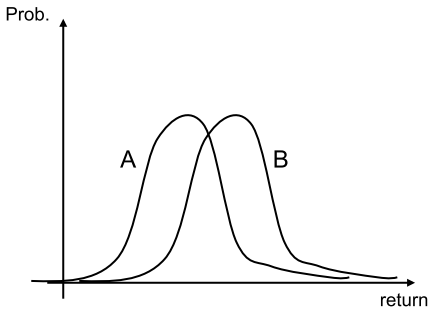
MEASURING RISK AND RETURN: AN ILLUSTRATION

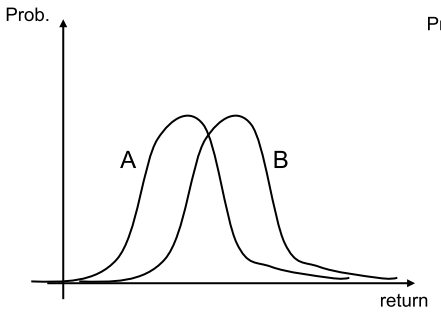
WHAT WILL YOU LEARN?

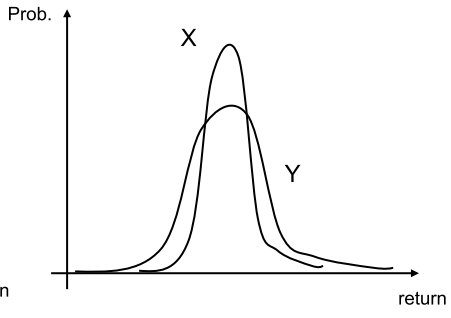
- We look at past returns on four stocks and compute the average annual return and volatility from historical monthly data.
- You will learn how to summarize the past returns on an asset.

WHICH ASSET IS BETTER?



WHICH ASSET IS BETTER?





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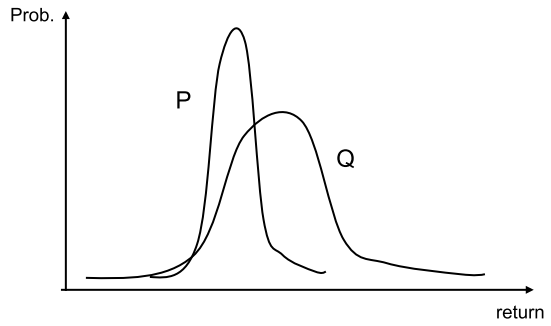

MONTHLY HISTORICAL DATA

	APPLE	WALMART	IBM	NIKE
1/31/11	5.20%	3.97%	10.38%	-3.44%
…	…	…	…	…
1/31/14	-10.77%	-5.10%	-5.81%	-7.36%
2/28/14	5.75%	0.03%	5.38%	7.81%
3/31/14	2.00%	2.98%	3.95%	-5.67%
4/30/14	9.94%	4.29%	2.07%	-1.23%
5/30/14	7.87%	-3.09%	-5.62%	5.76%
6/30/14	2.77%	-2.21%	-1.68%	0.83%
7/31/14	2.87%	-1.98%	5.74%	-0.54%
8/29/14	7.75%	3.29%	0.92%	2.15%
9/30/14	-1.71%	1.28%	-1.28%	13.56%
10/31/14	7.20%	-0.26%	-13.40%	4.23%
11/28/14	10.60%	14.78%	-0.68%	6.80%
12/31/14	-7.19%	-1.35%	-1.07%	-2.88%

AVERAGE RETURN AND VOLATILITY

	APPL	WALMART	IBM	NIKE
Average monthly return	1.755%	0.540%	0.177%	2.103%
Monthly volatility	7.145%	4.815%	4.545%	6.098%

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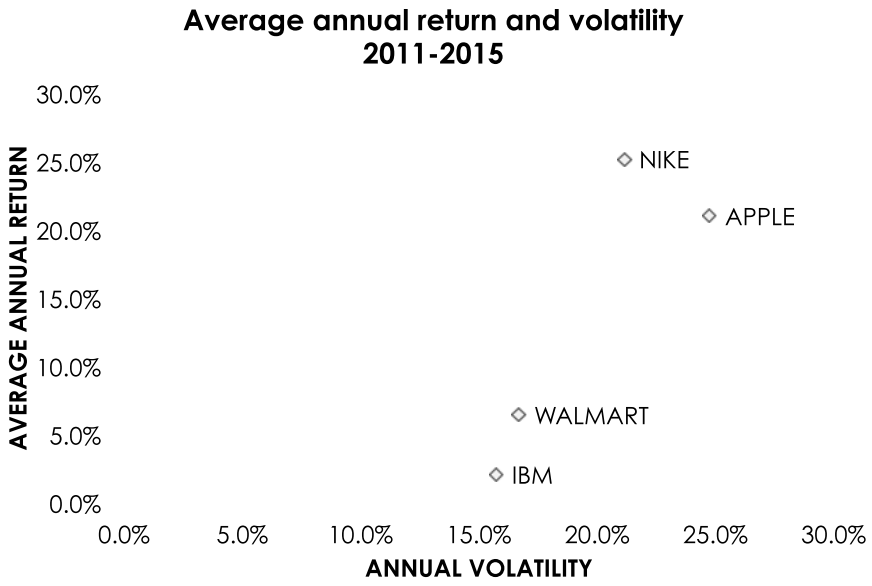
	APPL	WALMART	IBM	NIKE
Average annual return	21.062%	6.483%	2.123%	25.234%
Annual volatility	24.750%	16.680%	15.744%	21.125%



SUMMARY

- You learned to compute the average return and volatility from a time series of returns.
- You learned to annualize average return and volatility.

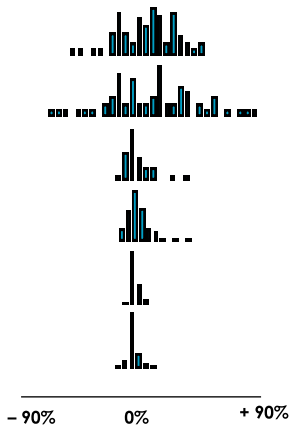
HISTORICAL RECORD ON RISK & RETURN PATTERNS

WHAT WILL YOU LEARN?

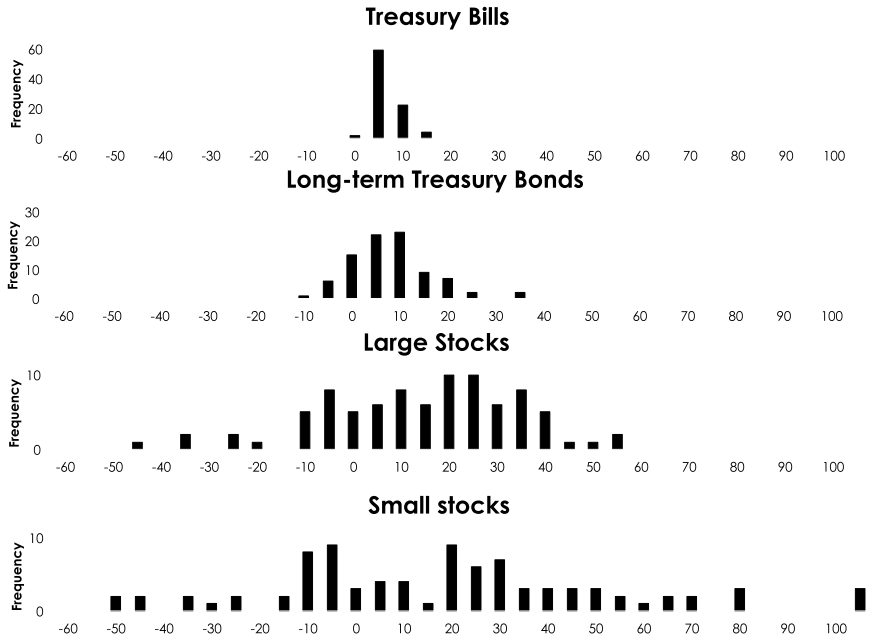
- Historical data on risk and return patterns

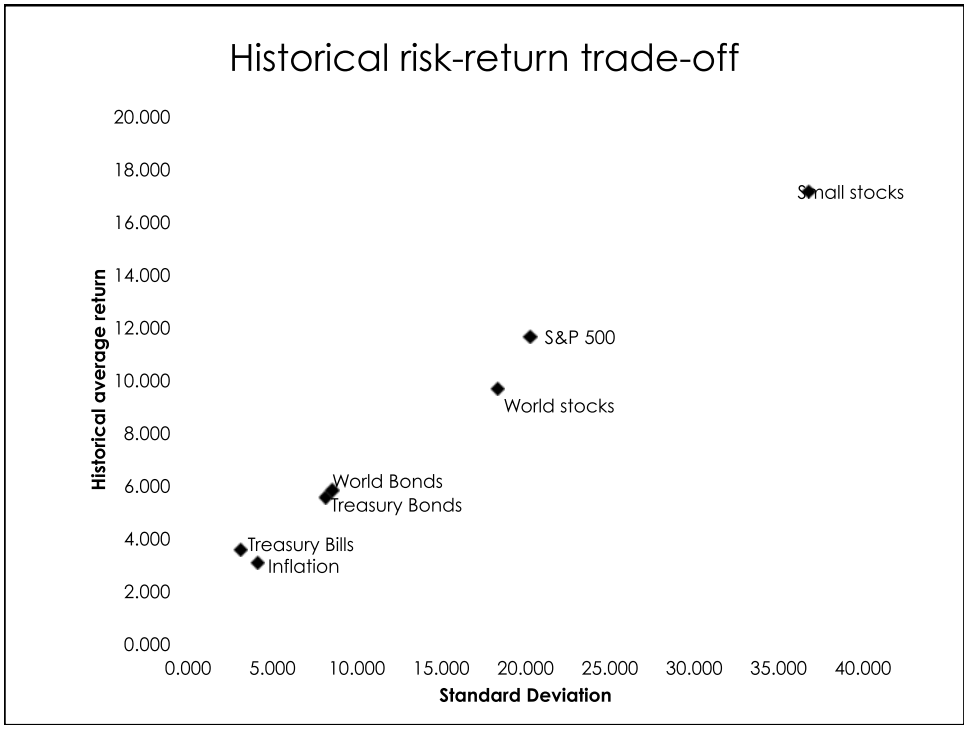
SUMMARY STATISTICS OF ANNUAL TOTAL RETURNS FROM 1926 TO 2009

	Average Annual Ret.	Standard Deviation	Distribution
Large stocks	9.8%	20.5%	
Small stocks	11.9	52.8	
Long-term corp. bonds	5.9	8.3	
Long-term govt. bonds	5.4	8.7	
U.S. Treasury bills	3.7	3.1	
Inflation	3.0	4.2	



The Empirical Distribution of Annual Returns for U.S. Large stocks (S&P 500), Small Stocks, Treasury Bonds and Treasury Bills (1926-2012)





FROM HISTORICAL DATA TO EXPECTED RETURNS

- Where do we come up with expected returns?

HISTORICAL AVERAGE RETURNS

- The idea is if expected returns are constant over time, long-run average *realized* returns is a good estimate of expected future returns.
- Should you think twice before using historical returns as forecasts of future returns?
- YES! Why?

HISTORICAL AVERAGE RETURNS

- Any sample period may be biased.
- Longer historical window reduce sample specificity and give more accurate estimates
  - Would you want to include data from 1600s even if good quality data were available to us?
- Expected returns may vary in cyclical fashion.
- For specific funds and strategies, historical performance is often upward biased: Voluntary reporting or survivorship bias. Same point with simulated 'paper' portfolios that ignore trading costs.

SUMMARY

- Investors face a risk-return trade-off.
- Riskier investments have on average had higher returns.
- Be very careful on using historical data to come up with forecasts of expected returns.