WELCOME TO CDIAC'S PUBLIC FUNDS INVESTING WORKSHOP

CDIAC

CALIFORNIA DEBT AND INVESTMENT ADVISORY COMMISSION

PRESENTER:
KEVIN WEBB, CFA
PRINCIPAL, PIPER JAFFRAY

NOVEMBER 18, 19, 20, 2019

HOUSEKEEPING

Breaks & Facilities

Spreadsheets and Slides Online

Free Guest WiFi

Evaluation

WHO IS CDIAC?

CDIAC

CALIFORNIA
DEBT AND
INVESTMENT
ADVISORY
COMMISSION

Commission in the State Treasurer's Office founded in 1981.

Clearinghouse for public debt issuance information.

Assists state and local agencies with monitoring, issuance, and management of public debt.

Mission expanded to cover public investments in 1996.

More Information [online](#).

UNITS WITHIN CDIAC

RESEARCH

Examines issues of current interest to public debt management and investment professionals resulting in guidance and recommendations.

EDUCATION

Organizes educational seminars and webinars for public finance officials on public debt management and the investment of public funds both solely and in collaboration with allied organizations.

DATA

Has compiled data on CA public debt issuance since 1982. Processes more than 12,000 debt issuance reports annually. Much of the data provided on these reports are available on DebtWatch and is used in the development CDIAC's monthly newsletter, *Debt Line*.

RESEARCH PUBLICATIONS

All Available Online
Treasurer.ca.gov/cdiac/publications.asp

Popular and Recent Publications:
- *Investment Primer*
- *Debt Financing Guide*
- *Local Agency Investment Guidelines (LAIG)*
- *Socially Responsible Investing - What Does It Mean and What's the Risk?*

CALIFORNIA PUBLIC FUND
INVESTMENT PRIMER

CALIFORNIA DEBT AND INVESTMENT ADV...
UPDATED DECEMBER 2009 • CD...

SOCIALLY RESPONSIBLE INVESTING – WHAT DOES IT MEAN AND WHAT'S THE RISK?
CALIFORNIA DEBT AND INVESTMENT ADVISORY COMMISSION | CDIAC NO. 19.14

EDUCATION OPPORTUNITIES

Socially Responsible Investing: Integration in the Local Agency Portfolio
Webinar | December 10, 2019 | 10:00 – 11:30 AM PST

CMTA/CDIAC Advanced Public Funds Investing
January 15-16, 2020 | Claremont

Municipal Market Disclosure
March 3, 2020 | Irvine

**For more information, registration, and archives visit:
Treasurer.ca.gov/CDIAC/Seminars**

AUDIENCE INTRODUCTION

1. Organize yourselves into groups of 3-4 people
2. Take a couple minutes to answer the questions on your card then turn the card in.
3. We will recap everyone's responses as a group after the next activity.

AUDIENCE INTRODUCTION

In your groups, on a scratch piece of paper, take 3 minutes to identify the celebrity by their childhood photo.

SPEAKER INTRODUCTION

Kevin Webb, CFA

Principal

Piper Jaffray

With over a decade of experience, Mr. Webb has been a guest lecturer and speaker at several fixed-income workshops and conferences. He holds dual degrees in computer science and finance, a Master of Business Administration, and the Chartered Financial Analyst (CFA) designation. Mr. Webb is a member of the CFA Institute, and Global Association of Risk Professionals.

Understanding & Managing Risk

Kevin Webb, CFA
kevin.p.webb@pjc.com

Philosophy, Strategy & Tactics

Where Does this Fit?
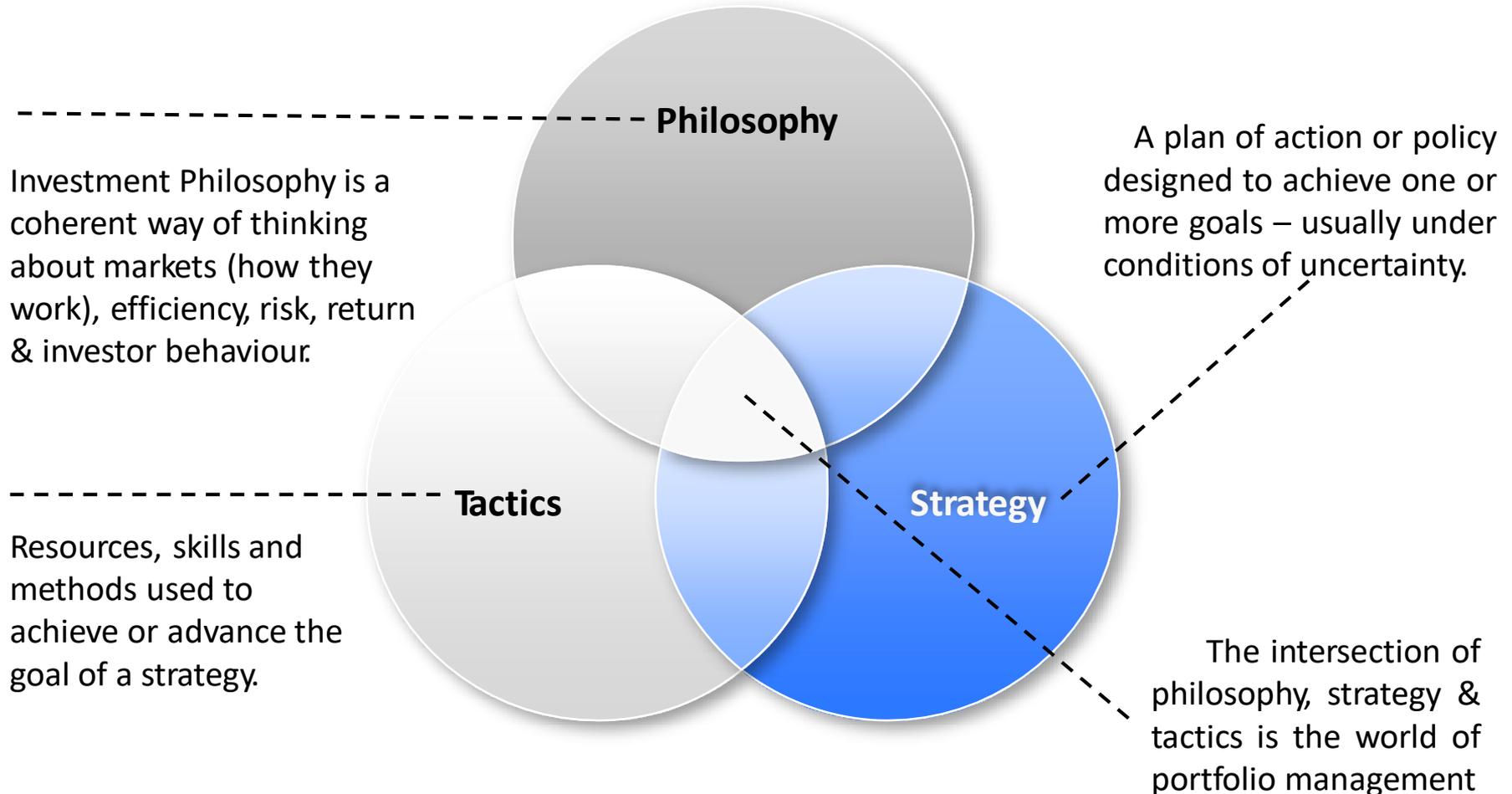
Investment Philosophy is a coherent way of thinking about markets (how they work), efficiency, risk, return & investor behaviour.

A plan of action or policy designed to achieve one or more goals – usually under conditions of uncertainty.

Resources, skills and methods used to achieve or advance the goal of a strategy.

Philosophy

Tactics

Strategy

The intersection of philosophy, strategy & tactics is the world of portfolio management

The difference between strategy and tactics: Strategy is done above the shoulders, Tactics are done below the shoulders

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Session Outline

(1)   What is Risk?
(2)   Interest Rate Risk
    (i)   Time Value of Money Circle of Life
    (ii)   Yield$\longleftrightarrow$Duration are Linked
    (iii)   Interest Rate Changes & Gains/Losses
(3)   Credit Risk
    (i)   The Letters
    (ii)   Default Rates & Transition Matrices
    (iii)   Composite Ratings – Letters & Numbers
    (iv)   A Digression on Credit Ratings
(4)   Reinvestment Risk
(5)   Total Risk

What is risk?

"The revolutionary idea that defines the boundary between modern times and the past is the mastery of risk: the notion that the future is more than a whim of the gods and that men and women are not passive before nature. (1)"
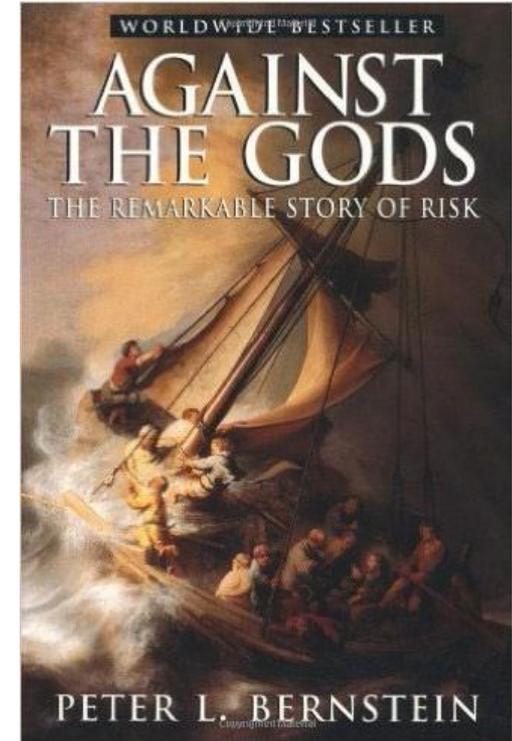
"Risk means more things can happen than will happen. The range of future outcomes is the impenetrable mystery all investors must face. Investors must shape all portfolio decisions around that simple but powerful truth. If we do not know the future, decision errors and surprises are inevitable. As a result, managing investment portfolios is ultimately about managing risk, or preparing for uncertainty and unexpected outcomes." (2)
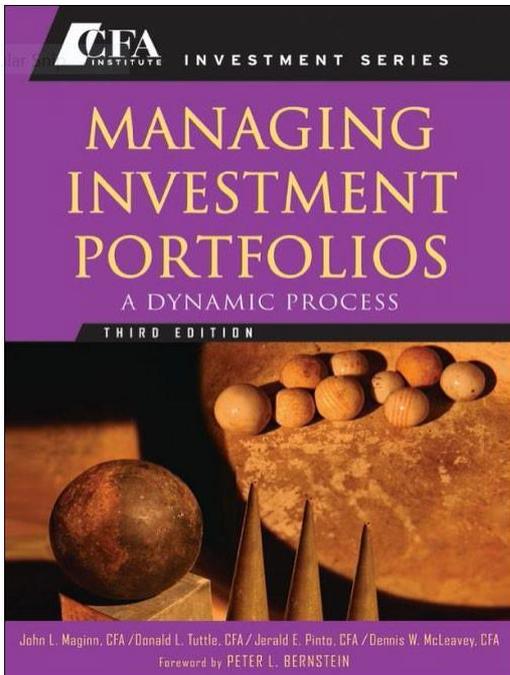
1.Peter L. Bernstein. Against the Gods: The Remarkable Story of Risk (Kindle Locations 51-52). Kindle Edition.
2.Managing Investment Portfolios: A Dynamic Process (CFA Institute Investment Series – Kindle Location 179) . Wiley. Kindle Edition.

Uncertainty versus Risk

"But Uncertainty must be taken in a sense radically distinct from the familiar notion of Risk, from which it has never been properly separated." (1)
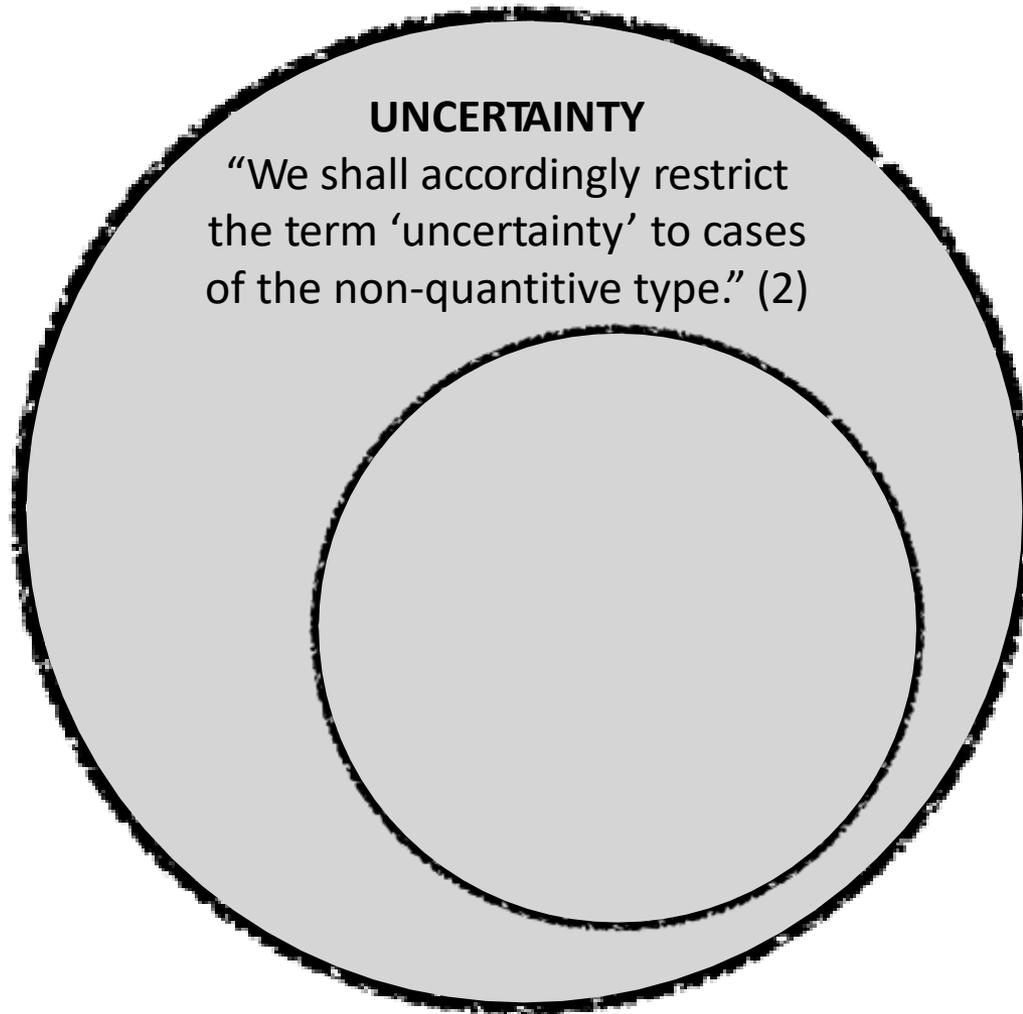
UNCERTAINTY
"We shall accordingly restrict the term 'uncertainty' to cases of the non-quantitive type." (2)

"You want a valve that doesn't leak and you try everything possible to develop one. But the real world provides you with a leaky valve. You have to determine how much leaking you can tolerate." (4)

(1), (2) & (3) Knight, Frank H.. Risk, Uncertainty, and Profit (Illustrated) (Kindle Locations 433-442). Evergreen Books. Kindle Edition.
(4) Peter L. Bernstein. Against the Gods: The Remarkable Story of Risk (Kindle Locations 69-71). Kindle Edition.
Read the full obituary of Arthur Rudolph here.

Session Outline

(1)   What is Risk?

(2)   **Interest Rate Risk**
    (i)   Time Value of Money Circle of Life
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    (i)   The Letters
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(5)   Total Risk

# Time Value of Money Circle of Life

Compounding

Present Value
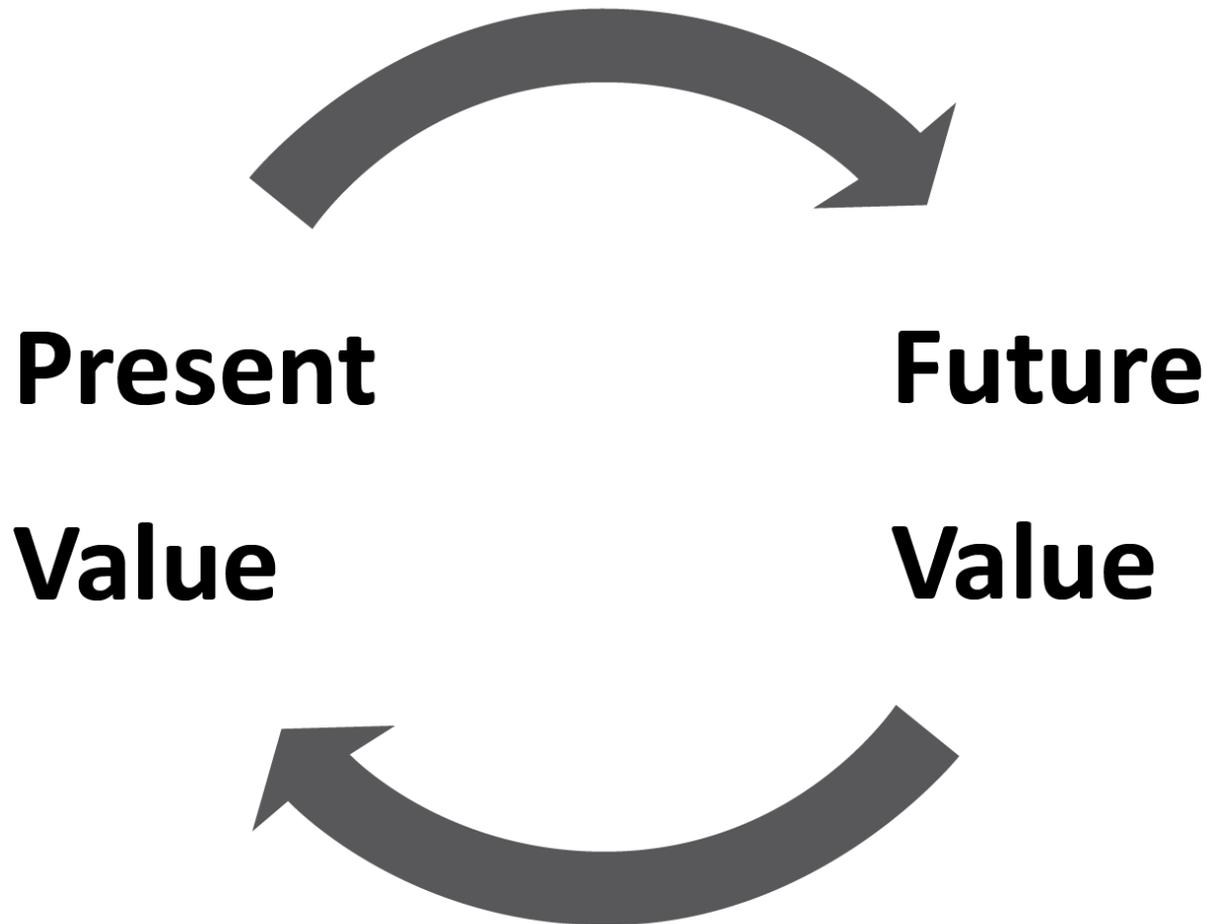
Future Value

Discounting

Time Value of Money Circle of Life

$$FV = PV*(1+i)^n$$

Compounding

Present

Value

Discounting

Future

Value

"Evaluating financial transactions requires valuing uncertain future cash flows; that is, determining what uncertain cash flows are worth at different points in time." …

"Moving money through time—that is, finding the equivalent value to money at different points in time—involves translating values from one period to another. Translating money from one period involves interest, which is how the time value of money and risk enter into the process." …

"Interest is the compensation for the opportunity cost of funds and the uncertainty of repayment of the amount borrowed; that is, it represents both the price of time and the price of risk. The price of time is compensation for the opportunity cost of funds— what someone could have done with the money elsewhere—and the price of risk is compensation for bearing risk. That is, the riskier the investment, the higher the interest rate."
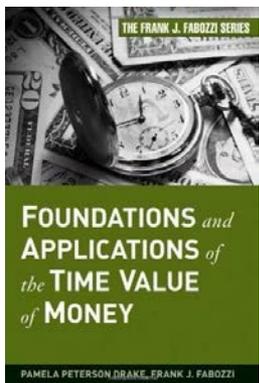
Peterson Drake, Pamela; Fabozzi, Frank J.. Foundations and Applications of the Time Value of Money (Frank J. Fabozzi Series) (Kindle Locations 286-293). Wiley. Kindle Edition.

Time Value of Money Math

$$FV = PV*(1+i)\wedge n$$

This "basic valuation equation is the foundation of all the financial mathematics that involves compounding, and <mark>if you understand this equation, you understand most everything in financial mathematics</mark>: where: FV = the future value PV = the present value i = the rate of interest n = is the number of compounding periods"

Peterson Drake, Pamela; Fabozzi, Frank J. (2009-07-30). Foundations and Applications of the Time Value of Money (Frank J. Fabozzi Series) (Kindle Locations 316-318). Wiley. Kindle Edition.

Time Value of Money Circle of Life & Math

Compounding
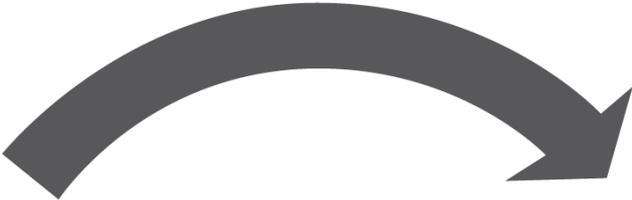
Present Value

Future Value

PV= FV / (1+i)^n   i = (FV/PV)^(1/n)-1   FV = PV*(1+i)^n

Discounting

i = Yield = IRR = Required Rate of Return = etc…

$$i = (FV/PV)^{(1/n)} - 1$$

INTEREST 1. cost of using money, expressed as a rate per period of time, usually one year, in which case it is called an annual rate of interest. (1)

REQUIRED RATE OF RETURN return required by investors before they will commit money to an investment at a given level of risk. Unless the expected return exceeds the required return, an investment is unacceptable. See also HURDLE RATE; INTERNAL RATE OF RETURN; MEAN RETURN. (2)

INTERNAL RATE OF RETURN (IRR) discount rate at which the present value of the future cash flows of an investment equal the cost of the investment. When the net present values of cash outflows (the cost of the investment) and cash inflows (returns on the investment) equal zero, the rate of discount being used is the IRR. When IRR is greater than the required return-called the hurdle rate in capital budgeting-the the investment is acceptable. (3)
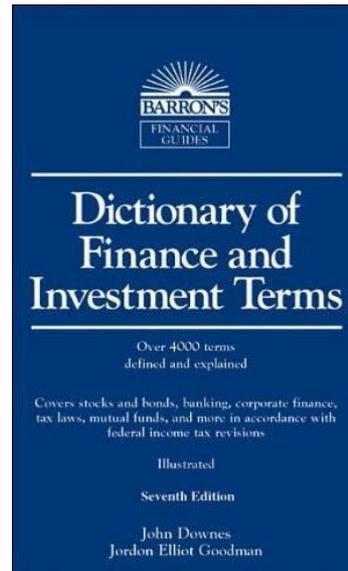
YIELD TO MATURITY (YTM) concept used to determine the rate of return an investor will receive if a long-term, interest-bearing investment, such as a bond, is held to its MATURITY DATE. It takes into account purchase price, REDEMPTION value, time to maturity, COUPON yield, and the time between interest payments. Recognizing time value of money, it is the DISCOUNT RATE at which the PRESENT VALUE of all future payments would equal the present price of the bond, also known as INTERNAL RATE OF RETURN. It is implicitly assumed that coupons are reinvested at the YTM rate. YTM can be approximated using a bond value table (also called a bond yield table) or can be determined using a programmable calculator equipped for bond mathematics calculations. ***See also DURATION***; HORIZON ANALYSIS; YIELD TO AVERAGE LIFE, YIELD TO CALL.

YIELD TO WORST bond yield assuming worst-case scenario, that is, earliest redemption possible under terms of the INDENTURE. See also YIELD TO CALL; YIELD TO MATURITY. (4)

1. John Downes;Jordan Elliot Goodman. Dictionary of Finance and Investment Terms (Barron's Financial Guides) (Kindle Locations 4807-4808). Kindle Edition.
2. John Downes;Jordan Elliot Goodman. Dictionary of Finance and Investment Terms (Barron's Financial Guides) (Kindle Locations 8221-8222). Kindle Edition.
3. John Downes;Jordan Elliot Goodman. Dictionary of Finance and Investment Terms (Barron's Financial Guides) (Kindle Locations 4849-4852). Kindle Edition.
4. John Downes;Jordan Elliot Goodman. Dictionary of Finance and Investment Terms (Barron's Financial Guides) (Kindle Locations 11433-11438). Kindle Edition.

Duration Basics: The Price/Yield Relationship

DURATION concept first developed by Frederick Macaulay in 1938 that measures bond price VOLATILITY by measuring the "length" of a bond. It is a weighted-average term-to-maturity of the bond's cash flows, the weights being the present value of each cash flow as a percentage of the bond's full price. A Salomon Smith Barney study compared it to a series of tin cans equally spaced on a seesaw. The size of each can represents the cash flow due, the contents of each can represent the present values of those cash flows, and the intervals between them represent the payment periods. Duration is the distance to the fulcrum that would balance the seesaw. The duration of a zero- coupon security would thus equal its maturity because all the cash flows-all the weights-are at the other end of the seesaw. The greater the duration of a bond, the greater its percentage volatility. In general, duration rises with maturity, falls with the frequency of coupon payments, and falls as the yield rises (the higher yield reduces the present values of the cash flows.) Duration (the term modified duration is used in the strict sense because of modifications to Macaulay's formulation) as a measure of percentage of volatility is valid only for small changes in yield. ***For working purposes, duration can be defined as the approximate percentage change in price for a 100-basis-point change in yield.*** A duration of 5, for example, means the price of the bond will change by approximately 5% for a 100-basis point change in yield.

Price / Yield Relationship

Holding a bonds Maturity and Coupon Constant:
When Yields Rise, Prices Fall

When Yields Fall, Prices Rise

John Downes;Jordan Elliot Goodman. Dictionary of Finance and Investment Terms (Barron's Financial Guides) (Kindle Locations 2787-2795). Kindle Edition.
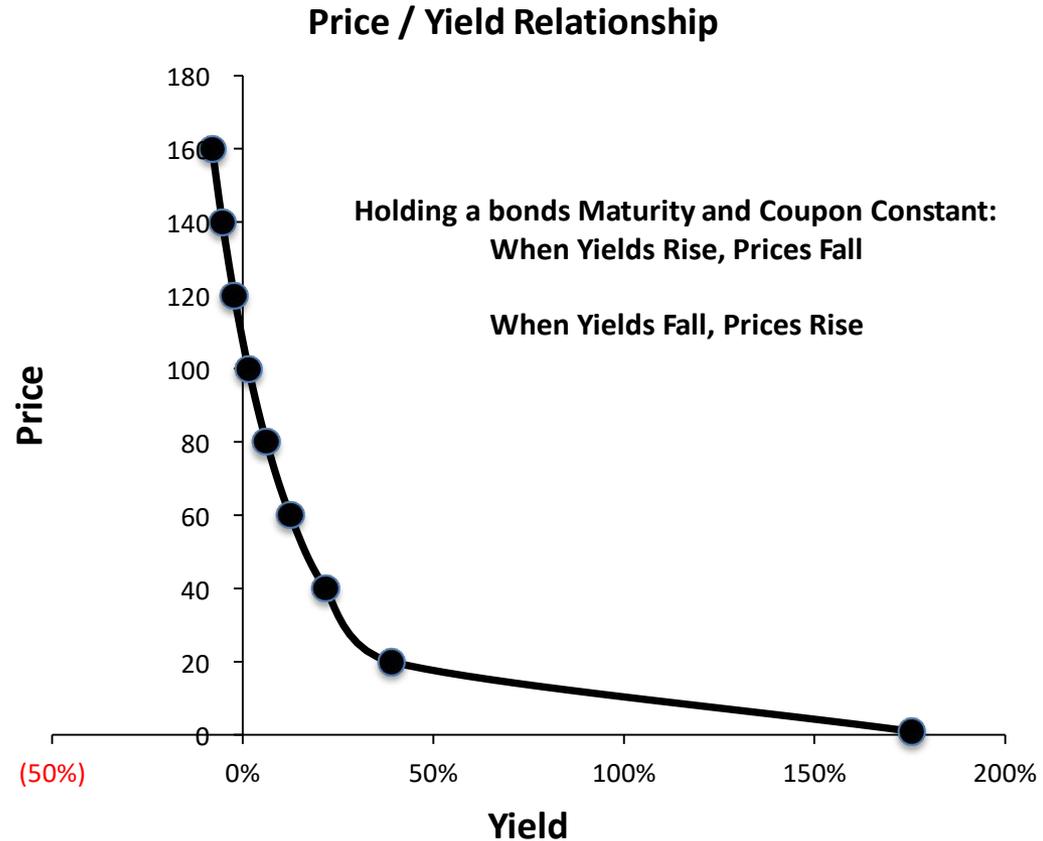
Duration Depends on Yield

Settlement:	12/31/2015
Maturity:	12/31/2020
Par Amount:	1,000,000.00
Price:	98.761
Coupon:	1.500%
Payment Frequency:	2
Yield:	1.760%
Modified Duration:	4.792
Convexity:	0.258

$$Price = \frac{Total\ Present\ Value}{Par\ Amount}$$

$$Present\ Value = \frac{Cash\ Flow}{(1 + Yield\ /\ Frequency)^{Period}}$$

Cash Flow = Par*(Coupon / Frequency)

Time Period	Cash Flow	Present Value
1	7,500.00	7,434.58
2	7,500.00	7,369.72
3	7,500.00	7,305.43
4	7,500.00	7,241.71
5	7,500.00	7,178.54
6	7,500.00	7,115.92
7	7,500.00	7,053.84
8	7,500.00	6,992.31
9	7,500.00	6,931.31
10	1,007,500.00	922,984.31
Total	1,075,000.00	987,607.67

PRICE is expressed as a percentage of face value. Thus a bond quoted at 98.761 has a dollar price of $987,607.67, which is 98.760767% of $1,000,000.

YIELD is simply a bond's internal rate of return. Specifically, the yield to maturity is the interest rate that will make the present value of the bond's cash flows equal to its market price plus accrued interest (i.e., the full price).

"There is a which-comes-first aspect to bond prices and yields: Do prices drive yields, or do yields drive prices? If we know an investor's required rate of return for a particular bond, we can calculate the bond price. If instead we observe the price, we can calculate the yield to maturity and thereby infer the required rate of return."

Smith, Donald J. (2011-07-05). Bond Math: The Theory Behind the Formulas (Wiley Finance) (Kindle Locations 1033-1035). Wiley. Kindle Edition.

# Duration Approximates Price/Yield Relationship

Price / Yield Relationship
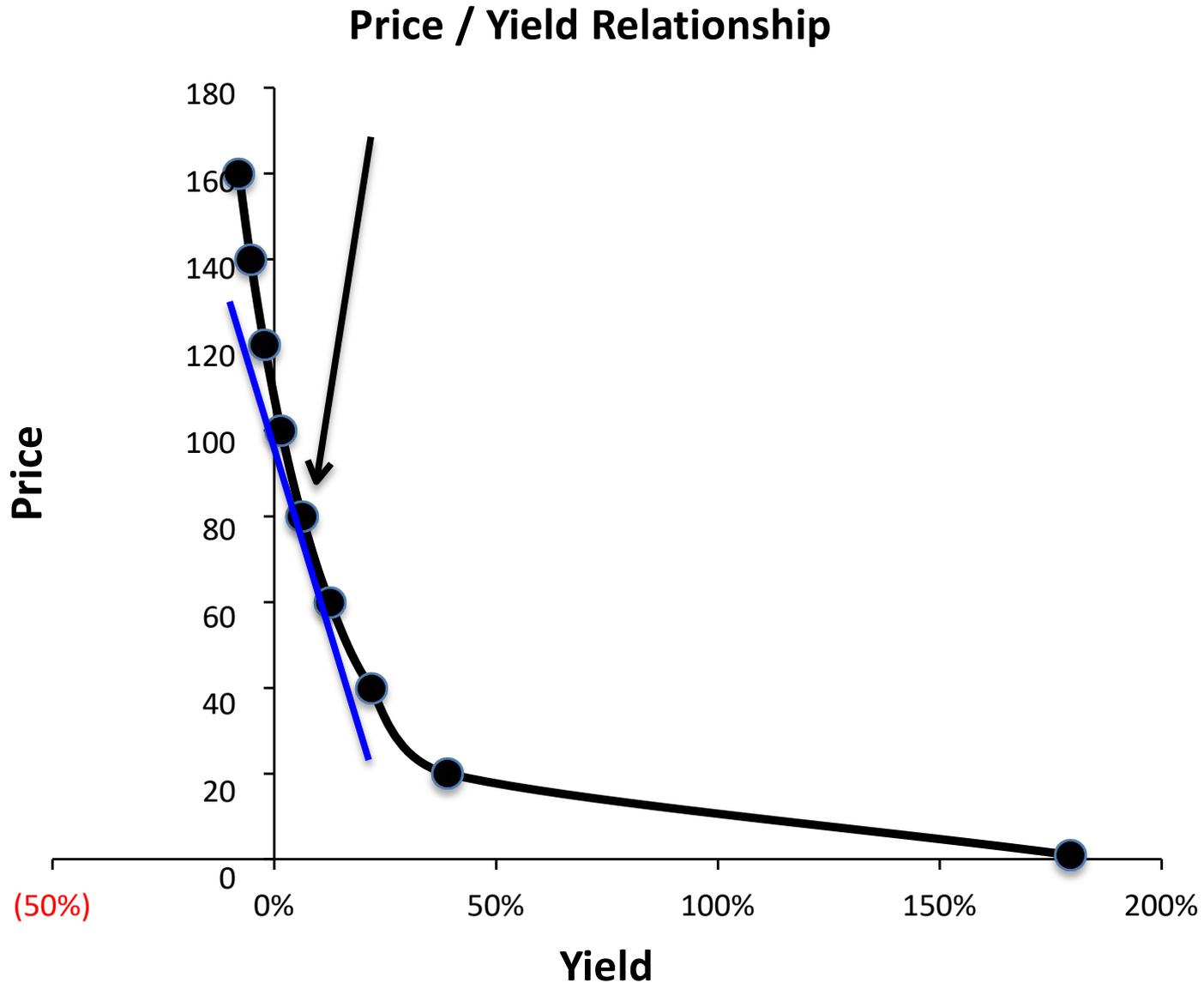
Duration ↑ as Final Maturity ↑

**Duration Rises as Maturity Increases**
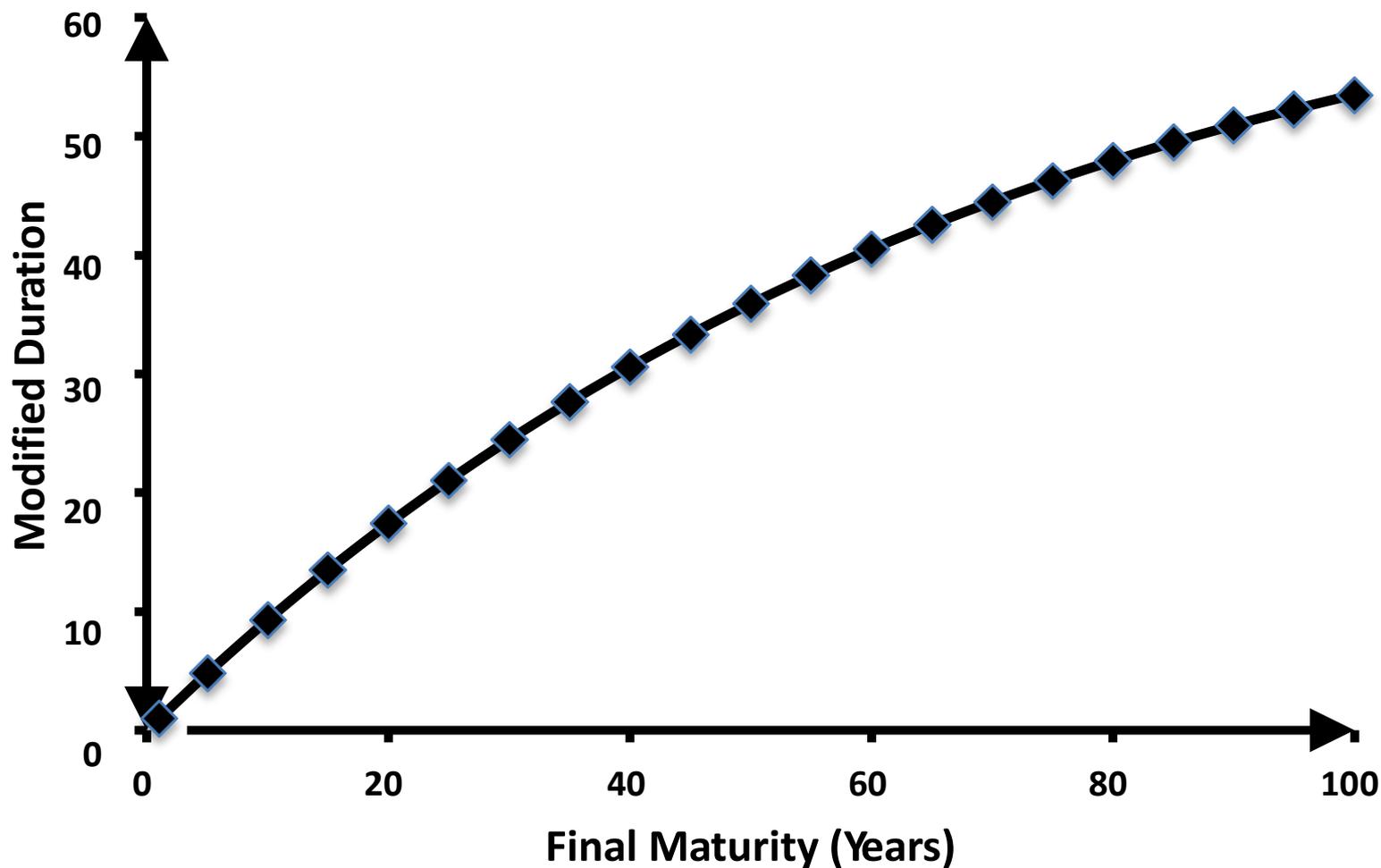
Duration↓ as Coupon Rate ↑

Duration Falls as Coupon Rate Increases
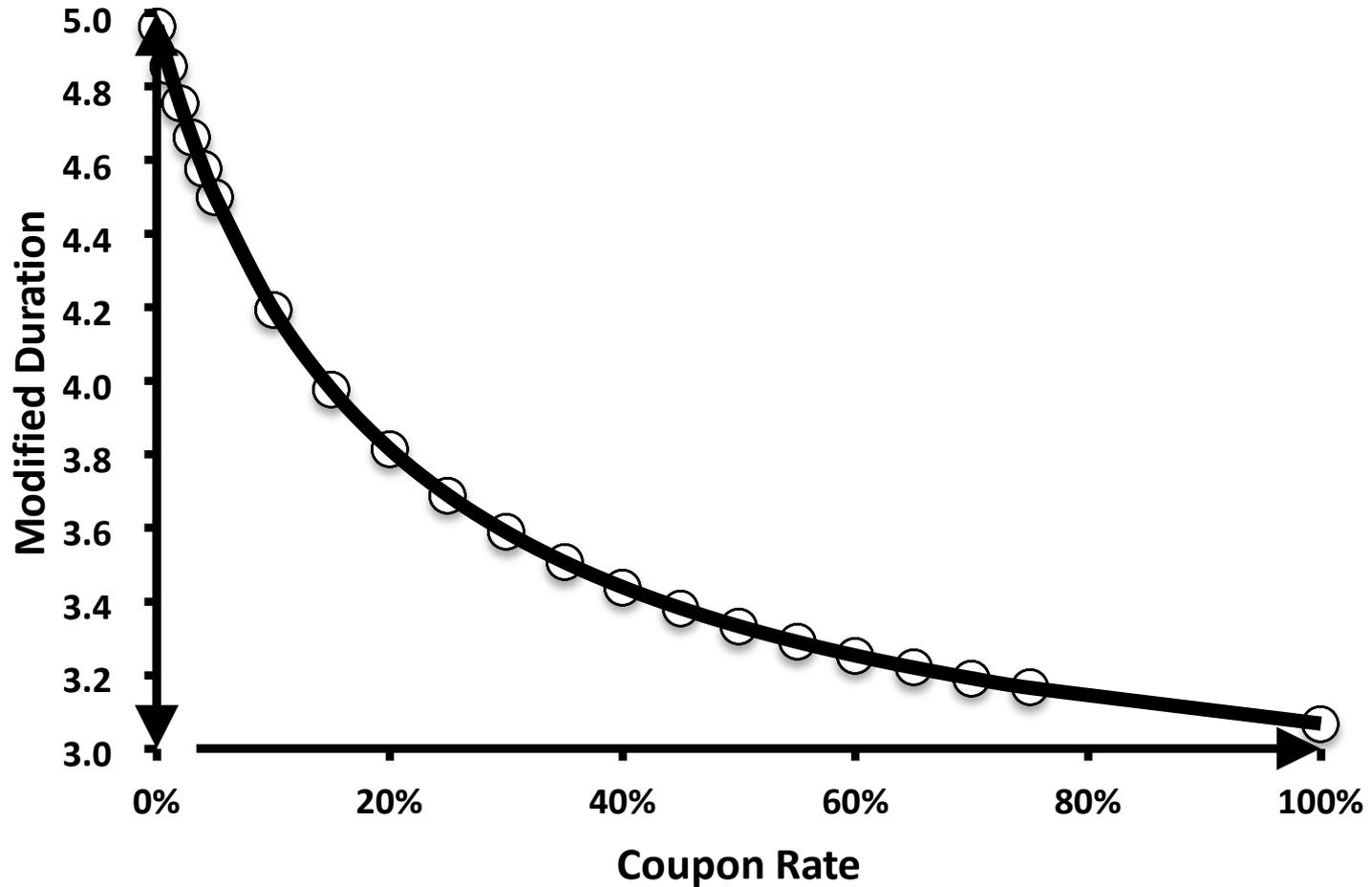
Duration↓ as Yield ↑

Duration Falls as Yields Rise
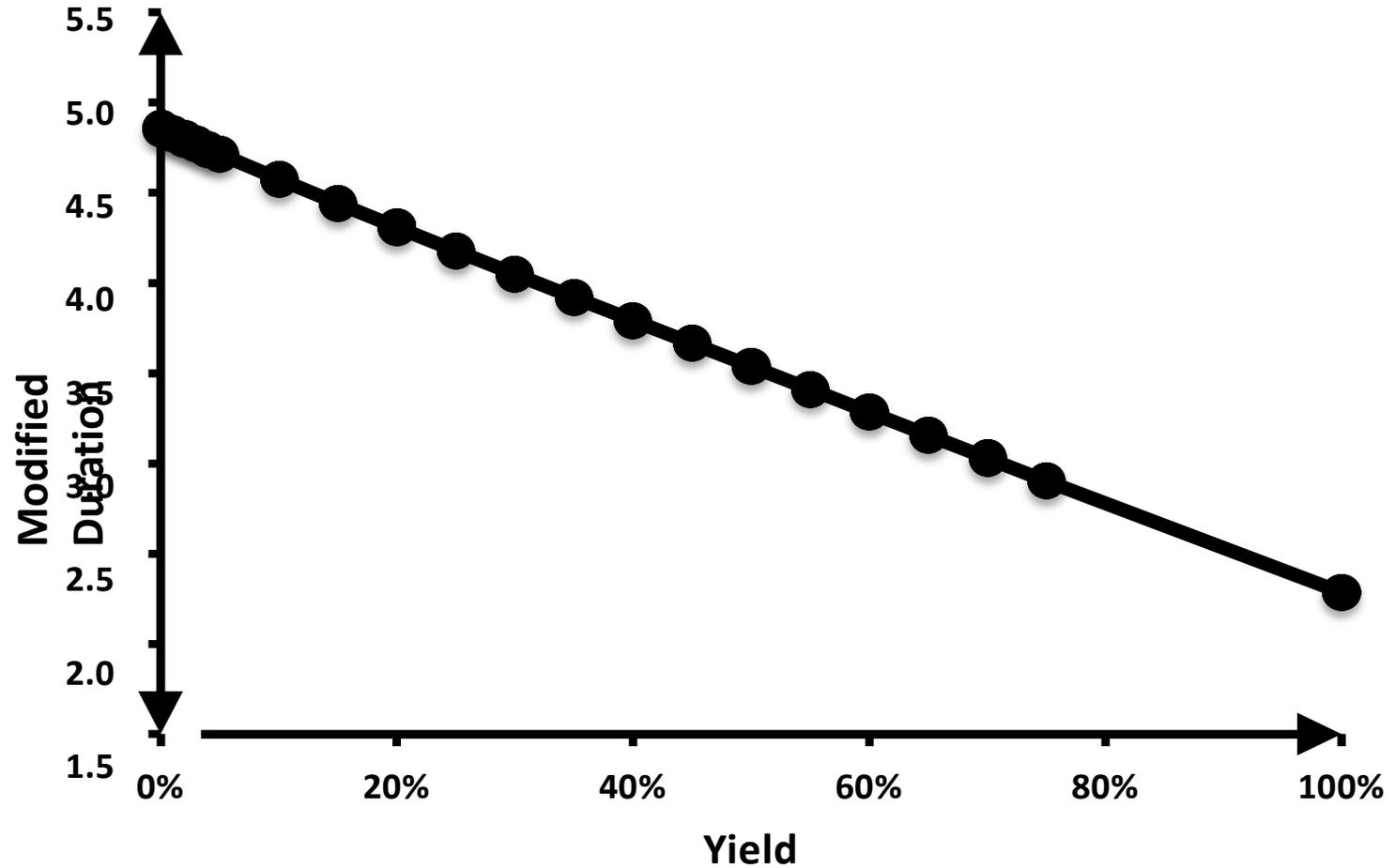
Interest Rate Changes & Gain/Losses (a)

Settlement:	12/31/2015
Maturity:	12/31/2020
Par Amount:	1,000,000.00
Price:	98.761
Coupon:	1.50%
Payment Frequency:	2
Yield:	1.76%
Modified Duration:	4.792
Yield Move (+/-):	1.00%

Assume rates rise or fall by the amount of the Yield Move (+/-) and see how time heals all wounds.

Time Heals All Wounds/Erases All Gains		
Month	Price Rates Rise	Price Rates Fall
0.00	94.15	103.62
6.00	94.70	103.27
12.00	95.26	102.91
18.00	95.82	102.55
24.00	96.40	102.19
30.00	96.98	101.83
36.00	97.56	101.47
42.00	98.16	101.10
48.00	98.77	100.74
54.00	99.38	100.37
59.00	99.89	100.06
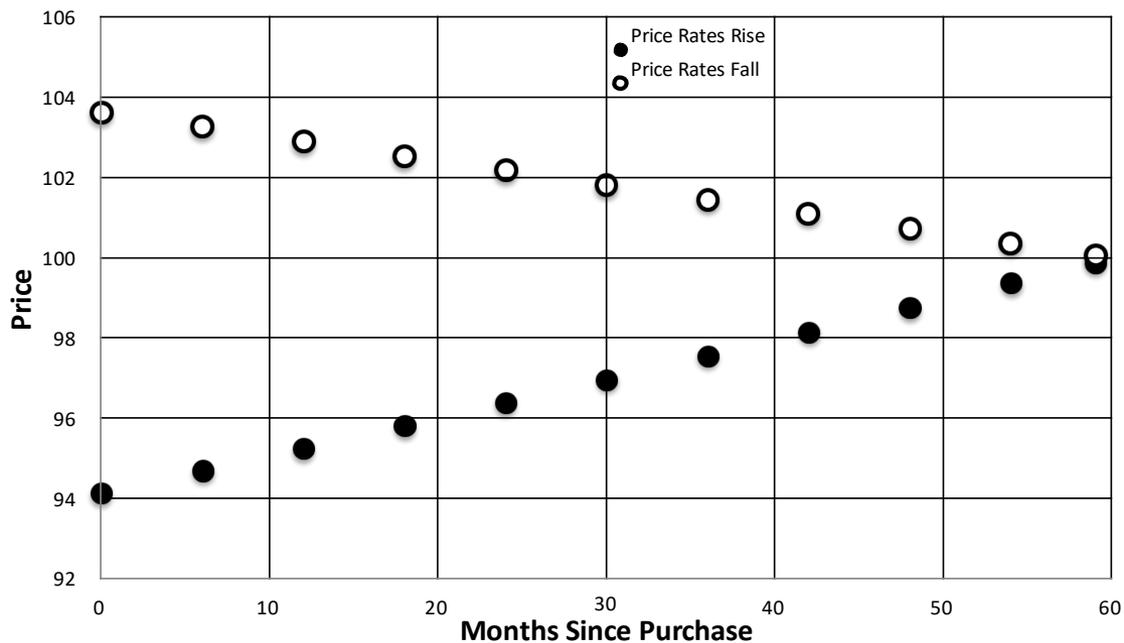
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Session Outline

(1)   What is Risk?

(2)   Interest Rate Risk

    (i)   Time Value of Money Circle of Life

    (ii)   Yield←→Duration are Linked

    (iii) Interest Rate Changes & Gains/Losses

(3)   Credit Risk

    (i)   The Letters

    (ii)   Default Rates & Transition Matrices

    (iii) Composite Ratings – Letters & Numbers

    (iv) A Digression on Credit Ratings

(4)   Reinvestment Risk

(5)   Total Risk

Ratings: The Letters

| Moody's		S&P		Fitch		Rating description	
Long-term	Short-term	Long-term	Short-term	Long-term	Short-term		
Aaa	P-1	AAA	A-1+	AAA	F1+	Prime	Investment-grade
Aa1	P-1	AA+	A-1+	AA+	F1+	High grade	Investment-grade
Aa2	P-1	AA	A-1+	AA	F1+	High grade	Investment-grade
Aa3	P-1	AA−	A-1+	AA−	F1+	High grade	Investment-grade
A1	P-1	A+	A-1	A+	F1	Upper medium grade	Investment-grade
A2	P-1	A	A-1	A	F1	Upper medium grade	Investment-grade
A3	P-2	A−	A-2	A−	F2	Upper medium grade	Investment-grade
Baa1	P-2	BBB+	A-2	BBB+	F2	Lower medium grade	Investment-grade
Baa2	P-3	BBB	A-3	BBB	F3	Lower medium grade	Investment-grade
Baa3	P-3	BBB−	A-3	BBB−	F3	Lower medium grade	Investment-grade

Bond credit rating. (2016, January 15). In Wikipedia, The Free Encyclopedia. Retrieved 07:22, January 21, 2016, from https://en.wikipedia.org/w/index.php?title=Bond_credit_rating&oldid=691840556
Also see, Frank J. Fabozzi;Harry M. Markowitz. The Theory and Practice of Investment Management (p. 451). Kindle Edition.

Default Rates

Average Cumulative Default Rates For Corporates By Region (1981-2017)

(%)							--Time horizon (years)--								
Rating	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**
U.S.															
AAA	0.00	0.04	0.17	0.29	0.41	0.54	0.58	0.66	0.75	0.84	0.88	0.93	0.98	1.07	1.17
AA	0.03	0.08	0.17	0.31	0.44	0.59	0.73	0.85	0.94	1.04	1.14	1.23	1.31	1.39	1.48
A	0.07	0.20	0.35	0.53	0.71	0.92	1.15	1.37	1.60	1.83	2.05	2.25	2.44	2.61	2.79
BBB	0.21	0.56	0.95	1.44	1.97	2.50	2.97	3.44	3.90	4.35	4.80	5.14	5.45	5.79	6.14
BB	0.78	2.45	4.44	6.39	8.15	9.85	11.29	12.62	13.79	14.84	15.71	16.51	17.22	17.82	18.46
B	3.78	8.74	13.09	16.52	19.18	21.37	23.16	24.58	25.83	27.00	27.99	28.76	29.46	30.12	30.75
CCC/C	28.79	39.34	45.00	48.55	51.23	52.38	53.84	54.84	55.81	56.49	57.11	57.68	58.30	58.78	58.78
Investment grade	0.12	0.31	0.54	0.84	1.14	1.45	1.74	2.03	2.30	2.59	2.85	3.07	3.27	3.47	3.69
Speculative grade	4.13	8.13	11.63	14.47	16.76	18.68	20.30	21.65	22.84	23.93	24.83	25.60	26.30	26.91	27.50
All rated	1.80	3.57	5.13	6.44	7.53	8.47	9.26	9.95	10.56	11.13	11.62	12.03	12.40	12.73	13.07

Transition Matrix

"A popular tool used by managers to gauge the prospects of an issue being downgraded or upgraded is a rating transition matrix. This is simply a table constructed by the rating agencies that shows the percentage of issues that were downgraded or upgraded in a given time period. So, the table can be used to approximate downgrade risk and default risk."

Frank J. Fabozzi. Fixed Income Analysis (Kindle Locations 828-830). Kindle Edition.
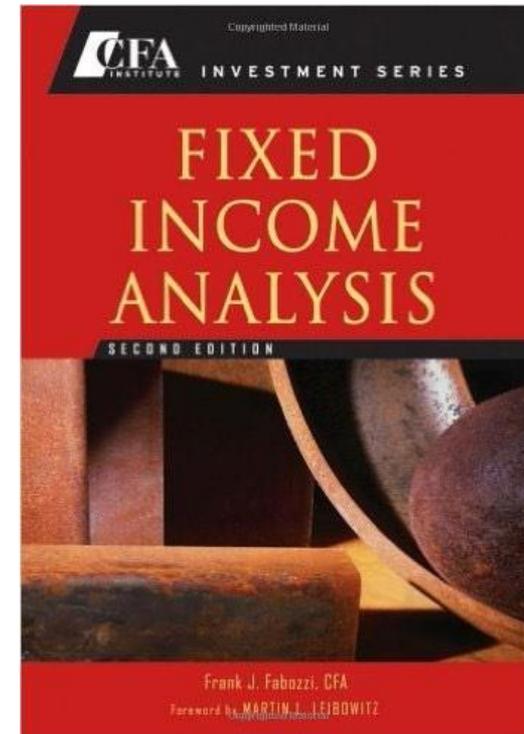
Transition Rates: 1 Year

Average Multiyear Global Corporate Transition Matrix (1981-2017): One-Year Transition Rates

(%)

From/to	AAA	AA	A	BBB	BB	B	CCC/C	D	NR
AAA	86.99	9.12	0.53	0.05	0.08	0.03	0.05	0.00	3.15
	(7.20)	(7.27)	(0.83)	(0.25)	(0.25)	(0.17)	(0.35)	(0.00)	(2.43)
AA	0.51	86.95	7.91	0.50	0.05	0.07	0.02	0.02	3.97
	(0.53)	(5.25)	(4.18)	(0.68)	(0.19)	(0.21)	(0.07)	(0.08)	(1.87)
A	0.03	1.72	88.00	5.22	0.30	0.12	0.02	0.06	4.52
	(0.09)	(1.03)	(3.63)	(2.15)	(0.39)	(0.26)	(0.07)	(0.11)	(1.74)
BBB	0.01	0.10	3.45	85.79	3.73	0.49	0.11	0.17	6.16
	(0.04)	(0.16)	(1.63)	(3.77)	(1.51)	(0.69)	(0.22)	(0.25)	(1.58)
BB	0.01	0.03	0.12	4.88	77.19	6.79	0.58	0.68	9.72
	(0.06)	(0.09)	(0.25)	(1.86)	(4.36)	(3.08)	(0.75)	(0.84)	(2.31)
B	0.00	0.02	0.08	0.18	5.05	74.34	4.44	3.59	12.28
	(0.00)	(0.08)	(0.20)	(0.22)	(2.01)	(4.11)	(2.12)	(3.22)	(2.29)
CCC/C	0.00	0.00	0.12	0.21	0.59	13.18	43.46	26.82	15.63
	(0.00)	(0.00)	(0.43)	(0.66)	(0.95)	(7.82)	(8.81)	(11.07)	(5.32)

Note: Numbers in parentheses are weighted standard deviations, weighted by the issuer base. D--Default. NR--Not rated. Sources: S&P Global Fixed Income Research and S&P Global Market Intelligence's CreditPro®.

Standard & Poor's "Default, Transition, and Recovery: 2017 Annual Global Corporate Default Study And Rating Transitions", Table 33 on Page 77.

Transition Rates: 5 Years

Average Multiyear Global Corporate Transition Matrix (1981-2017): Five-Year Transition Rates

(%)

From/to	AAA	AA	A	BBB	BB	B	CCC/C	D	NR
AAA	49.55	28.51	4.83	0.81	0.24	0.16	0.08	0.35	15.46
	(11.87)	(13.22)	(2.69)	(1.54)	(0.47)	(0.41)	(0.28)	(0.60)	(6.49)
AA	1.49	50.83	24.58	3.63	0.58	0.38	0.04	0.33	18.13
	(0.93)	(8.46)	(4.98)	(1.70)	(0.63)	(0.59)	(0.10)	(0.38)	(4.56)
A	0.08	5.15	55.47	14.98	2.09	0.69	0.15	0.54	20.86
	(0.10)	(2.30)	(6.98)	(2.31)	(1.13)	(0.87)	(0.18)	(0.43)	(4.01)
BBB	0.02	0.45	10.52	51.55	7.64	2.23	0.39	1.84	25.35
	(0.07)	(0.54)	(3.16)	(7.55)	(1.70)	(1.44)	(0.39)	(1.46)	(4.38)
BB	0.01	0.08	1.03	12.71	31.43	11.03	1.26	7.56	34.89
	(0.06)	(0.18)	(0.97)	(3.15)	(7.07)	(2.15)	(0.92)	(4.85)	(4.41)
B	0.01	0.03	0.26	1.57	10.47	25.16	2.93	18.76	40.80
	(0.11)	(0.09)	(0.56)	(1.19)	(2.64)	(5.43)	(1.01)	(8.72)	(5.47)
CCC/C	0.00	0.00	0.12	0.73	2.89	12.09	2.62	46.73	34.83
	(0.00)	(0.00)	(0.49)	(1.79)	(2.06)	(4.61)	(3.68)	(12.03)	(9.05)

Note: Numbers in parentheses are weighted standard deviations, weighted by the issuer base. D--Default. NR--Not rated. Sources: S&P Global Fixed Income Research and S&P Global Market Intelligence's CreditPro®.

Standard & Poor's "Default, Transition, and Recovery: 2017 Annual Global Corporate Default Study And Rating Transitions", Table 36 on Page 79.

Composite Rating: Letters→Numbers→Letter

Numeric Rating	Composite Rating	Moody Rating	S&P Rating	Fitch Rating
21	AAA	Aaa	AAA	AAA
20	AA1	Aa1	AA+	AA+
19	AA2	Aa2	AA	AA
18	AA3	Aa3	AA-	AA-
17	A1	A1	A+	A+
16	A2	A2	A	A
15	A3	A3	A-	A-
14	BBB1	Baa1	BBB+	BBB+
13	BBB2	Baa2	BBB	BBB
12	BBB3	Baa3	BBB-	BBB-

Composite Rating Example 1

AMZN	AMAZON.COM INC	
NRSRO	**Rating**	**Number**
Moody	Baa1	14.00
S&P	AA-	18.00
Fitch		
Average		16.00
Rounded		16.00
Composite	A2	

Ratings information from Bloomberg as of 8/11/16

Composite Rating Example 2

MS	MORGAN STANLEY	
NRSRO	Rating	Number
Moody	A3	15.00
S&P	BBB+	14.00
Fitch	A	16.00
Average		15.00
Rounded		15.00
Composite	A3	

Ratings information from Bloomberg as of 8/11/16

Credit Ratings Digression Part 1

Lehman Brothers Credit Rating History

Moody's Senior Unsecured Debt

Rating	Watch	Effective
WR		12/10/2008
C		12/08/2008
B3	*-	09/15/2008
A2	*	09/10/2008
A2		07/17/2008
A1	*-	06/13/2008
A1		10/22/2003
A2	*+	06/24/2003
A2		11/03/2000

Up / Down / No Change / Initial

Close

S&P LT Local Issuer Credit

Rating	Watch	Effective
NR		09/25/2008
D		09/16/2008
SD		09/15/2008
A	*	09/12/2008
A	*-	09/09/2008
A		06/02/2008
A+		10/11/2005
A		03/23/1993

Fitch Senior Unsecured Debt

Rating	Watch	Effective
NR		10/27/2008
CCC		09/15/2008
A+	*-	09/09/2008
A+		06/09/2008
AA-		06/28/2007
A+		06/20/2001
A		05/31/1994

Up / Down / No Change / Initial

Close

Credit Rating History Source: Bloomberg
For a timeline and other data on the financial crisis visit the Federal
Reserve Bank of St. Louis Financial Crisis webpage.

Credit Ratings Digression Part 2

"The ratings agencies had given their AAA rating, normally reserved for a handful of the world's most solvent governments and best-run businesses, to thousands of mortgage-backed securities, financial instruments that allowed investors to bet on the likelihood of someone else defaulting on their home. The ratings issued by these companies are quite explicitly meant to be predictions: estimates of the likelihood that a piece of debt will go into default. Standard & Poor's told investors, for instance, that when it rated a particularly complex type of security known as a collateralized debt obligation (CDO) at AAA, there was only a 0.12 percent probability— about 1 chance in 850— that it would fail to pay out over the next five years. …
In fact, around 28 percent of the AAA-rated CDOs defaulted, according to S&P's internal figures. … This is just about as complete a failure as it is possible to make in a prediction: trillions of dollars in investments that were rated as being almost completely safe instead turned out to be almost completely unsafe. It was as if the weather forecast had been 86 degrees and sunny, and instead there was a blizzard."
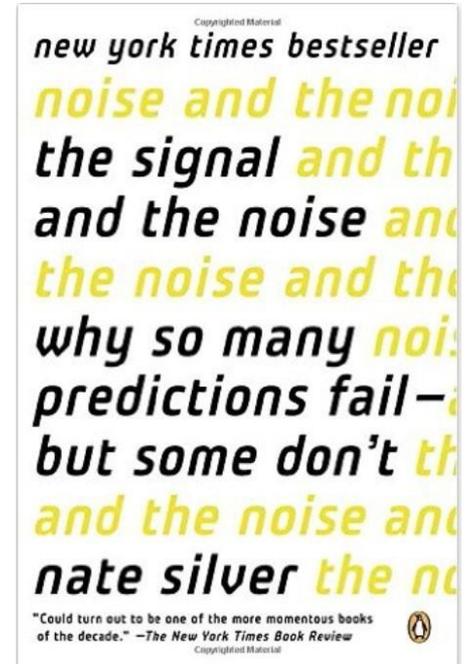
Silver, Nate (2012-09-27). *The Signal and the Noise: Why So Many Predictions Fail-but Some Don't* (pp. 20-21). Penguin Group US. Kindle Edition.

An article published by Nate Silver for his FiveThirtyEight blog at the New York Times titled "Why S&P's Ratings are Substandard and Porous" is an interesting read and can be found here.

Session Outline

(1)   What is Risk?

(2)   Interest Rate Risk

    (i)   Time Value of Money Circle of Life

    (ii)   Yield$\longleftrightarrow$Duration are Linked

    (iii)   Interest Rate Changes & Gains/Losses

(3)   Credit Risk

    (i)   The Letters

    (ii)   Default Rates & Transition Matrices

    (iii)   Composite Ratings – Letters & Numbers

    (iv)   A Digression on Credit Ratings

(4)   Reinvestment Risk

(5)   Total Risk

Reinvestment Risk

"Reinvestment risk is the risk that the proceeds received from the payment of interest and principal (i.e., scheduled payments, called proceeds, and principal prepayments) that are available for reinvestment must be reinvested at a lower interest rate than the security that generated the proceeds."

1. Reinvestment risk "occurs when an investor purchases a bond and relies on the yield of that bond as a measure of return. … for the yield computed at the time of purchase to be realized, the investor must be able to reinvest any coupon payments at the computed yield."
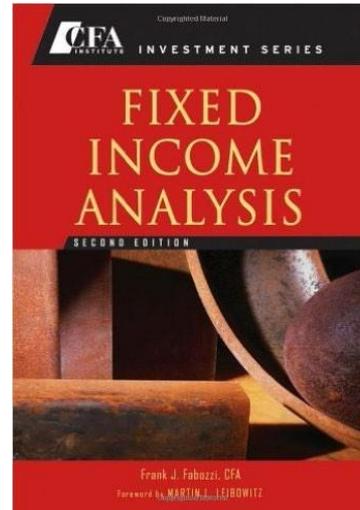
Not Necessarily True!

Frank J. Fabozzi. Fixed Income Analysis (Kindle Locations 759-765). Kindle Edition.
See Investopedia for more on this topic online.

2. Reinvestment risk "is present when an investor purchases a callable or principal prepayable bond. When the issuer calls a bond, it is typically done to lower the issuer's interest expense because interest rates have declined after the bond is issued. The investor faces the problem of having to reinvest the called bond proceeds received from the issuer in a lower interest rate environment."

YTM Is Always Received as Promised

Yield to maturity (YTM hereafter) is "the standard measure of the total rate of return of the bond over its life. …… This interest rate is often viewed as a measure of the average rate of return that will be earned on a bond if it is bought now and held until maturity" (Bodie, et al, 2002, p. 426). And it is considered "the most accurate measure of interest rate" (Mishkin, 2004, p. 64). Unfortunately, due to a fact that "yield to maturity will equal the rate of return realized over the life of the bond if all coupons are reinvested at an interest rate equal to the bond's yield to maturity (Bodie, et al, 2002, p. 429), YTM has been widely misinterpreted as "the true rate of return an investor would received by holding the security until its maturity if each … interest payment is reinvested at the yield to maturity" (Strong, 2004, p.70, italic original). Similar interpretations can be also found in, to name a few, Reilly and Brown (1997, pp.530-531), Madura (1998, p. 217), and Fabozzi and Modigliani (2002, p. 364).

This note points out that the above-mentioned common treatment in many textbooks turns out to be a fallacy. The truth is that YTM on a (coupon) bond is always received regardless of how coupon payments are re-invested, provided that the bond is held until maturity without default. It addresses a basic question in bond theory: between YTM and realized compounding yield (RCY hereafter), which concept measures the true rate of return from holding a coupon bond until maturity? It is well accepted that YTM measures the rate of return from holding a bond until maturity for both coupon bond and zero-coupon bond as well. By definition, the YTM received from holding a bond is independent of how coupon payments are allocated, as long as they are paid on time as contracted. By comparing the initial investment and the final value accumulated over the investment horizon, on the other hand, RCY on a bond measures the rate of return from an account (or trust) that holds the bond and the interests paid. Of course, it depends on how coupon payments are reinvested. We demonstrate that the RCY actually measures the YTM from a combined investment - holding a coupon bond plus an additional periodic investment with each coupon payment received. Not surprisingly, YTM and RCY would be normally unequal; RCY equals YTM if and only if coupon payments are reinvested at the same rate as the initial YTM. However, this conclusion should not be interpreted as "the yield to maturity is actually received only if coupon payments are reinvested at the yield to maturity". Cebula & Yang 2008, 'Yield To Maturity Is Always Received as Promised', *Journal of Economics and Finance Education*, vol. 7, no. 1, pp. 43-47.

Yield Curve(s): 12/31/01 vs 02/28/19
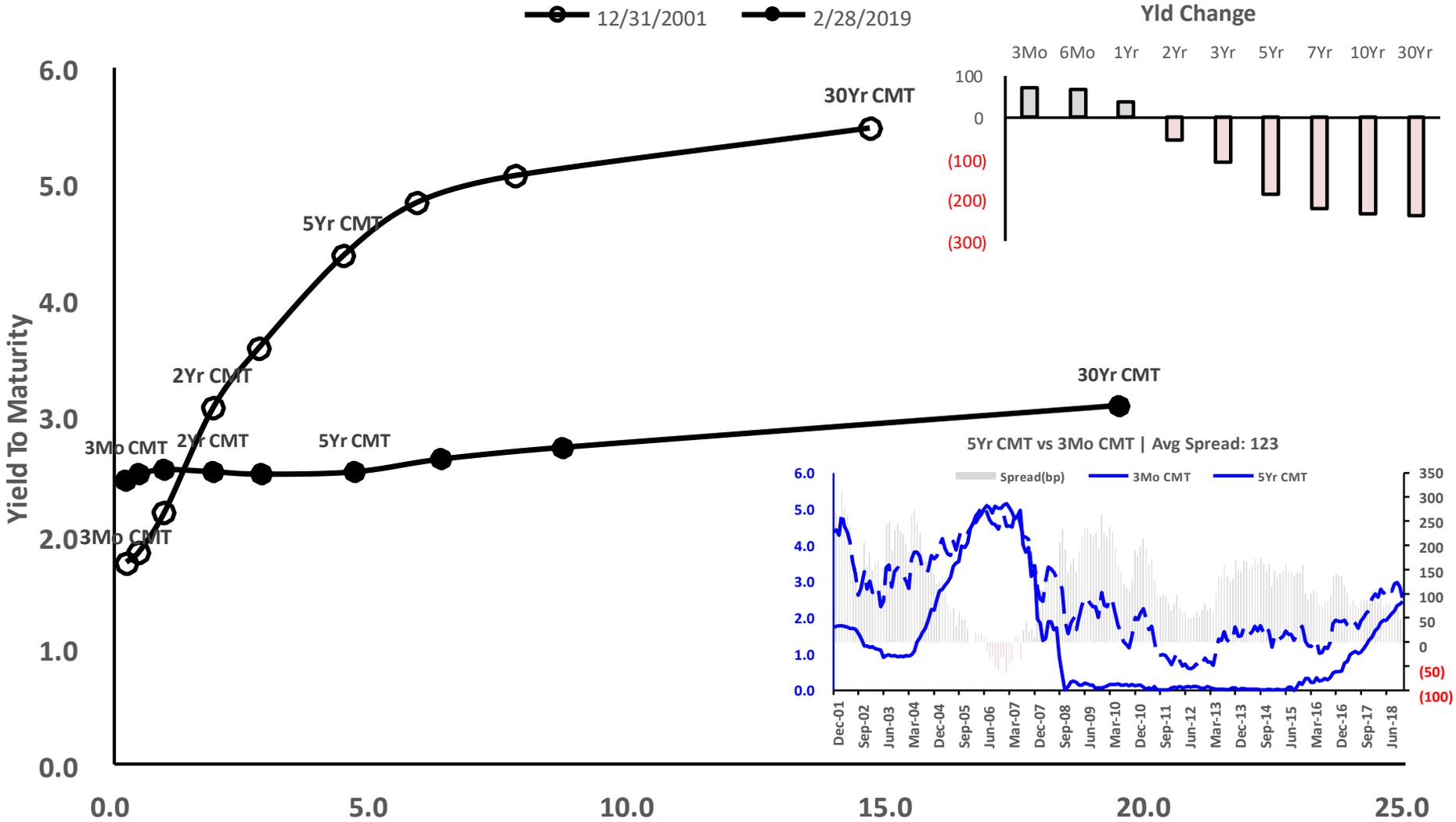
○— 12/31/2001   ●— 2/28/2019

Yld Change

5Yr CMT vs 3Mo CMT | Avg Spread: 123

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Data from FRED. Calculations and presentation by Kevin Webb, CFA.

Strategy Webb Constant Maturity Treasury Yield, Duration & Convexity Calculations

		Treasury Yield Curve on 02/28/19				
Par Amount:	**$1,000,000.00**	Maturity	Duration	Yield	Slope(bp)	Slope(bp) to 3Mo
Treasury Maturity (Yrs):	**5.00**	0.00	0.00	2.40%		
Treasury Settlement Date:	**02/28/19**	0.25	0.25	2.45%		
Treasury Maturity Date:	**02/29/24**	0.50	0.49	2.50%	5.00	5.00
Coupon Rate:	**2.52%**	1.00	0.98	2.54%	4.00	9.00
Yield:	**2.52%**	2.00	1.94	2.52%	(2.00)	7.00
Price:	**100.000**	3.00	2.87	2.50%	(2.00)	5.00
Coupon Frequency:	**2.000**	5.00	4.67	2.52%	2.00	7.00
Price (Excel):	**100.000**	10.00	8.70	2.73%	21.00	28.00
Yield (Excel):	**2.52%**	30.00	19.46	3.09%	36.00	64.00
Modified Duration (Excel):	**4.670**					

Table Calc Price:	**100.000**	**100.002**
Table Calc Yield (IRR):	**2.520%**	**2.520%**
Table Calc Duration:	**4.670**	**4.670**
Table Calc Convexity:	**0.2489**	**0.2489**

Semi-Annual Periods	Cash Flow	Present Value @ 2.52% Yield	Maturity Matched Discount Rates	Present Value @ Maturity Matched Rates
0	(1,000,000.00)	(1,000,000.00)	2.40%	(1,000,000.00)
1	12,600.00	12,443.22	2.50%	12,444.44
2	12,600.00	12,288.38	2.54%	12,285.96
3	12,600.00	12,135.47	2.53%	12,133.68
4	12,600.00	11,984.47	2.52%	11,984.47
5	12,600.00	11,835.35	2.51%	11,838.27
6	12,600.00	11,688.08	2.50%	11,695.00
7	12,600.00	11,542.64	2.51%	11,548.62
8	12,600.00	11,399.01	2.51%	11,403.51
9	12,600.00	11,257.17	2.52%	11,259.67
10	1,012,600.00	893,426.22	2.52%	893,426.22
Total	1,126,000.00	1,000,000.00		1,000,019.85

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Data from FRED. Calculations and presentation by Kevin Webb, CFA.

Strategy Webb Constant Maturity Treasury Yield, Duration & Convexity Calculations

		Treasury Yield Curve on 12/31/01			
		Maturity	Duration	Yield	Slope(bp)	Slope(bp) to 3Mo
Par Amount:	$1,000,000.00	0.00	0.00	1.75%		
Treasury Maturity (Yrs):	5.00	0.25	0.25	1.74%		
Treasury Settlement Date:	12/31/01	0.50	0.50	1.83%	9.00	9.00
Treasury Maturity Date:	12/31/06	1.00	0.98	2.17%	34.00	43.00
Coupon Rate:	4.38%	2.00	1.93	3.07%	90.00	133.00
Yield:	4.38%	3.00	2.82	3.59%	52.00	185.00
Price:	100.000	5.00	4.45	4.38%	79.00	264.00
Coupon Frequency:	2.000	10.00	7.77	5.07%	69.00	333.00
Price (Excel):	100.000	30.00	14.64	5.48%	41.00	374.00
Yield (Excel):	4.38%					
Modified Duration (Excel):	4.447					

Table Calc Price:	100.000	100.359
Table Calc Yield (IRR):	4.380%	4.299%
Table Calc Duration:	4.447	4.441
Table Calc Convexity:	0.2316	0.2310

Semi-Annual Periods	Cash Flow	Present Value @ 4.38% Yield	Maturity Matched Discount Rates	Present Value @ Maturity Matched Rates
0	(1,000,000.00)	(1,000,000.00)	1.75%	(1,000,000.00)
1	21,900.00	21,430.67	1.83%	21,701.43
2	21,900.00	20,971.39	2.17%	21,432.39
3	21,900.00	20,521.96	2.62%	21,061.40
4	21,900.00	20,082.16	3.07%	20,605.40
5	21,900.00	19,651.79	3.33%	20,164.47
6	21,900.00	19,230.64	3.59%	19,682.73
7	21,900.00	18,818.51	3.79%	19,204.87
8	21,900.00	18,415.22	3.99%	18,702.44
9	21,900.00	18,020.57	4.18%	18,178.06
10	1,021,900.00	822,857.08	4.38%	822,857.08
Total	1,219,000.00	1,000,000.00		1,003,590.26

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Reinvestment Risk as Call Risk(2)

"… bonds may contain a provision that allows the issuer to retire, or 'call', all or part of the issue before the maturity date. The issuer usually retains this right to refinance the bond in the future if market interest rates decline below the coupon rate.

From the investor's perspective, there are three disadvantages of the call provision. First, the cashflow pattern of a callable bond is not known with certainty. Second, ==because the issuer may call the bonds when interest rates have dropped, the investor is exposed to reinvestment risk.== That is, the investor will have to reinvest the proceeds received when the bond is called at lower interest rates. Finally, the capital appreciation potential of a bond will be reduced because the price of a callable bond may not rise much above the price at which the issuer may call the bond."

Fabozzi, Frank. The Handbook of Fixed Income Securities (Kindle Locations 1331-1337). McGraw-Hill. Kindle Edition.
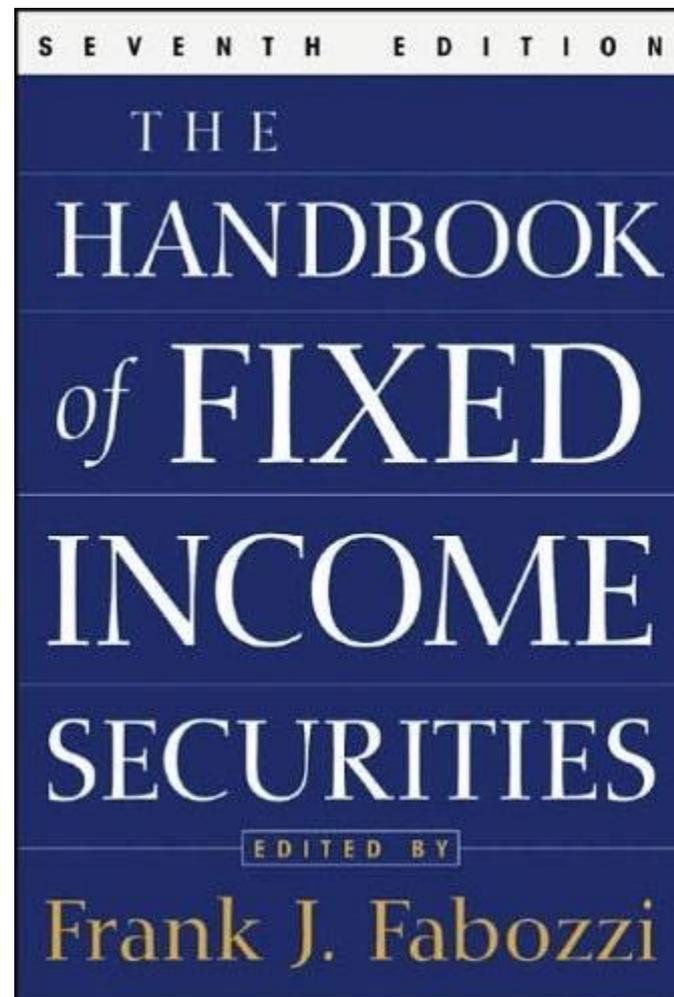
Session Outline

(1)　　What is Risk?

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(4)　　Reinvestment Risk

(5)　　Total Risk

Total Risk & Total Return are Related

$$Total\ Return = \frac{(Ending\ Market\ Value - Beginning\ Market\ Value) + Income}{Beginning\ Market\ Value}$$

Note that Total Return as a measure of performance is an industry standard but may not be as meaningful for those that do not budget gains/losses. The formula implies that the manager is indifferent between the return coming from a "paper" gain or a coupon payment.

"Total rate of return measures the increase in the investor's wealth due to both investment income (for example, dividends and interest) and capital gains (both realized and unrealized). The total rate of return implies that a dollar of wealth is equally meaningful to the investor whether that wealth is generated by the secure income from a 90-day Treasury bill or by the unrealized appreciation in the price of a share of common stock."

Managing Investment Portfolios: A Dynamic Process (CFA Institute Investment Series) (p. 723). Wiley. Kindle Edition.
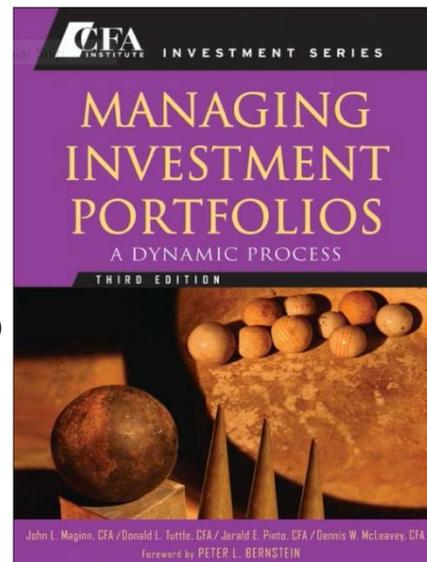
Treasury Yield Curve Framework: 12/00-02/19

Fixed Income Sector	Average Edur	Average Ytw
3Mo Tbill	0.237	1.397
6Mo Tbill	0.484	1.509
2Yr Tsy	1.928	1.878
3Yr Tsy	2.819	2.126
5Yr Tsy	4.639	2.605
10Yr Tsy	8.542	3.319
30Yr Tsy	17.558	4.003

Average Ytw (vertical axis)

Average Edur (horizontal axis)

● 30Yr Tsy [#6]

● 10Yr Tsy [#5]

● 5Yr Tsy [#1]

● 3Yr Tsy [#2]

● 2Yr Tsy [#3]

● 6Mo Tbill [#4]

● 3Mo Tbill [#7]

Average Edur (Horizontal Axis)	Average Ytw (Vertical Axis)
This is the average of the monthly effective durations over the period. Effective Duration is the by-product of an option model that takes into consideration any possible early redemption features and is read as a percent which gives the inverse percent change in market value for a given percent change in interest rates	This is the Average Yield To Worst and represents the average over the period of all the yield to worsts. Yield to Worst is the lowest potential yield that can be received without a default. Yield To Worst over a given period can act as a proxy for what the expected book income might have been. A higher number, all things equal, is better.

Index data from BofA Merrill Lynch Indices. Calculations and presentation by Kevin Webb, CFA.

Treasury Total Risk vs Total Return: 12/00-02/19

Fixed Income Sector	Annualized Total Return StdDev	Annualized Total Return
3Mo Tbill	0.504	1.516
6Mo Tbill	0.576	1.794
2Yr Tsy	1.577	2.560
3Yr Tsy	2.425	3.186
5Yr Tsy	4.224	3.927
10Yr Tsy	7.276	4.335
30Yr Tsy	13.670	5.820

Annualized Total Return *(vertical axis label)*

30Yr Tsy [#6]

10Yr Tsy [#5]

5Yr Tsy [#3]

3Yr Tsy [#1]

2Yr Tsy [#2]

6Mo Tbill [#4]

3Mo Tbill [#7]
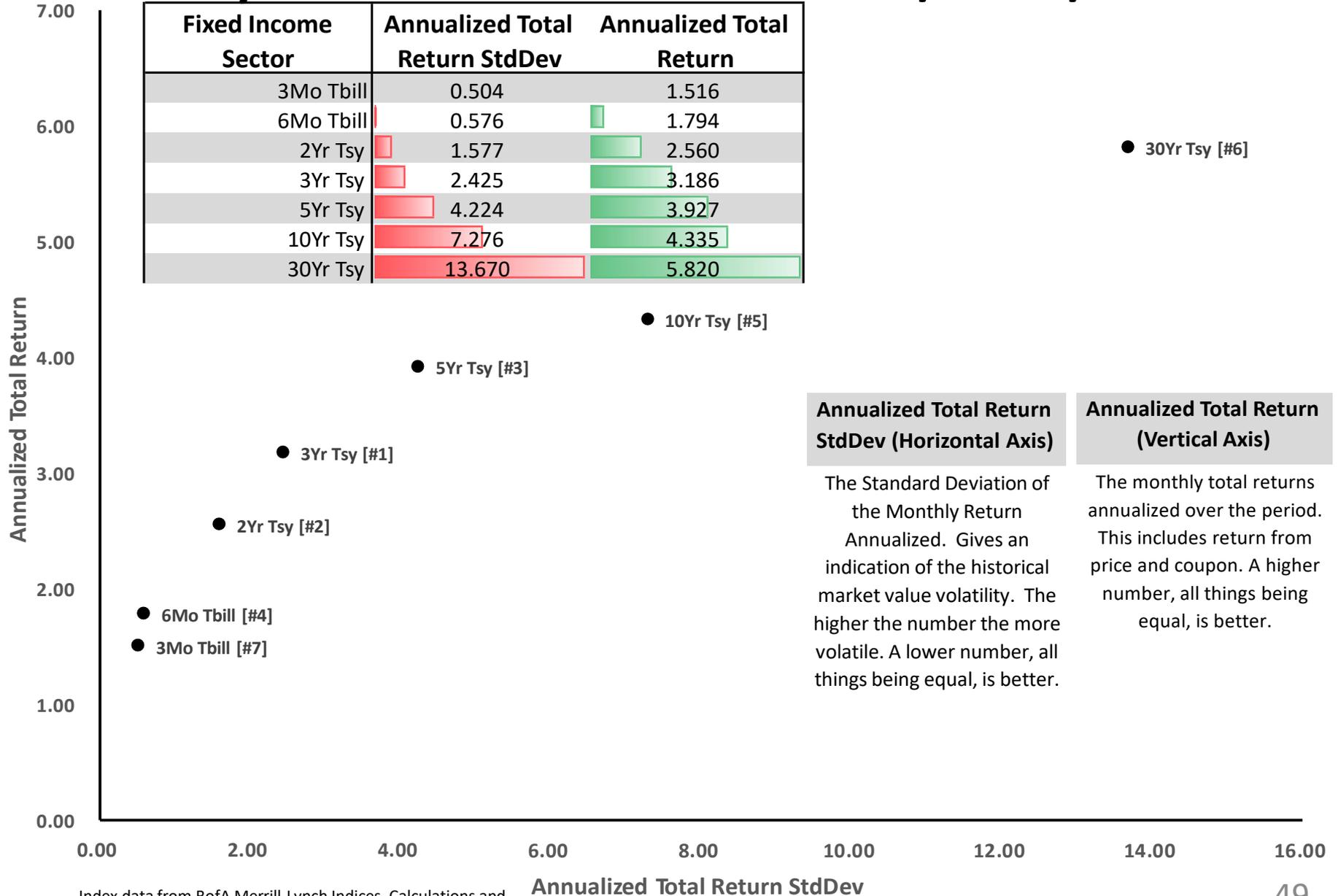
Annualized Total Return StdDev (Horizontal Axis)

The Standard Deviation of the Monthly Return Annualized. Gives an indication of the historical market value volatility. The higher the number the more volatile. A lower number, all things being equal, is better.

Annualized Total Return (Vertical Axis)

The monthly total returns annualized over the period. This includes return from price and coupon. A higher number, all things being equal, is better.

Annualized Total Return StdDev *(horizontal axis label)*

For Treasuries Avg Dur ~ Total Risk: 12/00-02/19
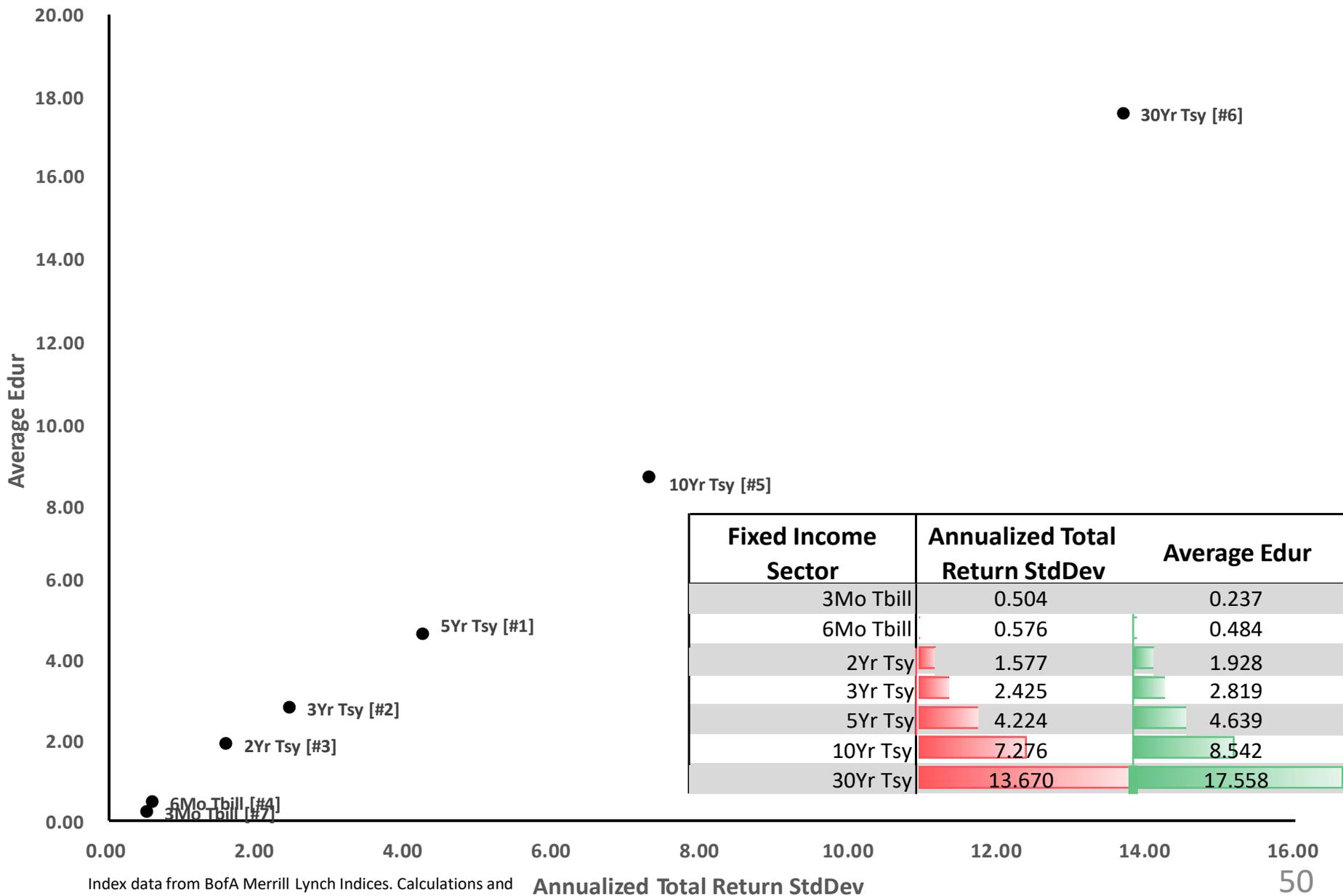
Fixed Income Sector	Annualized Total Return StdDev	Average Edur
3Mo Tbill	0.504	0.237
6Mo Tbill	0.576	0.484
2Yr Tsy	1.577	1.928
3Yr Tsy	2.425	2.819
5Yr Tsy	4.224	4.639
10Yr Tsy	7.276	8.542
30Yr Tsy	13.670	17.558

Index data from BofA Merrill Lynch Indices. Calculations and presentation by Kevin Webb, CFA.

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Which Treasury was Best (12/00-02/19)?
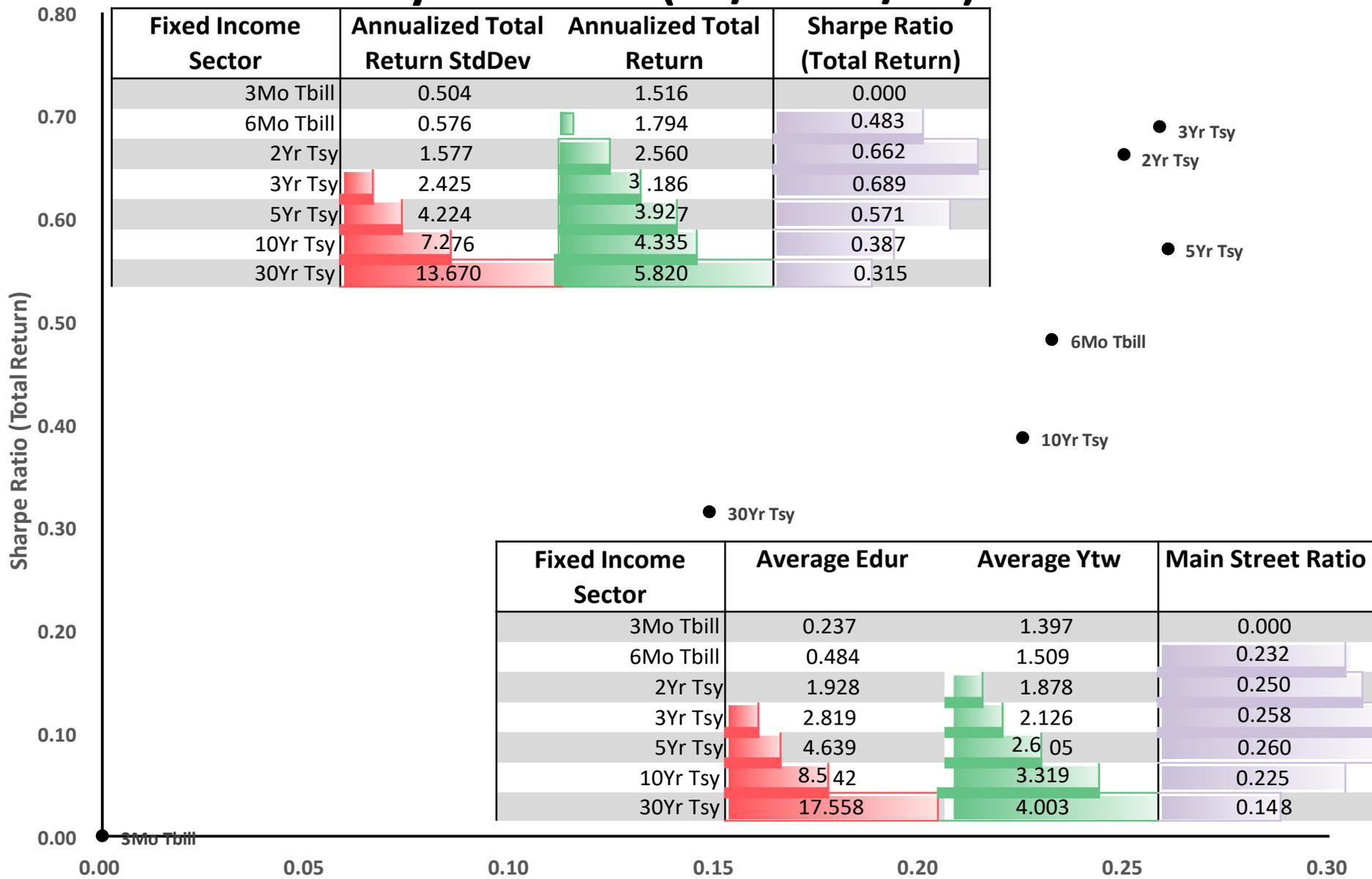
Fixed Income Sector	Annualized Total Return StdDev	Annualized Total Return	Sharpe Ratio (Total Return)
3Mo Tbill	0.504	1.516	0.000
6Mo Tbill	0.576	1.794	0.483
2Yr Tsy	1.577	2.560	0.662
3Yr Tsy	2.425	3.186	0.689
5Yr Tsy	4.224	3.927	0.571
10Yr Tsy	7.276	4.335	0.387
30Yr Tsy	13.670	5.820	0.315

Fixed Income Sector	Average Edur	Average Ytw	Main Street Ratio
3Mo Tbill	0.237	1.397	0.000
6Mo Tbill	0.484	1.509	0.232
2Yr Tsy	1.928	1.878	0.250
3Yr Tsy	2.819	2.126	0.258
5Yr Tsy	4.639	2.605	0.260
10Yr Tsy	8.542	3.319	0.225
30Yr Tsy	17.558	4.003	0.148

Sharpe Ratio (Total Return) (y-axis)

Main Street Ratio (x-axis)

Scatter points: 3Mo Tbill, 6Mo Tbill, 2Yr Tsy, 3Yr Tsy, 5Yr Tsy, 10Yr Tsy, 30Yr Tsy

Index data from BofA Merrill Lynch Indices. Calculations and presentation by Kevin Webb, CFA.

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Broad Sector Avg Duration/Yield: 12/00-02/19

1-5Yr Financial [#1]
1-5Yr Corporate [#2]
1-5Yr Industrial [#3]
US Domestic Master [#6]
3-5Yr Agency Bullet [#8]
3-5Yr Agency Callable [#5]
3-5Yr Treasury [#9]
1-3Yr Agency Callable [#4]
1-3Yr Agency Bullet [#7]
2Yr Tsy [#11]
1-3Yr Treasury [#10]
3Mo Tbill [#12]

Average Ytw (y-axis): 4.00, 3.50, 3.00, 2.50, 2.00, 1.50, 1.00, 0.50, 0.00

Average Edur (x-axis): 0.00, 1.00, 2.00, 3.00, 4.00, 5.00, 6.00

Fixed Income Sector	Average Edur	Average Ytw	Main Street Ratio
3Mo Tbill	0.237	1.397	0.000
2Yr Tsy	1.928	1.878	0.250
1-3Yr Treasury	1.799	1.855	0.255
3-5Yr Treasury	3.736	2.403	0.269
1-3Yr Agency Bullet	1.820	2.083	0.377
3-5Yr Agency Bullet	3.625	5	0.353
		2.6	
	7		
1-3Yr Agency Callable	1.217	2.089	0.569
3-5Yr Agency Callable	.144	34	0.531
		2.	
	5		
1-5Yr Corporate	2.771	3.569	0.784
1-5Yr Industrial	2.802	3.483	0.745
1-5Yr Financial	2.738	3.690	0.837
US Domestic Master	5.036	3.513	0.420

Index data from BofA Merrill Lynch Indices. Calculations and presentation by Kevin Webb, CFA.

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Broad Sector Total Risk/Total Return: 12/00-02/19

Annualized Total Return (y-axis) vs Annualized Total Return StdDev (x-axis)

Plotted points:
- 1-5Yr Industrial [#1]
- US Domestic Master [#4]
- 1-5Yr Financial [#8]
- 3-5Yr Agency Bullet [#5]
- 1-5Yr Corporate [#2]
- 3-5Yr Treasury [#10]
- 1-3Yr Agency Bullet [#3]
- 3-5Yr Agency Callable [#7]
- 1-3Yr Treasury [#9]
- 2Yr Tsy [#11]
- 1-3Yr Agency Callable [#6]
- 3Mo Tbill [#12]

| Fixed Income Sector	Annualized Total Return StdDev	Annualized Total Return	Sharpe Ratio (Total Return)
3Mo Tbill	0.504	1.516	0.000
2Yr Tsy	1.577	2.560	0.662
1-3Yr Treasury	1.394	2.518	0.718
3-5Yr Treasury	3.346	3.812	0.686
1-3Yr Agency Bullet	1.534	2.907	0.907
3-5Yr Agency Bullet	3.241	4.303	0.860
1-3Yr Agency Callable	0.886	2.229	0.804
3-5Yr Agency Callable	1.758	2.	0.796
	916		
1-5Yr Corporate	3.011	4.339	0.938
1-5Yr Industrial	2.787	4.448	1.052
1-5Yr Financial	3.855	4.306	0.724
US Domestic Master	3.501	4.540	0.864

Index data from BofA Merrill Lynch Indices. Calculations and presentation by Kevin Webb, CFA.

Broad Sector Avg Dur vs Total Risk: 12/00-02/19

Scatter plot with axis "Average Edur" (x-axis, 0.00 to 6.00) and "Annualized Total Return StdDev" (y-axis, 0.00 to 4.50). Data points labeled:
- 1-5Yr Financial [#8]
- 3-5Yr Treasury [#10]
- US Domestic Master [#4]
- 1-5Yr Corporate [#2]
- 3-5Yr Agency Bullet [#5]
- 1-5Yr Industrial [#1]
- 2Yr Tsy [#11]
- 3-5Yr Agency Callable [#7]
- 1-3Yr Agency Bullet [#3]
- 1-3Yr Treasury [#9]
- 1-3Yr Agency Callable [#6]
- 3Mo Tbill [#12]

Fixed Income Sector	Average Edur	Annualized Total Return StdDev
3Mo Tbill	0.237	0.504
2Yr Tsy	1.928	1.577
1-3Yr Treasury	1.799	1.394
3-5Yr Treasury	3.736	3.346
1-3Yr Agency Bullet	1.820	1.534
3-5Yr Agency Bullet	3.625	3.241
1-3Yr Agency Callable	1.217	0.886
3-5Yr Agency Callable	2.144	1.758
1-5Yr Corporate	2.771	3.011
1-5Yr Industrial	2.802	2.787
1-5Yr Financial	2.738	3.855
US Domestic Master	5.036	3.501

Index data from BofA Merrill Lynch Indices. Calculations and presentation by Kevin Webb, CFA.

Broad Sector Risk-Adjusted Returns: 12/00-02/19

Scatter plot with Main Street Ratio on x-axis (0.00 to 0.90) and Sharpe Ratio (Total Return) on y-axis (0.00 to 1.20). Data points labeled:
- 1-5Yr Industrial [#3]
- 1-5Yr Corporate [#2]
- 1-3Yr Agency Bullet [#7]
- 3-5Yr Agency Bullet [#8]
- US Domestic Master [#6]
- 1-3Yr Agency Callable [#4]
- 1-5Yr Financial [#1]
- 3-5Yr Agency Callable [#5]
- 1-3Yr Treasury [#10]
- 3-5Yr Treasury [#9]
- 2Yr Tsy [#11]
- 3Mo Tbill [#12]

Fixed Income Sector	Main Street Ratio	Sharpe Ratio (Total Return)
3Mo Tbill	0.000	0.000
2Yr Tsy	0.250	0.662
1-3Yr Treasury	0.255	0.718
3-5Yr Treasury	0.269	0.686
1-3Yr Agency Bullet	0.377	0.907
3-5Yr Agency Bullet	0.353	0.860
1-3Yr Agency Callable	0.569	0.804
3-5Yr Agency Callable	0.531	0.796
1-5Yr Corporate	0.784	0.938
1-5Yr Industrial	0.745	1.052
1-5Yr Financial	0.837	0.724
US Domestic Master	0.420	0.864

Index data from BofA Merrill Lynch Indices. Calculations and presentation by Kevin Webb, CFA.

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Contact Information

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Lies, Damned Lies & Economic Forecasts

Kevin Webb, CFA
kevin.p.webb@pjc.com

Lies, Damned Lies & Economic Forecasts

Agenda

1   What's the big deal?

2   Experts kNOw better than the rest of us, right?

3   Financial/Economic experts kNOw better, right?

4   A framework for thinking about economic forecasts

5   Updated economic forecasts

Philosophy, Strategy & Tactics

Sleep-Adusted returns via Suitability Benchmark using evidence based methods.

Investment philsophy is a coherent way of thinking about the markets, risk, return, investor behaviour, etc.

Philosophy

A plan of action or policy to achieve one or more goals (e.g., demonstrate good stewardship via a suitability benchmark).

Tactics

Strategy

Resources, skills & methods used to achieve the goal of a strategy (e.g., education, formulas, data, software, etc.)

The intersection of philosophy, strategy & tactics is the world of portfolio management

The difference between strategy and tactics: Strategy is done above the shoulders, Tactics are done below the shoulders.

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Designed and created by Kevin Webb, CFA
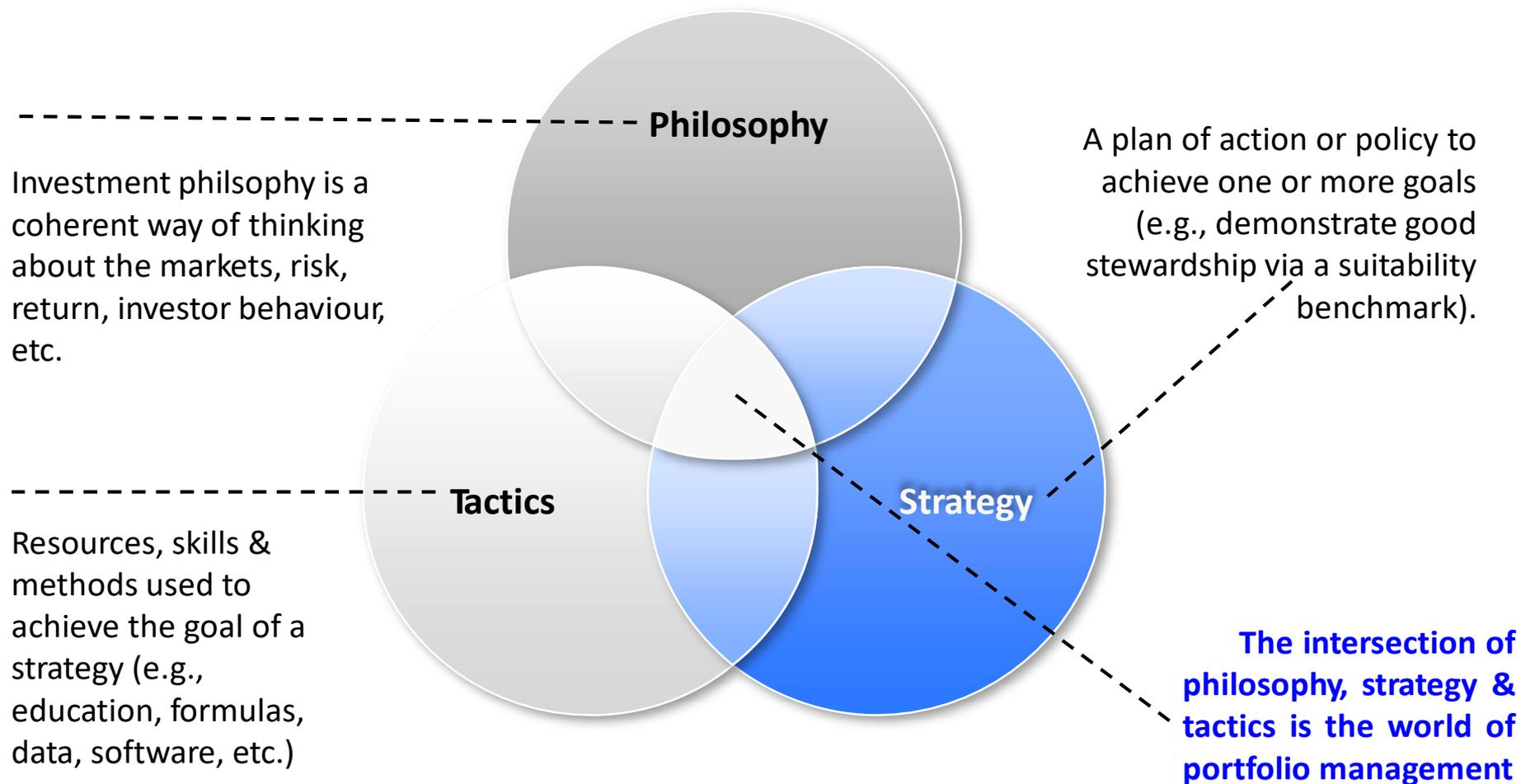
What Should I Benchmark?

Prudent Person

Investments shall be made with judgment and care, under circumstances then prevailing, which persons of prudence, discretion and intelligence exercise in the management of their own affairs, not for speculation, but for investment, considering the probable safety of their capital as well as the probable income to be derived*.*

Prudent Investor

A U.S. law that sets the standard of fiduciary duty for those entrusted with the responsibility of managing others' money, such as trustees and estate administrators. It requires that a trustee weigh risk versus reward when making investment decisions, taking into account the income that may be generated by the investment as well as the probable safety of the invested capital.

Prudent Investor vs Prudent Man/Person

1. Trust accounts are judged on their entire portfolio, rather than whether the investment was prudent at the time of purchase.
2. Diversification is explicitly required under the Prudent Investor Act
3. Suitability is deemed more important than individual investments
4. Fiduciaries are allowed to delegate investment management to qualified third parties

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What Should I Benchmark?

General Objectives

"The primary objectives, in priority order...

1. Safety

Safety of principal is the foremost objective... ***The goal will be to mitigate credit risk and interest rate risk.***

2. Liquidity

The investment portfolio shall ***remain sufficiently liquid*** to meet all operating requirements that may be reasonably anticipated.

3. Return

The investment portfolio shall be designed with the objective of attaining a ***market rate of return throughout budgetary and economic cycles***, taking into account the investment risk constraints of safety and liquidity needs."

GFOA Sample Investment Policy, accessed 12/31/16, pages 1-2. Emphasis added.

Benchmark Suitability
Gain/Loss is not listed! Why not?

Primary Liquidity
Port: 20.0%
Plan:15.0%

Secondary Liquidity
Port: 15.0%
Plan:15.0%

Total Liquidity
Port: 35.0%
Plan:30.0%

Effective Duration
Port: 1.93
Plan:1.80

Composite Credit Rating
Port: AAA
Plan:AAA

Market Rate of Return
Port: 1.65%
Plan:1.34%

Primary Liquidity

Secondary Liquidity

Total Liquidity

Effective Duration

Composite Credit Rating

Market Rate Return

For the background and concepts behind this visualization see the presentation "Understanding Benchmarks: Concepts" by Kevin Webb, CFA

Prediction ⟷ Forecast

noun
a thing predicted; a forecast: *a prediction that the Greeks would destroy the Persian empire.*
• the action of predicting something: *the prediction of future behavior.*
ORIGIN
mid 16th cent.: from Latin *praedictio(n-)*, from *praedicere* **'make known beforehand'** (see predict) .

Prediction
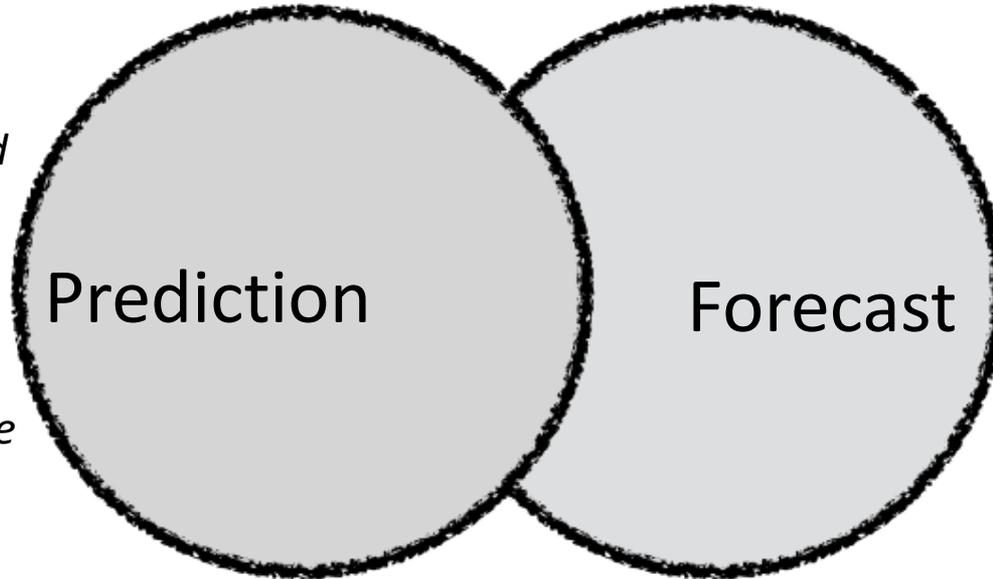
Forecast

Verb
(past and past participle **forecast** or **forecasted**) *[with obj.]*
predict or estimate (a future event or trend): *rain is forecast for eastern Ohio | [with obj. and infinitive] : coal consumption is forecast to increase.*
noun
a prediction or estimate of future events, especially coming weather or a financial trend.

forecaster |ˈfôrˌkastər| noun: a person who predicts or estimates a future event or trend: economic forecasters are predicting a downturn.

Experts kNOw better, right?

Rock n' roll? It will be gone by June

Variety magazine, 1955.

Experts kNOw better, right?

The Beatles have no future in show business

A Decca Records executive to the band's manager, Brian Epstein, following an audition in 1962. He continued: "We don't like your boys' sound. Groups are out. Four-piece groups with guitars, particularly, are finished."

http://www.buzzfeed.com/lukelewis/26-shockingly-bad-predictions#.fanwK6eXE

Experts kNOw better, right?
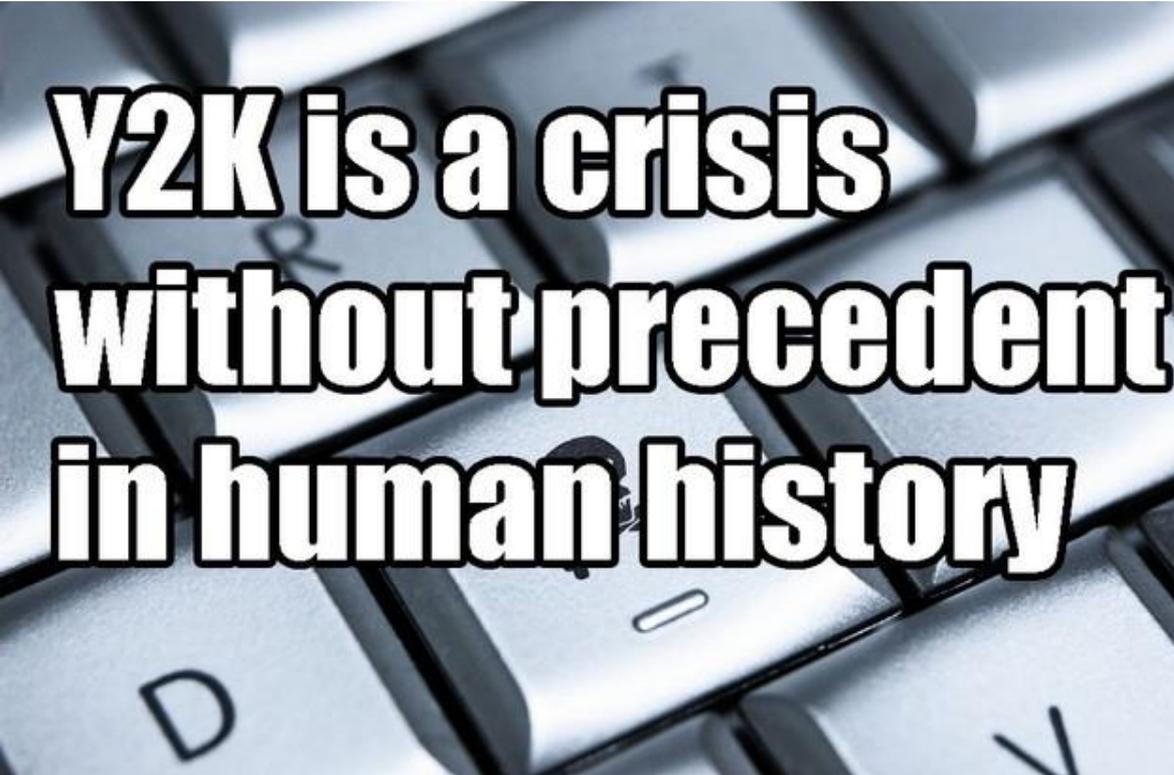
Y2K is a crisis without precedent in human history

Byte magazine editor Edmund DeJesus, 1998.

Experts kNOw better, right?

Next Christmas the iPod will be dead, finished, gone, kaput

Alan Sugar, 2005.

Experts kNOw better, right?

There's no chance that the iPhone is going to get any significant market share. No chance

Microsoft CEO Steve Ballmer, 2007.

"The only function of economic forecasting is to make astrology look respectable." - John Kenneth Galbraith

Financial experts kNOw better, right?

Stock prices have reached what looks like a permanently high plateau
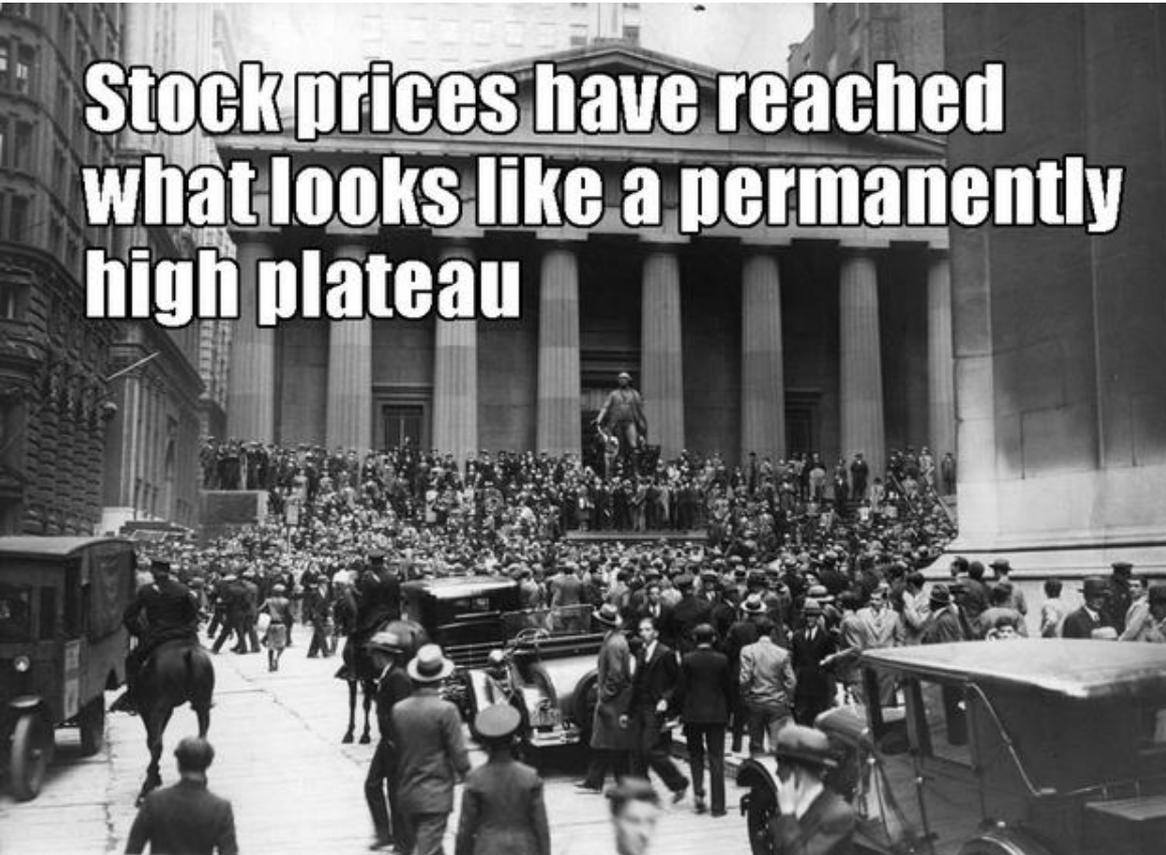
Economist Irving Fisher in October 1929, three days before the stock market crash that triggered the Great Depression.

Financial experts kNOw better, right?

Franklin Raines (CEO of Fannie Mae), 10th June 2004: "These subprime assets are so riskless that their capital for holding them should be under 2 percent."

Financial experts kNOw better, right?

Joseph Cassano (Head of Financial Products at AIG), 2007: "It is hard for us, without being flippant, to even see a scenario within any kind of realm of reason that would see us losing one dollar in any of these Credit Default Swap transactions."

Financial experts kNOw better, right?

In December 2007, Goldman Sachs chief investment strategist Abby Joseph Cohen made a Fisher-like prediction of her own. She suggested the S&P 500 would hit 1,675 by the end of 2008, a climb of 14% — it actually ended below 900.

Financial experts kNOw better, right?
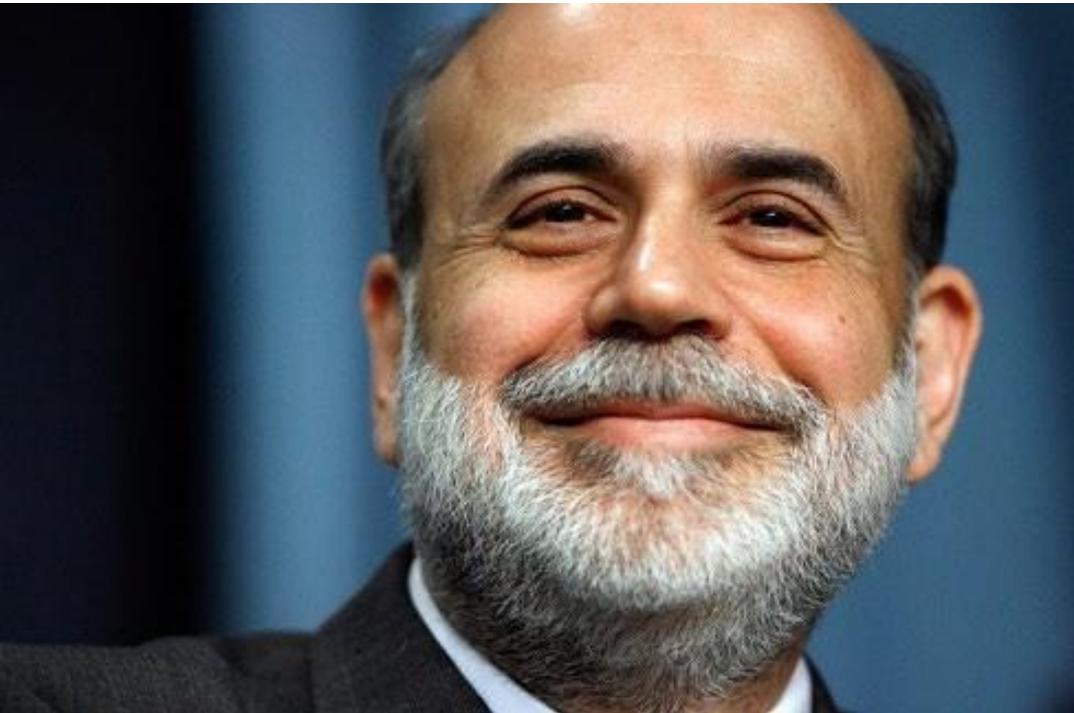
Ben Bernanke, 10th January 2008 - "The Federal Reserve is currently not forecasting a recession."

Financial experts kNOw better, right?

Donald Luskin (US investment guru), 14th September 2008: "Anyone who says we're in a recession, or heading into one—especially the worst one since the Great Depression—is making up his own private definition of 'recession'."

Coin Flipping as Insight

Are Coin Flips Really Random?
Adler, David E. "A Reliable Randomizer, Turned on Its Head." The Washington Post, August 2, 2009.
http://www.washingtonpost.com/wp-dyn/content/article/2009/07/31/AR2009073104170.html

"Generate a long series of coin flips producing heads and tails with 50% odds each and fill up sheets of paper. If the series is long enough you may get eight heads or eight tails in a row, perhaps even ten of each. Yet you know that in spite of these wins the conditional odds of getting a head or a tail is still 50%."

Named by *Fortune*
ONE OF THE SMARTEST BOOKS OF ALL TIME

FOOLED

BY

RANDOMNESS

The Hidden Role of Chance
in Life and in the Markets

NASSIM NICHOLAS TALEB

SECOND EDITION, UPDATED BY THE AUTHOR

Taleb, Nassim Nicholas (2008-10-06). Fooled by Randomness: The Hidden Role of Chance in Life and in the Markets (Incerto) (Kindle Locations 2813-2815). Random House Publishing Group. Kindle Edition.

100 Simulations: Avg~4.7 / # 4 > 70

Analysis by Kevin Webb, CFA. WSJ and Bloomberg forecasts as published. Econ data from FRED.

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The Flip Side of the Coin

"DR. THEODORE P. HILL asks his mathematics students at the Georgia Institute of Technology to go home and either flip a coin 200 times and record the results, or merely pretend to flip a coin and fake 200 results. The following day he runs his eye over the homework data, and to the students' amazement, he easily fingers nearly all those who faked their tosses."

Browne, Malcom W. "Following Benford's Law, or Looking Out for No. 1." New York Times, August 4, 1998.
http://www.nytimes.com/1998/08/04/science/following-benford-s-law-or-looking-out-for-no-1.html

Odds of 6 Heads in a row on 200 flips?

WolframAlpha | PRO PREMIUM

probability of 6 heads in a row 200 coin flips

Web Apps   Examples   Random

Input interpretation:

| sequence of coin flips | number of flips | 200 |
| | consecutive heads | 6 |

Probability:

10 055 065 607 232 664 699 800 060 596 833 042 695 309 909 291 044 ∵
214 980 169 /
12 554 203 470 773 361 527 671 578 846 415 332 832 204 710 888 ∵
928 069 025 792 ≈ 0.800932

Approximate chance:

1 in 1.2

Approximate expected length of longest run of heads:

$$-\frac{1}{2} + \frac{\gamma}{\log(2)} + \frac{\log(100)}{\log(2)} \approx 6.9766$$

$\log(x)$ is the natural logarithm
γ is the Euler-Mascheroni constant

Download page   POWERED BY THE WOLFRAM LANGUAGE

http://www.wolframalpha.com/input/?i=probability+of+6+heads+in+a+row+200+coin+flips

Hurricanes & The Iliad
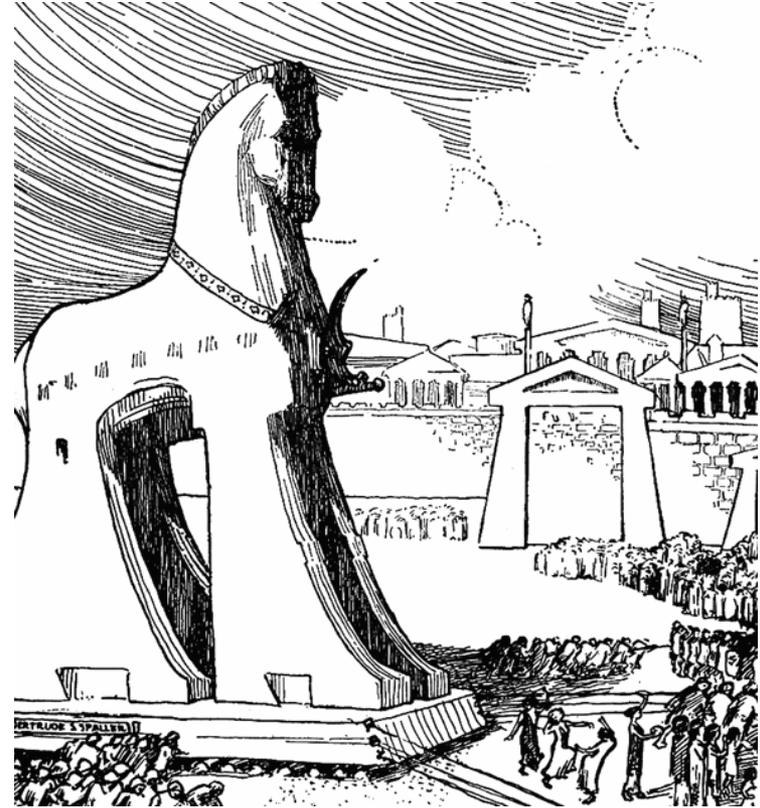
Technically the Trojan Horse is not mentioned in The Iliad
Trojan Horse. (2016, January 6). In Wikipedia, The Free Encyclopedia. Retrieved 19:02, January 10, 2016, from
https://en.wikipedia.org/w/index.php?title=Trojan_Horse&oldid=698496365

Hurricane Rita

Hurricane Rita

Hurricane Rita

Hurricane Rita Storm Track (2005) — LawrencevilleWeather.com

Hurricane Ike

Hurricane Ike

Chalcas the wise

"...Chalcas the wise, the Grecian priest and guide,
That sacred seer, whose comprehensive view,
The past, the present, and the future knew..."

Wall Street Journal Economic Forecast Survey

- Updated Monthly

- Includes Identities

- Spreadsheet Data

History Alone

10Yr Treasury Yield: 12/31/03 - 12/31/08
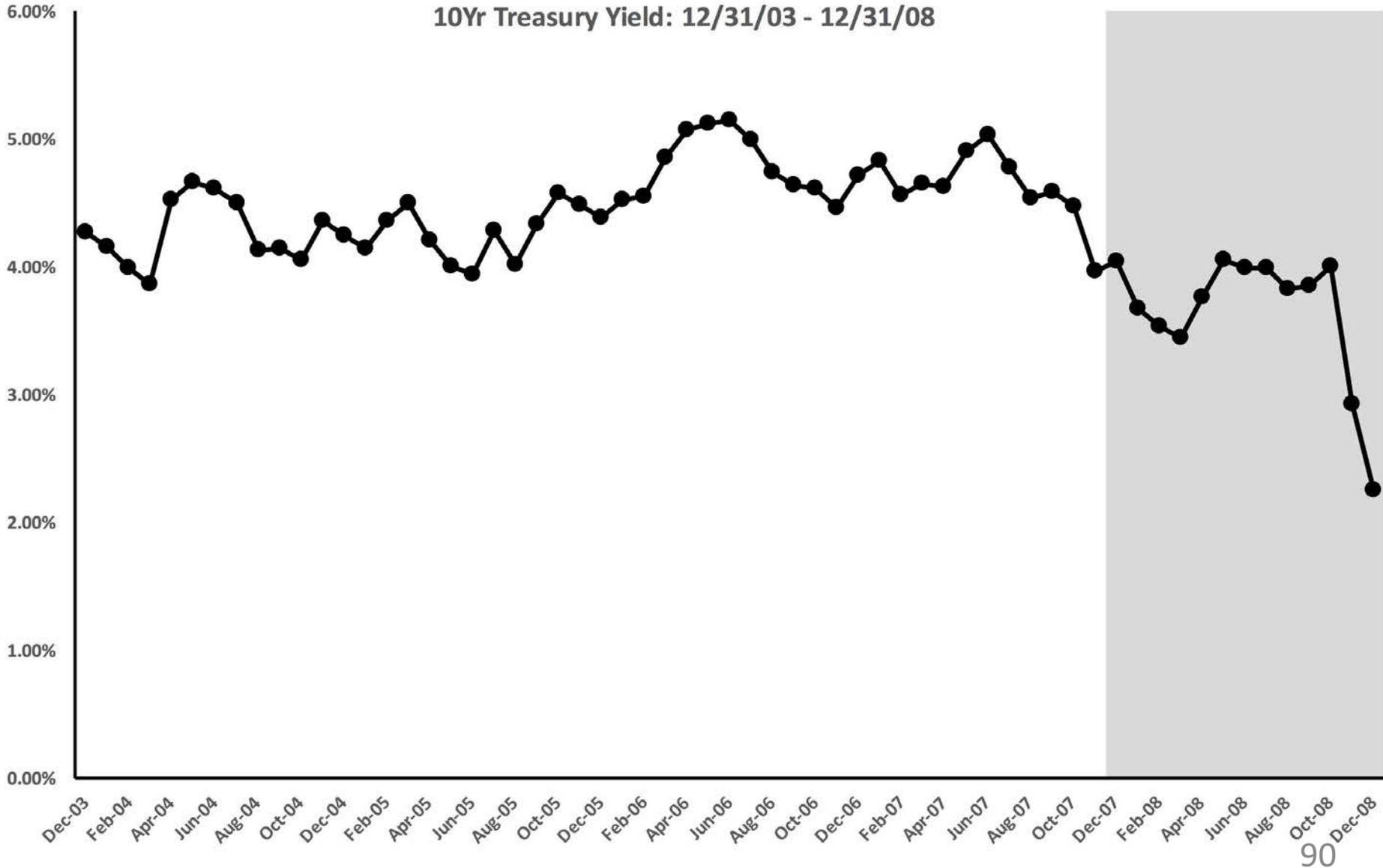
Analysis by Kevin Webb, CFA. WSJ and Bloomberg forecasts as published. Econ data from FRED.

Forecast Alone

10Yr Treasury Yield: 12/31/03 - 12/31/08

Recession (NBER)

– △ – Wall Street Journal Survey Median Forecast: 12-2007
– △ – Wall Street Journal Survey Median Forecast: 12-2006
– ○ – Wall Street Journal Survey Median Forecast: 12-2005
– ☐ – Wall Street Journal Survey Median Forecast: 12-2004
– ☐ – Wall Street Journal Survey Median Forecast: 12-2003

Data labels: 4.70%, 5.14%, 4.78%, 5.10%, 4.90%, 5.00%, 4.70%, 4.88%, 4.10%, 4.30%

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Analysis by Kevin Webb, CFA. WSJ and Bloomberg forecasts as published. Econ data from FRED.

All Together

10Yr Treasury Yield: 12/31/03 - 12/31/08

Legend:
- Recession (NBER)
- Actual 10Yr Treasury Yield
- Wall Street Journal Survey Median Forecast: 12-2007
- Wall Street Journal Survey Median Forecast: 12-2006
- Wall Street Journal Survey Median Forecast: 12-2005
- Wall Street Journal Survey Median Forecast: 12-2004
- Wall Street Journal Survey Median Forecast: 12-2003

Analysis by Kevin Webb, CFA. WSJ and Bloomberg forecasts as published. Econ data from FRED.

Chalcas Chart: Dec-08 to Dec-13

10Yr Treasury Yield: 12/31/08 - 12/31/13

Legend:
- Recession (NBER)
- Actual 10Yr Treasury Yield
- Wall Street Journal Survey Min Forecast: 12-2011
- Wall Street Journal Survey 25th Percentile Forecast: 12-2011
- Wall Street Journal Survey Median Forecast: 12-2011
- Wall Street Journal Survey 75th Percentile Forecast: 12-2011
- Wall Street Journal Survey Max Forecast: 12-2011

Data labels: 5.30%, 4.60%, 4.56%, 3.93%, 3.50%, 3.28%, 3.00%, 3.21%, 2.95%, 2.70%, 3.00%, 2.67%, 2.50%, 2.40%, 2.37%, 2.10%, 2.40%, 2.20%, 2.00%, 1.60%, 1.50%, 1.50%, 1.50%, 1.50%

Analysis by Kevin Webb, CFA. WSJ and Bloomberg forecasts as published. Econ data from FRED.

Let's Focus. How did they do?

10Yr Treasury Yield: 12/31/11 - 12/31/13

Recession (NBER)

- Wall Street Journal Survey Min Forecast: 12-2011
- Wall Street Journal Survey 25th Percentile Forecast: 12-2011
- Wall Street Journal Survey Median Forecast: 12-2011
- Wall Street Journal Survey 75th Percentile Forecast: 12-2011
- Wall Street Journal Survey Max Forecast: 12-2011

Analysis by Kevin Webb, CFA. WSJ and Bloomberg forecasts as published. Econ data from FRED.

How did "they" do? Did You Remember?

10Yr Treasury Yield: 12/31/11 - 12/31/13

Recession (NBER)
Actual 10Yr Treasury Yield
Wall Street Journal Survey Min Forecast: 12-2011
Wall Street Journal Survey 25th Percentile Forecast: 12-2011
Wall Street Journal Survey Median Forecast: 12-2011
Wall Street Journal Survey 75th Percentile Forecast: 12-2011
Wall Street Journal Survey Max Forecast: 12-2011

Analysis by Kevin Webb, CFA. WSJ and Bloomberg forecasts as published. Econ data from FRED.

Who did the best?

Overall Rank for Wall Street Journal 12-2011 Survey Forecasts for 06/30/12						
Overall Rank	Forecaster	Fed Funds Rate	10Yr Treasury Yield	Unemployment Rate	CPI YoY	GDP
1	Moody's Investors Service	9	11	21	12	9
2	Univ of Central FL	9	24	25	4	3
3	IHS Global Insight	9	24	30	4	6
4	NEMA Business Information Services	*1*	9	25	27	15
5	Capital Economics	24	*1*	41	4	9
6	The Conference Board	9	6	41	19	7
7	Mesirow Financial	*1*	11	21	8	43
8	Credit Suisse	24	3	30	8	25
9	Goldman Sachs & Co.	9	18	30	27	9
10	PNC Financial Services Group	*1*	17	21	21	34
11	Comerica Bank	9	32	6	16	32
12	*Morgan Stanley*	*8*	*6*	*37*	*13*	*32*
12	*UCLA Anderson Forecast*	*9*	*22*	*52*	*10*	*3*
14	*Bank of America Securities-Merrill*	*24*	*3*	*41*	*14*	*15*
14	*JPM*	*24*	*32*	*30*	*2*	*9*
16	Societe Generale	45	3	48	3	*1*
17	California State University	*1*	18	14	32	38
18	The Northern Trust	20	8	21	27	30
19	*Macroeconomic Advisers*	*24*	*31*	*30*	*10*	*15*
19	*Parsec Financial*	*24*	*27*	*4*	*1*	*54*
21	Fannie Mae	42	11	41	14	3
22	Decision Economics Inc.	*1*	32	6	35	38
23	Barclays	9	45	6	19	34
24	Vanderbilt University	24	11	41	16	25
25	Nomura Securities International Inc.	24	28	25	16	25

Analysis by Kevin Webb, CFA. WSJ and Bloomberg forecasts as published. Econ data from FRED.

Who did the best the next time? Not the same firms.

Overall Rank for Wall Street Journal 12-2011 Survey Forecasts for 12/31/12						
Overall Rank	**Forecaster**	**Fed Funds Rate**	**10Yr Treasury Yield**	**Unemployment Rate**	**CPI YoY**	**GDP**
1	NEMA Business Information Services	*1*	6	30	12	2
2	Mesirow Financial	*1*	17	20	2	28
3	Capital Economics	24	*1*	43	2	3
4	Univ of Central FL	9	24	30	6	5
5	IHS Global Insight	9	23	34	2	9
6	The Conference Board	9	4	30	32	5
7	Bank of America Securities-Merrill	24	9	43	10	*1*
8	Morgan Stanley	8	3	34	26	19
9	Credit Suisse	24	6	34	11	18
10	California State University	*1*	17	20	20	36
11	JPM	24	17	34	6	22
12	Nationwide Insurance	9	16	24	46	9
13	PNC Financial Services Group	*1*	26	24	32	22
14	Economic Analysis	7	33	3	44	19
15	Vanderbilt University	24	5	43	20	16
16	*Goldman Sachs & Co.*	*9*	*17*	*43*	*18*	*22*
16	*Economic and Revenue Forecast*	*24*	*28*	*17*	*12*	*28*
18	*UCLA Anderson Forecast*	*9*	*33*	*52*	*2*	*16*
18	*Decision Economics Inc.*	*1*	*30*	*7*	*27*	*47*
20	Fannie Mae	42	9	43	15	4
21	Nomura Securities International Inc.	24	30	24	8	28
22	Perna Associates	*1*	41	17	27	31
23	*Comerica Bank*	*9*	*33*	*10*	*27*	*39*
23	*Moody's Investors Service*	*9*	*28*	*20*	*20*	*41*
25	International Council of Shopping	52	9	10	40	9

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Analysis by Kevin Webb, CFA. WSJ and Bloomberg forecasts as published. Econ data from FRED.

What about the FED?

What about the FED?

What about the FED?

What about the FED?

Fed Funds 12/31/17 Forecasts
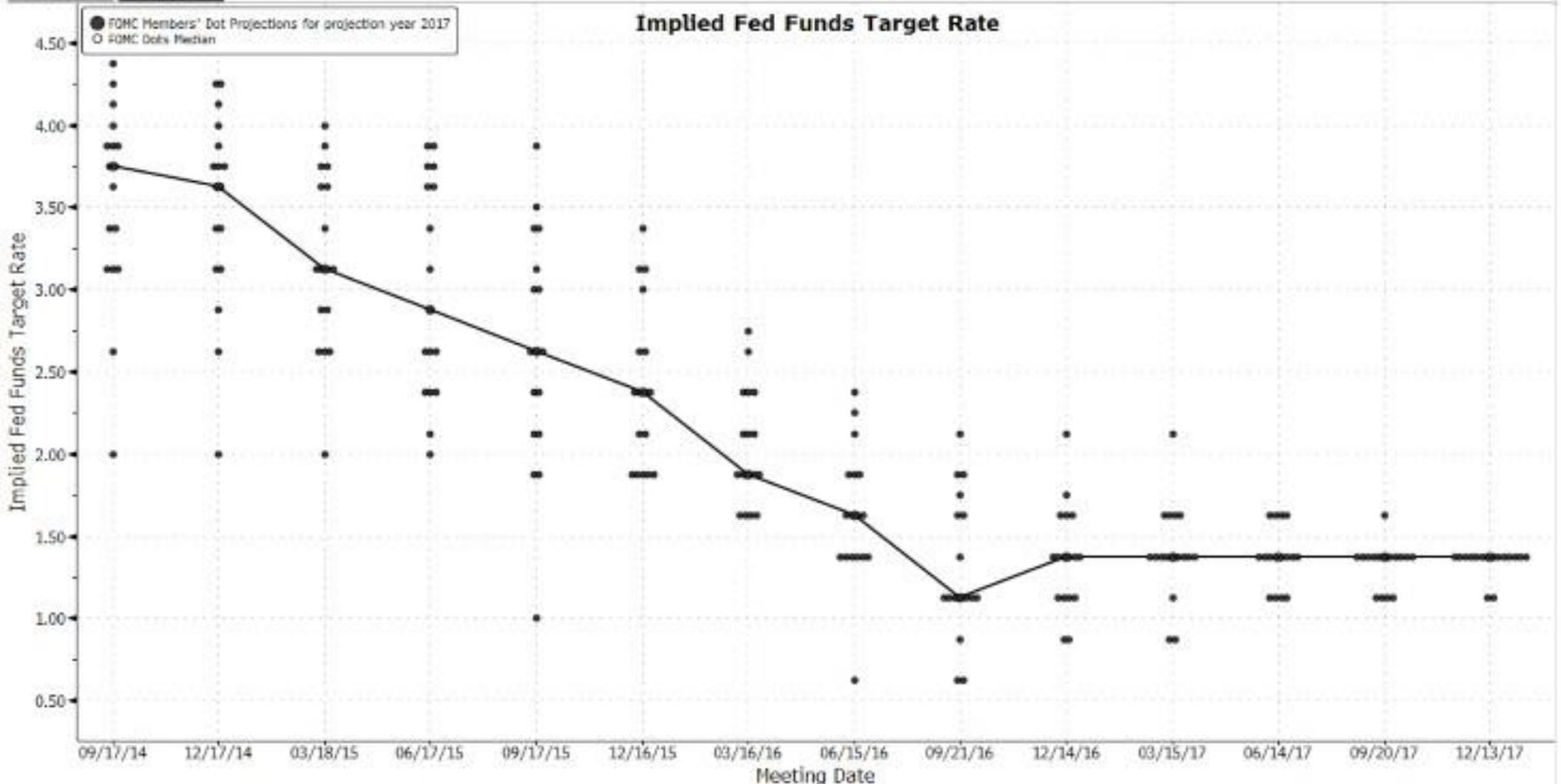
Which forecaster should you follow?
The average/median forecast

"If you're looking for an economic forecast, the best place to turn is the average or aggregate prediction rather than that of any one economist. … This property— group forecasts beat individual ones— has been found to be true in almost every field in which it has been studied."

Silver, Nate (2012-09-27). The Signal and the Noise: Why So Many Predictions Fail-but Some Don't (p. 197-198). Penguin Group US. Kindle Edition.

"The group mean forecasts from a series of surveys are on the average over time more accurate than most of the corresponding sets of individual predictions. This is a strong conclusion, which applies to all variables and predictive horizons covered and is consistent with evidence for different periods and from other studies." - Zarnowitz, Victor (January 1992). Business Cycles: Theory, History, Indicators, and Forecasting (p. 457). University of Chicago Press. Downloadable from http://www.nber.org/books/zarn92-1

Required for planning purposes...

"Nobel laureate Kenneth Arrow has warned, "[O]ur knowledge of the way things work, in society or in nature, comes trailing clouds of vagueness. Vast ills have followed a belief in certainty.""

"... The young statisticians in the Weather Division ... finding that prevailing techniques were not significantly more reliable than the null ... sent a memo to the General of the Air Corps suggesting that the group be disbanded. Six months later ... 'The general is well aware that your forecasts are no good. However, they are required for planning purposes.' The group remained intact."

For fools rush in where angels fear to tread
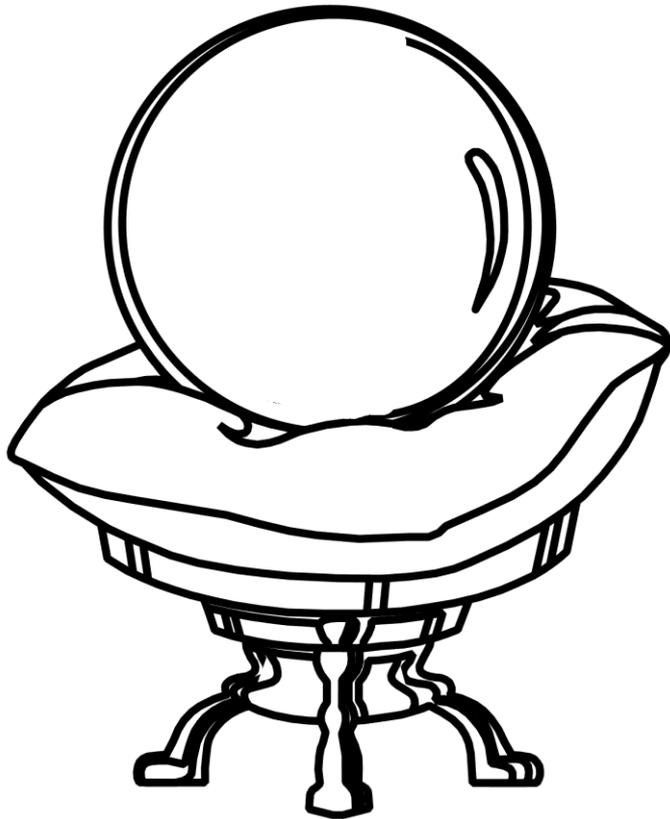
"He who lives by the crystal ball soon learns to eat ground glass."

C.C. Gaither;Alma E Cavazos-Gaither. Statistically Speaking: A Dictionary of Quotations (Kindle Locations 960-961). Kindle Edition.

Chalcas Chart: Dec-16 to Dec-22 on Nov-19 Fed Funds Rate: 12/31/16 - 12/31/22

Legend:
- Recession (NBER)
- Actual Fed Funds Rate
- Wall Street Journal Survey Min Forecast: 11-2019
- Wall Street Journal Survey 25th Percentile Forecast: 11-2019
- Wall Street Journal Survey Median Forecast: 11-2019
- Wall Street Journal Survey 75th Percentile Forecast: 11-2019
- Wall Street Journal Survey Max Forecast: 11-2019

Analysis by Kevin Webb, CFA. WSJ and Bloomberg forecasts as published. Econ data from FRED.

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Chalcas Chart: Dec-16 to Dec-22 on Nov-19

10Yr Treasury Yield: 12/31/16 - 12/31/22

Legend:
- Recession (NBER)
- Actual 10Yr Treasury Yield
- Wall Street Journal Survey Min Forecast: 11-2019
- Wall Street Journal Survey 25th Percentile Forecast: 11-2019
- Wall Street Journal Survey Median Forecast: 11-2019
- Wall Street Journal Survey 75th Percentile Forecast: 11-2019
- Wall Street Journal Survey Max Forecast: 11-2019

Max Forecast values: 2.13%, 2.69%, 3.07%, 3.30%, 3.50%, 3.90%, 4.10%
75th Percentile values: 1.87%, 2.00%, 2.21%, 2.35%, 2.50%, 2.78%, 2.99%
Median values: 1.75%, 1.81%, 2.00%, 2.15%, 2.25%, 2.26%, 2.43%
25th Percentile values: 1.70%, 1.70%, 1.70%, 1.80%, 1.93%, 2.00%, 2.05%
Min Forecast values: 1.25%, 1.15%, 1.10%, 1.20%, 1.40%, 1.25%, 1.00%

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Analysis by Kevin Webb, CFA. WSJ and Bloomberg forecasts as published. Econ data from FRED.

Chalcas Chart: Dec-16 to Dec-22 on Nov-19

CPI YoY: 12/31/16 - 12/31/22

Legend:
- Recession (NBER)
- Actual CPI YoY
- Wall Street Journal Survey Min Forecast: 11-2019
- Wall Street Journal Survey 25th Percentile Forecast: 11-2019
- Wall Street Journal Survey Median Forecast: 11-2019
- Wall Street Journal Survey 75th Percentile Forecast: 11-2019
- Wall Street Journal Survey Max Forecast: 11-2019

Data labels (Max Forecast, red): 2.30%, 2.60%, 3.00%, 3.00%, 3.00%, 2.80%, 2.70%

Data labels (75th Percentile, brown): 2.10%, 2.10%, 2.20%, 2.20%, 2.30%, 2.30%, 2.38%

Data labels (Median, black): 1.90%, 2.00%, 2.00%, 2.00%, 2.10%, 2.20%, 2.20%

Data labels (25th Percentile, blue): 1.80%, 1.88%, 1.80%, 1.90%, 2.00%, 2.00%, 2.00%

Data labels (Min Forecast, light blue): 1.70%, 1.50%, 1.30%, 1.30%, 1.40%, 1.50%, 1.50%

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Analysis by Kevin Webb, CFA. WSJ and Bloomberg forecasts as published. Econ data from FRED.

Chalcas Chart: Dec-16 to Dec-22 on Nov-19 Unemployment Rate: 12/31/16 - 12/31/22

Legend:
- Recession (NBER)
- Actual Unemployment Rate
- Wall Street Journal Survey Min Forecast: 11-2019
- Wall Street Journal Survey 25th Percentile Forecast: 11-2019
- Wall Street Journal Survey Median Forecast: 11-2019
- Wall Street Journal Survey 75th Percentile Forecast: 11-2019
- Wall Street Journal Survey Max Forecast: 11-2019

Analysis by Kevin Webb, CFA. WSJ and Bloomberg forecasts as published. Econ data from FRED.

Chalcas Chart: Dec-16 to Dec-22 on Nov-19

Crude Oil: 12/31/16 - 12/31/22

Legend:
- Recession (NBER)
- Actual Crude Oil
- Wall Street Journal Survey Min Forecast: 11-2019
- Wall Street Journal Survey 25th Percentile Forecast: 11-2019
- Wall Street Journal Survey Median Forecast: 11-2019
- Wall Street Journal Survey 75th Percentile Forecast: 11-2019
- Wall Street Journal Survey Max Forecast: 11-2019

Analysis by Kevin Webb, CFA. WSJ and Bloomberg forecasts as published. Econ data from FRED.

Chalcas Chart: Dec-16 to Dec-22 on Nov-19

GDP: 12/31/16 - 12/31/20

Legend:
- Recession (NBER)
- Actual GDP
- Wall Street Journal Survey Min Forecast: 11-2019
- Wall Street Journal Survey 25th Percentile Forecast: 11-2019
- Wall Street Journal Survey Median Forecast: 11-2019
- Wall Street Journal Survey 75th Percentile Forecast: 11-2019
- Wall Street Journal Survey Max Forecast: 11-2019

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Analysis by Kevin Webb, CFA. WSJ and Bloomberg forecasts as published. Econ data from FRED.

Fed Funds Visual Accuracy Test

Fed Funds Rate: 12/31/11 - 12/31/17

Legend:
- Recession (NBER)
- Actual Fed Funds Rate
- Wall Street Journal Survey Median Forecast: 12-2011
- Wall Street Journal Survey Median Forecast: 12-2012
- Wall Street Journal Survey Median Forecast: 12-2013
- Wall Street Journal Survey Median Forecast: 12-2014
- Wall Street Journal Survey Median Forecast: 12-2015

Analysis by Kevin Webb, CFA. WSJ and Bloomberg forecasts as published. Econ data from FRED.

10Yr Treasury Yield Visual

10Yr Treasury Yield: 12/31/11 - 12/31/17

Recession (NBER)

Actual 10Yr Treasury Yield
Wall Street Journal Survey Median Forecast: 12-2011
Wall Street Journal Survey Median Forecast: 12-2012
Wall Street Journal Survey Median Forecast: 12-2013
Wall Street Journal Survey Median Forecast: 12-2014
Wall Street Journal Survey Median Forecast: 12-2015

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Analysis by Kevin Webb, CFA. WSJ and Bloomberg forecasts as published. Econ data from FRED.

CPI YoY Visual Accuracy

CPI YoY: 12/31/11 - 12/31/17

114

Analysis by Kevin Webb, CFA. WSJ and Bloomberg forecasts as published. Econ data from FRED.
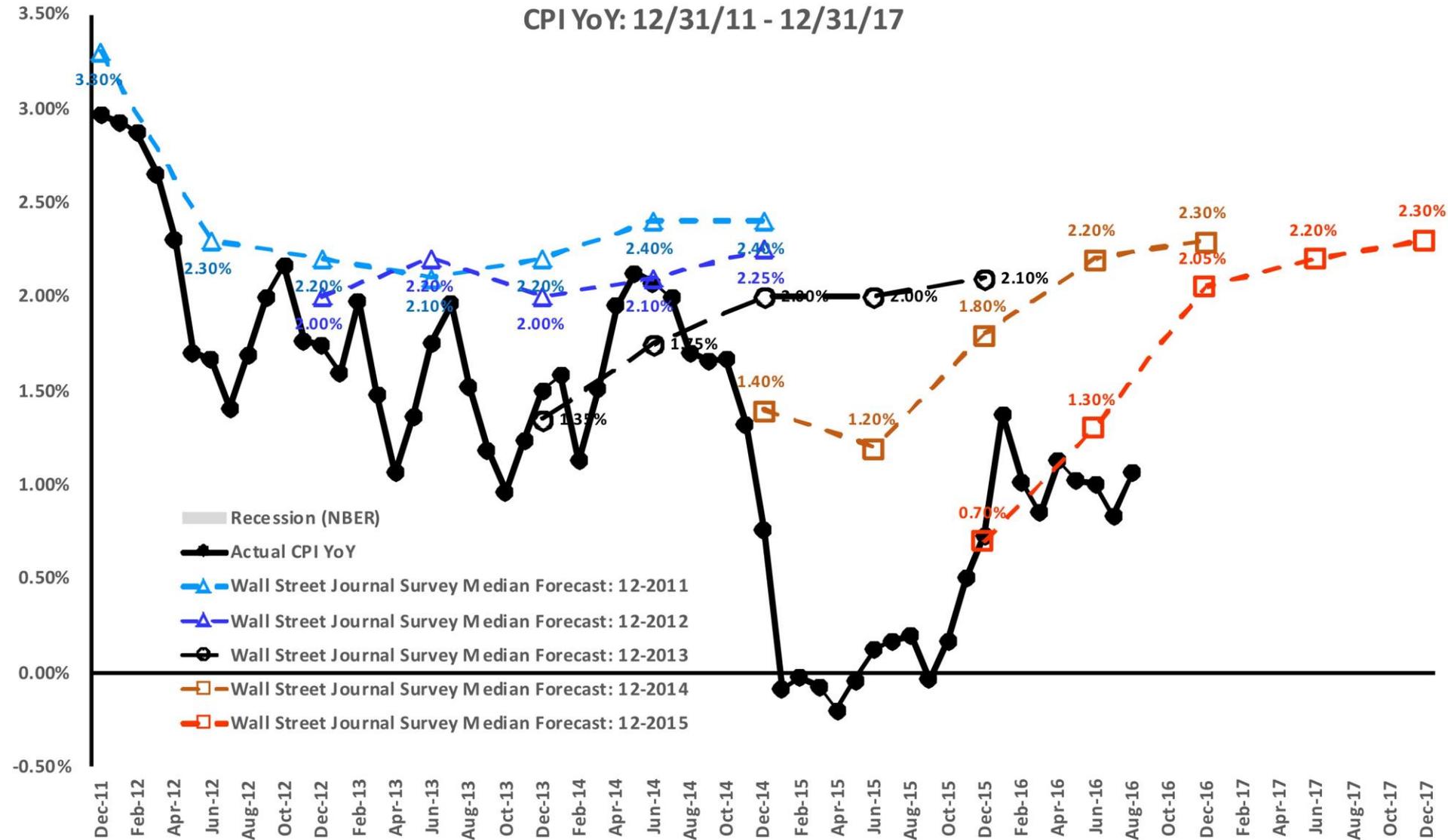
Unemployment Rate Visual

Unemployment Rate: 12/31/11 - 12/31/17

8.80%
8.70%
8.50%
8.30%
8.00%
7.80%
7.70%
7.50%
7.50%
7.30%
7.20%
7.00%
7.00%
6.80%
6.50%
6.20%
6.00%
5.80%
5.50%
5.30%
5.20%
5.10%
5.00%
4.80%
4.60%
4.60%
4.53%

Recession (NBER)
Actual Unemployment Rate
Wall Street Journal Survey Median Forecast: 12-2011
Wall Street Journal Survey Median Forecast: 12-2012
Wall Street Journal Survey Median Forecast: 12-2013
Wall Street Journal Survey Median Forecast: 12-2014
Wall Street Journal Survey Median Forecast: 12-2015

Analysis by Kevin Webb, CFA. WSJ and Bloomberg forecasts as published. Econ data from FRED.

GDP Visual Accuracy

GDP: 12/31/11 - 12/31/16

Legend:
- Recession (NBER)
- Actual GDP
- Wall Street Journal Survey Median Forecast: 12-2011
- Wall Street Journal Survey Median Forecast: 12-2012
- Wall Street Journal Survey Median Forecast: 12-2013
- Wall Street Journal Survey Median Forecast: 12-2014
- Wall Street Journal Survey Median Forecast: 12-2015

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Analysis by Kevin Webb, CFA. WSJ and Bloomberg forecasts as published. Econ data from FRED.

Crude Oil Visual Accuracy

Crude Oil: 12/31/11 - 12/31/17

Legend:
- Recession (NBER)
- Actual Crude Oil
- Wall Street Journal Survey Median Forecast: 12-2011
- Wall Street Journal Survey Median Forecast: 12-2012
- Wall Street Journal Survey Median Forecast: 12-2013
- Wall Street Journal Survey Median Forecast: 12-2014
- Wall Street Journal Survey Median Forecast: 12-2015

Data labels: 98.50, 100.00, 99.00, 87.55, 91.00, 94.00, 97.25, 95.75, 95.25, 65.00, 68.25, 71.45, 40.00, 45.00, 49.00, 52.00, 55.00

Analysis by Kevin Webb, CFA. WSJ and Bloomberg forecasts as published. Econ data from FRED.

Federal Reserve

Home

Monetary Policy

Monetary policy is the Federal Reserve's actions, as a central bank, to achieve three goals specified by Congress: maximum employment, stable prices, and moderate long-term interest rates in the United States.

The Federal Reserve conducts the nation's monetary policy by managing the level of short-term interest rates and influencing the availability and cost of credit in the economy. Monetary policy directly affects interest rates; it indirectly affects stock prices, wealth, and currency exchange rates. Through these channels, monetary policy influences spending, investment, production, employment, and inflation in the United States.

Learn more

Federal Open Market Committee

FOMC Calendar

About the FOMC

Transcripts and other historical materials

Rules and Authorizations

FAQs

FOMC Longer-Run Goals and Monetary Policy Strategy (PDF)

Communications Policies:
Committee (PDF) | Staff (PDF)

Recent Documents

FOMC Statement: PDF | HTML
Released December 13, 2017

Projection Materials: PDF | HTML
Released December 13, 2017

Press Conference
December 13, 2017

FOMC Minutes: PDF | HTML
Released January 3, 2018

Upcoming Dates

Jan. 30-31   FOMC Meeting
Two-day meeting

Feb. 21   FOMC Minutes
Meeting of Jan. 30-31

March 20-21   FOMC Meeting
Two-day meeting
Press Conference

April 11   FOMC Minutes
Meeting of March 20-21

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https://www.federalreserve.gov/monetarypolicy.htm

Congressional

Budget and Economic Data

CBO regularly publishes data to accompany some of its key reports. These data have been published in the Budget and Economic Outlook and Updates and in their associated supplemental material, except for that from the Long-Term Budget Outlook.

BUDGET

- 10-Year Budget Projections
- Long-Term Budget Projections
- Historical Budget Data
- 10-Year Trust Fund Projections
- Detailed Revenue Projections
- Spending Projections, by Budget Account
- Estimates of Automatic Stabilizers

ECONOMIC

- 10-Year Economic Projections
- Potential GDP and Underlying Inputs

10-Year Economic Projections

Projections of output, prices, labor market measures, interest rates, and income.

Jun 2017	Jan 2017	Aug 2016	Jan 2016	Aug 2015	Jan 2015	Aug 2014
Feb 2014	Feb 2013					

Survey of Professional Forecasters

The Anxious Index
Probability of Decline in Real GDP in the Following Quarter
**Quarterly, 1968:Q4 to 2019:Q3**

https://www.philadelphiafed.org/research-and-data/real-time-center/survey-of-professional-forecasters/anxious-index

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Understanding Benchmarks
Concepts

Kevin Webb, CFA
kevin.p.webb@pjc.com

Philosophy, Strategy & Tactics

Sleep-Adusted returns via Suitability Benchmark using evidence based methods.

Philosophy

Tactics

Strategy

Investment philsophy is a coherent way of thinking about the markets, risk, return, investor behaviour, etc.

A plan of action or policy to achieve one or more goals (e.g., demonstrate good stewardship via a suitability benchmark).

Resources, skills & methods used to achieve the goal of a strategy (e.g., education, formulas, data, software, etc.)

The intersection of philosophy, strategy & tactics is the world of portfolio management

The difference between strategy and tactics: Strategy is done above the shoulders, Tactics are done below the shoulders.

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Designed and created by Kevin Webb, CFA
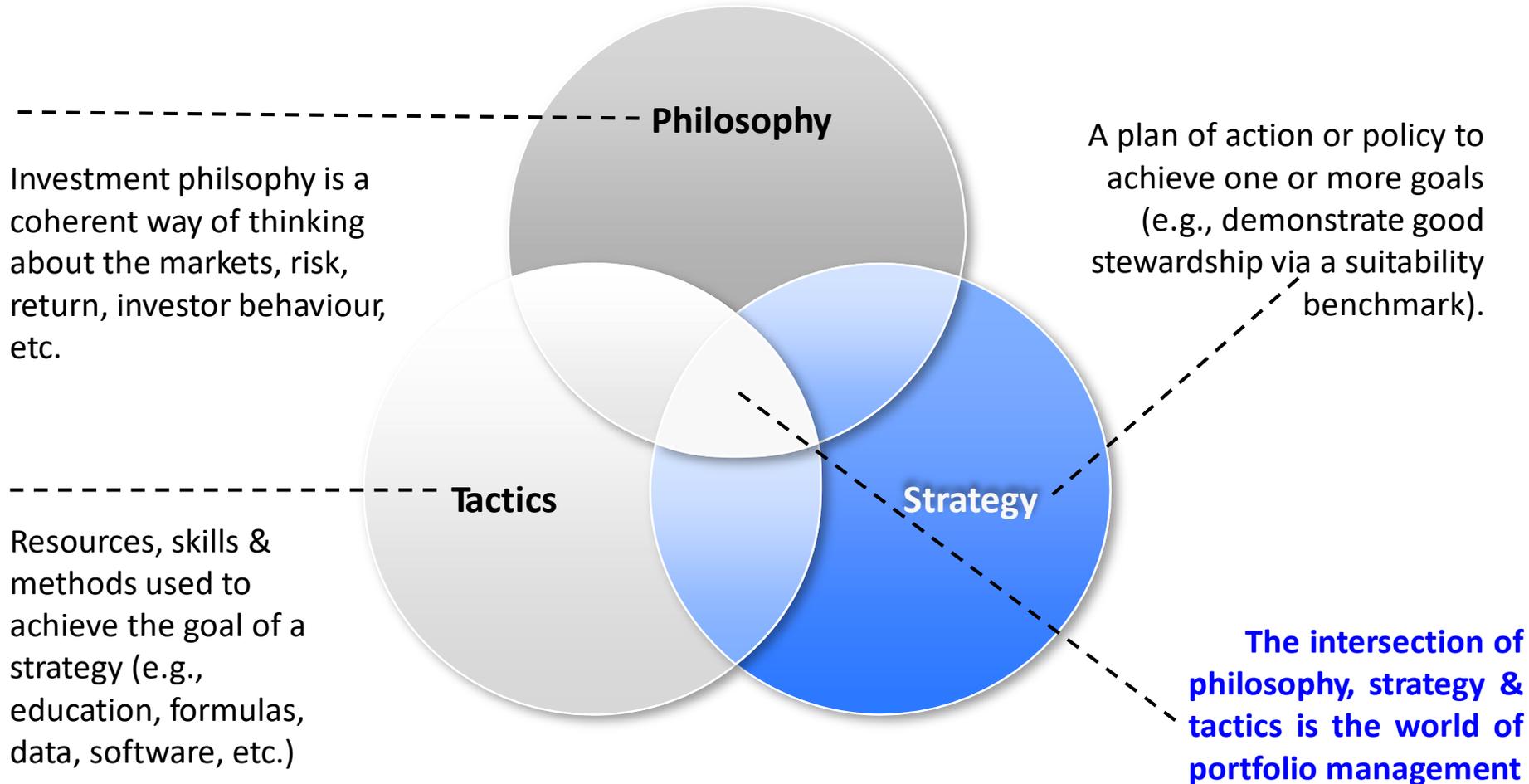
Understanding Benchmarks - Concepts

Agenda

1   Assumptions/Definitions

2   Benchmark/Index Examples

3   What Should I Benchmark?

4   How Should I Benchmark?

5   Excel'ing @ Benchmarks – Bonding with Excel

Risk Defined

More things can happen than will happen.

" … It has been philosophically defined by finance professor Elroy Dimson of London Business School this way: ***"Risk means more things can happen than will happen."*** In the end, risk is the gap between what investors think they know and what they end up learning— about their investments, about the financial markets, and about themselves. "

THE DEVIL'S FINANCIAL DICTIONARY

RUMOR, n. The Wall Street equivalent of a fact.

REGULATOR, n. A bureaucrat who attempts to stop rampaging elephants by brandishing feather dusters at them.

STOCK MARKET, n. A chaotic hive of millions of people who overpay for hope and underpay for value.

JASON ZWEIG
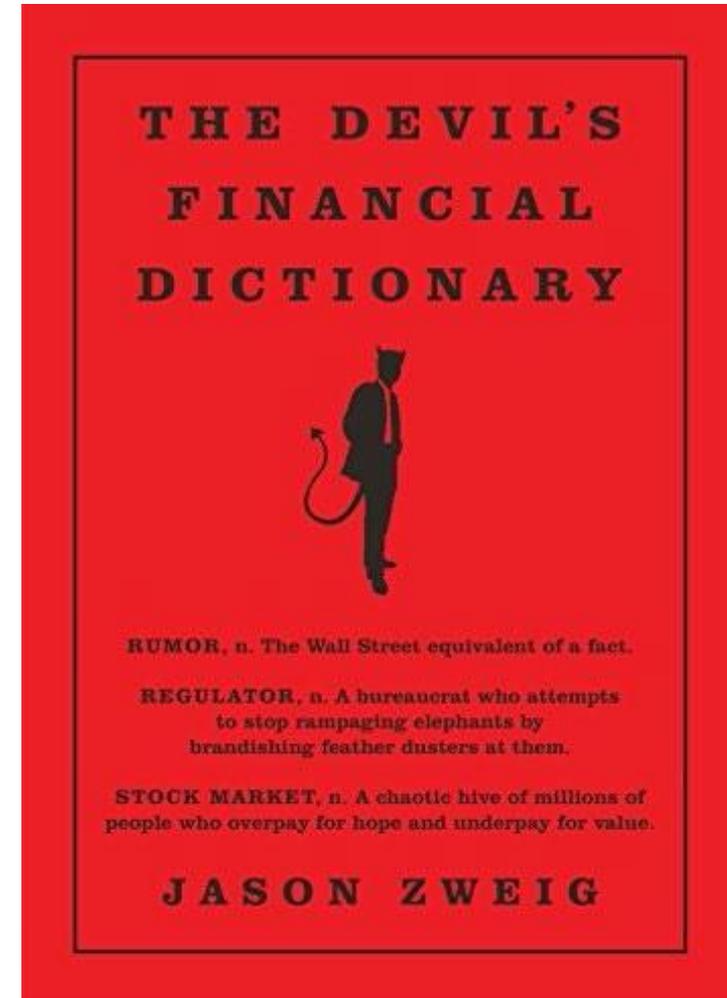
Risk & Return are Related

Finding the right trade-off is the key

" *The scientist who developed the Saturn 5 rocket that launched the first Apollo mission to the moon put it this way: *"You want a valve that doesn't leak and you try everything possible to develop one. But the real world provides you with a leaky valve. You have to determine how much leaking you can tolerate."* (Obituary of Arthur Rudolph, in The New York Times, January 3, 1996.) "

Peter L. Bernstein. Against the Gods: The Remarkable Story of Risk (Kindle Locations 69-71). Kindle Edition. Emphasis added.
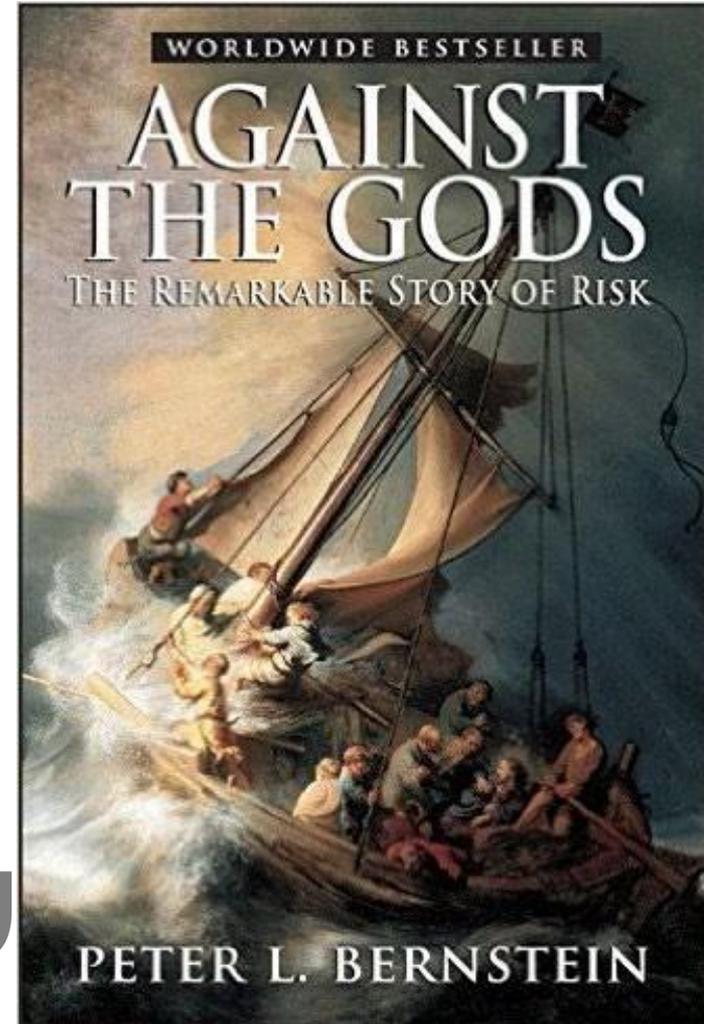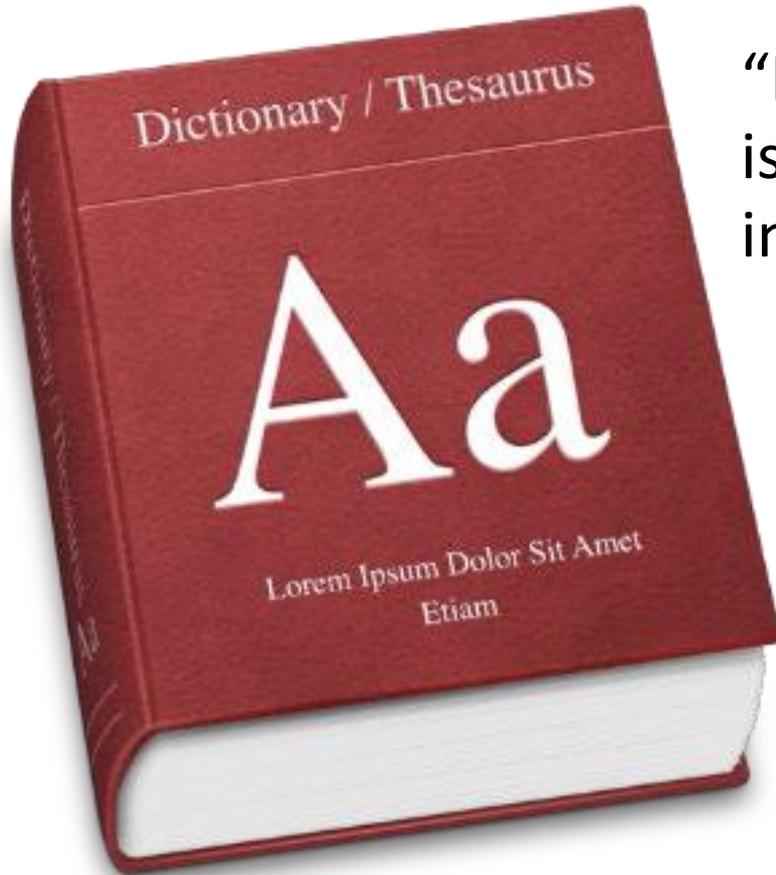
Definitions

"Knowledge is knowing a tomato is a fruit; Wisdom is not putting it in a fruit salad."

Benchmark

Definitions :

1   noun   a standard by which something can be measured or judged

2   noun   a surveyor's mark on a permanent object of predetermined position and elevation used as a reference point

benchmark | Computed by Wolfram|Alpha

Word frequency history :
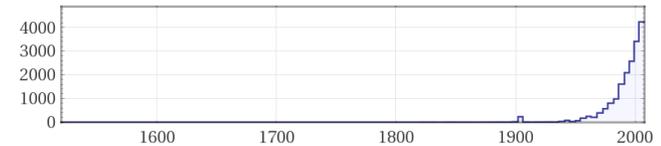
(from 1539 to 2007) (in occurrences per billion words per year)

benchmark | Computed by Wolfram|Alpha

Benchmarks ~ Expectations

Index

1   noun   a numerical scale used to compare variables with one another or with some reference number

2   noun   a number or ratio (a value on a scale of measurement) derived from a series of observed facts; can reveal relative changes as a function of time

3   noun   a mathematical notation indicating the number of times a quantity is multiplied by itself

4   noun   an alphabetical listing of names and topics along with page numbers where they are discussed

5   noun   the finger next to the thumb

6   verb   list in an index

7   verb   provide with an index

8   verb   adjust through indexation

(8 meanings)

index | Computed by Wolfram|Alpha

Word frequency history :
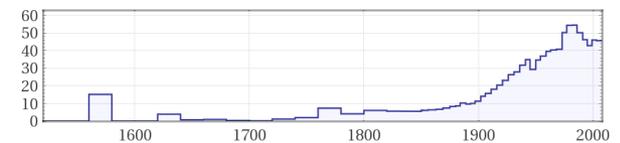
(from 1539 to 2007) (in occurrences per million words per year)

index | Computed by Wolfram|Alpha

WolframAlpha, http://www.wolframalpha.com/input/?i=index (December 30, 2016).

Benchmark/Index Examples

Benchmark does not necessarily mean an Index

INDICES

BENCHMARKS

Index
a numerical scale used to compare variables with one another or with some reference number … can reveal relative changes as a function of time.

Benchmark
A standard by which something can be measured or judged. Can help set expectations.

Not every index serves as a benchmark and not every benchmark is an index.
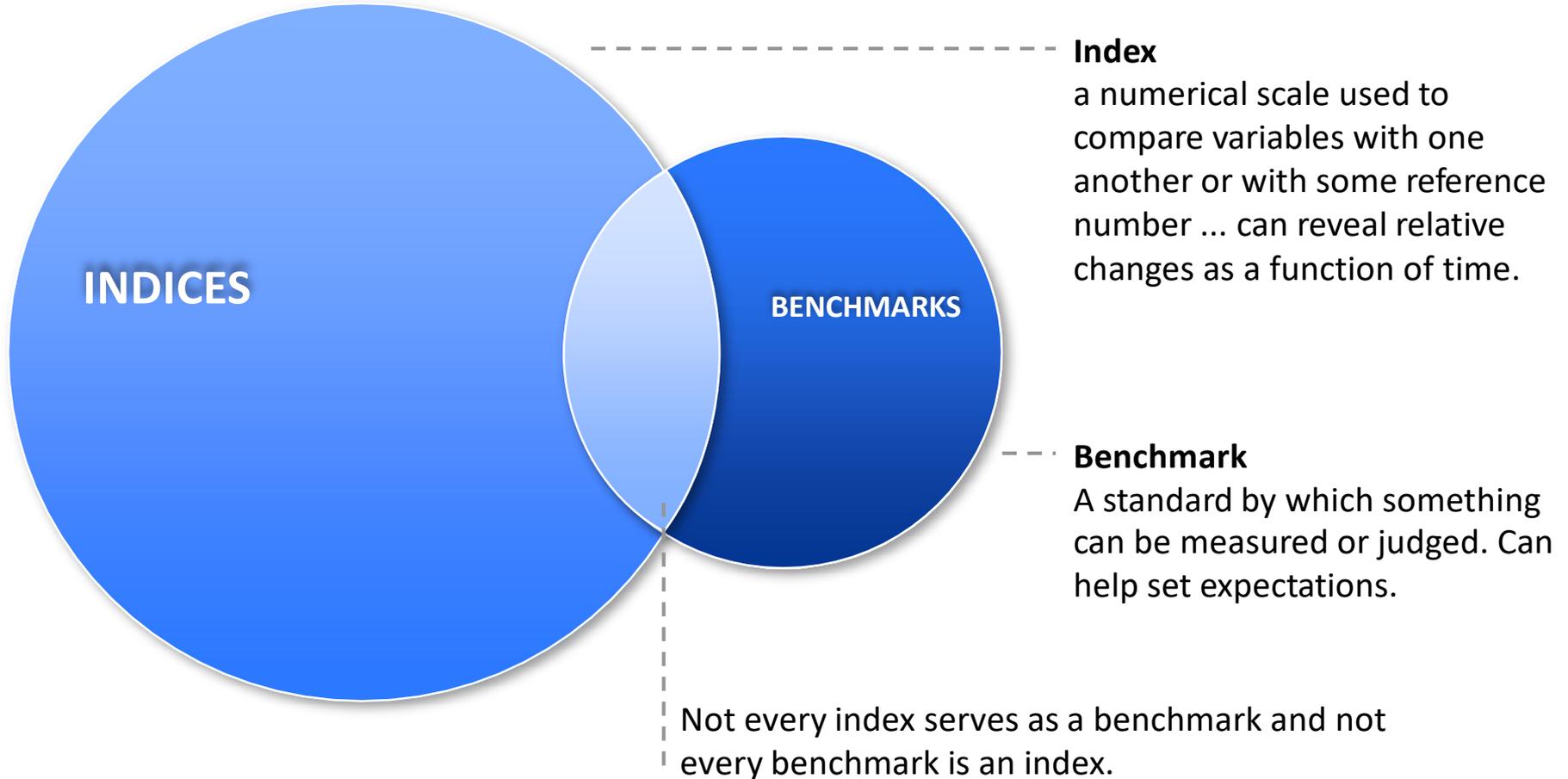
Benchmarking Fed Funds?
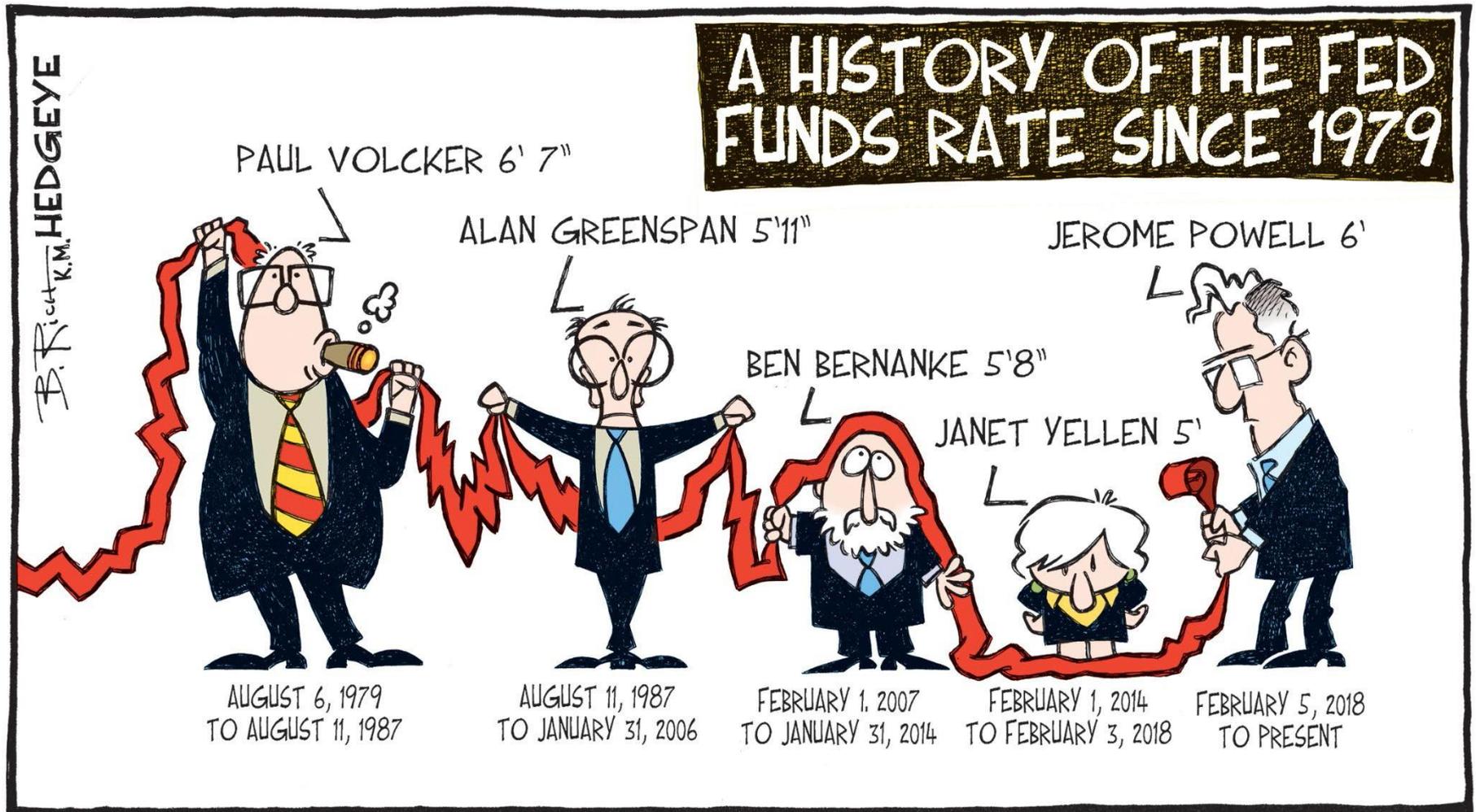
# Pure Benchmark Example – The Taylor Rule

"The Taylor rule is an equation John Taylor introduced in a 1993 paper that prescribes a value for the federal funds rate—the short-term interest rate targeted by the Federal Open Market Committee (FOMC)—based on the values of inflation and economic slack such as the output gap or unemployment gap."

Effective federal funds rate and Taylor rule prescription
Percent, Quarterly average

— Taylor rule prescription
— Actual Fed Funds Rate
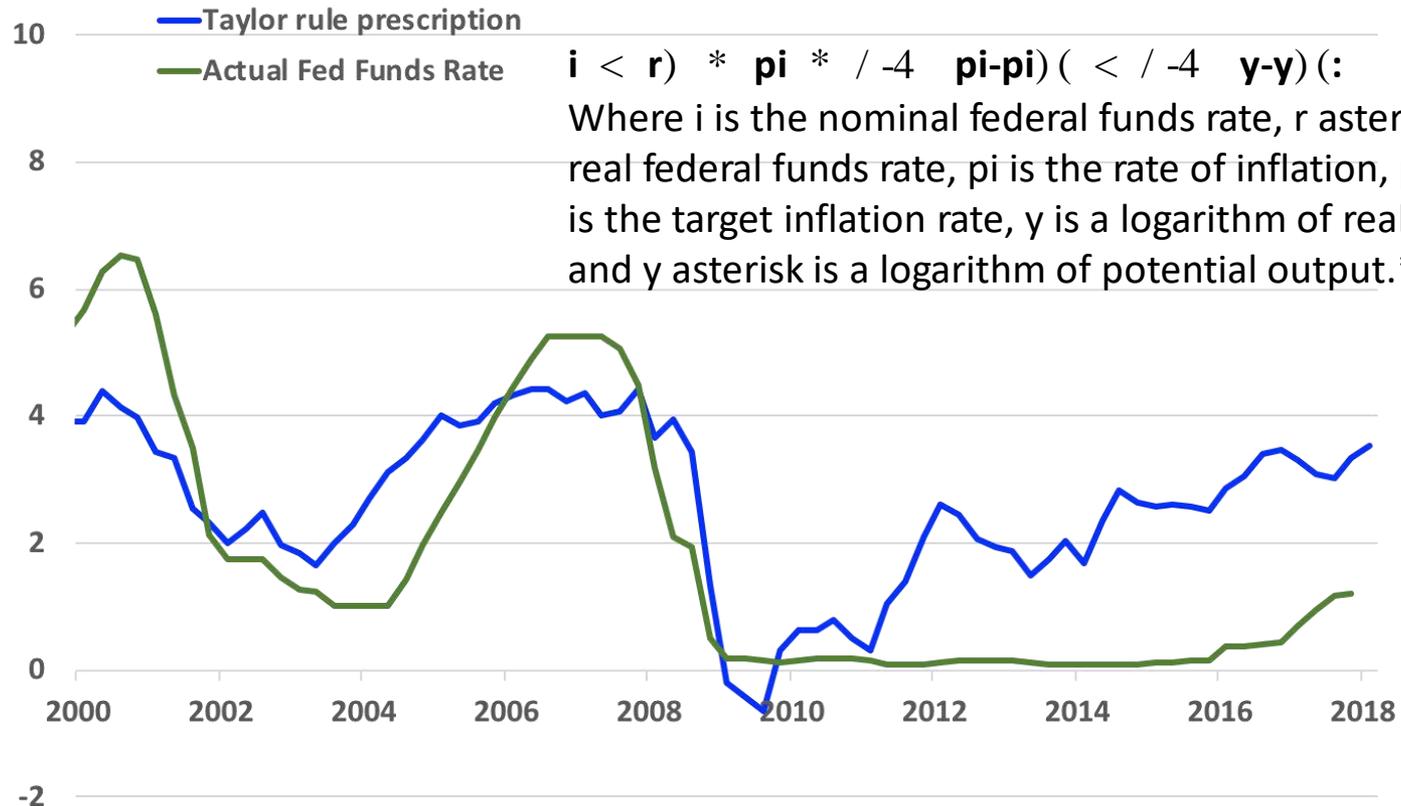
$$i < r) * pi * / -4 \quad pi\text{-}pi) (< / -4 \quad y\text{-}y) (:$$

Where i is the nominal federal funds rate, r asterisk is the real federal funds rate, pi is the rate of inflation, p asterisk is the target inflation rate, y is a logarithm of real output, and y asterisk is a logarithm of potential output.*

Pure Index Example – Christmas Price Index

The PNC Christmas Price Index® shows the current cost for one set of each of the gifts given in the song "The Twelve Days of Christmas."

TOTAL CHRISTMAS PRICE INDEX (CPI)

$34,558.65
(+0.6%)

The cost of this year's CPI rose ever so slightly, driven by the cost increases for the Pear Tree, the increased demand for Golden Rings and wage increases for the Lords-a-Leaping

TRUE COST OF CHRISTMAS IN SONG

$157,558.00
(+0.7%)

This represents the cumulative cost of all the gifts when you count each repetition in the song (364 gifts).

"CORE" INDEX (EXCLUDING SWANS)

$21,443.65
(+0.9%)

This version of the CPI removes the most unpredictable gift from the index - the Swans-a-Swimming.

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The PNC Christmas Price index, https://www.pnc.com/en/about-pnc/topics/pnc-christmas-price-index.html (Dec 31, 2017).

Index as Benchmark Example – Big Mac Index

THE Big Mac index was invented by The Economist in 1986 as a lighthearted guide to whether currencies are at their "correct" level. It is based on the theory of purchasing-power parity (PPP) ... For example, the average price of a Big Mac in America in January 2018 was $5.28; in China it was only $3.17 at market exchange rates. So the "raw" Big Mac index says that the yuan was undervalued by 40% at that time.

China January 2018

Price: $3.17 (Yuan 20.40)
Raw index: undervalued by 39.9%
Actual exchange rate: 6.43
Implied exchange rate*: 3.86

Undervalued by:
- >50%
- 25-50%
- 10-25%
- -/+ 10%

Overvalued by:
- 10-50%
- 50-100%
- >100%

China
Under(−)/over(+) valuation against the dollar, %

What Should I Benchmark?

Prudence Investor Standard

"The standard of prudence to be used by investment officials shall be the "uniform prudent investor act" standard and shall be applied in the context of managing an overall portfolio. Investment officers acting in accordance with written procedures and this investment policy and exercising due diligence shall be relieved of personal responsibility…"

GFOA Sample Investment Policy, accessed 1/21/19, page 3. Emphasis added.

"The primary objectives of investment activities shall be...

1. Safety

Investments shall be undertaken in a manner that seeks to ensure the preservation of capital in the overall portfolio. *The objective will be to mitigate credit risk and interest rate risk. …*

2. Liquidity

The investment portfolio shall *remain sufficiently liquid* to meet all operating requirements that may be reasonably anticipated.

3. Return

The investment portfolio shall be designed with the objective of attaining a *market rate of return throughout budgetary and economic cycles*…"

GFOA Sample Investment Policy, accessed 1/21/19, pages 1-2. Emphasis added.

GFOA Sample IPS Word Cloud

# What Measures to Benchmark?

The 5 Points of Suitability

Liquidity

Responsible amount of liquidity to reasonably insure bond gods are neutered.

1

Duration

Appropriate level of interest rate risk.

2

Credit

Appropriate level of credit risk.

3

Market Rate of Return

Earn a market rate of return through budgetary & economic cycles.

4

Legal Investments

Portfolio holds investments that are legal & in compliance with the Investment Policy Statement.

5

How Should I Benchmark?

Use an Index or Benchmark Individual Risk/Reward Measures?

INDICES
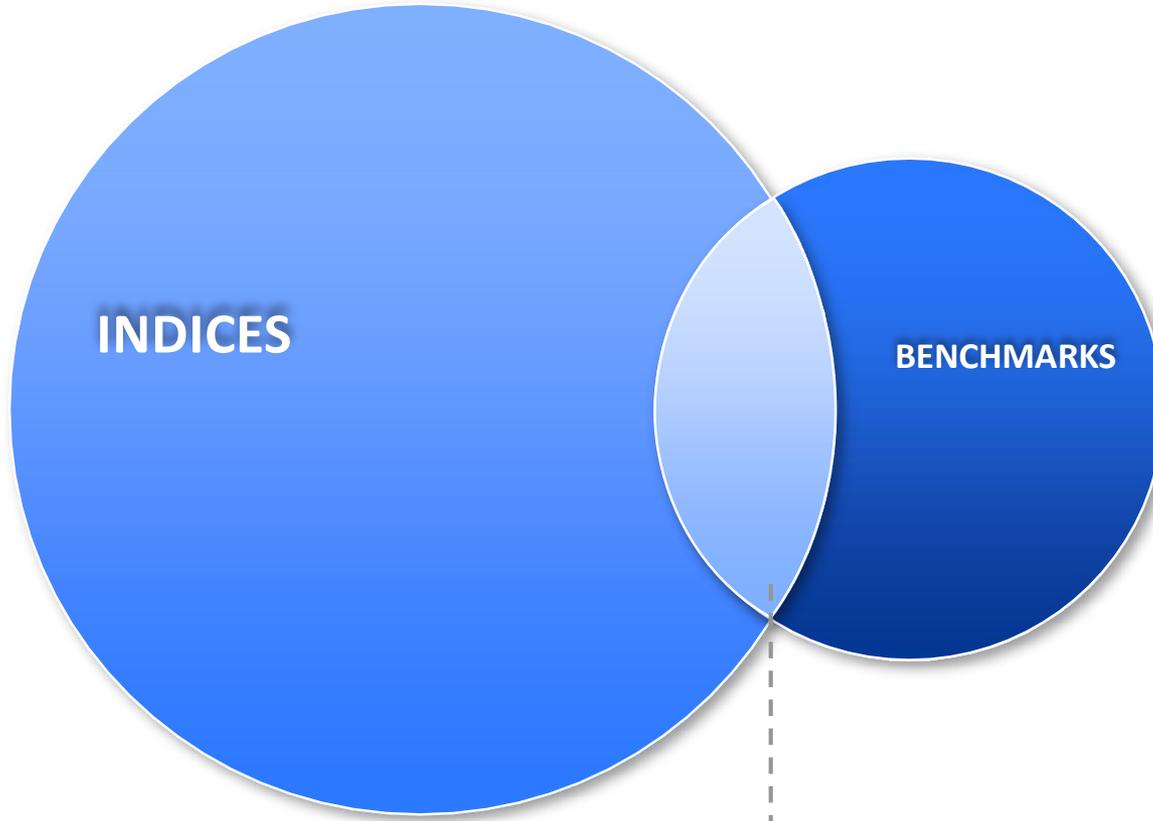
BENCHMARKS

Benchmark
Determine your preferences for each risk/reward measure and use those as a benchmark.

Index
Find an Index that is closest to your risk/reward preferences and then use it as a proxy for the risk/reward measures you want to benchmark.

Markets: Equities = Indices / Bonds = Yields?

S&P 500 INDEX (INX:I...	FTSE 100 Index (FTSE...	FTSE 250 MID INDEX (...	US 10 year Treasury (...	UK Pound Sterling/US...
5 DAYS	5 DAYS	5 DAYS	5 DAYS	5 DAYS
+3.57%	+0.94%	+1.71%	+4.19%	
2,670.71 (+1.32%)	6,970.59 (+0.03%)	18,762.83 (-0.01%)	2.77 (-0.37%)	1.29 (0.00%)

The Financial Times, Markets Data, http://markets.ft.com/data/ (1/21/2019).
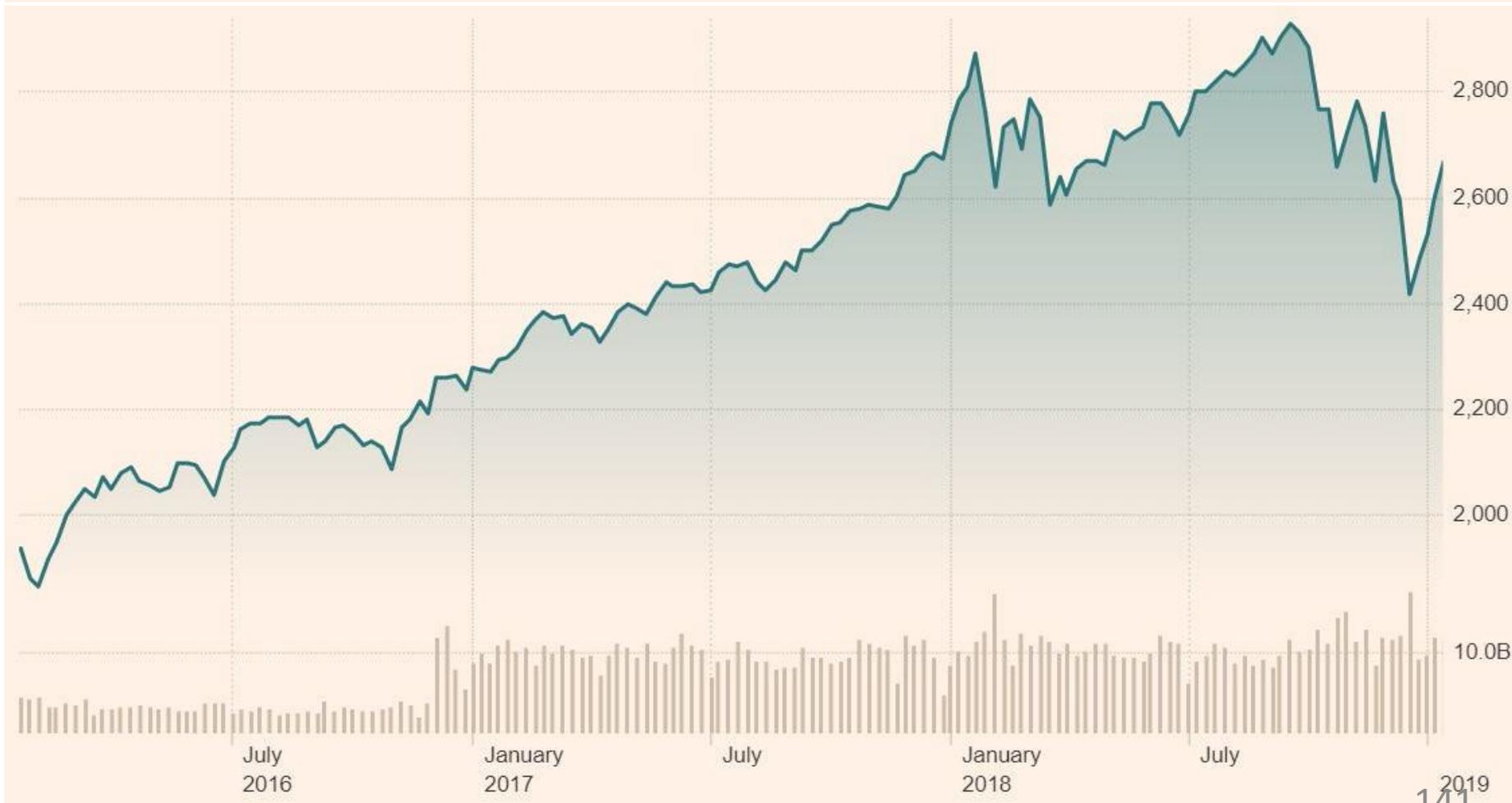
Bond Market Indices Overview

Lehman Brothers | A Guide to the Global Family of Indices

Figure 1.   Lehman Brothers Global Family of Indices-Index Map as of January 2008

A Guide to the Lehman Brothers Global Family of Indices – Global Family of Indices 35th Anniversary 1973-2008, page 8, March 2008.
Note: Barclays purchased Lehman Brothers assets (including the indices) after Lehman's bankruptcy in Sep-08. Barclay's current guide
can be found here: https://index.barcap.com/Home/Guides_and_Factsheets
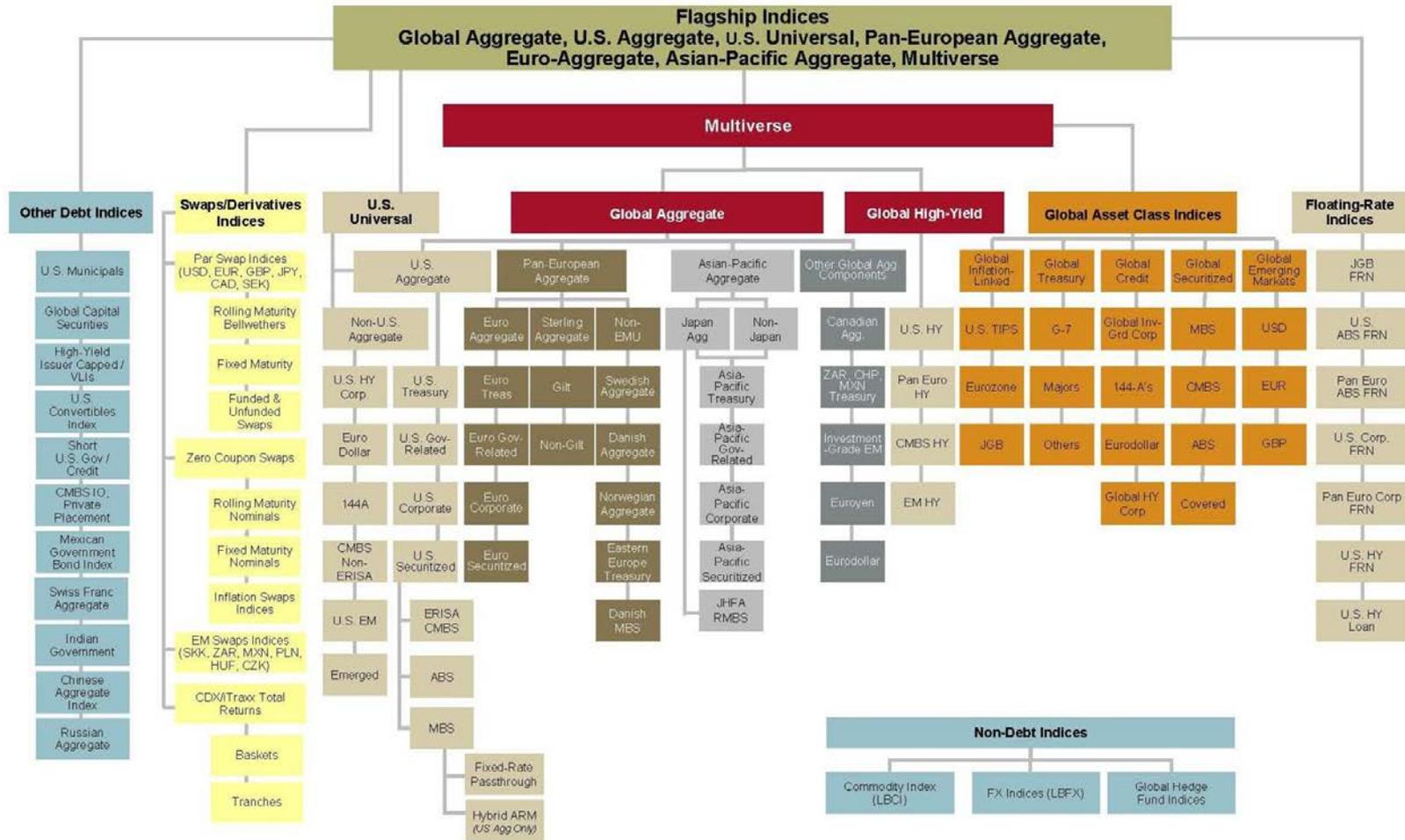
Bond Market Indices are Rule Based

A Guide to the
Lehman Brothers
Global Family of Indices

BASIC PRINCIPLES OF THE LEHMAN BROTHERS INDICES

Although each of the Lehman indices has been constructed to reflect the essential characteristics of the securities and markets it covers, all Lehman indices conform to certain general index construction standards and guidelines.

1) Rule-Based: Our indices are rule-based benchmarks whose composition is reset monthly. To be included in a Lehman index, a security must meet all published eligibility criteria.

Thus, our indices are representative of the marketplace, replicable and reliable. They are unbiased, in that subjective factors, such as Lehman security inventory or whether it managed the underwriting, do not enter into the selection process whatsoever. This is in contrast to portfolio-based indices, in which the performance benchmark is an arbitrarily-selected basket of securities.

The criteria are specified so that, in most cases, a given security can contribute to only one index or group of indices. For example, within the U.S. Aggregate Index, a security cannot be part of both the U.S. Credit Index and the Securitized Index. However, it can be part of both the U.S. Credit Index and the higher-level U.S. Aggregate Index. In both cases, the security is contributing to only one index[2].

Since launching our first index in 1973, we have expanded our index offerings to new geographic regions and asset classes, meeting the needs of index users with objective rules-based benchmarks. We add new benchmarks to the Global Family of Indices based on three criteria:

- Relevance of an asset class;
- Investor demand for a performance metric; and
- Availability of security-level pricing and analytics to create a rules-based benchmark.

A Guide to the Lehman Brothers Global Family of Indices – Global Family of Indices 35th Anniversary 1973-2008, page 11, March 2008.

Which Index is Largest?

Box Szie = # of Issues
Darker Grey = Larger Market Value
Data as of 12/31/2018

1-5Yr US Corp 3,112 Bonds 2.90 Yrs 2.69 MDur 3.65 Yld	**1-5Yr Tsy** 158 Bonds 2.75 Yrs 2.62 MDur 2.51 Yld
	1-5Yr AgyBlt 146 Bonds 2.24 Yrs 2.13 MDur 2.56 Yld
	1-5Yr AgyClbl 126 Bonds 2.54 Yrs 2.41 MDur 2.70 Yld

1-5Yr US Corp
12/31/1999 to 12/31/2018

Bank of America-Merrill Lynch Index Data as of 12/31/18. http://www.mlindex.ml.com/gispublic/bin/MLIndex.asp

Problems Using Bond Indices as Benchmarks

Bums & Duration
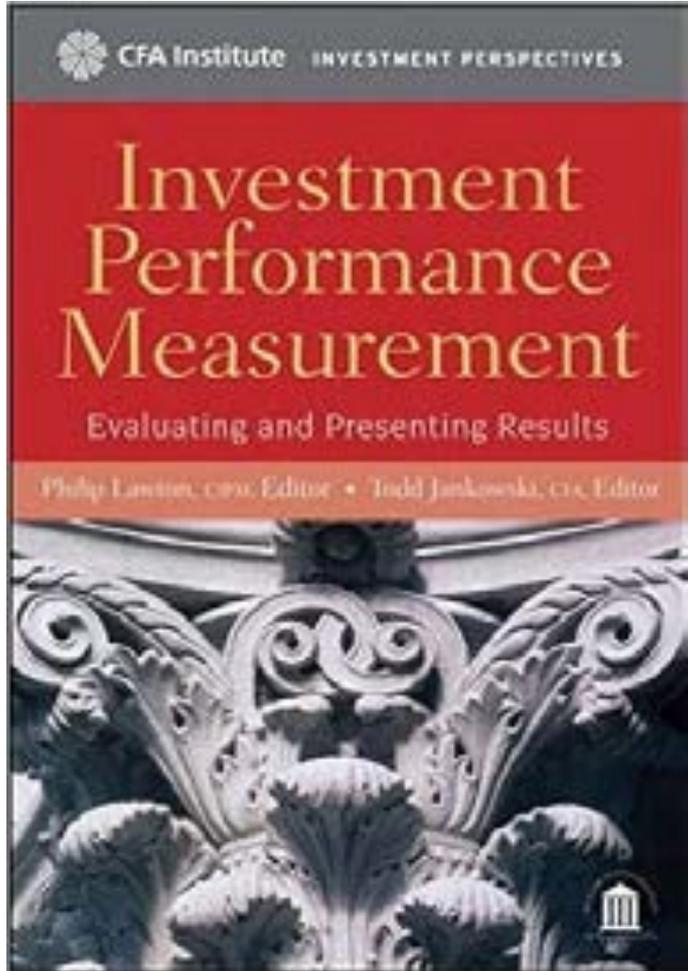
"Fixed-income benchmarks embody a great many complex issues … two issues: the duration problem and the "bums" problem. …The duration problem is the fact that the duration of the benchmark comes from issuer preferences and is not necessarily the duration that a given investor should hold. The bums (or deadbeats) problem is that the biggest debtors (whether companies, countries, or other entities) have the largest weights in the benchmark."

The Duration Problem

" The duration structure of a cap-weighted bond benchmark—that is, the proportions of bonds in short-, intermediate-, and long-term categories—reflects the maturity or duration preferences of issuers, who are seeking to minimize their (apparent) cost of capital. Investors, however, are not trying to minimize their returns (which are the issuers' costs of capital) but to maximize returns. Moreover, an investor usually has specific time-horizon preferences that make one duration more advantageous than another. These preferences do not necessarily match those of issuers in the aggregate, whose preferences are reflected in the benchmark. ... *Because the benchmark duration is a historical accident, the optimal portfolio for an investor with no defined time horizon should be set by that investor's risk tolerance rather than by matching the duration of the benchmark.* "
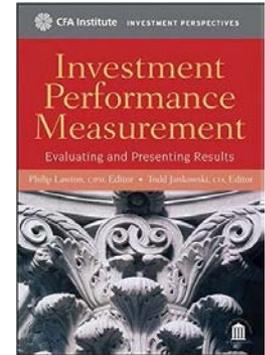
The "bums" Problem

"*Because the issuers who manage to go deepest into debt—the biggest bums—have the largest weights in a cap-weighted benchmark, such a benchmark is not likely to be mean-variance efficient.* If you are tracking such a benchmark, when someone issues a security, you have to buy it in proportion to its capitalization weight to minimize tracking error to the benchmark, even if the security is only marginally of high enough quality to make it into the benchmark and even if the size of the issue, and hence its weight in the benchmark, is inordinately large. Such securities would seem to be the most likely to be downgraded or to default. The bums problem applies to countries in an international sovereign bond benchmark just as it does to corporations in a U.S. bond benchmark. "
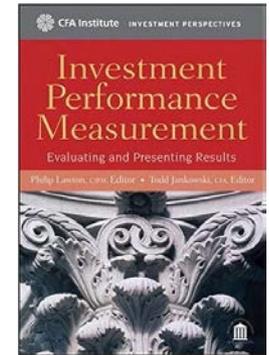
Suitability Benchmark Process

You decide your benchmarks. Don't let an index decide.

1. Liquidity
Examine historical cash flows to determine optimal liquidity.

2. Interest Rate Risk
Use Treasury Bellwethers to get a "feel" for your interest rate risk preference.

4. Market Rate of Return
Use indices or liabilities to determine optimal market rate of return benchmark point/range.

3. Credit Risk
Use credit analysis to determine preference for credit volatility.

Visualizing the Portfolio versus the Benchmarks

Good visualizations bring together a complex narrative…

Figurative map of Imperial Navy troop losses in the Galactic Civil War, 0 BBY-5ABY
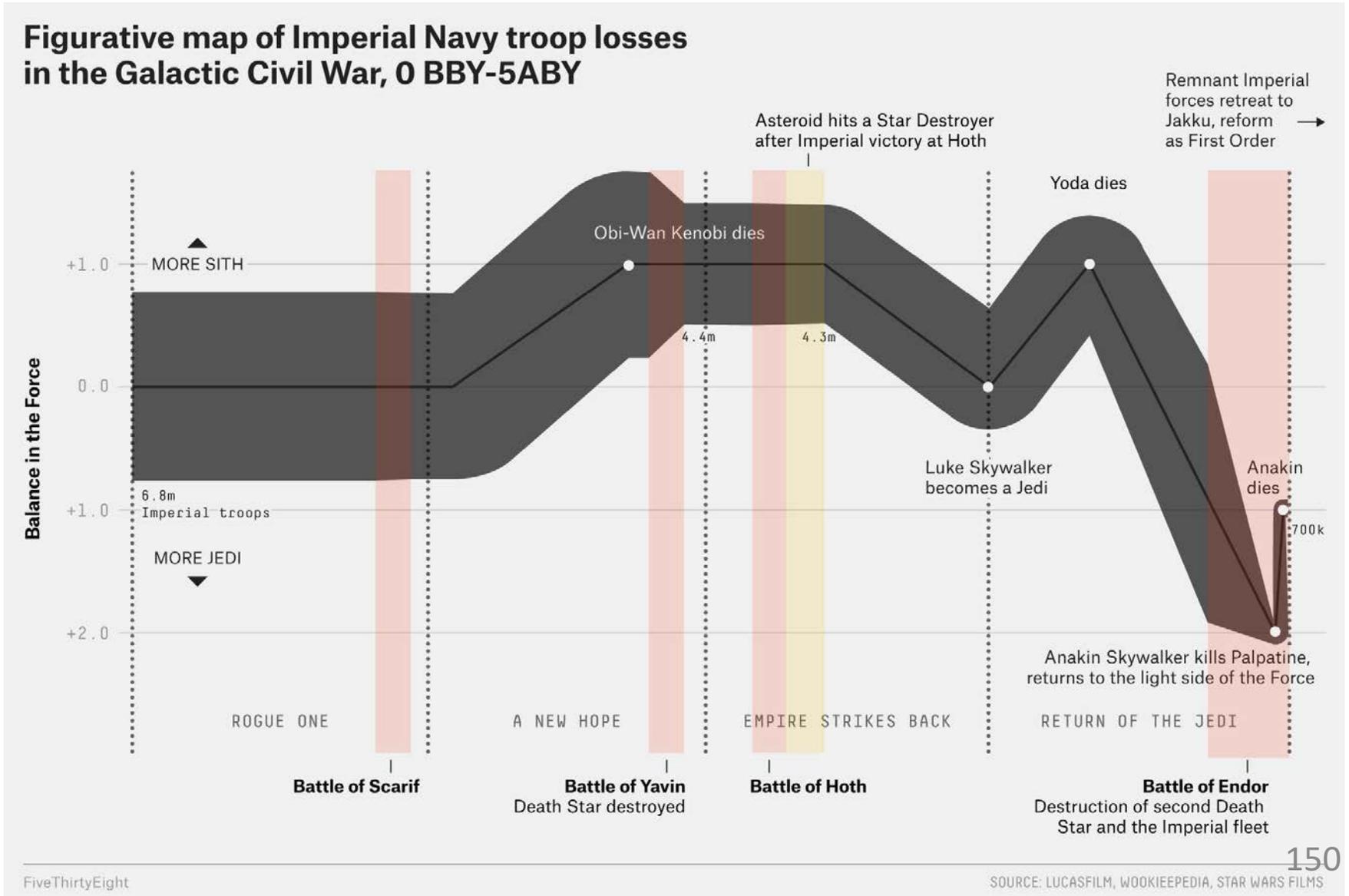
Visualizing the Portfolio versus the Benchmarks

… and measu

Everything we eat both causes and prevents cancer

● = One medical study

Protects against cancer | Causes cancer

Relative risk of cancer
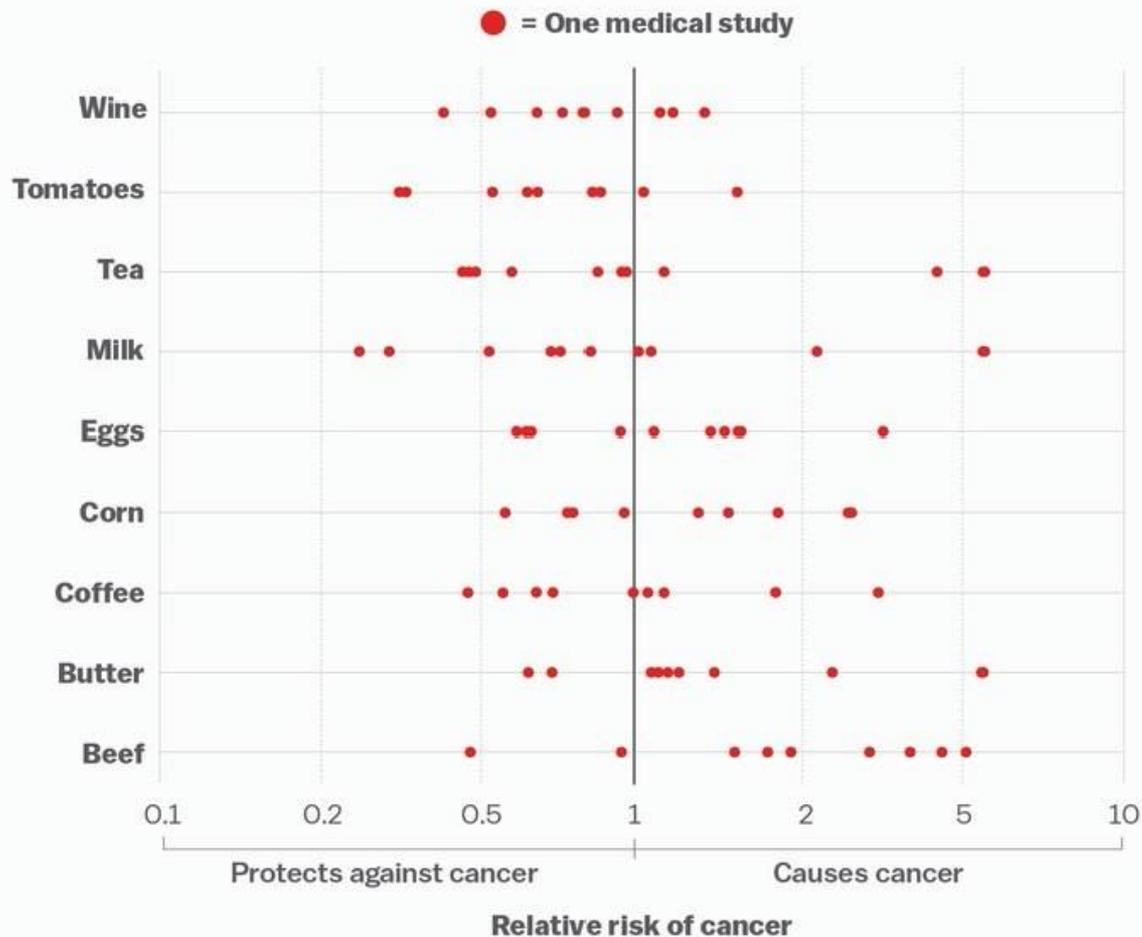
SOURCE: Schoenfeld and Ioannidis, *American Journal of Clinical Nutrition*

Vox

Suitability Benchmark Visualization Analysis

Primary Liquidity 86.82%

Port: $9,218.46M 18.68%
Plan: $4,934.28M 10.00%
Var: $4,284.17M
Var(%): 8.68%

Secondary Liquidity 6.42%

Port: $5,251.24M 10.64%
Plan: $4,934.28M 10.00%
Var: $316.96M
Var(%): 0.64%

Total Liquidity 46.62%

Port: $14,469.69M 29.32%
Plan: $9,868.57M 20.00%
Var: $4,601.13M 9.32%
Investable: $4,284.17M 8.68%

Effective Duration (15.19%)

Port: 2.544
Plan: 3.00
Var: (0.456)
Var(%): (15.19%)

Composite Credit Rating 8.58%

Port: AA1
Plan: AA3
Var: 1.5 Notches
Var(%): 8.58%

Market Rate of Return 69.37%

Port: 1.417
Plan: 0.837
Var: 0.58
Var(%): 69.37%

A Note on Total Return / Market Rate of Return

It is not the return on my investment that I am concerned about; it's the return of my investment

— *Will Rogers* —

What are your Return Preferences?

Total Return assumes indifference between Price return & Income return.
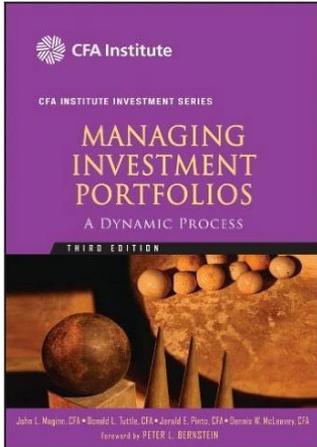
Total rate of return measures the increase in the investor's wealth due to both investment income (for example, dividends and interest) and capital gains (both realized and unrealized). ***The total rate of return implies that a dollar of wealth is equally meaningful to the investor whether that wealth is generated by the secure income from a 90-day Treasury bill or by the unrealized appreciation in the price of a share of common stock.***
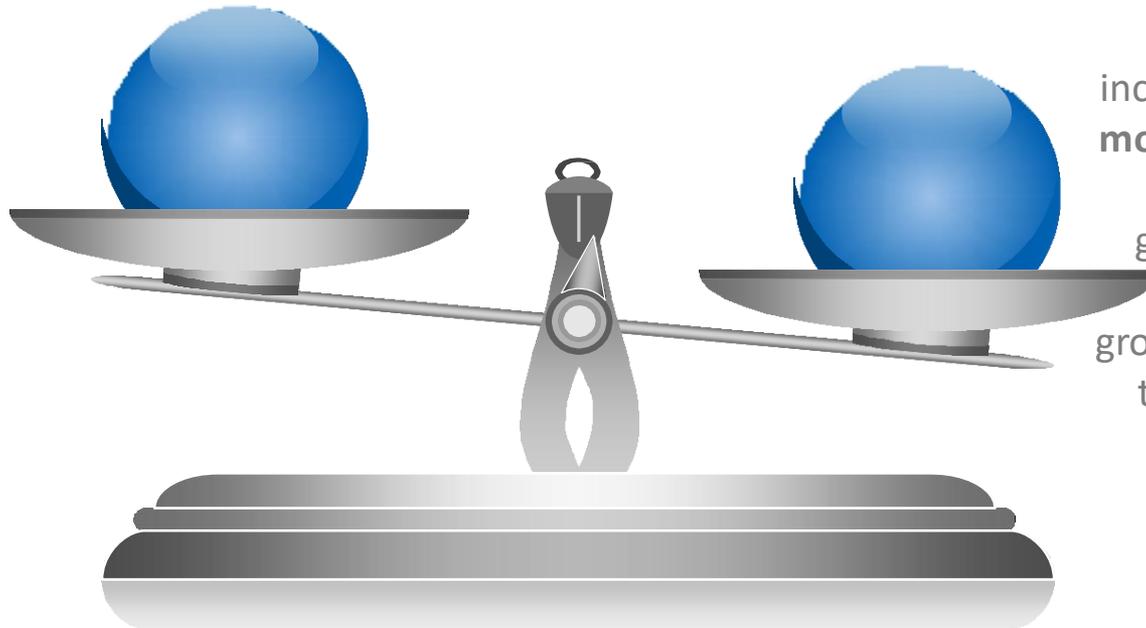
Income

Most public funds are income oriented and **put more weight on income.** If you don't budget gains/losses and aren't tasked with portfolio growth from investments then you likely have an income preference.

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What about GIPS?

The Global Investment Performance Standards
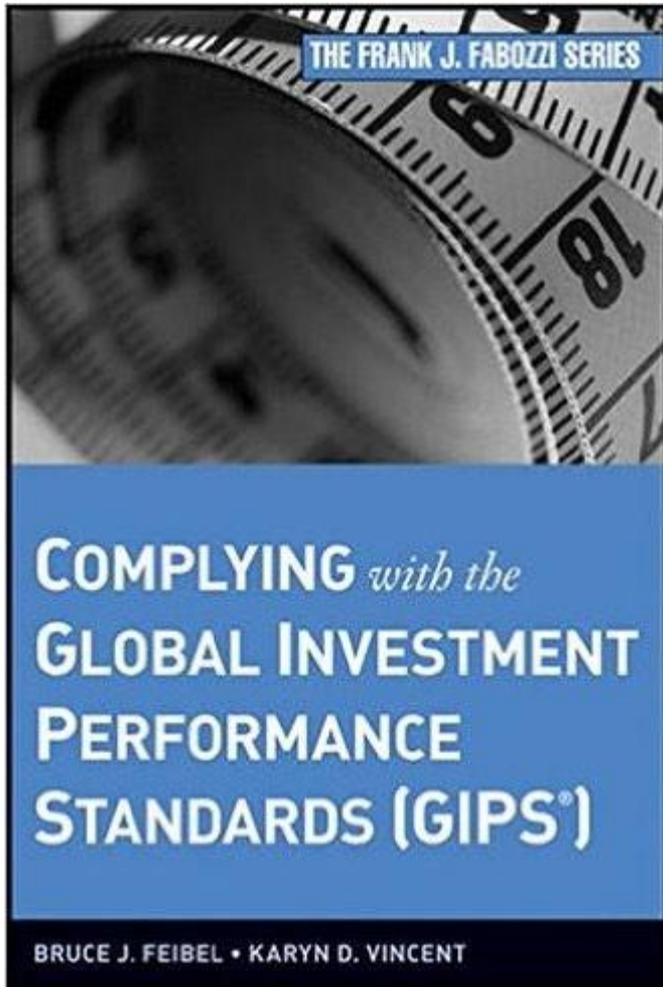
" The GIPS standards are typically used when performance information is communicated between an investment firm and prospective institutional investors ... there is no law that an investment firm must create its marketing materials according to the GIPS standards ... "

Feibel, Bruce J.; Vincent, Karyn D.. Complying with the Global Investment Performance Standards (GIPS) (Frank J. Fabozzi Series) (Kindle Locations 321-326). Wiley. Kindle Edition.

The first thing I get asked about the portfolio is…

## Return is last for primary objectives but usually the first question asked…

"…**the basic assumption that most institutional investors can outperform the market is false.** The institutions are the market. They cannot, as a group, outperform themselves. In fact, given the cost of active management—fees, commissions, and so forth—most investment managers will, over the long term, underperform the overall market. …

For any one manager to outperform the other professionals, he must be so skillful and so quick that he can regularly catch other professionals making errors—and can systematically exploit those errors faster than other professionals can. …

The beginning of wisdom for you is to understand that few—if any—major investment organizations will outperform the market averages over long periods of time and that it is very difficult to estimate which managers will outperform. …

The truly important but not very difficult task to which investment managers and their clients could and should devote themselves involves four steps: (1) understanding the client's real needs, (2) defining realistic investment objectives that can meet a client's realistic needs, (3) establishing the right asset mix for each particular portfolio, and (4) developing well-reasoned, sensible investment policies designed to achieve the client's realistic and specified long-term investment objectives. In this work, success can be easily achieved."

Ellis, Charles D.. Winning the Loser's Game: Timeless Strategies for Successful Investing (Winning the Loser's Game, 3rd ed) (Kindle Locations 243-540). McGraw-Hill Education. Kindle Edition.
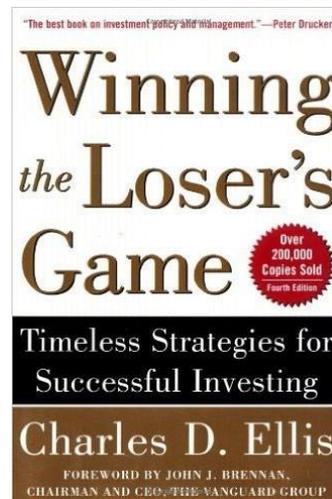
GFOA Sample IPS

General Objectives

"The primary objectives, in priority order…

1. Safety
Safety of principal is the foremost objective… ***The goal will be to mitigate credit risk and interest rate risk.***

2. Liquidity
The investment portfolio shall ***remain sufficiently liquid*** to meet all operating requirements that may be reasonably anticipated.

3. Return
The investment portfolio shall be designed with the objective of attaining a ***market rate of return throughout budgetary and economic cycles***, taking into account the investment risk constraints of safety and liquidity needs."

GFOA Sample Investment Policy, accessed 12/31/16, pages 1-2. Emphasis added.

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Suitability Simulator

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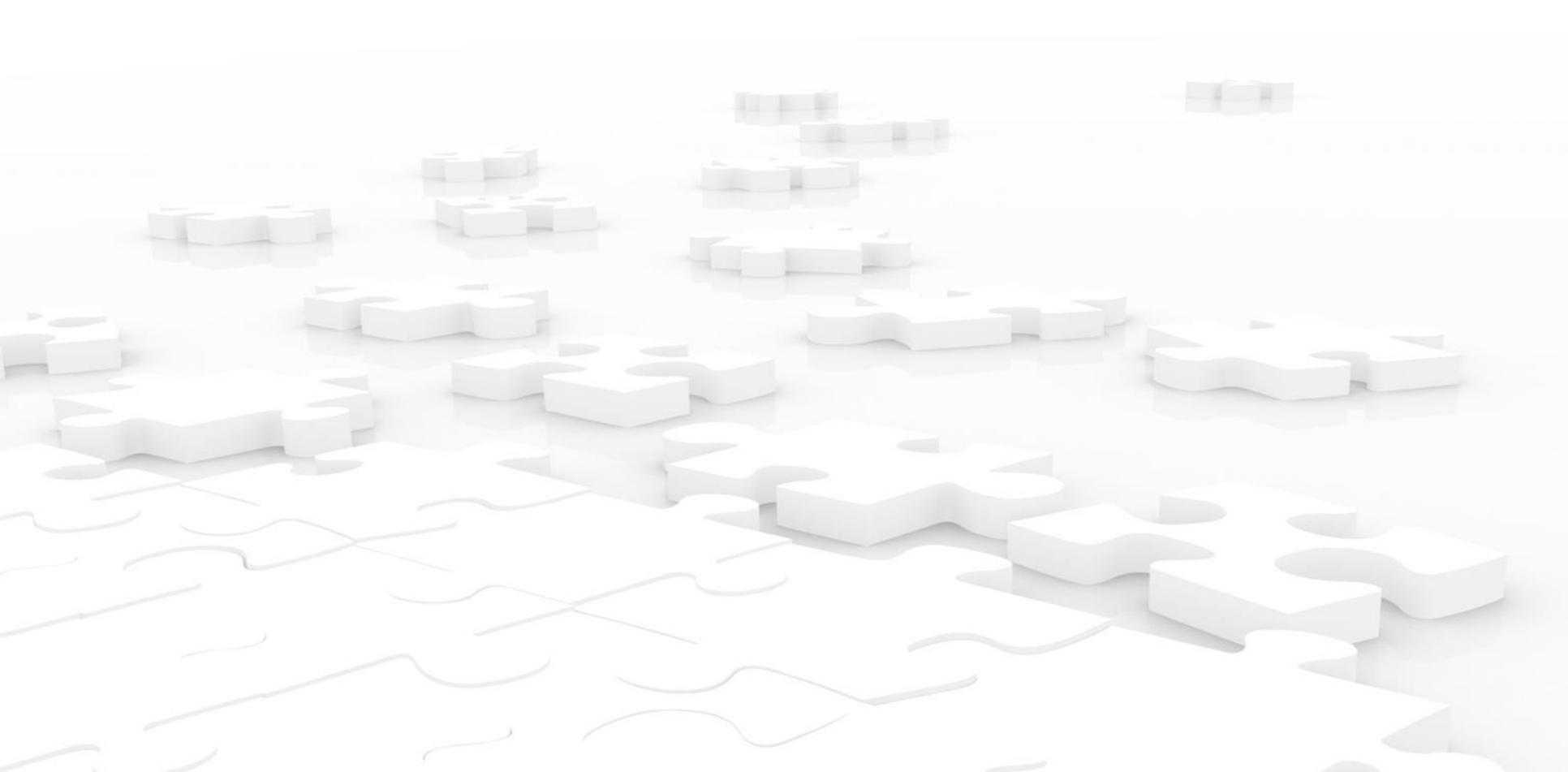
Bond with Excel before Excel'ing @ Bonds

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PLEASE COMPLETE YOUR EVALUATION

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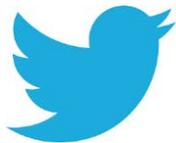
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