



CDIAC/CMTA Advanced Public Funds Investing Workshop

Session Three: Understanding and Managing Risk in Public Investing

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January 15, 2020

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Topics

TYPES OF FIXED INCOME INVESTMENT RISK

- ◆ Inflation
- ◆ Interest rate
- ◆ Liquidity
- ◆ Reinvestment
- ◆ Credit

HOW TO MANAGE AND MITIGATE RISK

- ◆ Investment policy development
- ◆ Diversification
- ◆ Discipline to long-term strategy
- ◆ Performance measurement



“Risk is **inherent** throughout the investment process. There is investment risk **associated with any investment activity** and opportunity risk related to **inactivity.**”

~Local Agency Investment Guidelines,
CDIAC January 1, 2019



Types of Fixed Income Investment Risk



Types of Fixed Income Investment Risk

Inflation Risk

Loss of purchasing power over time as a result of inflation

Liquidity Risk

Inability to sell portfolio holdings at a competitive price

Credit Risk

Risk of default or decline in security value due to issuer's financial strength

Reinvestment Risk

The risk that a security's cash flow will be reinvested at a lower rate of return

Interest Rate Risk

Variability of return/price related to changes in interest rates



Inflation Risk



Inflation (Purchasing Power) Risk

- ◆ Loss of purchasing power over time as a result of inflation

- ◆ Real interest rate is after inflation; nominal is before inflation
 - $\text{Real} = \text{nominal} - \text{inflation}$
 - $\text{Nominal} = \text{real} + \text{inflation}$
 - $\text{Inflation} = \text{nominal} - \text{real}$

- ◆ Multiple measures of inflation
 - PPI – Producer Price Index
 - CPI – Consumer Price Index
 - PCE – Personal Consumption Expenditures



Differences Between Inflation Indicators



PPI

Selling prices received by domestic producers of goods and services

CPI

Prices paid by urban consumers for a market basket of goods and services

PCE

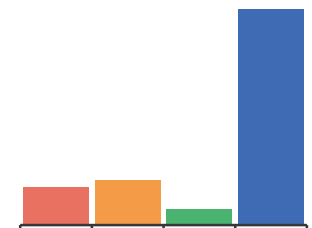
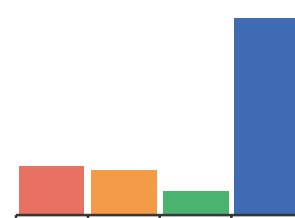
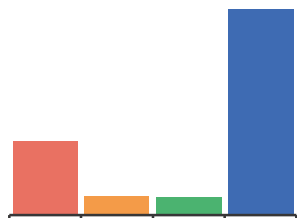
Prices paid for goods and services purchased by or on behalf of persons



Monthly
Before the 15th of the month
1-month lag

Monthly
Before the 15th of the month
1-month lag

Monthly
End of month
1-month lag



■ Goods ■ Food ■ Energy ■ Services



Interest Rate Risk



Interest Rate Risk

- ◆ Market values and interest rate movements are inversely related
- ◆ Longer maturity = Greater interest rate risk

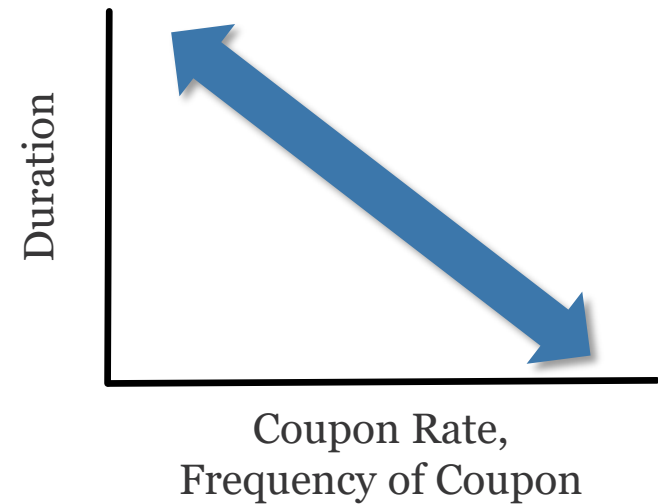
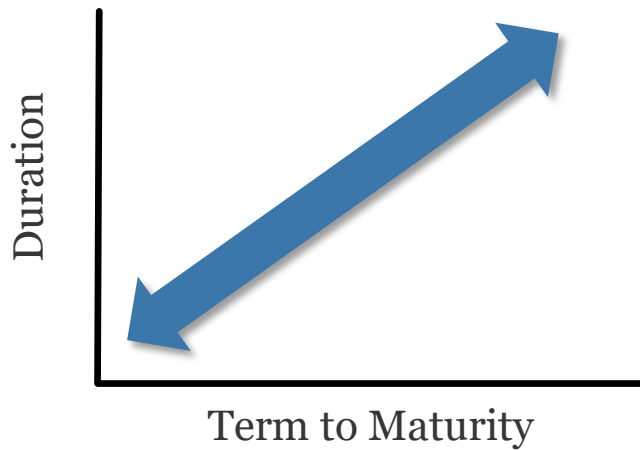


Duration is the metric for interest rate risk on individual securities and your portfolio



Duration

- ◆ A measure of a security's or portfolio's sensitivity to changes in interest rates
- ◆ Similar to, but more precise than, average life or average maturity





Different Types of Duration

LEVEL OF PRECISION		
Macaulay Duration	Modified Duration	Effective Duration
Time-weighted average of the bond cash flows discounted at the bond yield to maturity	Macaulay duration divided by one plus the bond's yield to maturity Provides the percentage change in a bond's price for 1% change in yield to maturity	Interest rate sensitivity of bonds with embedded options Impacted by prepayments on bonds Provides the percent change in market value of the security or portfolio for 1% change in yield to maturity



Macaulay Duration Calculation

Calculate the duration of a 2-year Treasury Note with a coupon of 3% yielding 2.50% (par = \$100)

1. Calculate bond cash flows
2. Calculate present value of cash flows
3. Time-weight the present value of cash flows

Time (in years)	Cash Flow	Present Value CF $= \frac{CF}{\left(1 + \frac{yield}{compd\ freq}\right)^{T * Compd\ Pds}}$	Time-weighted Cash Flows $= \sum t_i * \frac{PV_i}{V}$
0	--		
0.5	1.50	1.481481	$= (0.5)(1.481481) / 100.9695 = .0073$
1.0	1.50	1.463192	.0144
1.5	1.50	1.445127	.0215
2.0	101.50	96.57971	1.9130
TOTAL	106.00	100.9695	1.9563



Modified Duration Calculation

Calculate the modified duration of a 2-year Treasury Note with a coupon of 3% yielding 2.50% (par = \$100)

1. Calculate Macaulay Duration
2. Divide Macaulay Duration by bond yield (**don't forget compounding frequency**)

Time (in years)	Cash Flow	Present Value CF $= \frac{CF}{\left(1 + \frac{yield}{compd\ freq}\right)^{T \cdot Compd\ Pds}}$	Time-weighted Cash Flows $= \sum t_i * \frac{PV_i}{V}$
0	--		
0.5	1.50	1.481481	$=(0.5)(1.481481)/100.9695 = .0073$
1.0	1.50	1.463192	.0144
1.5	1.50	1.445127	.0215
2.0	101.50	96.57971	1.9130
TOTAL	106.00	100.9695	1.9563

$$\text{Modified} = \frac{1.9563}{1 + \frac{2.50\%}{2}} = 1.9322$$

Yield

Compounding frequency
(semi-annual)



Effective Duration

- ◆ Takes into account embedded options since future cash flows are contingent on market interest rates
- ◆ Measures interest rate risk in terms of a change in the benchmark yield curve, rather than change in yield to maturity (YTM)

$$\text{Effective Duration} = \frac{(PV_- - PV_+)}{2 * V_0 * \text{Change in Yield Curve}}$$

PV₊ – Price decrease when yield curve shifts up

PV₋ – Price increase when yield curve shifts down

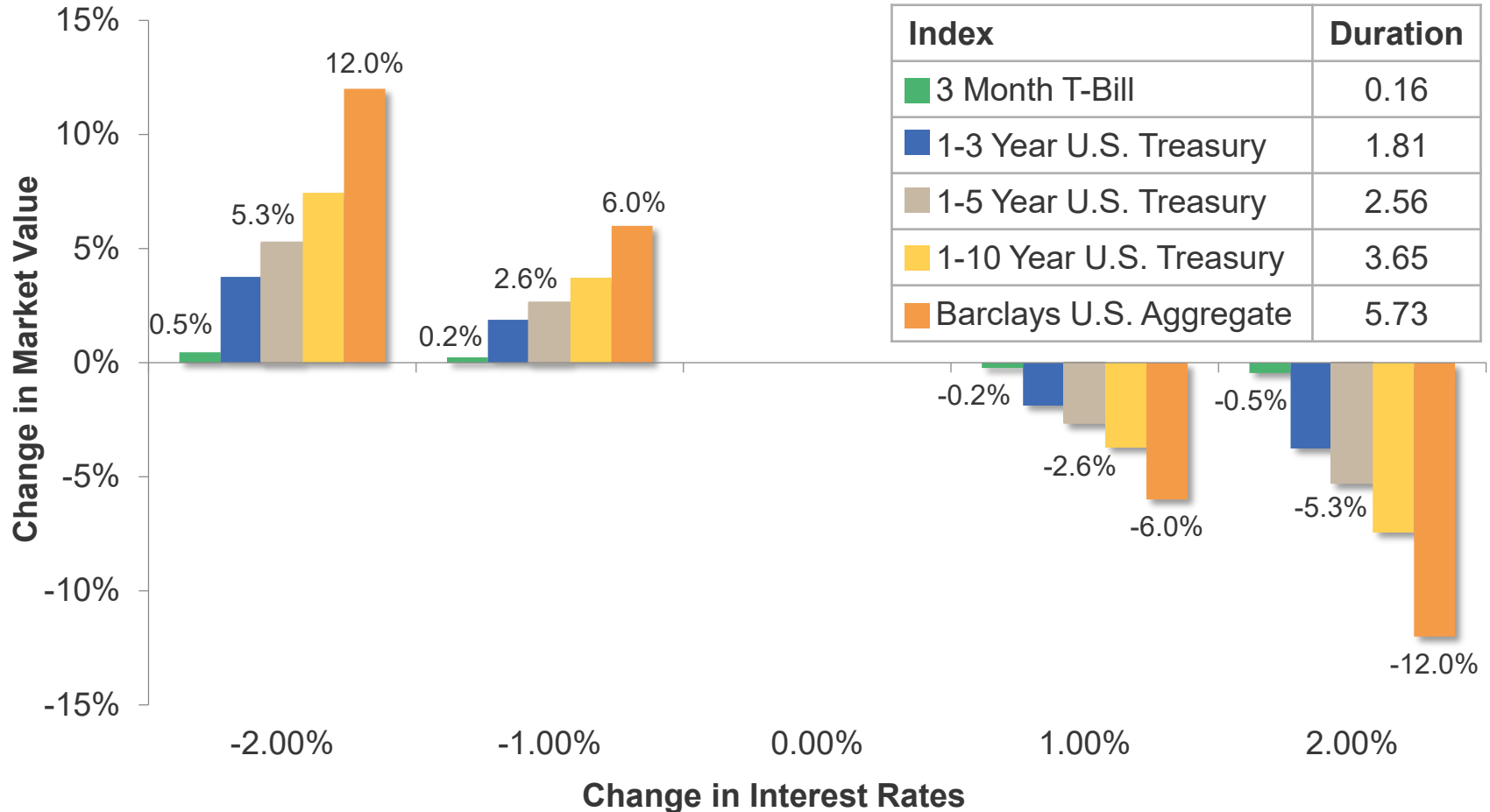
V₀ – Current price

Source: CFA Institute



Duration and Its Impact on Market Value

Impact of Rate Change on Portfolios of Varying Durations



Source: All data as of June 30, 2019. Bloomberg. Indexes are ICE Bank of America Merrill Lynch (BAML) indexes and Barclays US Aggregate Index.

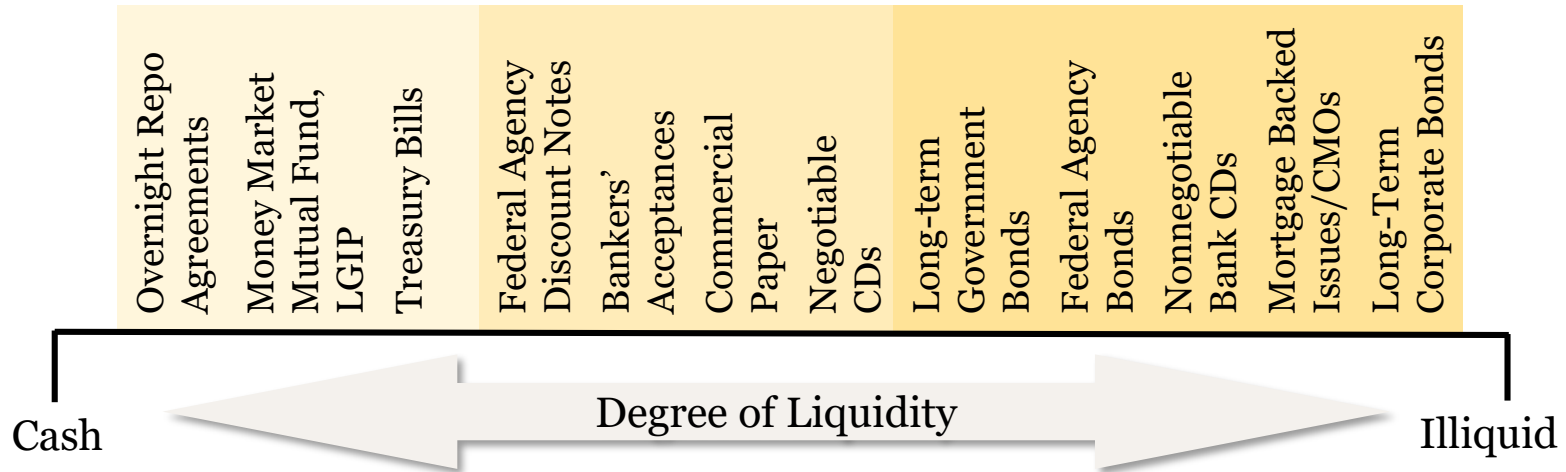


Liquidity Risk



Liquidity Risk

- ◆ Inability to sell portfolio holdings at a competitive price
 - Penalty for early withdrawal
 - Capital losses if interest rates have gone up
 - Fire sale prices





Liquidity Risk

- A wide bid/ask spread is generally reflective of less liquidity

					Bid/Ask (Offer)	Difference
Treasury Bill	B 0 03/28/19	↓2.3325	+.0200	2.3425/2.3325	2.384/2.374	••• \$25
Treasury Note	T 0 7 ₈ 05/15/19	↑99-17 ₈	+ 00 ₈	99-17/99-17 ₈	2.483/2.416	••• \$195
AID Bond	AID 0 02/15/25	\$↓82.161	+.079	81.929/82.394	3.325/3.230	••• \$4,650
Federal Agency Note	FNMA 1 1 ₄ 05/06/21	\$↓97.052	+.051	96.993/97.110	2.623/2.569	••• \$1,170
Muni	NYCGEN 5 08/01/23	113.4	--	113.33/113.46	1.9/1.87	••• \$1,300
Negotiable CD	RY 3.24 06/07/21	\$↓100.157	+.003	100.048/100.266	3.218/3.121	••• \$2,180
Corporate Note	WMT 3 5 ₈ 07/08/20	\$↑101.284	+.053	101.223/101.345	2.751/2.665	••• \$1,220

The dollar differences in the bid / ask (offer) spread are calculated based on a \$1,000,000 par value for each security type.



Value of a Basis Point

- ◆ 100 basis points = 1%
- ◆ 50 basis points = 1/2%
- ◆ 1 basis point = 1/100 of 1%

1 basis point = \$100 per \$1 million per year

Difference of 5 basis points on a 3-year, \$5 million investment

- \$5 million at 2.05% for 3 years = \$307,500
- \$5 million at 2.00% for 3 years = \$300,000

Difference = \$7,500



Reinvestment Risk

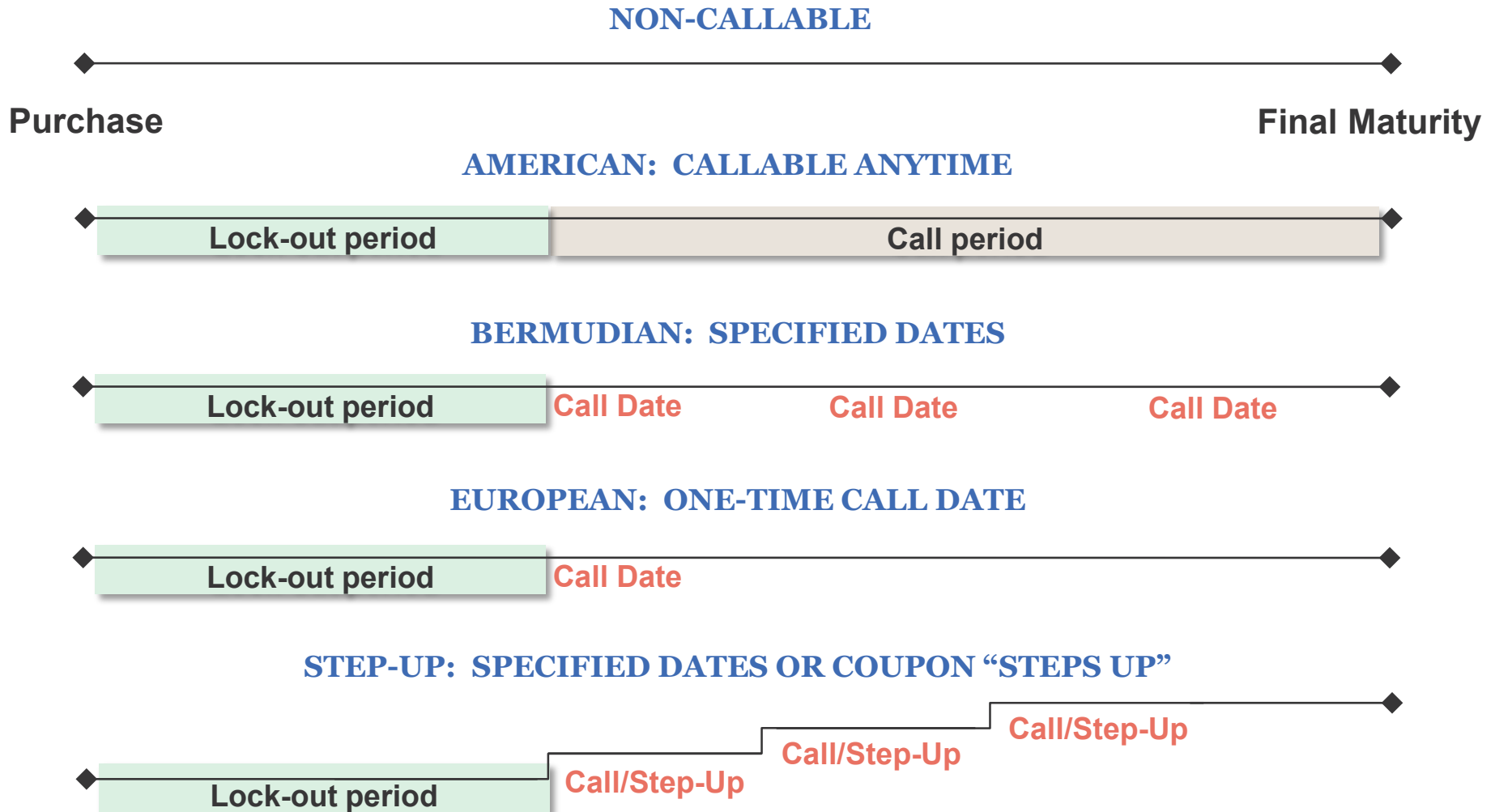


Reinvestment Risk

- ◆ The risk that a security's cash flow will be reinvested at a lower rate of return than what is being earned on the security
 - The interest rate environment is continuously evolving
- ◆ Exposure to reinvestment risk
 - Callable securities
 - Asset- and mortgage-backed securities
 - Securities with larger earlier cash flows (high coupon bonds)



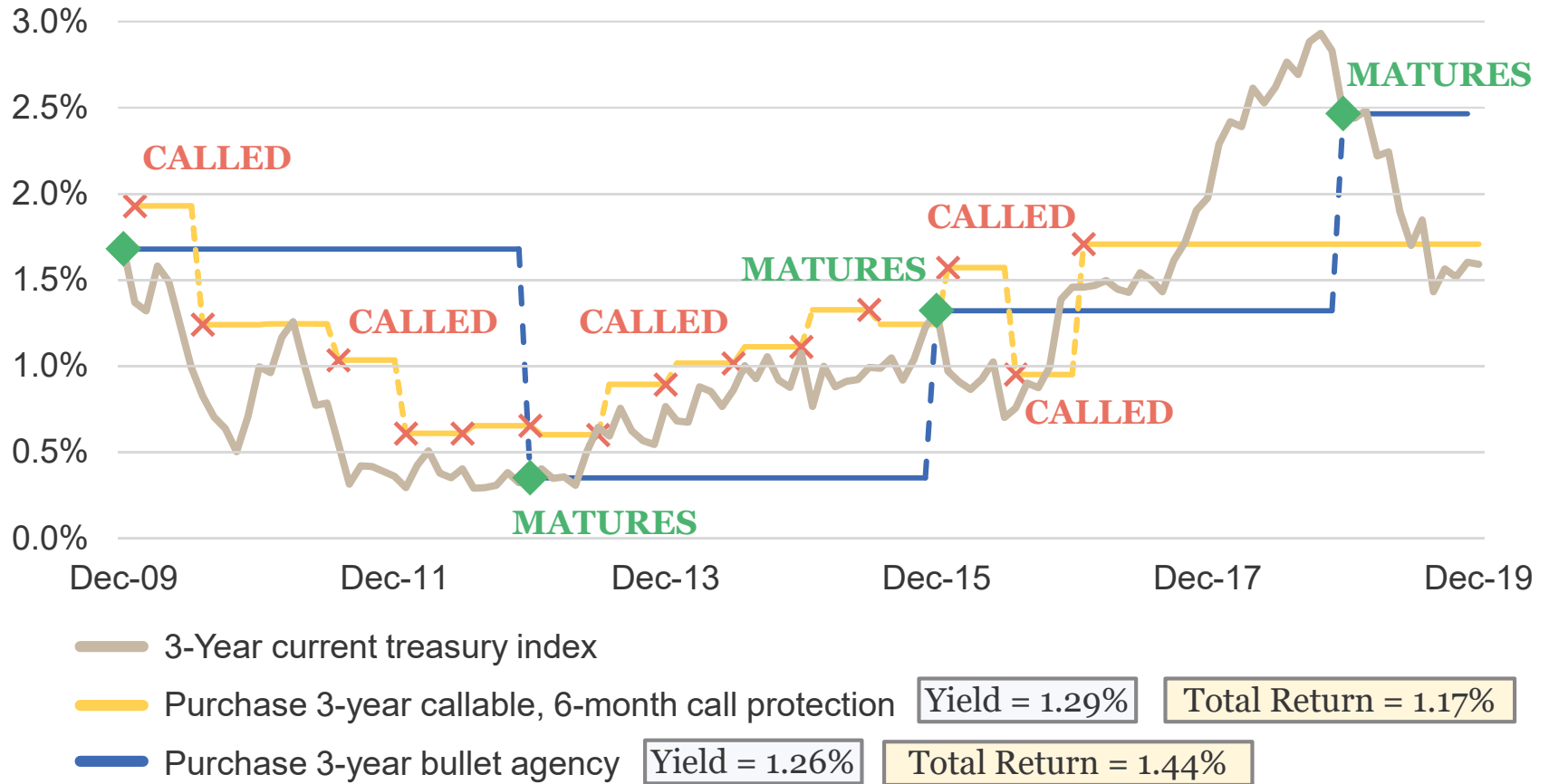
Types of Call Options





Bullets versus Callables

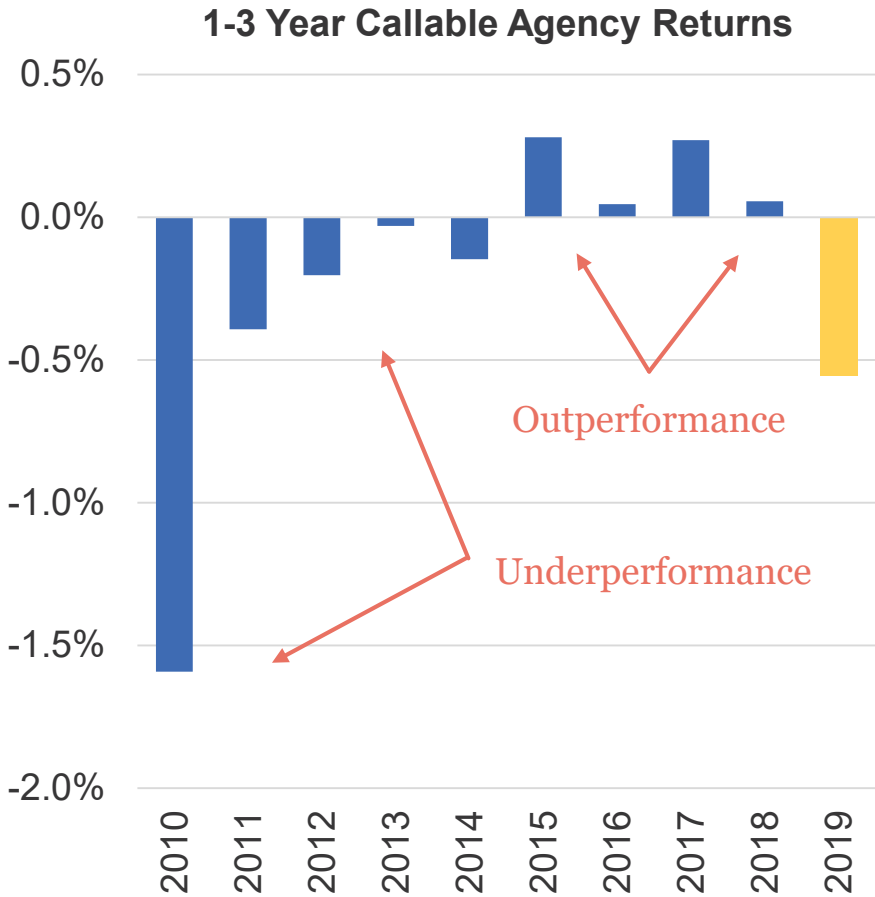
3-Year Federal Agency



Source: Bloomberg



Callable Federal Agency Bond Returns Vary by Rate Environment



**Annual Returns
Bullet vs. Callable Agencies**

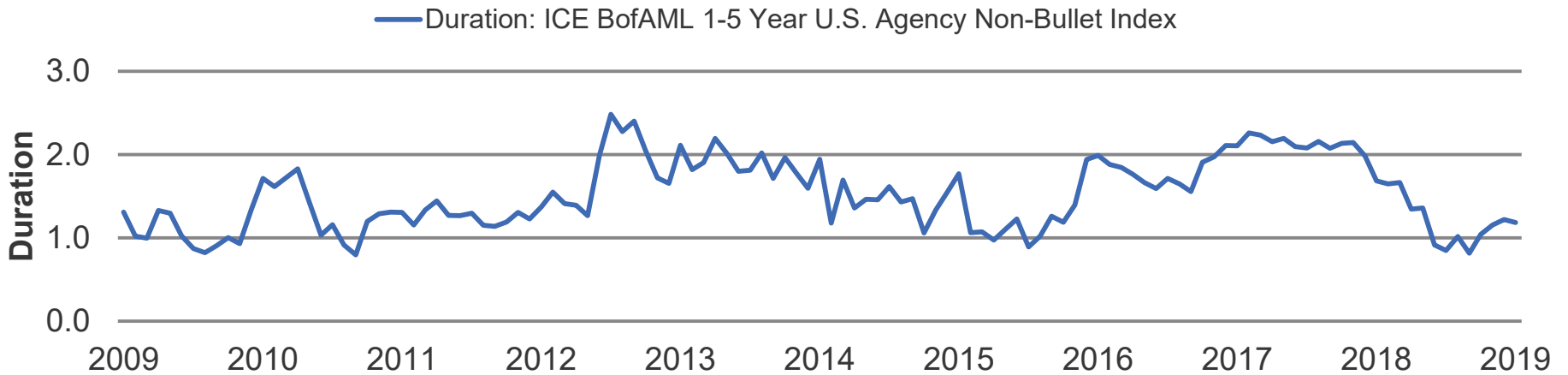
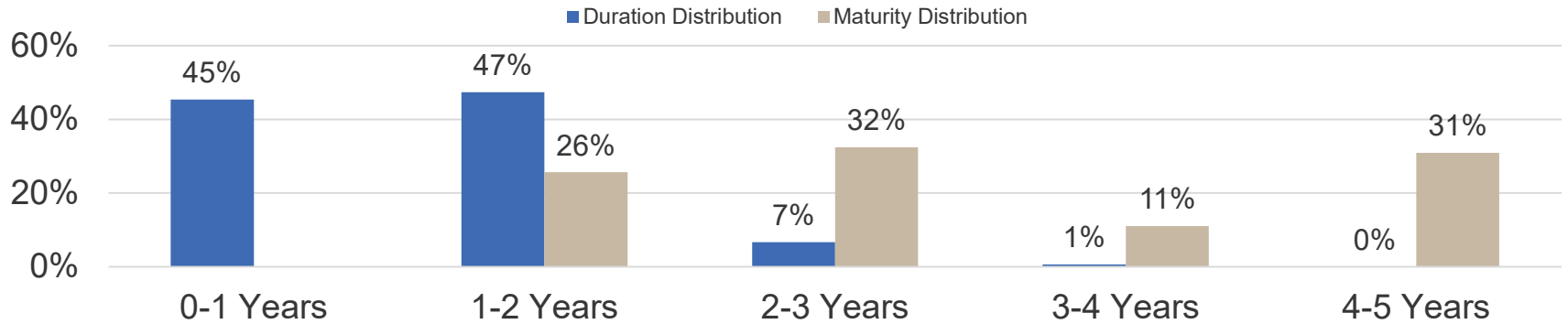
Year	Bullet	Callable	Out / Under-Performance
2010	2.67%	1.08%	-1.59%
2011	1.60%	1.21%	-0.39%
2012	0.89%	0.69%	-0.20%
2013	0.43%	0.40%	-0.03%
2014	0.73%	0.58%	-0.15%
2015	0.64%	0.92%	0.28%
2016	0.95%	0.99%	0.05%
2017	0.59%	0.86%	0.27%
2018	1.77%	1.82%	0.06%
2019	3.59%	3.04%	-0.55%
Average	1.44%	1.17%	-0.27%

Source: Bloomberg and ICE BofA Merrill Lynch 1-3 Year Indices, for the period ended December 31, 2019.



Callables Increase Volatility

Maturity Distribution



Source: Bloomberg. Index is the ICE Bank of America Merrill Lynch (BAML) 1-5 Year U.S. Non-Bullet Agency Index, as of December 31, 2019.

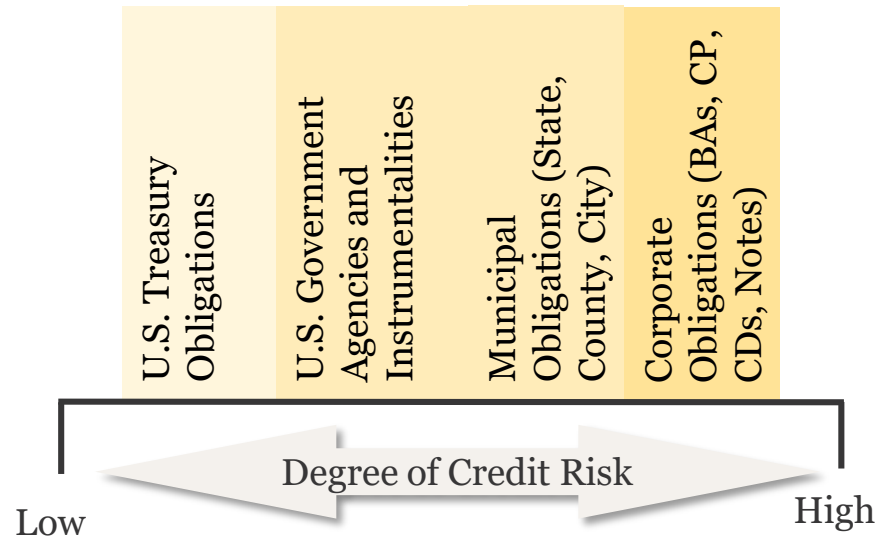


Credit Risk



Credit Risk

- ◆ Risk of default or decline in security value due to conditions outside investor's control
 - Bankruptcy
 - Rating agency downgrades
 - Regulatory changes





Monitoring Credit Risk

◆ Nationally Recognized Statistical Rating Organizations (NRSRO)

- Designated by the SEC

◆ Largest and most active NRSROs

- Standard & Poor's
- Moody's Investors Service
- Fitch Ratings

Actions	Definition
Credit Rating	<ul style="list-style-type: none">• Reflection of the probability of default (default rate) & loss to investor (loss rate)
Rating Watch	<ul style="list-style-type: none">• Indication that the NRSRO is reassessing the rating in response to a material change to the credit quality of the issuer• Potential upgrade or downgrade may occur within 3 months
Rating Outlook	<ul style="list-style-type: none">• Longer-term projection of a possible ratings change• Potential upgrade or downgrade may occur 6 months – 2 years



Long-Term Credit Ratings

S&P	Moody's	Explanation of Rating
AAA	Aaa	High quality. Smallest degree of investment risk.
AA	Aa	High quality. Differs only slightly from highest-rated issues.
A	A	Adequate capacity to pay interest and repay principal.
<hr/>		
BBB	Baa	More susceptible to adverse effects of changes in economic conditions.
<hr/>		
BB	Ba	Has speculative elements; future not considered to be well-assured.
B	B	Generally lack characteristics of desirable investment.
CCC	Caa	Poor standing. Vulnerability to default.
C	C	Extremely poor prospect.
D	D	In default.



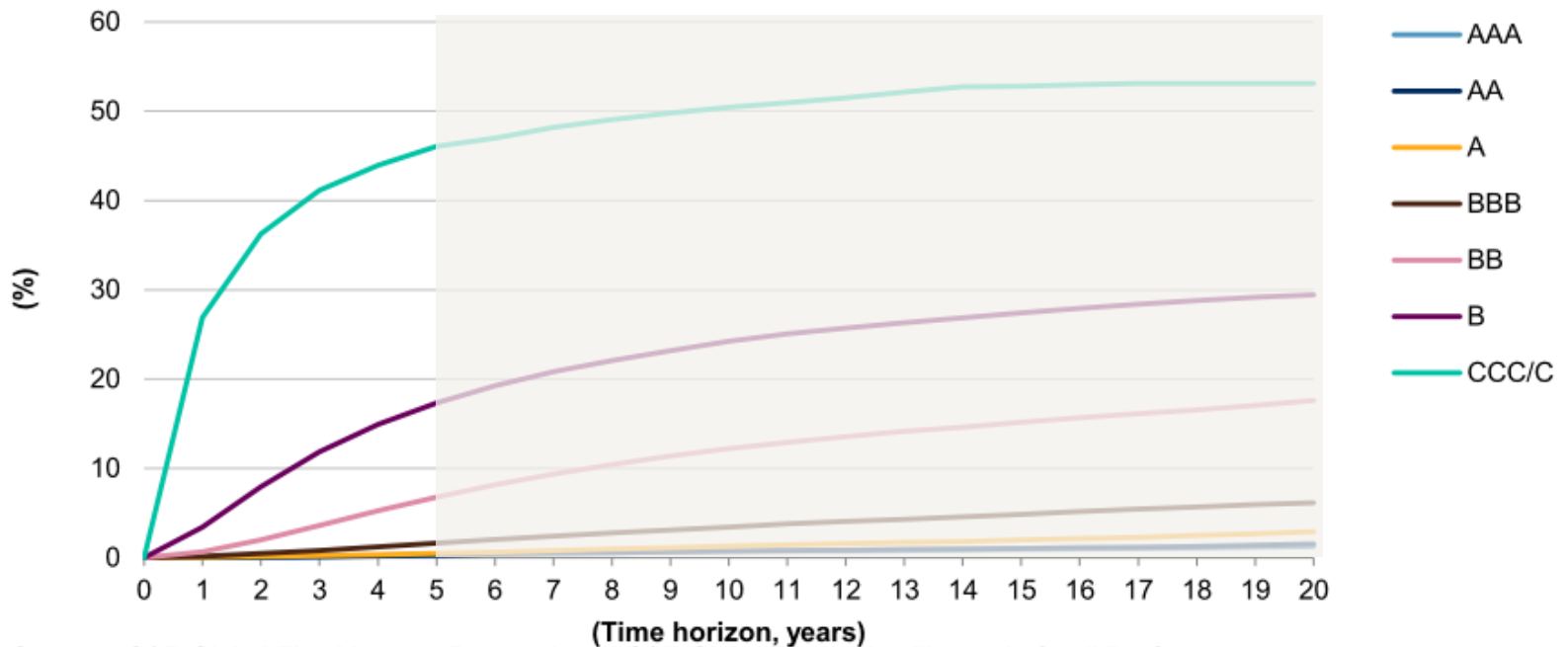
Short-Term Credit Ratings

S&P	Moody's	Explanation of Rating
A-1+	P-1	High quality. Smallest degree of investment risk.
A-1	P-1	High quality. Differs only slightly from highest-rated issues.
A-2	P-2	Adequate capacity to pay interest and repay principal.
A-3	P-3	More susceptible to adverse effects of changes in economic conditions.
B	Not Prime	Highly speculative; future not considered to be well-assured.
C	Not Prime	Poor standing. Vulnerability to default.
/	/	In default.



The Relationship Between Credit Ratings and Default Rates

Global Corporate Average Cumulative Default Rates by Rating (1981-2018)



Sources: S&P Global Fixed Income Research and S&P Global Market Intelligence's CreditPro®.
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Spreads are a Tool for Understanding Credit Risk

- ◆ Spreads move daily and can indicate more risk and/or more opportunity
 - Understanding the reasons behind those movements is key

Example: General Electric (GE) was downgraded in October 2018 by S&P to BBB+ and by Moody's to Baa1



Source: Bloomberg



How to Manage and Mitigate Risk



“Successful investing is about
managing risk, not avoiding it.”

~Benjamin Graham,
Author of *The Intelligent Investor*



Important Component of Managing Risk

- ◆ Know what risks you are willing to take





Manage Risk by Establishing Guidelines

- ◆ Risk management begins with a strong Investment Policy Statement (IPS) that clearly defines the parameters for investing funds
- ◆ The IPS should identify:
 - ✓ Investment objectives, preferences or tolerance for risk
 - ✓ Constraints on the investment portfolio
 - ✓ How the investment program will be managed and monitored

Investment Policy Certification Programs



CMTA



AP&T

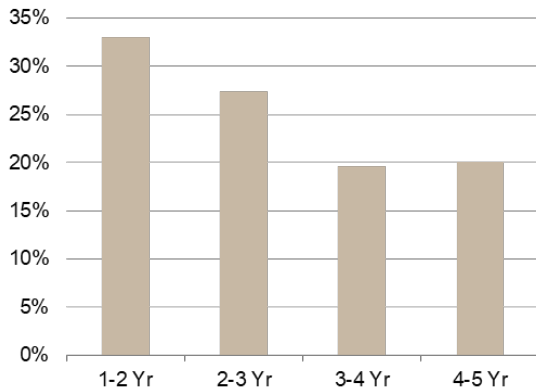
*The Government Finance
Officers Association lists
best practices when
creating an IPS*





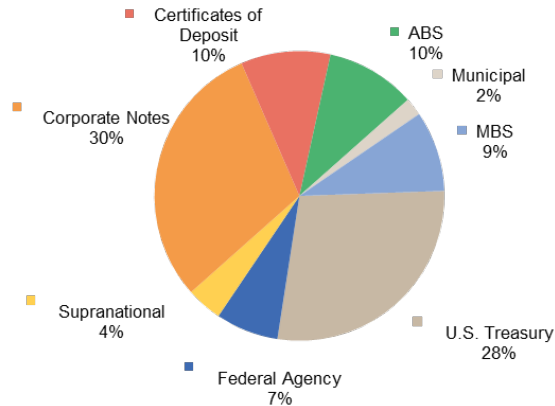
Investment Policy Considerations

Maturity Distribution



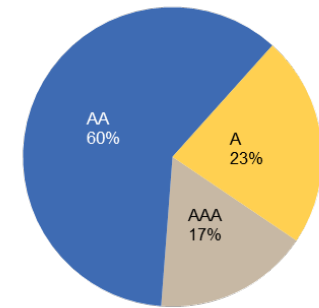
- ✓ Target average maturity?
Or average duration?
- ✓ Typically based on the type and purpose of funds

Sector Distribution



- ✓ No more than **X%** in securities other than Treasuries and Agencies
- ✓ No more than **X%** in any one issuer

Credit Quality



- ✓ Average portfolio credit rating of **X**

For illustrative purposes only.



California Government Code Offers Flexibility with Guard Rails

Securities	1 Day	180 Days	270 Days	1 Year	5 Years	Over 5 Years
U.S. Treasuries	✓ Permitted					Requires Approval
Federal Agencies	✓ Permitted					Requires Approval
Municipal Securities	✓ Permitted					Requires Approval
Negotiable Certificates of Deposit	✓ Permitted					Requires Approval
Commercial Paper	✓ Permitted			X Prohibited		
Bankers' Acceptances	✓ Permitted		X Prohibited			
Medium-Term Corporate Notes	✓ Permitted					X Prohibited
Asset-Backed Securities (ABS)	✓ Permitted					X Prohibited
Supranationals	✓ Permitted					X Prohibited
Repurchase Agreements	✓ Permitted				X Prohibited	
Money Market Funds/Bond Mutual Funds	✓ Permitted	X Prohibited				
Local Government Investment Pools	✓ Permitted	X Prohibited				
Foreign Sovereign						X Prohibited
Fixed-Income ETFs						X Prohibited
High-Yield Bonds						X Prohibited
Private Placements						X Prohibited
Convertibles						X Prohibited
Non-U.S. Dollar Investment Grade						X Prohibited
Emerging Markets Debt						X Prohibited
Bank Loans						X Prohibited
Domestic Equities (Large, Mid, Small Cap)						X Prohibited
International Equities (Large, Mid, Small Cap)						X Prohibited
Emerging Markets						X Prohibited
Preferred Stock						X Prohibited
Equity Mutual Funds and ETFs						X Prohibited
Commodities						X Prohibited
Real Estate						X Prohibited
Hedge Funds						X Prohibited
Private Equity						X Prohibited
Venture Capital						X Prohibited
Tangible Assets						X Prohibited
Complex Derivatives, Futures and Options						X Prohibited



Prudent Investor Standard in California

“When investing, reinvesting, purchasing, acquiring, exchanging, selling, or managing public funds, a trustee shall act with care, skill, prudence, and diligence under the circumstances then prevailing, including, but not limited to, **the general economic conditions** and the **anticipated needs of the agency**. Within the limitations of this section and considering individual investments **as part of an overall strategy**, investments may be acquired as authorized by law.”

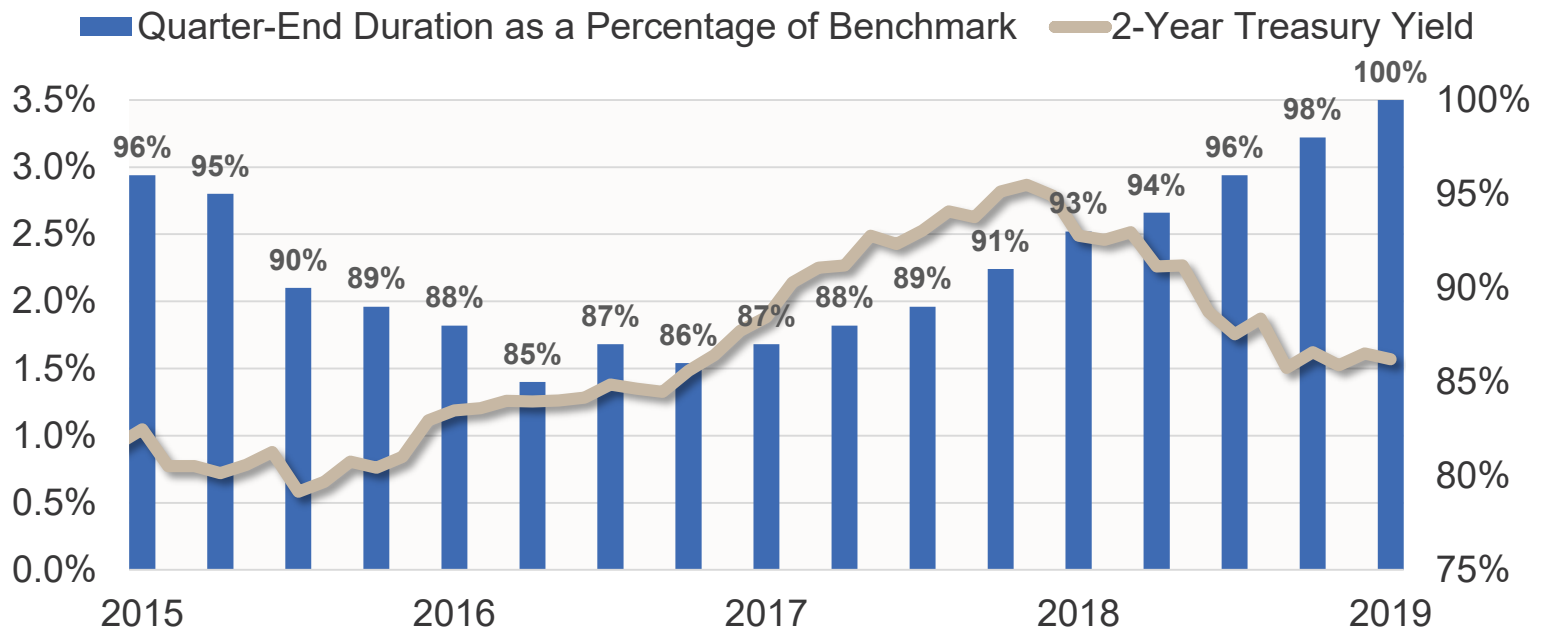
Source: California Government Code § 53600.3



Establishing a Long-Term Strategy Provides a Framework

- ◆ Your agency's investment program exists in a dynamic environment
- ◆ The path toward long-term growth is not linear, but experiences ebbs and flows

Maintaining long-term, adjusting short-term

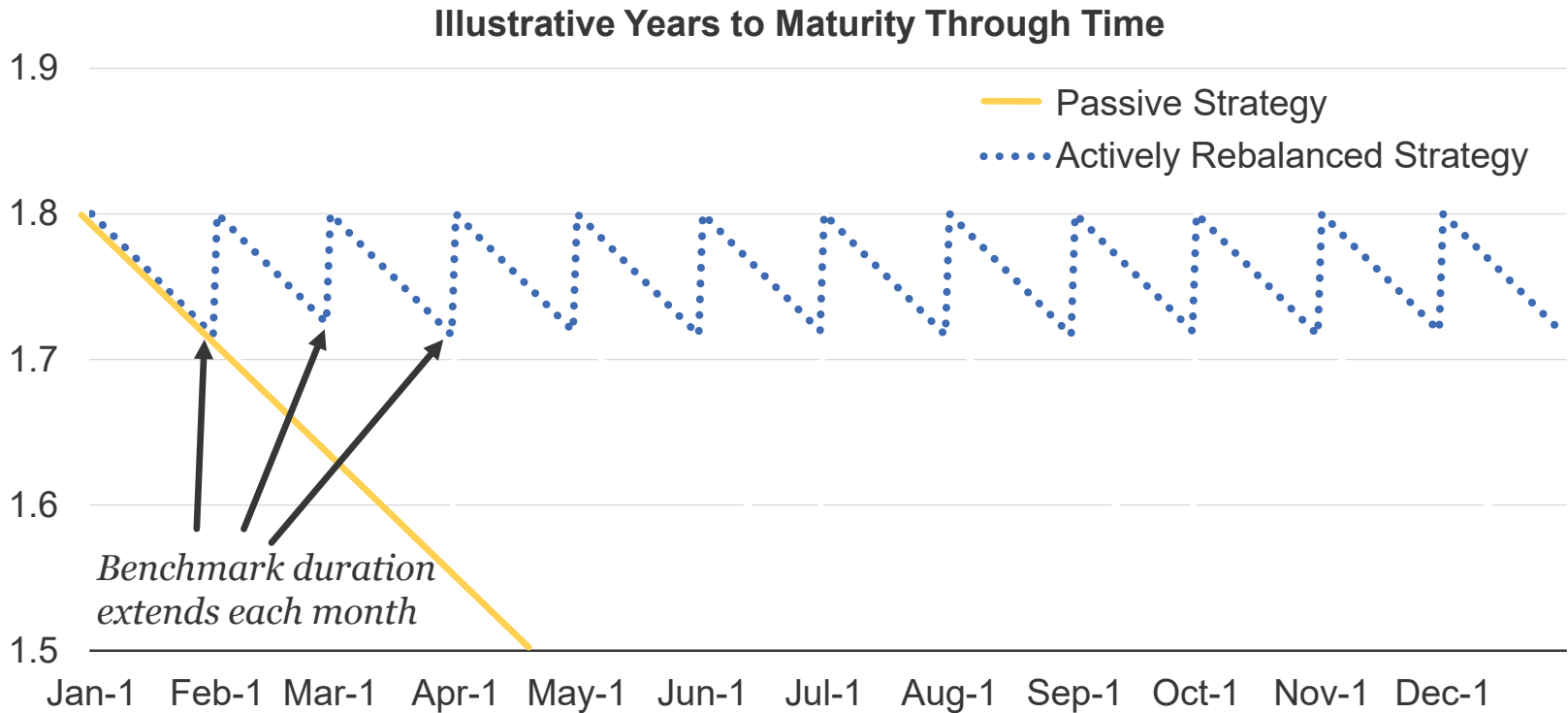


For illustrative purposes only.



Maintaining Discipline to Strategy Requires Active Management

- Active management allows the strategy to be continually rebalanced to maintain a near-constant duration target



For illustrative purposes only.



Diversification is a Fundamental Tactic for Multiple Risks

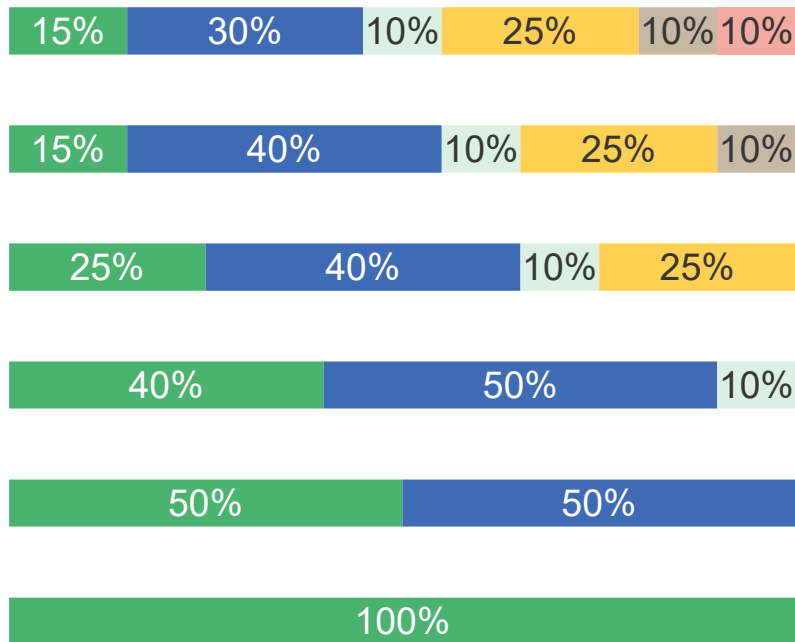
Index Ending Duration	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Annualized Average
1-5 Year Treasury Duration: 2.61	8.73%	14.35%	6.33%	3.66%	6.46%	1.29%	2.18%	1.54%	2.30%	2.36%	1.85%	6.56%	3.24%
1-5 Year Bullet Agencies Duration: 2.35	8.63%	9.29%	5.43%	3.36%	4.33%	1.24%	2.06%	1.51%	1.93%	1.94%	1.79%	5.64%	3.04%
1-5 Year Callable Agencies Duration: 1.18	5.65%	6.95%	5.42%	3.36%	2.81%	0.91%	1.92%	1.45%	1.32%	1.51%	1.68%	5.60%	3.04%
1-5 Year Corporate AAA Duration: 2.51	5.27%	5.98%	4.81%	3.15%	1.63%	0.70%	1.38%	1.28%	1.19%	1.46%	1.53%	5.40%	2.69%
1-5 Year Corporate AA Duration: 2.34	4.84%	5.56%	3.61%	2.62%	1.61%	0.41%	1.30%	1.20%	1.09%	1.00%	1.52%	4.20%	2.41%
1-5 Year Corporate A Duration: 2.66	4.41%	2.53%	3.54%	2.59%	1.52%	0.03%	1.29%	1.12%	0.81%	0.83%	1.38%	3.95%	2.37%
0-3 Year MBS Duration: 1.63	1.06%	2.14%	1.85%	2.32%	0.91%	-0.01%	1.24%	0.98%	0.19%	0.82%	1.36%	3.65%	2.17%
1-5 Year Municipal Duration: 2.50	-6.83%	0.23%	1.24%	1.67%	0.85%	-0.19%	1.10%	0.90%	0.16%	0.65%	1.08%	3.16%	1.67%

Source: Bloomberg. Annual returns of 1-5 Year ICE BofAML Indices unless specified otherwise.

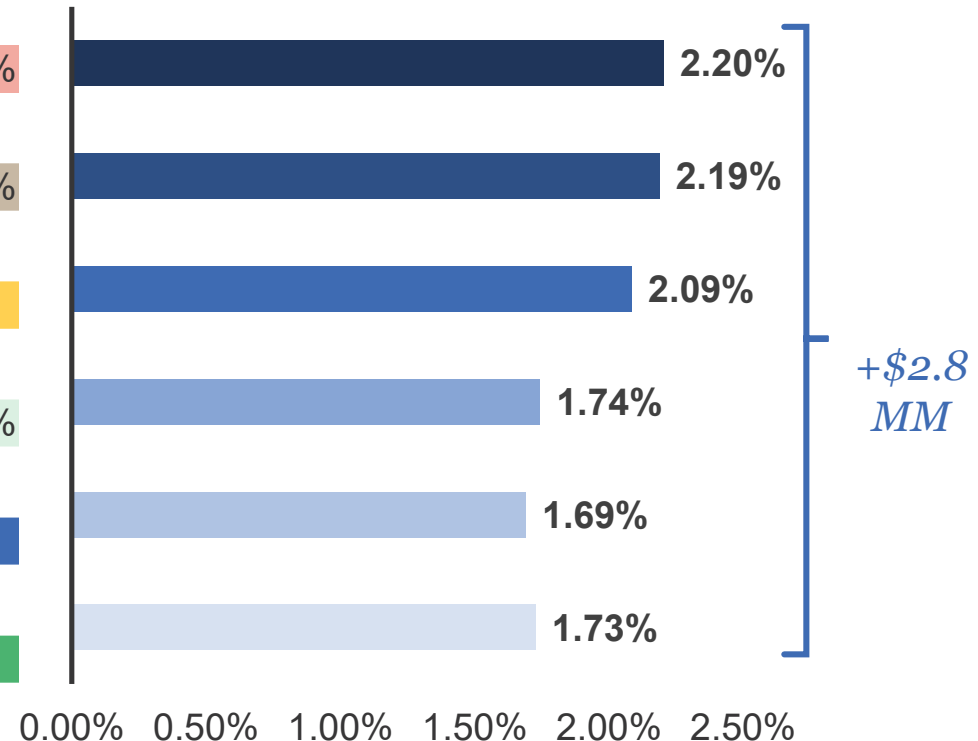


Diversification by Sector

Example 1-5 Year Portfolio Sector Allocation



10-Year Total Return Period Ending December 31, 2019

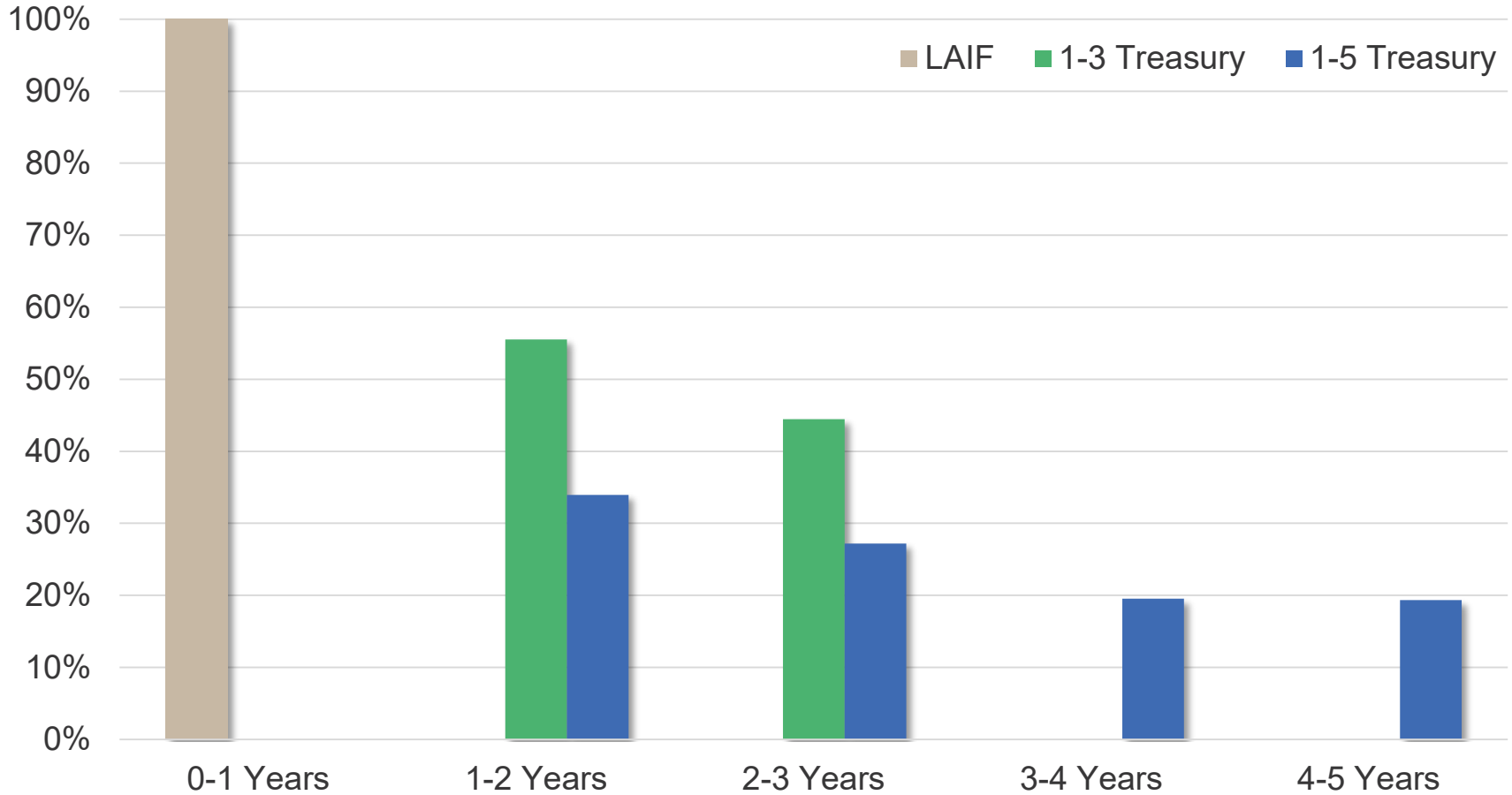


■ Treasury
 ■ Agency
 ■ Supranational
 ■ Corp (A-AAA)
 ■ MBS
 ■ ABS

As of December 31, 2019. Example portfolio returns are based on the ICE BofAML 1-5 Year indices except for mortgage- and asset-Backed Securities, which use 0-5 Year indices and are annualized for trailing periods longer than one year. Source: Bloomberg. Benefit illustrated based on an assumed initial \$50 million investment over the 10-year period analyzed.



Diversification by Maturity

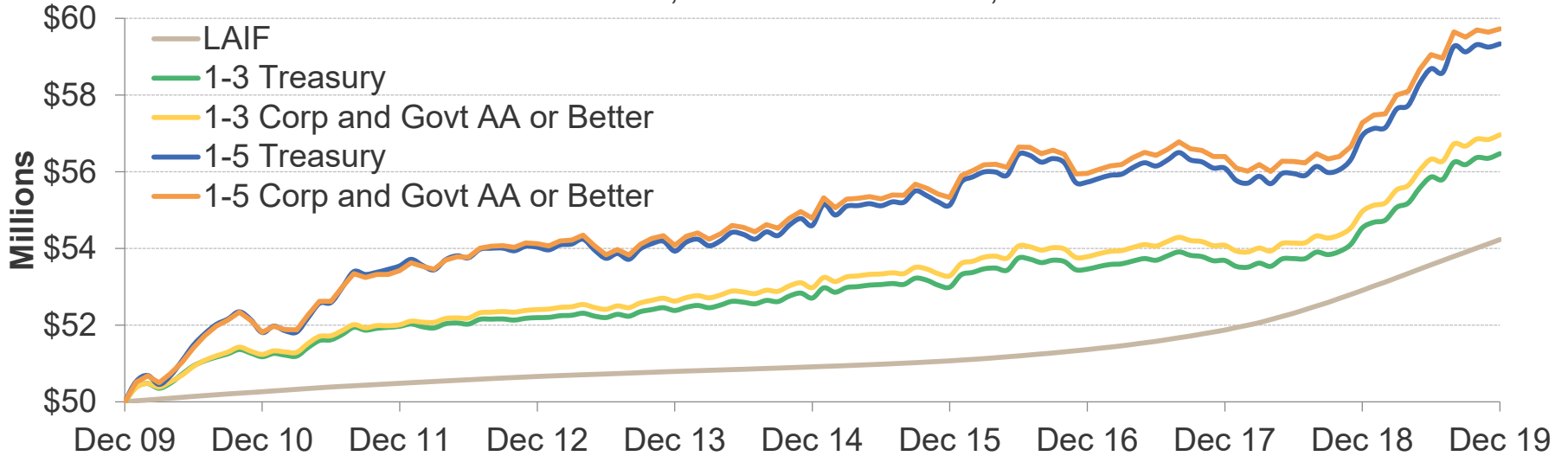


Source: Bloomberg. ICE Bank of America Merrill Lynch (BAML) Indexes, as of December 31, 2019.



Managing Interest Rate Risk: Establish Duration Targets

Growth of \$50 Million Portfolio
December 31, 2009 – December 31, 2019



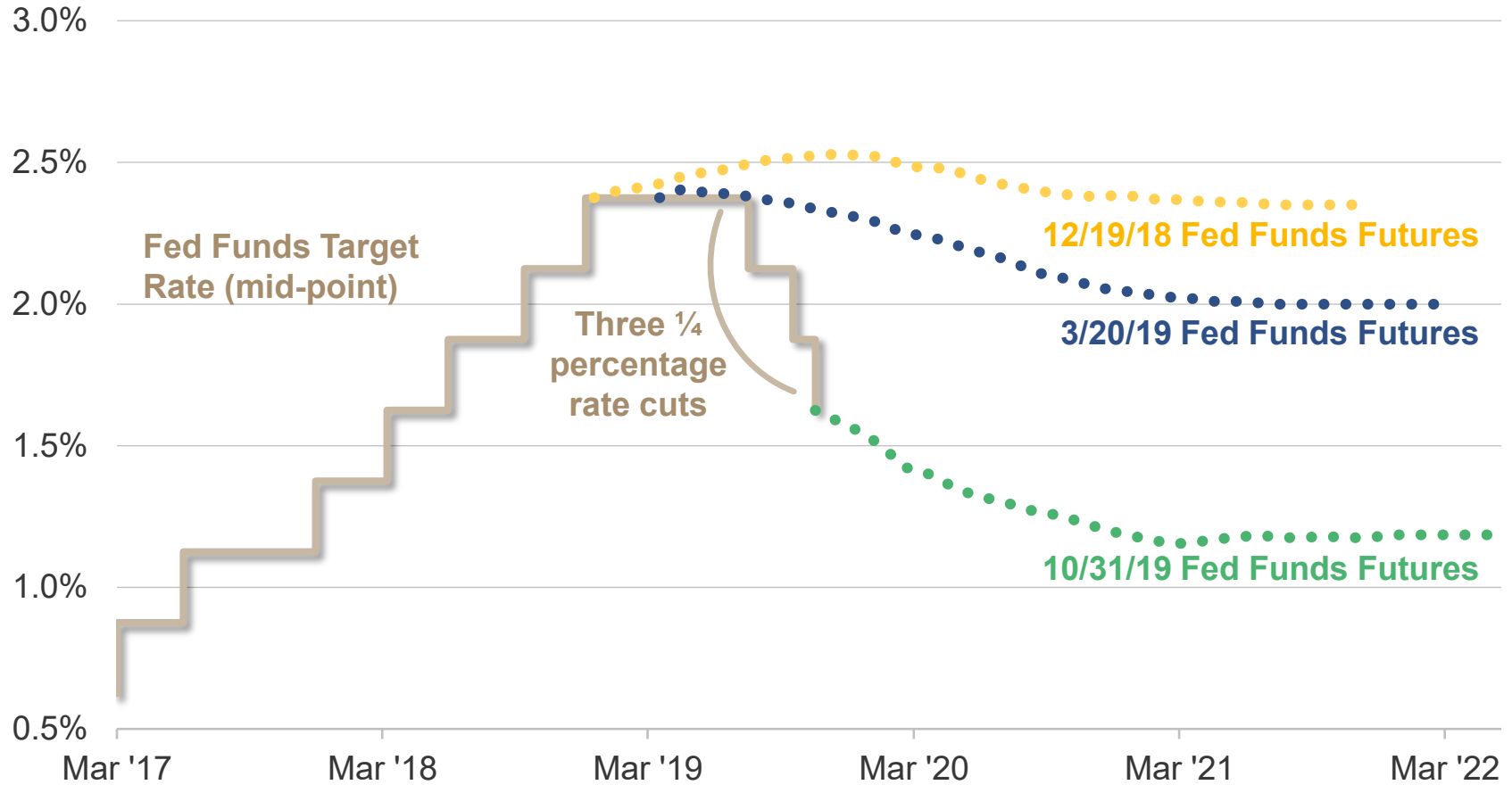
10 Years Ended December 31, 2019

Strategy	Duration (years)	Annualized Total Return	Cumulative Value of \$50 Million	Quarters With Negative Return
LAIF	0.00	0.82%	\$54,230,411	0 out of 40
1-3 Treasury	1.87	1.22%	\$56,472,084	8 out of 40
1-3 Corp and Govt AA or Better	1.85	1.31%	\$56,964,058	7 out of 40
1-5 Treasury	2.61	1.73%	\$59,336,714	10 out of 40
1-5 Corp and Govt AA or Better	2.57	1.79%	\$59,732,075	9 out of 40

Source: Bloomberg. ICE Bank of America Merrill Lynch (BAML) Indexes, as of December 31, 2019.



Managing Interest Rate Risk: Maintain a Market View



Source: Federal Reserve and Bloomberg. Fed funds futures as of Fed meeting dates of December, 19, 2018 and March 20, 2019, and October 31, 2019.



Evaluating Total Return at Various Interest Rate Changes

Current		3 Month Horizon														
YTM	Maturity	-10	Unch	+10	+20	+30	+40	+50	+60	+70	+80	+90	+100	+125	+150	+200
1.62	1yr UST	0.49	0.42	0.35	0.27	0.20	0.13	0.06	(0.01)	(0.08)	(0.16)	(0.23)	(0.30)	(0.48)	(0.66)	(1.02)
1.59	2yr UST	0.53	0.37	0.20	0.03	(0.14)	(0.31)	(0.48)	(0.65)	(0.82)	(0.99)	(1.16)	(1.32)	(1.75)	(2.17)	(3.01)
1.59	3yr UST	0.67	0.40	0.14	(0.12)	(0.39)	(0.65)	(0.92)	(1.18)	(1.45)	(1.71)	(1.98)	(2.24)	(2.90)	(3.57)	(4.89)
1.63	4yr UST	0.80	0.44	0.08	(0.28)	(0.64)	(1.00)	(1.36)	(1.71)	(2.07)	(2.43)	(2.79)	(3.15)	(4.05)	(4.94)	(6.74)
1.66	5yr UST	0.88	0.43	(0.02)	(0.47)	(0.92)	(1.37)	(1.82)	(2.28)	(2.73)	(3.18)	(3.63)	(4.08)	(5.21)	(6.33)	(8.59)
1.77	7yr UST	1.12	0.49	(0.14)	(0.76)	(1.39)	(2.02)	(2.65)	(3.28)	(3.91)	(4.54)	(5.17)	(5.79)	(7.37)	(8.94)	(12.08)
1.85	10yr UST	1.34	0.46	(0.42)	(1.30)	(2.18)	(3.07)	(3.95)	(4.83)	(5.71)	(6.59)	(7.48)	(8.36)	(10.56)	(12.77)	(17.18)

Current		6 Month Horizon														
YTM	Maturity	-10	Unch	+10	+20	+30	+40	+50	+60	+70	+80	+90	+100	+125	+150	+200
1.62	1yr UST	0.89	0.84	0.79	0.74	0.70	0.65	0.60	0.56	0.51	0.46	0.41	0.37	0.25	0.13	(0.11)
1.59	2yr UST	0.90	0.76	0.61	0.47	0.32	0.18	0.03	(0.12)	(0.26)	(0.41)	(0.55)	(0.70)	(1.06)	(1.42)	(2.15)
1.59	3yr UST	1.07	0.82	0.58	0.34	0.10	(0.14)	(0.39)	(0.63)	(0.87)	(1.11)	(1.35)	(1.60)	(2.20)	(2.81)	(4.02)
1.63	4yr UST	1.22	0.89	0.55	0.21	(0.12)	(0.46)	(0.80)	(1.13)	(1.47)	(1.81)	(2.14)	(2.48)	(3.32)	(4.17)	(5.85)
1.66	5yr UST	1.30	0.87	0.44	0.01	(0.42)	(0.85)	(1.28)	(1.71)	(2.14)	(2.57)	(3.00)	(3.43)	(4.50)	(5.58)	(7.73)
1.77	7yr UST	1.63	1.02	0.41	(0.20)	(0.81)	(1.42)	(2.03)	(2.64)	(3.25)	(3.86)	(4.47)	(5.08)	(6.60)	(8.13)	(11.18)
1.85	10yr UST	1.86	0.99	0.13	(0.74)	(1.60)	(2.47)	(3.34)	(4.20)	(5.07)	(5.93)	(6.80)	(7.66)	(9.83)	(11.99)	(16.32)

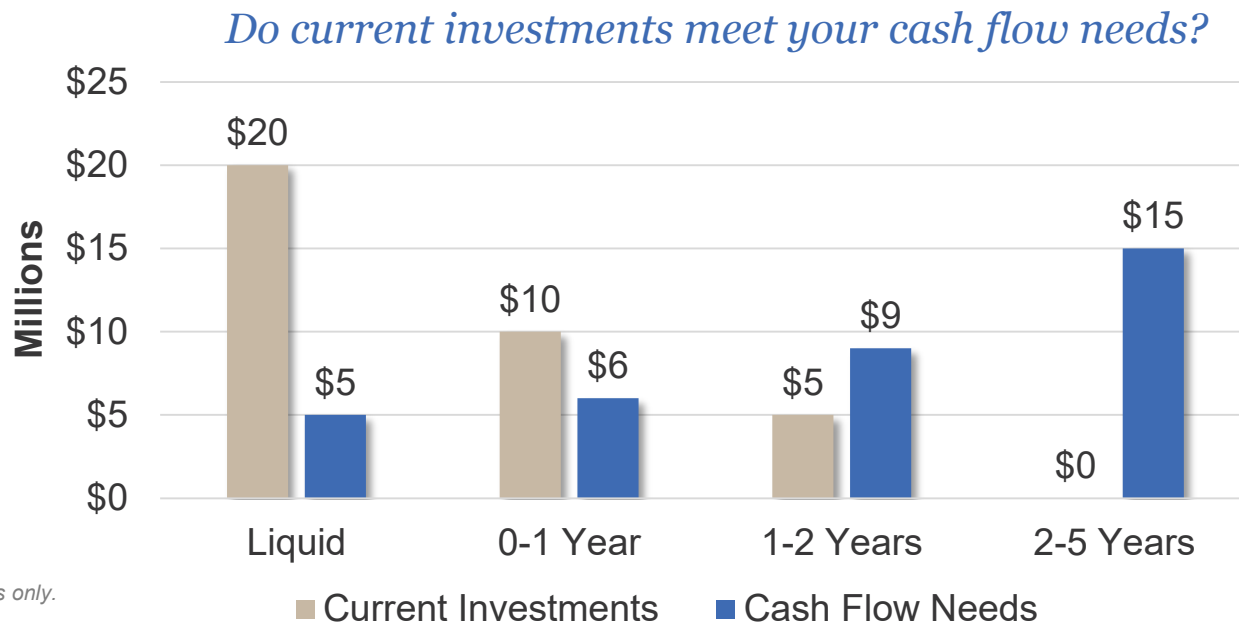
Current		12 Month Horizon														
YTM	Maturity	-10	Unch	+10	+20	+30	+40	+50	+60	+70	+80	+90	+100	+125	+150	+200
1.62	1yr UST	1.62	1.62	1.62	1.62	1.62	1.62	1.62	1.62	1.62	1.62	1.62	1.62	1.62	1.62	1.62
1.59	2yr UST	1.65	1.55	1.45	1.36	1.26	1.16	1.07	0.97	0.88	0.78	0.68	0.59	0.34	0.10	(0.38)
1.59	3yr UST	1.78	1.59	1.39	1.20	1.01	0.81	0.62	0.43	0.23	0.04	(0.16)	(0.35)	(0.84)	(1.32)	(2.29)
1.63	4yr UST	2.04	1.75	1.46	1.17	0.89	0.60	0.31	0.02	(0.27)	(0.56)	(0.85)	(1.14)	(1.87)	(2.59)	(4.04)
1.66	5yr UST	2.13	1.75	1.37	0.98	0.60	0.22	(0.17)	(0.55)	(0.93)	(1.32)	(1.70)	(2.08)	(3.04)	(4.00)	(5.92)
1.77	7yr UST	2.64	2.08	1.51	0.94	0.38	(0.19)	(0.75)	(1.32)	(1.88)	(2.45)	(3.02)	(3.58)	(5.00)	(6.41)	(9.24)
1.85	10yr UST	2.84	2.02	1.20	0.37	(0.45)	(1.28)	(2.10)	(2.92)	(3.75)	(4.57)	(5.40)	(6.22)	(8.28)	(10.34)	(14.46)

Source: Bloomberg, as of January 6, 2020.



Managing Liquidity Risk

- ◆ Invest in sectors and issuers with active secondary markets
- ◆ Obtain access to multiple broker-dealers
- ◆ Conduct cash flow analysis to help avoid unplanned selling



For illustrative purposes only.



Managing Reinvestment Risk

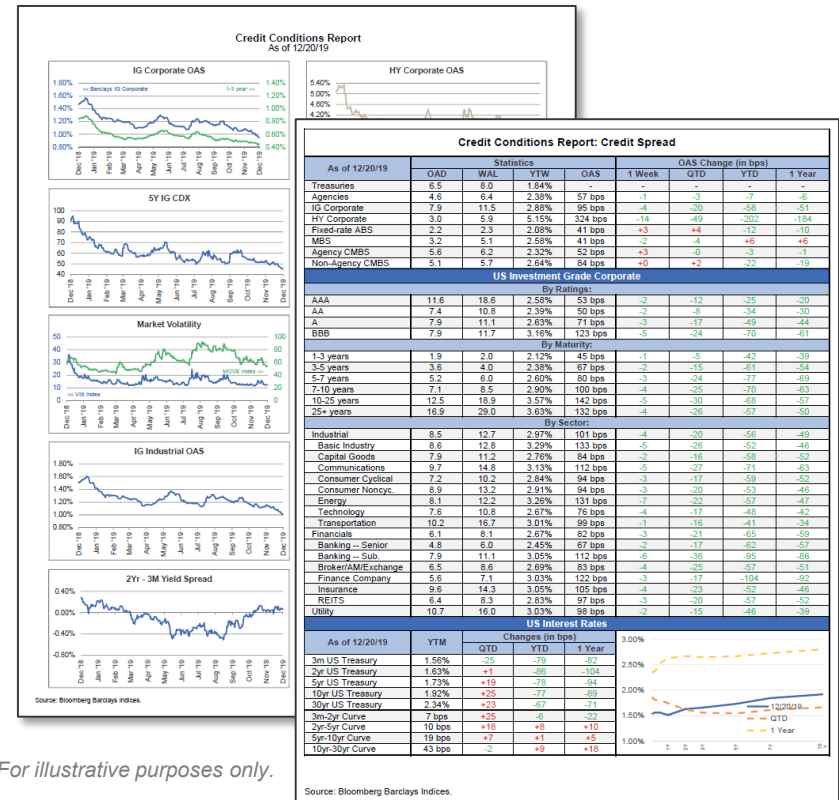
- ◆ Limit percentage of callable securities held in portfolio
- ◆ Limit structures to those with less frequent calls
- ◆ Diversify callable issuers
- ◆ Evaluate relative value using option-adjusted spread (OAS) analysis
- ◆ OAS assumptions can change the results dramatically



Managing Credit Risk

- ◆ Credit evaluation resources
- ◆ Formal approval process
- ◆ Approved issuer and counterparty list
- ◆ Procedures for ongoing credit monitoring
- ◆ Issuer percentage limits
- ◆ Be proactive when warning signs arise

Rating agency reports | Broker/dealer research | Monitoring of: spreads, news headlines, ratings events, credit default swaps market | Quarterly operating and financial results



For illustrative purposes only.

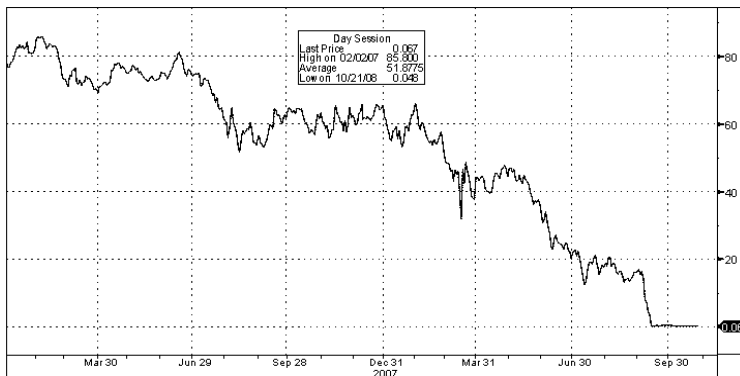


Manage Credit Risk by Monitoring Other Markets

Warning signs of the Lehman collapse

Stock Price

January 2007 – October 2008



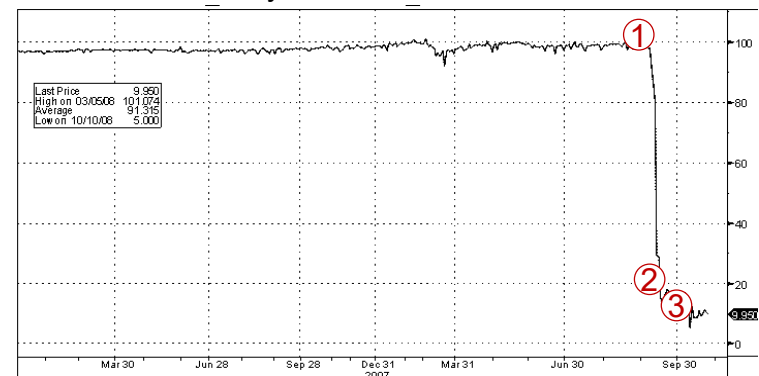
Credit Default Spread

January 2007 – October 2008



Bond Price

January 2007 – October 2008



1. Sep. 9 – Put on negative credit watch by S&P
2. Sep. 15 – Downgraded from A to CCC- by S&P
3. Sep. 16 – Declared bankruptcy



Managing Inflation Risk: Purchase Inflation-Protected Securities

- ◆ Guarantees a real rate of return, serving as a hedging tool against inflation changes
- ◆ Benchmarked against the Consumer Price Index
- ◆ Primarily issued by the U.S. government → Treasury Inflation-Protected Securities (TIPS)
- ◆ Typically does not yield more than traditional Treasury

10-Year Treasury Yield Vs. 10-Year TIPS Yield: 2003-Present

During the recession, the 10-year Treasury fell sharply while the 10-year inflation-protected Treasury rose, making the breakeven rate effectively 0. At that rate, owning TIPS is preferable to owning Treasuries.

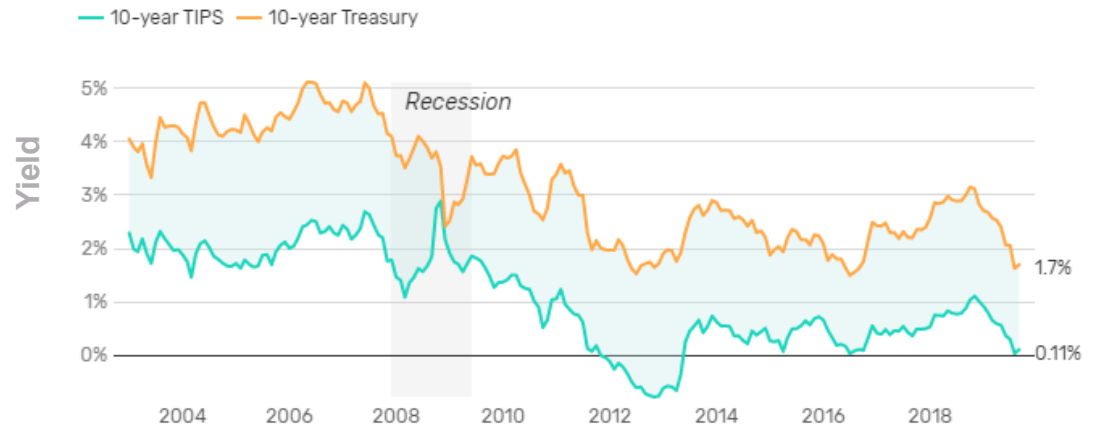


Chart: The Balance • Source: [St. Louis Fed](#)



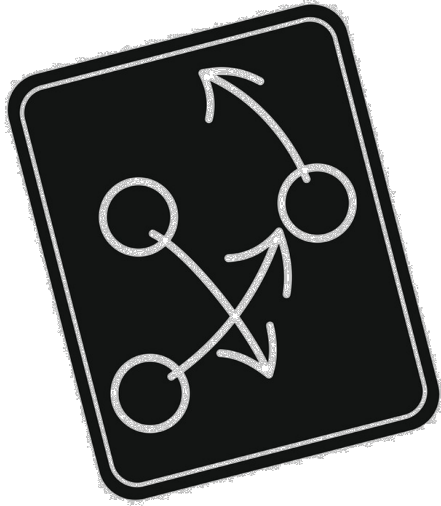
Does Your Performance Metric Reflect Your Risk Preferences?

	YIELD/EARNINGS TARGET	TOTAL RETURN
<i>Characteristics?</i>	Forward-looking; assumes reinvestment of coupon	Backward-looking (historical); includes yield and realized and unrealized gains/losses
<i>Performance Objective?</i>	Maximize current year earnings	Long-term growth relative to a market index
<i>Investment Philosophy?</i>	Purchase securities with highest yield, regardless of risk or value	Identify opportunities offering the best risk/return characteristics
<i>Measurement of Risk?</i>	Weighted average maturity	Duration, as informed by the index
<i>Management Style?</i>	Typically buy-and-hold	Actively managed to capitalize on changes in interest rates

The benchmark should not lead to taking inappropriate risks to outperform the benchmark



Summary of Risk Mitigation Tactics



Inflation Risk

Purchase Treasury Inflation-Protected Securities (TIPS)

Liquidity Risk

Invest in sectors and issuers with active secondary markets

Reinvestment Risk

Limit investments in securities with optional calls or variable prepayments

Interest Rate Risk

Establish duration limits and targets based on your objectives

Monitor duration on an absolute basis and relative to the benchmark

Credit Risk

Implement a disciplined credit approval and monitoring process

Maintain prudent and appropriate diversification

Risk can be managed...

*Establish and follow written guidelines | Stick to a long-term strategy
| Actively manage the portfolio | Measure performance*

Thank You



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