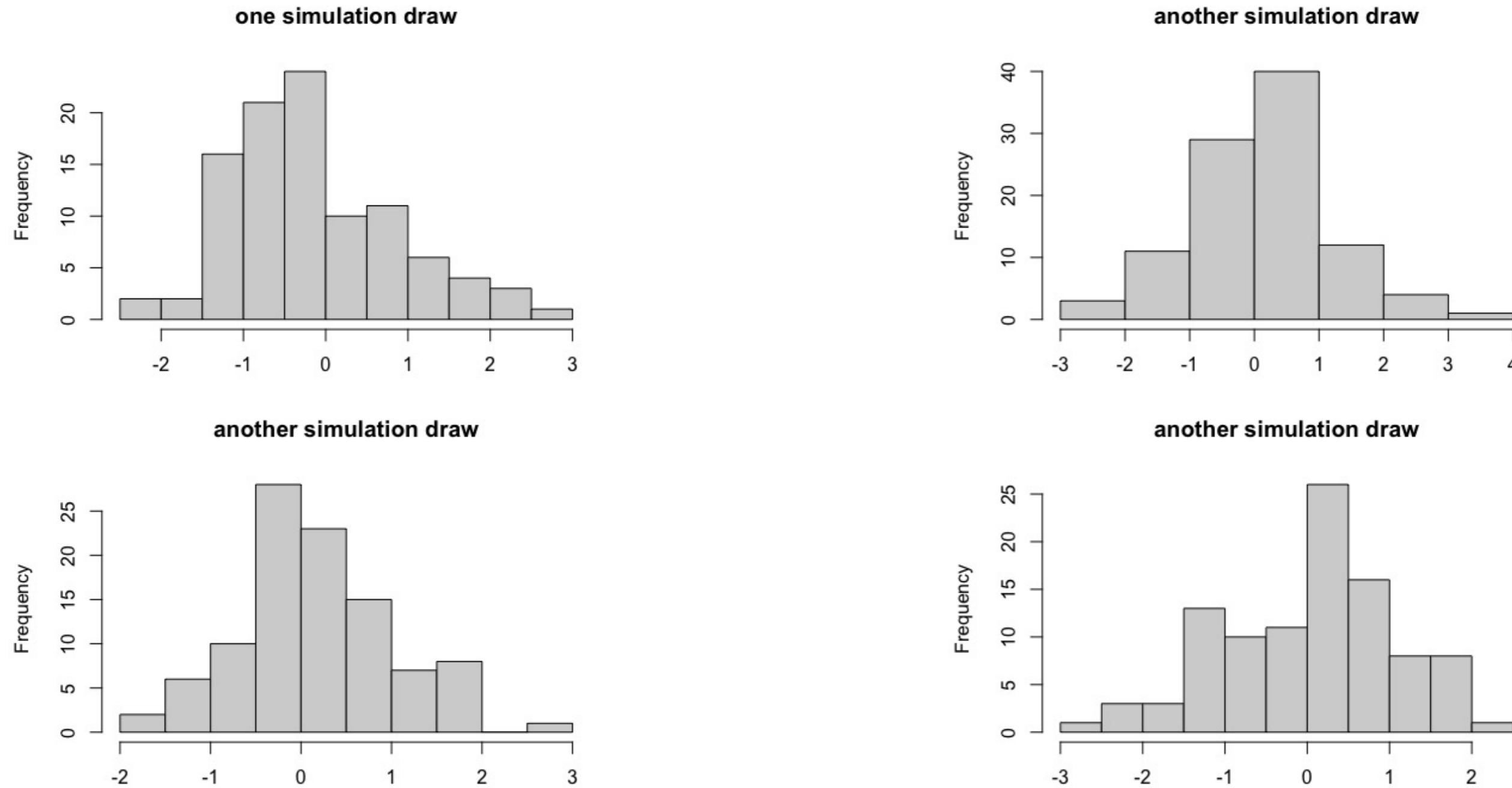
**REWARD** Some packs will contain the rare, expensive cards which can immediately be sold for more than the cost of the pack.

# Using data to assess risk vs reward

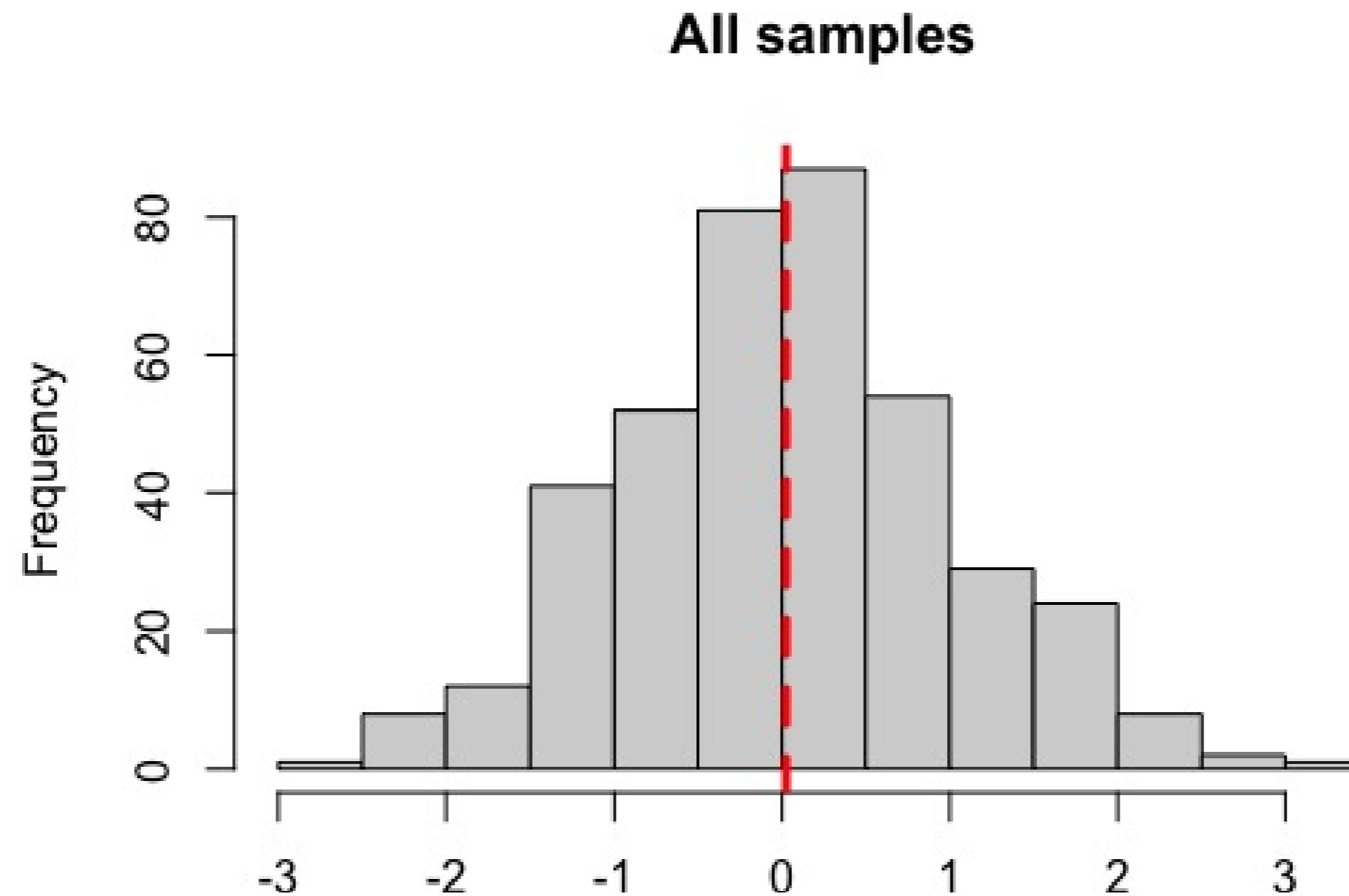


- Known information:
  - Cards in a set
  - Current prices
  - Probabilities of getting specific cards
- Simulate pack openings

# What is a simulation?



# Aggregating all the simulated samples



# Simulating Magic The Gathering

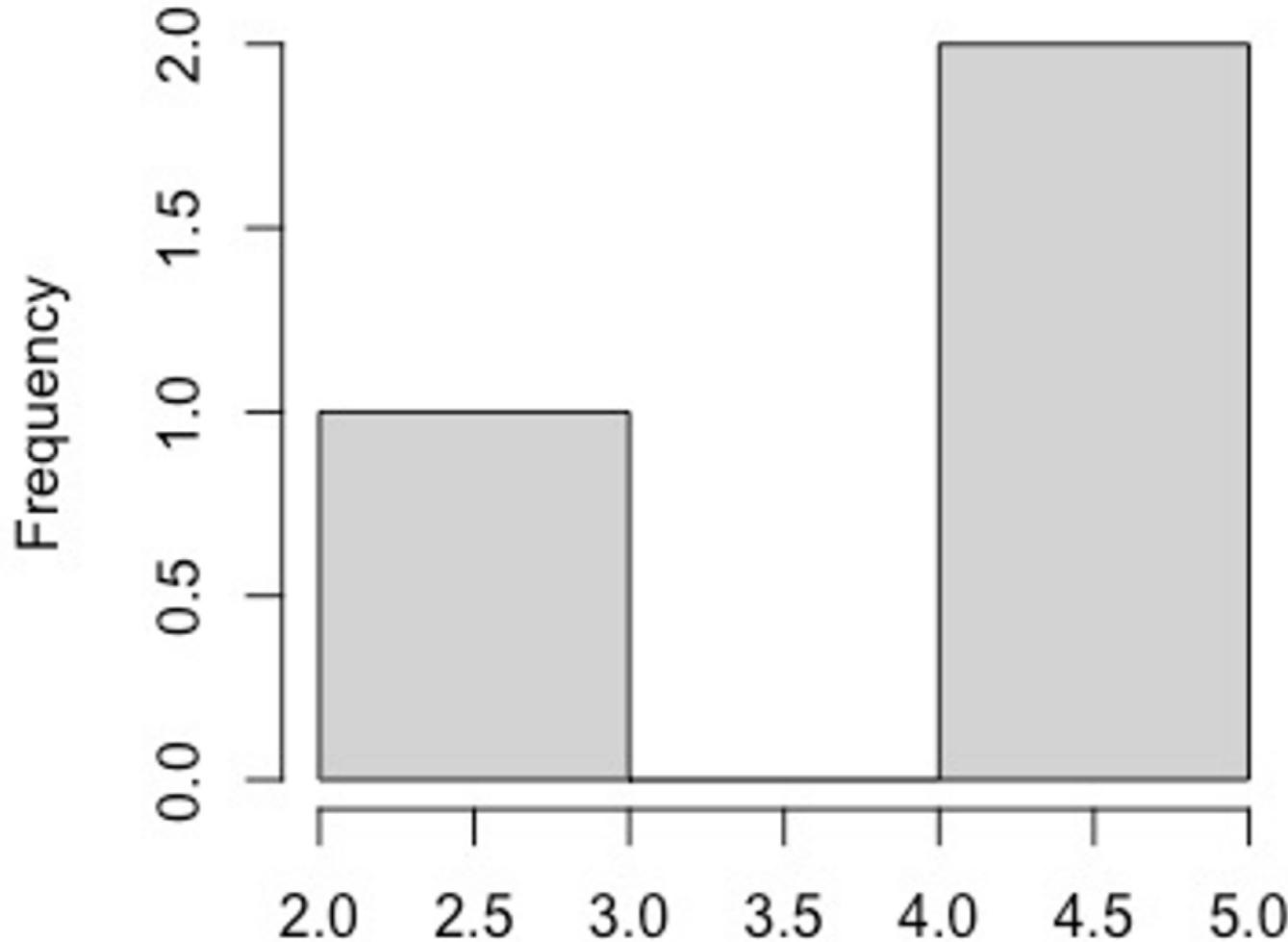


**Booster box:** 36 booster packs

**Booster card pack contents**

Rarity	Published Likelihood
Mythic	1 in 8 packs
Rare	1 per pack unless there is a mythic
Common	3 per pack
Uncommon	11 per pack

# A simple example



Average return

$$\begin{aligned} &= (\$2 + \$5 + \$5) / 3 \\ &= \$4 \end{aligned}$$

# Account for all additional expenses.

Profit

$$\text{net profit} = \text{revenue} - \text{cost}$$

Example

$$\begin{aligned}\text{net profit} &= \text{selling price} \\ &\quad - (\text{purchase price} \\ &\quad + \text{listing fees} \\ &\quad \text{of 10% of sales price}) \\ &= \$100 - (\$50 + \$10) \\ &= \$100 - (\$60) = \$40\end{aligned}$$

Profit margin

$$\text{profit margin} = \text{profit} / \text{revenue}$$

$$\begin{aligned}\text{profit margin} &= \text{profit} / \text{revenue} \\ &= \$40 / \$100 \\ &= .4\end{aligned}$$

# **Let's practice!**

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