

Diversification By the Numbers

Why and How to Diversify Your Portfolio

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Portfolio Diversification Recommendations for BetterInvesting Members & Clubs

3

Recap of BI Diversification Guidelines



- Diversify by size of company.
 - Include small, mid-sized, & large company stocks.
- Diversify by sector & industry.
 - Include companies from many different sectors & industries.

Why?

4

Behind the Guidelines



- Diversification is actually driven by levels of **correlation** within portfolio securities.
- Risk levels can be measured by **beta** of individual holdings & entire portfolio.
- Academic research from 1950s & beyond changed the way that diversification was considered & measured.
- Many of the risk & diversification measurements were not widely available until late in 20th century.
- Better understanding of the rationale behind BI guidelines can aid individuals & clubs in knowing **why** diversification is so important.

5

Principles of Diversification

6

Thoughts on Eggs and Baskets



- Common advice for investors is, “Don’t put all your eggs in one basket.”
- If basket is dropped, some of your eggs in another basket would be saved.
- Many individuals & clubs interpret this as instruction to simply **hold “a lot” of stocks**, thus satisfying objectives of portfolio diversification.

7

But Portfolio Diversification Is Much More



- It is not enough to simply hold a lot of eggs (stocks) & put them in different baskets (portfolios).
- Egg/basket metaphor greatly oversimplifies how diversification works in investing portfolio.
- Other factors are at work to achieve positive impact from diversification.
- Understanding these—even if only the principles & not the math—can provide big benefits to stock portfolios.

8

First, What Is Diversification?



- Method of **managing risk** in portfolio.
 - Problems with one security are counterbalanced by other securities that are unaffected.
- May also **enhance returns**.
 - Besides decreasing overall volatility & “smoothing out” returns over time, possible to also generate higher returns with well-diversified portfolio.

9

What Is Investment Risk?



1. That portfolio or single investment will lose money.
2. That portfolio or single investment will fluctuate widely in value.
3. That you won't have enough money to achieve goals in available timeframe.

Diversification can help mitigate some of these risks.

10

Diversifying Across & Within Asset Classes



- Financial advisors often recommend clients hold different asset classes: bonds, stocks, real estate, etc.
- Bond investors may select bonds with different durations, quality, yields, terms from federal government, municipalities, or corporations.
- Real estate investors may elect to own properties that span residential, commercial, industrial, retail, entertainment uses.
- Individuals parking cash may build CD ladder with different terms & interest rates.
- Stock investors may invest in companies of different sizes & in different sectors & industries.

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How Diversification Came to Be Understood

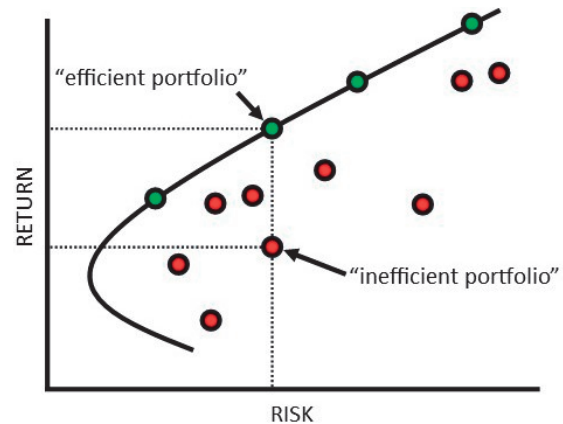


- Importance of diversification was quantified by Harry Markowitz in 1952 in his Modern Portfolio Theory (MPT)
 - Awarded 1990 Nobel Memorial Prize in Economic Sciences.
- According to MPT, investors should diversify in many **non-correlated** assets in order to maximize returns & manage risk.
- Reduces risk because no single asset or sector will move in same direction at any given time.

Theoretical Risk/Reward Thresholds



- Markowitz also introduced concept of **Efficient Frontier**.
- This tool graphs diversified portfolio that offers **highest return for desired level of risk**.
- Portfolio that lands on “efficient frontier” is considered to deliver maximum return for individual’s risk tolerance.



13

Better Investing Recommends



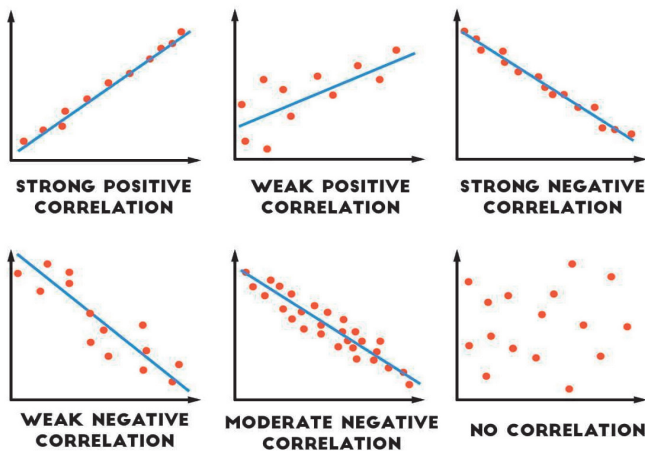
- BI suggests that individuals can focus mostly on common stocks & not worry about other asset classes.
- BI recommends that portfolios be diversified by holding stocks of companies of different sizes, sectors, industries.
- Also teaches that holdings not be over-concentrated.
- Achieving these objectives can be made clearer with deeper understanding of how risk & return attributes of securities can be assessed.

14

Understanding Correlation

15

What is Correlation?



Source: us-static.z-dn.net

- Correlation is degree to which values react or change in same or different ways.
- (Always remember that correlation is not causation.)

16

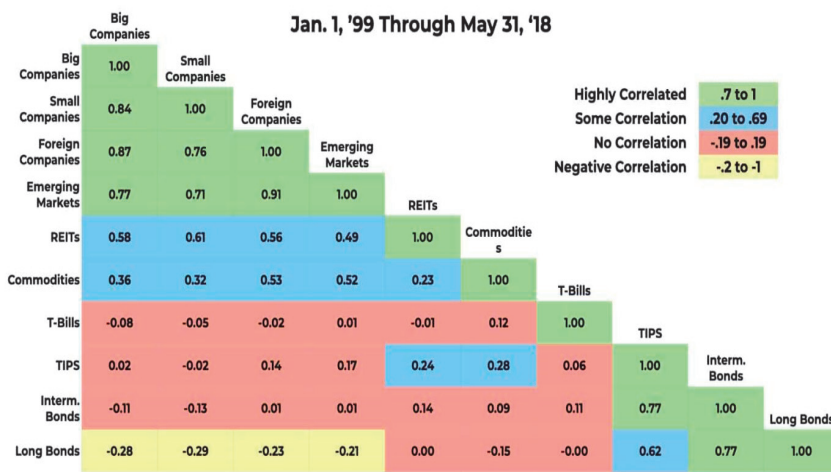
Correlation as Relates to Investing



- Different asset classes can have different levels of correlation.
- Holding multiple highly-correlated assets can **increase** units of risk in portfolio, since single event can impact all related assets.
- Within broad asset classes, correlation may be relatively strong, however timeframe & portfolio objectives must be considered—small variances in correlation can be meaningful.

17

Correlation Matrix by Asset Class



- Stocks have high correlation no matter size or country.
- Negative correlated assets are not desirable in long-term portfolio.

Source: retirewire.com

Correlation in Equities



- Stocks of similar businesses (Home Depot & Lowe's, CVS & Walgreen's) tend to have high correlation since economic, sector, industry trends impact them similarly.
- For example, portfolio loaded with technology stocks will not perform if tech sector hits rough patch.

19

What Is Non-Correlation?



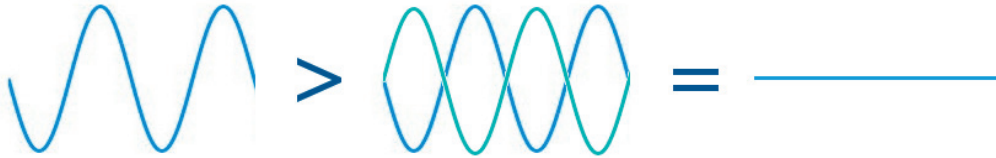
- Holding securities with low degrees of correlation (securities that are highly **non-correlated**) is thus desirable in portfolio.
- Problems in one sector/industry may not impact companies in other sectors/industries.
- Investor sentiment towards long-cap vs small-cap stocks may mean some stocks in portfolio will hold up while others are underperforming.

20

Non-Correlated Holdings Cancel Out



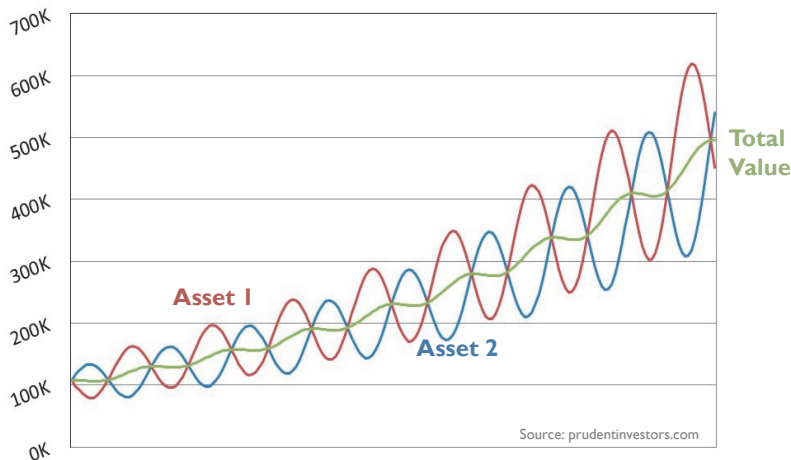
- In noise-cancelling headphones, waves of equal amplitude & opposite phase cancel out:



- In portfolio, ups & downs of pairs of securities can also effectively cancel each other out.
- But if ups & downs zero out, how does portfolio gain value?

21

Assets Contribute to Growth



- Well-selected security **fundamentals** drive price over time despite short term price gyrations.
- Total portfolio value is thus “smoothed out” over time but still moves upwards.

22

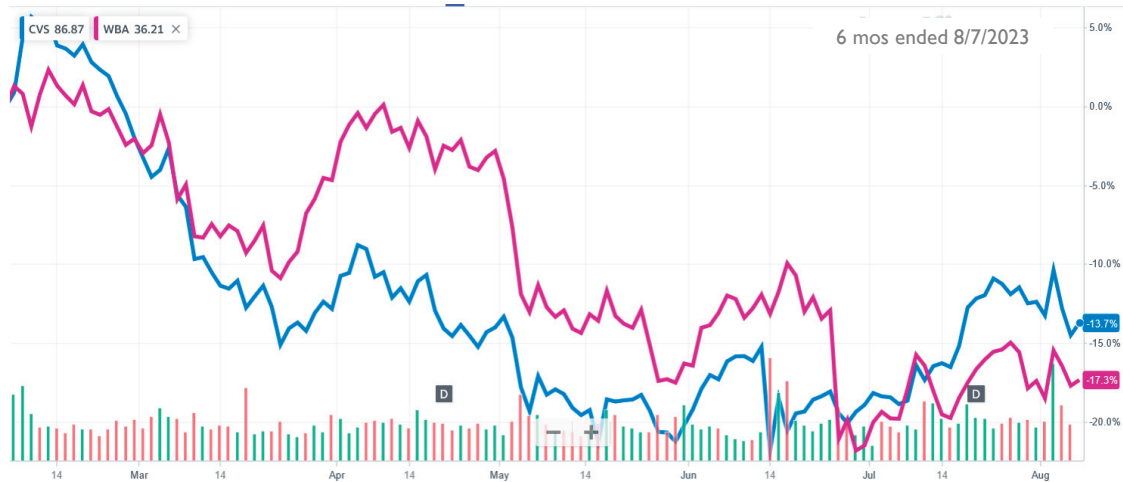
Checking Correlation of Stocks



- Before owning stocks in similar or related sector/industries, check historical correlation levels.
- Use site like Yahoo! Finance to check how closely stock prices align over various periods.
 - Portfolio Visualizer > Asset Correlations (Free) can also compare rolling correlation of pairs of securities. (<https://www.portfoliovisualizer.com/asset-correlations>)
- If prices closely align, owning both stocks may not provide desired diversification.

23

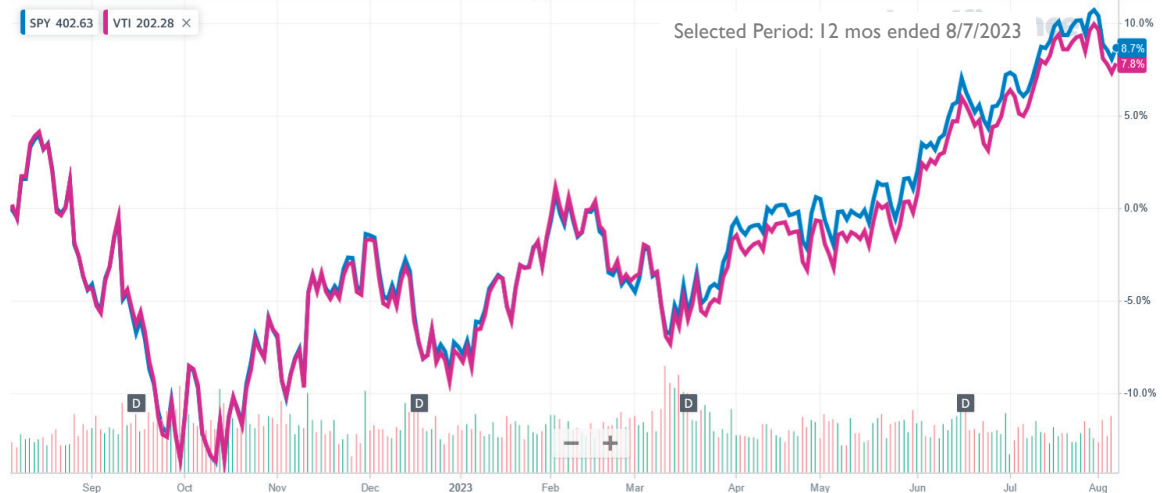
CVS vs. Walgreen's – Often Highly Correlated



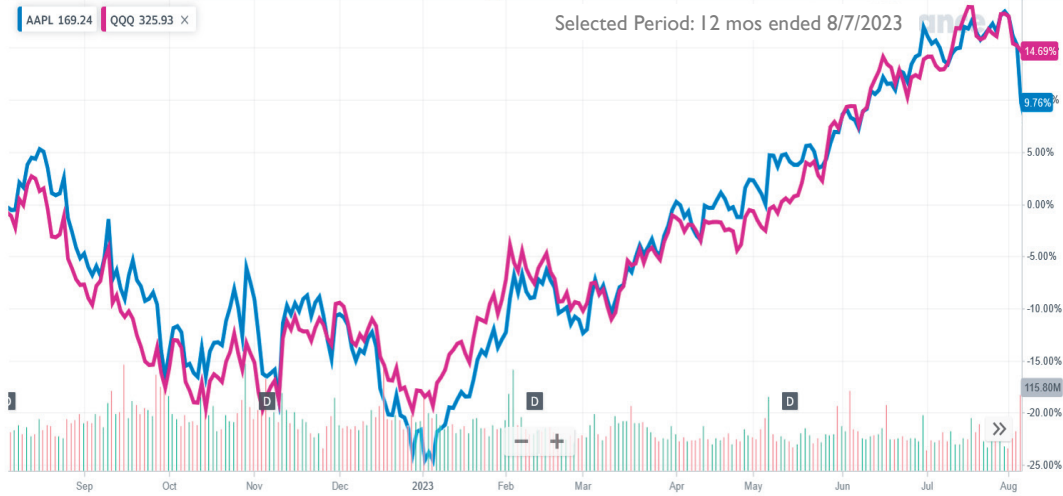
Lowe's vs. Home Depot – Often Highly Correlated



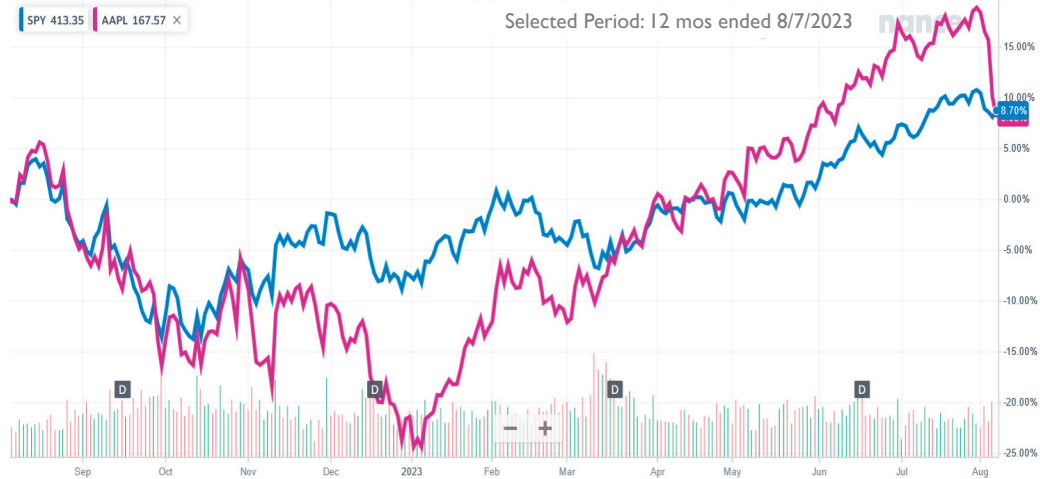
S&P 500 vs. Wilshire 5000 – Highly Correlated



Apple vs. Nasdaq 100



Apple vs. S&P 500



Portfolio Level Correlation



- Check rolling correlations of pairs of securities in entire portfolio.
- Portfolio Visualizer > Asset Correlations (Free, limited to 50 symbols). (<https://www.portfoliovisualizer.com/asset-correlations>)
- StockRover.com (\$). (<https://www.stockrover.com>)

29

Correlation of Magnificent 7



Daily Returns over 5 Years

Ticker	AAPL	AMZN	GOOGL	META	MSFT	NVDA	TSLA
AAPL	1	0.60	0.66	0.56	0.75	0.61	0.49
AMZN	0.60	1	0.65	0.61	0.68	0.58	0.43
GOOGL	0.66	0.65	1	0.64	0.75	0.60	0.40
META	0.56	0.61	0.64	1	0.62	0.53	0.33
MSFT	0.75	0.68	0.75	0.62	1	0.68	0.45
NVDA	0.61	0.58	0.60	0.53	0.68	1	0.48
TSLA	0.49	0.43	0.40	0.33	0.45	0.48	1

Red shading indicates **high correlations** between pairs of assets—**not very diversified!**

Source: StockRover.com

Correlation of Imbalanced Club Portfolio



Daily Returns over 5 Years

Source: StockRover.com

Ticker	AAPL	AFL	AMD	AMZN	BRK.B	CAT	COST	CRM	CSCO	GOOG	HD	JPM	KO	LOW	MCD	META	MSFT	NVDA	PEP	PG	RTX	SBLX	SYK	UNH	V
AAPL	1	0.36	0.56	0.60	0.55	0.36	0.56	0.54	0.54	0.65	0.56	0.42	0.44	0.52	0.47	0.56	0.75	0.61	0.49	0.42	0.36	0.50	0.48	0.43	0.59
AFL	0.36	1	0.24	0.18	0.73	0.54	0.27	0.27	0.43	0.33	0.47	0.71	0.56	0.50	0.56	0.24	0.37	0.26	0.44	0.34	0.66	0.47	0.56	0.50	0.59
AMD	0.56	0.24	1	0.56	0.36	0.30	0.45	0.50	0.41	0.55	0.43	0.31	0.20	0.40	0.31	0.49	0.61	0.75	0.26	0.21	0.22	0.42	0.39	0.28	0.43
AMZN	0.60	0.18	0.56	1	0.36	0.24	0.50	0.56	0.39	0.65	0.43	0.27	0.22	0.38	0.27	0.61	0.68	0.58	0.29	0.24	0.18	0.38	0.36	0.22	0.41
BRK.B	0.55	0.73	0.36	0.35	1	0.63	0.44	0.40	0.59	0.50	0.59	0.78	0.65	0.56	0.61	0.38	0.54	0.38	0.58	0.52	0.65	0.55	0.61	0.56	0.68
CAT	0.36	0.54	0.30	0.24	0.63	1	0.30	0.30	0.46	0.35	0.45	0.63	0.43	0.44	0.39	0.24	0.35	0.33	0.33	0.28	0.53	0.40	0.46	0.35	0.49
COST	0.56	0.27	0.45	0.50	0.44	0.30	1	0.43	0.47	0.48	0.54	0.31	0.45	0.46	0.39	0.41	0.58	0.49	0.53	0.51	0.27	0.38	0.38	0.39	0.45
CRM	0.54	0.27	0.50	0.55	0.40	0.30	0.43	1	0.42	0.56	0.46	0.34	0.31	0.44	0.39	0.52	0.64	0.55	0.36	0.26	0.30	0.41	0.43	0.29	0.50
CSCO	0.54	0.43	0.41	0.39	0.59	0.46	0.47	0.42	1	0.49	0.53	0.50	0.51	0.48	0.51	0.37	0.56	0.42	0.53	0.49	0.43	0.49	0.49	0.44	0.55
GOOG	0.65	0.33	0.55	0.65	0.50	0.35	0.48	0.56	0.49	1	0.49	0.41	0.37	0.46	0.41	0.64	0.75	0.59	0.39	0.34	0.34	0.46	0.48	0.35	0.54
HD	0.56	0.47	0.43	0.43	0.59	0.45	0.54	0.46	0.53	0.49	1	0.52	0.50	0.87	0.57	0.42	0.58	0.48	0.56	0.47	0.44	0.53	0.51	0.48	0.56
JPM	0.42	0.71	0.31	0.27	0.78	0.63	0.31	0.34	0.50	0.41	0.52	1	0.54	0.49	0.53	0.31	0.43	0.33	0.44	0.38	0.63	0.53	0.56	0.46	0.61
KO	0.44	0.56	0.20	0.22	0.65	0.43	0.45	0.31	0.51	0.37	0.50	0.54	1	0.45	0.59	0.22	0.44	0.22	0.75	0.66	0.56	0.46	0.58	0.51	0.57
LOW	0.52	0.50	0.40	0.38	0.56	0.44	0.46	0.44	0.48	0.46	0.87	0.49	0.45	1	0.57	0.41	0.54	0.44	0.50	0.41	0.44	0.51	0.51	0.46	0.54
MCD	0.47	0.56	0.31	0.27	0.61	0.39	0.39	0.39	0.51	0.41	0.57	0.53	0.59	0.57	1	0.33	0.48	0.33	0.57	0.48	0.55	0.59	0.59	0.50	0.61
META	0.56	0.24	0.49	0.61	0.38	0.24	0.41	0.52	0.37	0.64	0.42	0.31	0.22	0.41	0.33	1	0.62	0.53	0.28	0.24	0.21	0.39	0.29	0.22	0.44
MSFT	0.75	0.37	0.61	0.68	0.54	0.35	0.58	0.64	0.56	0.75	0.58	0.43	0.44	0.54	0.48	0.62	1	0.68	0.51	0.46	0.34	0.50	0.52	0.45	0.62
NVDA	0.61	0.26	0.75	0.58	0.38	0.33	0.49	0.55	0.42	0.59	0.48	0.33	0.22	0.44	0.33	0.53	0.68	1	0.29	0.24	0.25	0.44	0.41	0.29	0.48
PEP	0.49	0.44	0.26	0.29	0.58	0.33	0.53	0.36	0.53	0.39	0.56	0.44	0.75	0.50	0.57	0.28	0.51	0.29	1	0.75	0.41	0.47	0.48	0.55	0.52
PG	0.42	0.34	0.21	0.24	0.52	0.28	0.51	0.26	0.49	0.34	0.47	0.38	0.68	0.41	0.48	0.24	0.46	0.24	0.75	1	0.32	0.37	0.44	0.48	0.46
RTX	0.36	0.66	0.22	0.18	0.65	0.53	0.27	0.30	0.43	0.34	0.44	0.63	0.56	0.44	0.55	0.21	0.34	0.25	0.41	0.32	1	0.45	0.53	0.47	0.58
SBLX	0.50	0.47	0.42	0.38	0.55	0.40	0.38	0.41	0.49	0.46	0.53	0.53	0.46	0.51	0.59	0.39	0.50	0.44	0.47	0.37	0.45	1	0.58	0.41	0.57
SYK	0.48	0.56	0.39	0.36	0.61	0.46	0.38	0.43	0.49	0.48	0.51	0.56	0.58	0.51	0.59	0.39	0.52	0.41	0.48	0.44	0.53	0.58	1	0.47	0.65
UNH	0.43	0.50	0.28	0.22	0.56	0.35	0.39	0.29	0.44	0.35	0.48	0.46	0.51	0.46	0.50	0.22	0.45	0.29	0.55	0.48	0.47	0.41	0.47	1	0.50
V	0.59	0.59	0.43	0.41	0.68	0.49	0.45	0.50	0.55	0.54	0.56	0.61	0.57	0.54	0.61	0.44	0.62	0.48	0.52	0.46	0.58	0.57	0.65	0.50	1

Red shading indicates **high correlations** between pairs of assets (not good!).

Correlation of Balanced Club Portfolio



Daily Returns over 5 Years

Source: StockRover.com

Ticker	AAPL	ADBE	ALGN	AX	CPRX	DAR	DE	DHI	FIVE	IBP	IMXI	KNSL	MEDP	MKSI	MMS	MSFT	PINS	QLYS	REGN	RPM	STAG
AAPL	1	0.63	0.46	0.39	0.34	0.35	0.38	0.43	0.42	0.42	0.27	0.36	0.38	0.57	0.45	0.75	0.46	0.42	0.34	0.47	0.53
ADBE	0.63	1	0.40	0.31	0.35	0.31	0.27	0.39	0.38	0.38	0.24	0.29	0.38	0.53	0.40	0.74	0.44	0.47	0.35	0.40	0.42
ALGN	0.46	0.40	1	0.42	0.31	0.39	0.36	0.48	0.44	0.48	0.27	0.24	0.40	0.53	0.34	0.49	0.36	0.35	0.18	0.44	0.44
AX	0.39	0.31	0.42	1	0.34	0.50	0.51	0.45	0.42	0.54	0.32	0.36	0.35	0.49	0.48	0.37	0.30	0.26	0.13	0.50	0.56
CPRX	0.34	0.35	0.31	0.34	1	0.34	0.30	0.33	0.35	0.35	0.24	0.26	0.30	0.35	0.34	0.37	0.25	0.26	0.28	0.31	0.37
DAR	0.35	0.31	0.39	0.50	0.34	1	0.53	0.38	0.39	0.44	0.32	0.28	0.31	0.44	0.37	0.35	0.29	0.26	0.17	0.44	0.44
DE	0.38	0.27	0.36	0.51	0.30	0.53	1	0.40	0.41	0.48	0.31	0.35	0.33	0.43	0.44	0.35	0.25	0.24	0.20	0.50	0.48
DHI	0.43	0.39	0.48	0.45	0.33	0.38	0.40	1	0.50	0.76	0.33	0.33	0.41	0.50	0.39	0.44	0.35	0.32	0.16	0.54	0.56
FIVE	0.42	0.38	0.44	0.42	0.35	0.39	0.41	0.50	1	0.49	0.27	0.33	0.37	0.47	0.42	0.43	0.34	0.28	0.17	0.49	0.41
IBP	0.42	0.38	0.48	0.54	0.35	0.44	0.48	0.76	0.49	1	0.38	0.34	0.40	0.52	0.42	0.42	0.33	0.32	0.18	0.56	0.57
IMXI	0.27	0.24	0.27	0.32	0.24	0.32	0.31	0.33	0.27	0.38	1	0.28	0.25	0.28	0.28	0.29	0.23	0.21	0.12	0.27	0.32
KNSL	0.36	0.29	0.24	0.36	0.26	0.28	0.35	0.33	0.33	0.34	0.28	1	0.29	0.31	0.41	0.35	0.30	0.22	0.26	0.37	0.41
MEDP	0.38	0.38	0.40	0.35	0.30	0.31	0.33	0.41	0.37	0.40	0.25	0.29	1	0.43	0.30	0.41	0.31	0.30	0.29	0.42	0.45
MKSI	0.57	0.53	0.53	0.49	0.35	0.44	0.43	0.50	0.47	0.52	0.28	0.31	0.43	1	0.45	0.59	0.41	0.38	0.26	0.51	0.47
MMS	0.45	0.40	0.34	0.48	0.34	0.37	0.44	0.39	0.42	0.42	0.28	0.41	0.30	0.45	1	0.46	0.28	0.31	0.28	0.46	0.48
MSFT	0.75	0.74	0.49	0.37	0.37	0.35	0.35	0.44	0.43	0.42	0.29	0.35	0.41	0.59	0.46	1	0.46	0.46	0.37	0.47	0.52
PINS	0.46	0.44	0.36	0.30	0.25	0.29	0.25	0.35	0.34	0.33	0.23	0.30	0.31	0.41	0.28	0.46	1	0.29	0.19	0.32	0.33
QLYS	0.42	0.47	0.35	0.26	0.26	0.26	0.24	0.32	0.28	0.32	0.21	0.22	0.30	0.38	0.31	0.46	0.29	1	0.24	0.35	0.34
REGN	0.34	0.35	0.18	0.13	0.28	0.17	0.20	0.16	0.17	0.18	0.12	0.26	0.29	0.26	0.28	0.37	0.19	0.24	1	0.26	0.25
RPM	0.47	0.40	0.44	0.50	0.31	0.44	0.50	0.54	0.49	0.56	0.27	0.37	0.42	0.51	0.46	0.47	0.32	0.35	0.26	1	0.56
STAG	0.53	0.42	0.44	0.56	0.37	0.44	0.48	0.56	0.41	0.57	0.32	0.41	0.45	0.47	0.48	0.52	0.33	0.34	0.25	0.56	1

Lack of red shading indicates **low correlations** between most pairs of assets (much better!).

Preventing Over-Correlation



- Diversification guidelines are simple to implement and intended to reduce chance of correlated holdings in portfolio.
- Still, oversight is required to prevent owning securities with overlapping qualities.
- Common sense will dictate how correlated many companies are (such as those in same or related industries), but further examination can be more revealing.

33

Understanding Beta

34

Diversifying by Beta



- Beta is measure of volatility of returns.
 - Shows how closely stock's price tends to track broader market (S&P 500).
 - If $\beta = 1$, stock performs exactly in line with index.
 - If $\beta < 1$, stock swings less than market.
 - If $\beta > 1$, stock swings more than market.
 - If beta is negative, stock moves opposite of market.

35

Portfolio Beta



- Beta doesn't consider risks unique to individual assets or industries.
- Primarily used to assess overall market exposure of portfolio.
- myICLUB.com & StockCentral.com both report beta of portfolio holdings & weighted average of entire portfolio.
- Portfolio beta of 1.1 is rough target for long-term oriented stock portfolios.
 - Beta at or near 1.0 is likely not poised to perform in bull markets, which are "default" state of stock market.

36

myICLUB.com Portfolio Beta Report



Portfolio Beta



Portfolio Beta as of 4/30/2024 (generated on: 4/30/2024).

This report shows the beta (β) of each stock in the club portfolio, and the overall portfolio beta. Beta is a commonly-used measure of a security's volatility relative to the broader market.

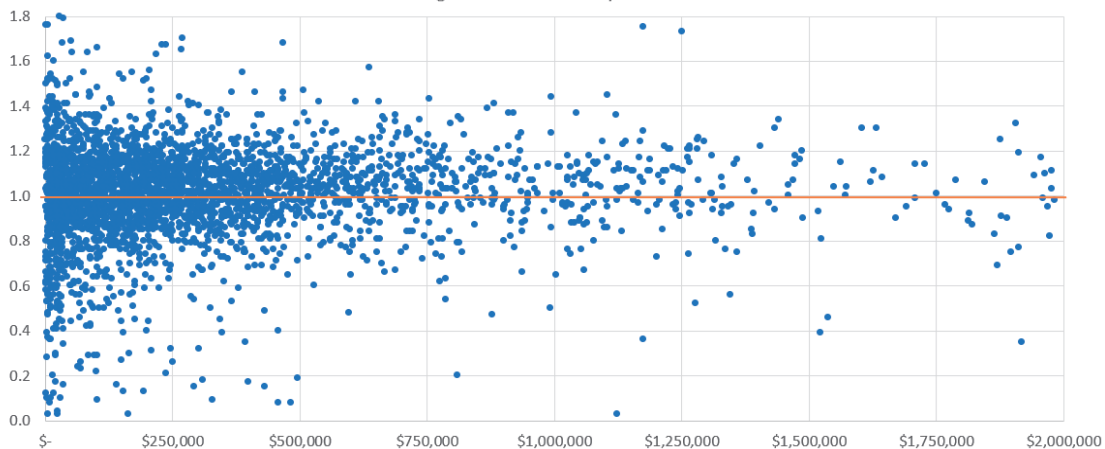
Weighted Average Portfolio Beta: 1.14

Ticker	Security	Shares owned	Price/share	Market value	% of Total	5-year Beta	Weighted Beta
AAPL	Apple	55.0	\$173.50	\$9,542.50	2.3%	1.20	0.03
ADBE	Adobe	21.0	\$473.07	\$9,934.47	2.4%	1.56	0.04
ALGN	Align Technology	48.0	\$304.82	\$14,631.36	3.5%	1.95	0.07
AX	Axos Financial	543.0	\$51.59	\$28,013.37	6.7%	1.21	0.08
CPRX	Catalyst Pharmaceuti	869.0	\$15.23	\$13,234.87	3.2%	0.89	0.03
DAR	Darling Ingredients	344.0	\$44.21	\$15,208.24	3.7%	1.27	0.05
DE	Deere & Co.	45.0	\$400.96	\$18,043.20	4.3%	0.99	0.04

Too Many Investment Clubs Favor Low-Beta Stocks



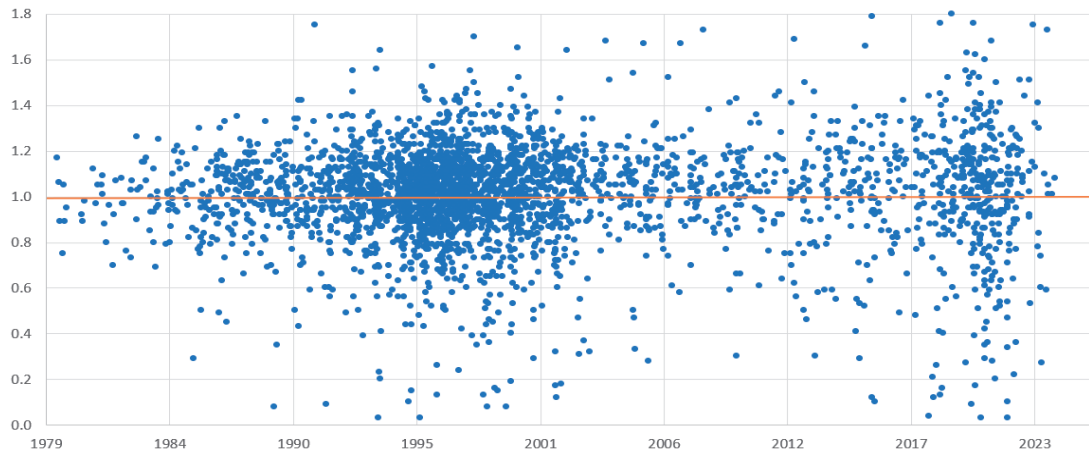
Weighted Portfolio Beta by Size of Club



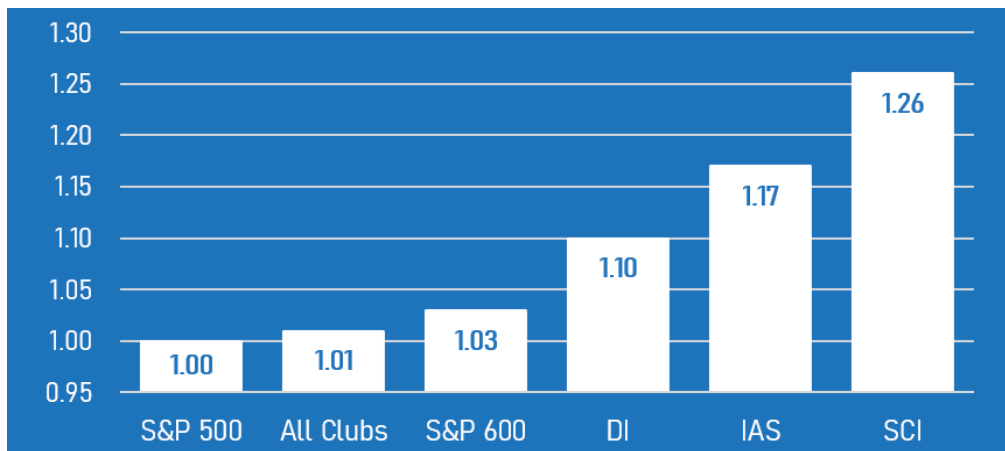
Too Many Investment Clubs Favor Low-Beta Stocks



Weighted Portfolio Beta by Age of Club



Equity Beta of Clubs & ERS Newsletters



40

As of May/June 2024.

Attaining Better Beta



- BI's stock selection tools & diversification guidelines are intended to reduce chances of building portfolio with too much or too little risk.
 - Small & large companies, stocks from different sectors & industries can carry different levels of beta
 - Well-diversified portfolios can thus include securities with both high & low betas, which helps in diversification & is not issue itself.
- However, security betas can change over time, & so regular monitoring is good idea.

41

Diversifying by Company Size

42

Diversify by Company Size



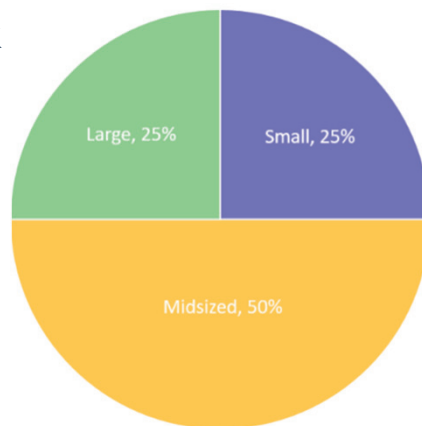
- **Hold stocks of different company size or market cap.**
 - BetterInvesting recommends using trailing twelve-month (TTM) revenues to define company size instead of market cap.
 - Midsized companies have TTM revs between \$1B and \$10B.
- Market tends to swing in preference for large vs small companies.
- Holding companies of all sizes allows for capturing upside while providing floor to downside.

43

Company Size Diversification



- BI recommends stock portfolios include:
 - 25% small companies.
 - 50% mid companies.
 - 25% large companies.



Size is determined by a company's annual revenues:

- * **Micro** < \$100M
- * **Small** between \$100M & \$1B
- * **Midsized** between \$1B & \$10B
- * **Large** between \$10B & \$50B
- * **Mega** > \$50B

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44

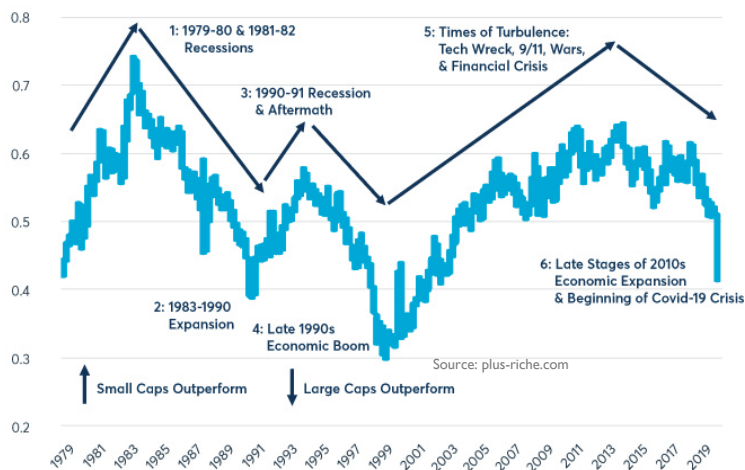
Characteristics of Small/Medium/Large



- Small companies: higher risk & volatility, but higher returns.
- Large companies: lower risk & volatility, but typically “steadier” returns.
- Medium companies: less risk & volatility than small companies, higher returns than large companies.
- Mix together in large pot for delicious results!

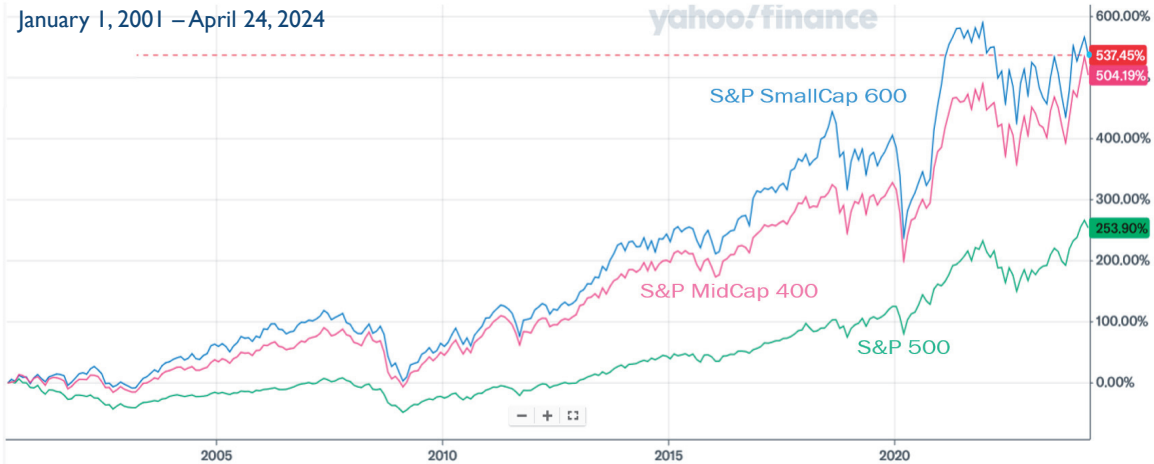
45

Russell 2000 vs S&P 500 Non-Correlation



- Market sees long stretches when small & large caps outperform.

Mid & Small Outpace Large over Long-Term



Different Characteristics of Small vs Large



- Small vs. large stocks tend to have significant levels of non-correlation which can help with portfolio risk.
- Stocks of different size companies tend to carry different typical/average betas.
- Understanding risk levels in portfolio can improve decisionmaking.

Diversifying by Sector/Industry

49

Diversify by Sector



- **BI recommends owning stocks from different sectors**
- Each sector has different characteristics, especially as applies to economic conditions.
- Some sectors are sensitive to recessions & expansions, while others are defensive.
- Holding some sectors that are cyclical & some that are defensive

50

Sector Diversification Recommendations



- Include all 3 super sectors (Defensive, Sensitive, Cyclical)
- Minimum exposure to any super sector 15-20%, maximum 50%.
- Include at least 8 sectors.
- Each company should be in different industry group.

51

Three Super Sectors



1. Defensive Super Sector:

- Healthcare
- Consumer Defensive
- Utilities *

2. Sensitive Super Sector:

- Communication Services
- Energy *
- Industrials
- Technology

3. Cyclical Super Sector:

- Basic Materials
- Consumer Cyclical
- Financial Services
- Real Estate

* All but Utilities & Energy stocks are suitable for SSG analysis.

52

S&P 500 Sector Annual Returns 1990-2018

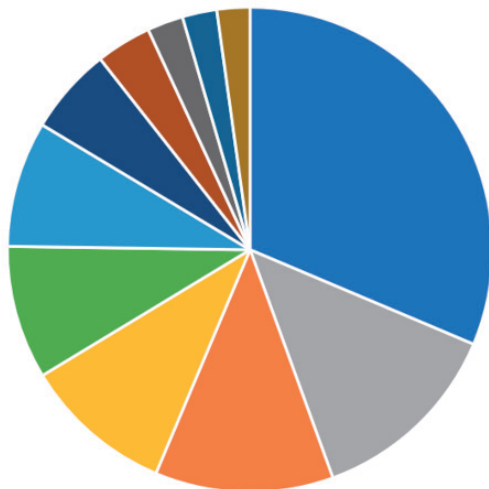


Year	Comm Svcs*	Cons. Disc.	Cons. Staples	Energy	Financials	Health Care	Industrials	Materials	Technology	Utilities	S&P 500
1990	-14.34	-12.25	15.29	2.81	-21.28	17.21	-7.63	-10.69	3.02	-0.63	-3.18
1991	12.48	41.50	41.57	6.80	48.52	53.68	29.50	25.48	9.10	23.89	30.40
1992	15.43	19.72	5.31	2.27	23.28	-16.17	9.50	10.24	2.85	6.64	7.62
1993	14.34	14.64	-3.86	15.87	10.59	-8.19	18.56	13.45	21.70	13.63	10.07
1994	-5.33	-8.34	9.78	3.74	-3.52	13.81	-2.43	5.76	19.95	-11.76	1.31
1995	42.32	20.34	39.62	30.90	53.86	57.98	39.04	19.99	39.45	32.76	37.54
1996	1.05	12.38	25.90	25.79	34.97	21.01	25.05	15.82	43.87	5.68	22.91
1997	41.25	34.34	32.87	25.21	47.97	43.72	26.97	8.42	28.56	24.68	33.32
1998	52.38	41.13	15.77	0.57	11.35	43.86	10.85	-6.21	78.14	14.84	28.55
1999	19.13	25.18	-15.09	18.68	4.13	-10.66	21.49	25.25	78.74	-9.18	21.04
2000	-38.76	-20.00	16.95	15.66	25.71	37.05	5.88	-15.73	-40.90	57.23	-9.10
2001	-12.24	2.78	-6.42	-10.45	-8.94	-11.96	-5.74	3.40	-25.87	-30.40	-11.89
2002	-34.11	-23.82	-4.17	-11.19	-14.64	-18.82	-26.35	-5.45	-37.41	-29.99	-22.10
2003	6.82	37.41	-1.57	25.63	31.03	15.06	32.18	38.19	47.21	26.20	28.66
2004	19.85	13.23	8.16	31.54	10.89	1.67	18.00	13.20	2.54	24.28	10.88
2005	-5.63	-6.36	3.58	31.36	6.47	6.46	2.30	4.39	0.99	16.83	4.91
2006	36.81	18.64	14.36	24.20	19.19	7.53	13.25	18.22	8.42	20.99	15.78
2007	11.94	-13.21	14.18	35.32	-18.64	7.15	12.00	22.37	16.31	19.38	5.57
2008	-30.49	-33.49	-15.44	-34.87	-55.32	-22.81	-39.92	-45.68	-43.14	-28.98	-37.00
2009	8.93	41.30	14.89	13.78	17.15	19.70	20.93	48.58	61.72	11.91	26.45
2010	18.96	27.66	14.11	20.42	12.13	2.90	26.73	22.20	10.18	5.46	15.06
2011	6.27	6.13	13.99	4.70	-17.06	12.73	-0.61	-9.75	2.40	19.93	2.11
2012	18.31	23.92	10.76	4.59	28.75	17.89	15.32	14.97	14.82	1.29	15.99
2013	11.47	43.08	26.14	25.05	35.59	41.46	40.64	25.60	28.42	13.21	32.37
2014	2.99	9.68	15.98	-7.79	15.18	25.34	9.80	6.91	20.11	28.98	13.68
2015	3.40	10.11	6.60	-21.12	-1.56	6.89	-2.56	-8.38	5.92	-4.84	1.37
2016	23.49	6.03	5.38	27.36	22.75	-2.69	18.85	16.69	13.85	16.29	11.95
2017	-1.25	22.98	13.49	-1.01	22.14	22.08	21.01	23.84	38.83	12.11	21.82
2018	-9.12	5.28	-2.22	-7.79	-3.72	10.75	-6.28	-9.73	4.00	5.50	1.23

- Every sector has under- & out-performed broader market at some point in this 28 year period.

Source: bespoke premium.com

Sector Weighting of S&P 500



- Information Technology, 31.4%
- Financials, 13.1%
- Health Care, 11.9%
- Consumer Discretionary, 10%
- Communication Services, 8.9%
- Industrials, 8.4%
- Consumer Staples, 5.8%
- Energy, 3.7%
- Utilities, 2.4%
- Real Estate, 2.3%
- Materials, 2.2%



The weightings for each sector of the index are rounded to the nearest tenth of a percent; therefore, the aggregate weights for the index may not equal 100%. Based on GICS® sectors as of Jul 31, 2024.

Diversify by Industry



- **Hold stocks from different industries.**
- Like with sectors, portfolios should include broad swath of industries.
 - 11 sectors are broken down into 148 industries.
- Companies often operate in many industries, industries overlap with other industries.
- Consider primary area of operations of each business when reviewing industries.

55

Average Betas by Selected Industries



Industry Name	Beta	Industry Name	Beta
Banks (Regional)	0.46	Chemical (Basic)	1.10
Retail (Grocery and Food)	0.49	Brokerage & Investment Banking	1.12
Utility (General)	0.58	Drugs (Biotechnology)	1.12
Beverage (Soft)	0.76	Beverage (Alcoholic)	1.13
Telecom. Services	0.78	Computers/Peripherals	1.13
Household Products	0.84	Restaurant/Dining	1.19
Precious Metals	0.87	Apparel	1.19
Information Services	0.93	Cable TV	1.28
Electronics (General)	0.93	Electronics (Consumer & Office)	1.30
Entertainment	0.99	Building Materials	1.32
Computer Services	1.00	Homebuilding	1.37
Drugs (Pharmaceutical)	1.03	Semiconductor	1.50
R.E.I.T.	1.03	Semiconductor Equip	1.53
Healthcare Products	1.06	Software (Internet)	1.62
Aerospace/Defense	1.08		

Source: https://pages.stern.nyu.edu/~adamodar/New_Home_Page/datafile/Betas.html

Sector/Industry Characteristics



- Stocks from an industry or sector may correlate with each other, but will often be less correlated with stocks from other industries/sectors.
- Betas may also be significantly different,
- Can think of diversifying by industry/sector as “diversifying by beta.”

57

Concentration vs. Diversification

58

How Many Holdings in a Diversified Portfolio?



- Retirement plans may only need 4-5 ETFs/index funds for cost-effective diversified portfolio.
- In stock portfolio, 20-30 stocks may be required.
 - Too few & diversification can't be achieved.
 - Too many & portfolio returns tend to regress to market's mean returns.

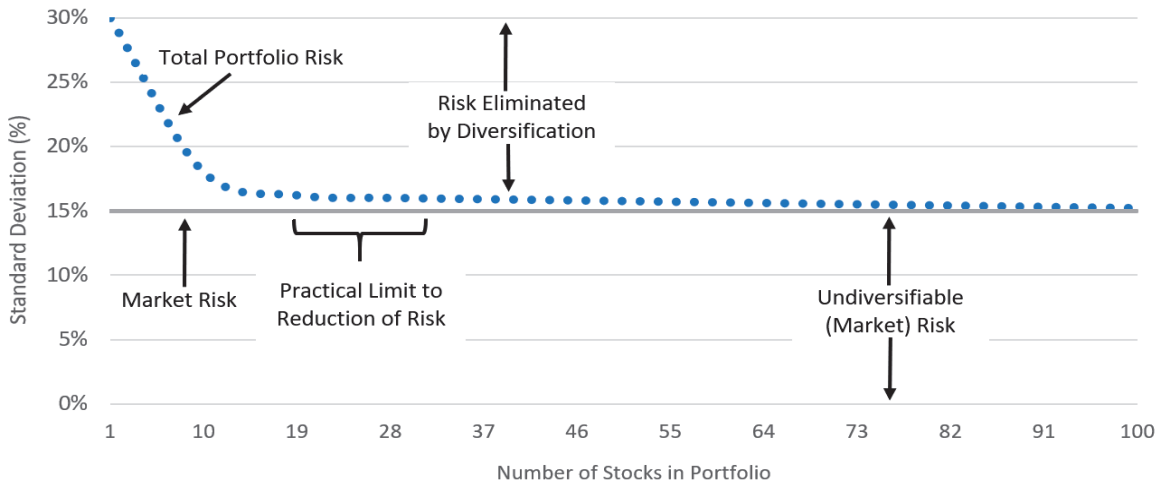
59

Too Many Stocks Turns Portfolio into Index



- After ~30 large stocks added to portfolio, returns more unlikely to exceed market average.
 - Thus these portfolios function like index fund or ETF.
- Due to cost & complication of managing stock portfolio, investors with 50-stock portfolios would be better off simply owning index ETF or fund.
- Best-performing mutual funds often hold as few as 50 stocks.
 - Management is able to execute strategy efficiently & without deviation in smaller number of securities.

Total Portfolio Risk as Function of # of Stocks



Guidelines for Number of Companies



- No holding (& thus industry) <3% of total portfolio value.
 - These aren't contributing to returns or diversification.
- No holding >1.5x or 2.0x of value of any security in equally-weighted portfolio.
 - Example: Each stock in equally-weighted portfolio of 20 stocks = 5.0%, so max of any single holding is 7.5% - 10.0%.
 - Any holding approaching 25% is dangerously overweighted.

Final Thoughts

63

Lather, Rinse & Repeat



- Portfolio management to maintain targeted diversification is ongoing task.
- Once (if) target is reached, chances are good that big price move of single holding (up or down) will turn everything upside down.
- Also, small & midsize companies will grow to be midsize & large companies, requiring constant search for smaller companies.

64

Final Tips



- **Understanding framework behind portfolio diversification guidelines can help improve decisions.**
 - May be possible to approach diversification targets from new perspectives with knowledge of correlation, beta, & concentration.
- **Don't sweat the details.**
 - Managing diversification in broad swaths is perfectly fine.
- **Ignore diversification at your own peril.**
 - Tech stocks were big in 1990s, but the crash of 2001 decimated investors who were overloaded in tech.

65



Questions?

66

Thank You!



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