First Probability Ideas and First Steps in R

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Finance and Uncertainty

Finance and Uncertainty

- Finance inherently involves **uncertainty** and **risk**.
- Core questions in Finance:
  - How to allocate and price money over time?
  - How to quantify and manage uncertainty?
- Examples:
  - **Saving**: Deferring consumption today for future benefits.
  - **Borrowing**: Investing now, with repayment tied to uncertain future revenues.

Role of Probability

- **Risk and uncertainty** are unavoidable in Finance.
- Probability provides the tools to:
  - Quantify uncertainty.
  - Analyze and manage risks.
- A cornerstone of **financial decision-making**.

Historical Context

- Probability theory began as a mathematical discipline.
- Origins trace back to **16th and 17th century Europe**:
  - Debates about gambling.
  - Involvement of great minds: Cardano, Pascal, Fermat, Bernoulli.
- Earlier human awareness of chance:
  - Gambling traditions.
  - Veneration of the **goddess of chance**.

First Steps: Coin Tossing

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- Tossing a coin:
  - **Classical probability**: Equal chance for heads and tails.
  - A simple chance process people have used throughout history.
- Link to Finance:
  - Simulates stock behavior with equal chances of price increase or decrease.

Simulating a Coin Toss in R (Code)

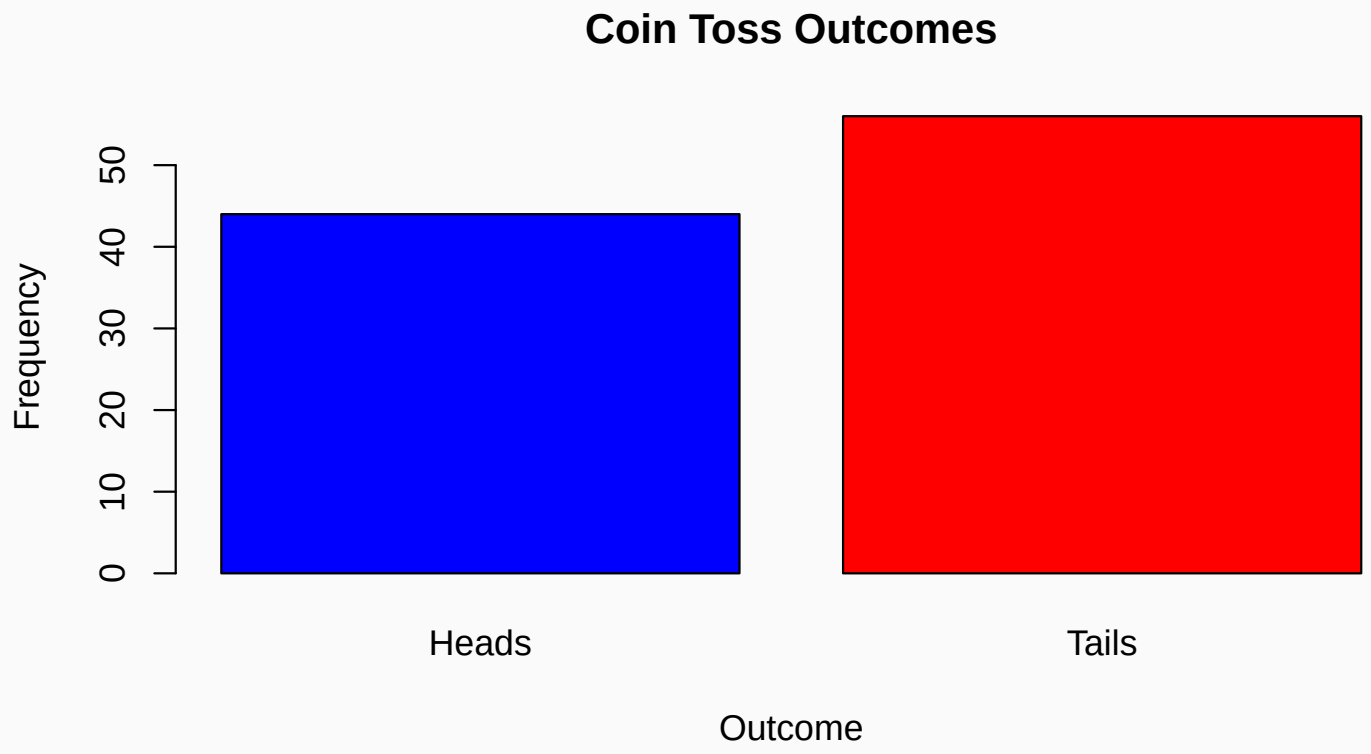
```r
set.seed(42)  # Ensures reproducibility
n_tosses <- 100
results <- sample(c("Heads", "Tails"), size = n_tosses, rep

# Print the first 10 results
print(results[1:10])
```

```
 [1] "Heads" "Heads" "Heads" "Heads" "Tails" "Tails" "Tails
[10] "Tails"
```

Visualizing Coin Toss Results (Code and Plot)

```
# Create a bar plot of the outcomes
barplot(table(results), col = c("blue", "red"),
        main = "Coin Toss Outcomes",
        xlab = "Outcome", ylab = "Frequency")
```



Key Takeaways

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1. Probability is essential for quantifying and managing uncertainty in Finance.
2. Simulations like coin tossing provide a simple way to explore probabilistic concepts.
3. R is a powerful tool for performing these simulations and visualizations.