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Benchmarking Your Portfolio for Performance and Risk

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By: David Witthohn, CFA, CIPM, Senior Portfolio Specialist

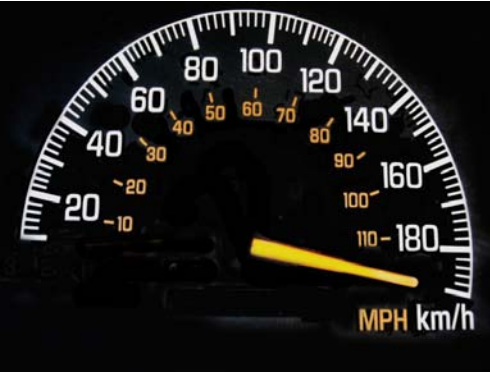
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Why Benchmark Your Portfolio?

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What is the Purpose of Benchmarking?

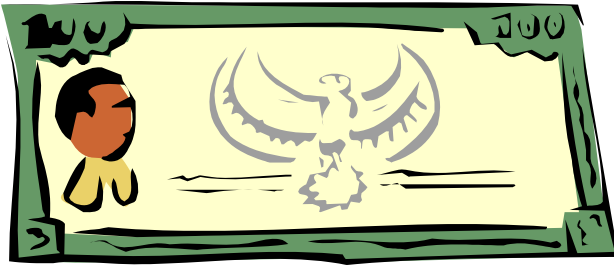


Why wear a watch?

- Establish a Standard – Minutes, Speed or Return
- Measure Progress – Next Break, Destination or Goals & Objectives
- Set Limits – Time, Speed or Risk

Why have a speedometer?

Isn't It Just All About Performance?



Would you buy a U.S. Treasury with a yield of 2.88%?

It's about performance and risk
Risk/Return Tradeoff

Portfolio Objectives



- **Preserving principal**
- **Providing sufficient liquidity to meet cash flow demands**
- **Achieving a market rate of return**

Benchmark used to Achieve Portfolio Objectives



A good benchmark can be used to measure all of the following:

- **Safety** – How much credit risk is in the portfolio? How much interest rate risk? How long is the portfolio's average maturity?
- **Liquidity** - Can the assets be sold? Are there sufficient funds available to meet cash demands?
- **Return** – What is a market rate of return? Is the portfolio under invested?

Performance Measurement

Measuring Return

There are two different Approaches:

Yield Approach

Pros

- Assumes held to maturity
- Simplifies calculations
- Smooths earnings
- Makes projections easier
- Bases return on true income

Cons

- Ignores price movement
- Hides risk
- Approximates performance

Total Return Approach

Pros

- Industry standard
- Shows all risks
- Gives an accurate value
- Allows comparability

Cons

- Difficult to calculate
- Hard to capture return
- Return is erratic

Yield Approach – Yield to Maturity (YTM)

Assumptions:

- Looks only at the income from the bond
- Yield-to-Maturity (purchase yield)
- Reinvestment of interest at the YTM
- Security held to maturity with no optionality (non-callable)
- Annualized for comparison purposes
- Weighted average yield is an approximation of true yield

Yield to Maturity

T 1 7/8 12/15/20 Govt		Settings	Yield and Spread Analysis	
99-19 1/4 / 99-19+		2.015/2.012	BGN @ 10:33	95 Buy 90 Sell
Yield & Spread Yields Graphs Pricing Description Custom				
T 1 7/8 12/15/20 (9128283L2)				
Spread	0.00 bp vs 3y T 1 7/8 12/15/20		Workout	OAS
Price	99-19 1/4	99-19+	10:34:37	M.Dur Dur 2.847 2.853
Yield	2.012111 Mty	2.012111 S/A		Risk 2.839 2.844
Wkout	12/15/2020 @ 100.00	Duration	6.6	Convexity 0.096 0.097
Settle	01/04/18	01/04/18		DV 01 on IMM 284 284
Spreads		Yield Calculations		Invoice
1) G-Sprd	0.0	Street Convention	2.012111	Face 1,000 M
2) I-Sprd	-18.4	Equiv 1 /Yr	2.022233	Principal 996,093.75
3) Basis	40.7	Mmkt (Act/ 360)		Accrued (20 Days) 1,030.22
4) Z-Sprd	-18.2	True Yield	2.012023	Total (USD) 997,123.97
5) ASW	-17.1	Current Yield	1.882	
6) OAS	0.0			
7) TED	19.5			
After Tax (Inc 43.400 % CG 23.800 %)		1.165390		
Issue Price = 99.835. OID Bond with Market Disco...				

Yield to Call

Yield-to-Call and Yield-to-Worst

- Adjusts the yield based on a call date
- Uses the market price as an indication of which securities will be called

Yield to Call

FHLMC 1 1/2 09/20/19 Corp		Settings	Yield and Spread Analysis	
			95 Buy	96 Sell
1) Yield & Spread		2) Yields	3) Graphs	4) Pricing
5) Description		6) Custom	7) Calls	
FHLMC 1 1/2 09/20/19 (3134GBSB9)				
Spread	6.30 bp vs 2y T 1 7/8 12/31/19	Risk		
Price	99.185	99-29	10:45:23	Maturity
Yield	1.986259 Mty	1.923219	S/A	OAS
Wkout	09/20/2019 @ 100.00	Consensus	6.6	
Settle	01/04/18	01/04/18		
Spreads		Yield Calculations		Invoice
11) G-Sprd	9.5	Street Convention	1.986259	Face
12) I-Sprd	-8.2	Equiv 1 /Yr	1.996123	Principal
Basis	N.A.	Mmkt (Act/ 360)	1.984909	Accrued (104 Days)
14) Z-Sprd	-8.1	True Yield	1.986259	Total (USD)
15) ASW	-7.1	Current Yield	1.512	
16) OAS	10.6			
17) TED	7.9			
After Tax (Inc 43.400% CG 23.800%)		1.219021		

Yield to Worst

FHLMC 1 1/2 09/20/19 Corp		Settings	Yield and Spread Analysis	
1) Yield & Spread 2) Yields 3) Graphs 4) Pricing 5) Description 6) Custom 7) Calls				
FHLMC 1 1/2 09/20/19 (3134GBSB9)		Risk		
Spread	349.97 bp vs 2y T 1 7/8 12/31/19	Workout	OAS	
Price	99.185	M.Dur	0.209	1.631
Yield	5.422947 Call	Risk	0.208	1.625
Wkout	03/20/2018 @ 100.00 Consensus 6 6	Convexity	0.001	-0.119
Settle	01/04/18	DV 01 on 1MM	20.79	162
		Benchmark Risk	1.941	1.942
		Risk Hedge	107 M	837 M
		Proceeds Hedge	997 M	
		Invoice		
		Face	1,000 M	
		Principal	991,850.00	
		Accrued (104 Days)	4,333.33	
		Total (USD)	996,183.33	
Spreads 1) G-Sprd 404.9 2) I-Sprd 372.9 Basis N.A. 4) Z-Sprd 374.7 5) ASW 381.7 6) OAS 10.6 TED N.A.		Yield Calculations Street Convention 5.381064 Equiv 1 /Yr 5.496468 Mmkt (Act/ 360) 5.452812 True Yield 5.381064 Current Yield 1.512		
After Tax (Inc 43.400 % CG 23.800 %)		3.812442		

Amortized Cost

Amortized Cost Method

$$\text{Return} = \frac{(\text{Interest} \pm \text{Accretion/Amortization} \pm \text{Realized Gain/Loss})}{\text{Average Daily Historical Cost}}$$

- Annualize: divide by # of days in the period and then multiple by 365
- Captures sales and purchases, maturities, and called securities
- Calculates actual reinvestment rate
- Calculates return for period – not just a point in time

Total Return – Industry Standard

Total return performance combines both income and change in price.

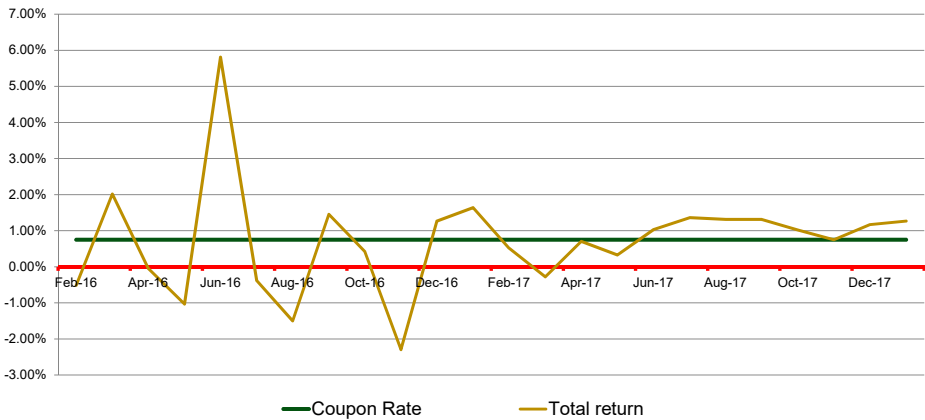
$$\text{Total Return} = \frac{\text{Value End} - \text{Value Start}}{\text{Value Start}}$$

- Doesn't allow for cash flows for the period (no additions or subtractions)
- Assumes you will sell the security today using the current price
- Changing prices varies return from period-to-period
- Global Investment Performance Standards (GIPS) – These are client returns adjusted for any cash flows

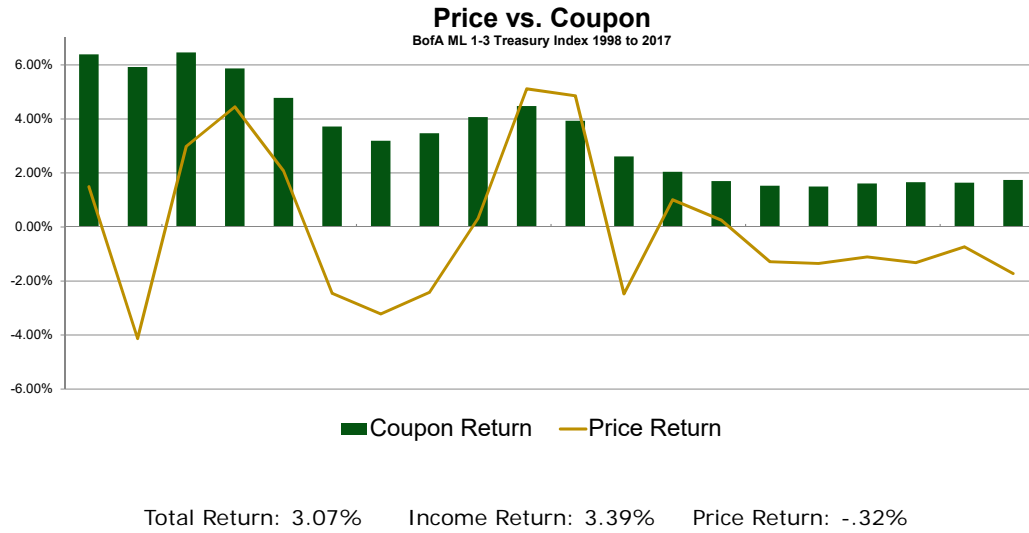
Total Return vs. Yield to Maturity (YTM)

Total Return vs Coupon

Treasury Note, Coupon - .75%, Issued - 2/1/16, Maturity - 1/31/18, YTM - .72%



Total Return – Price vs. Income



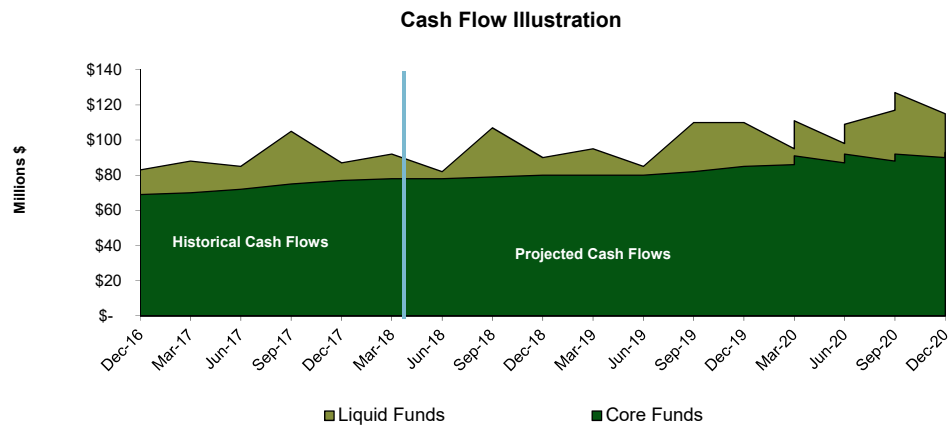
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Benchmark Selection



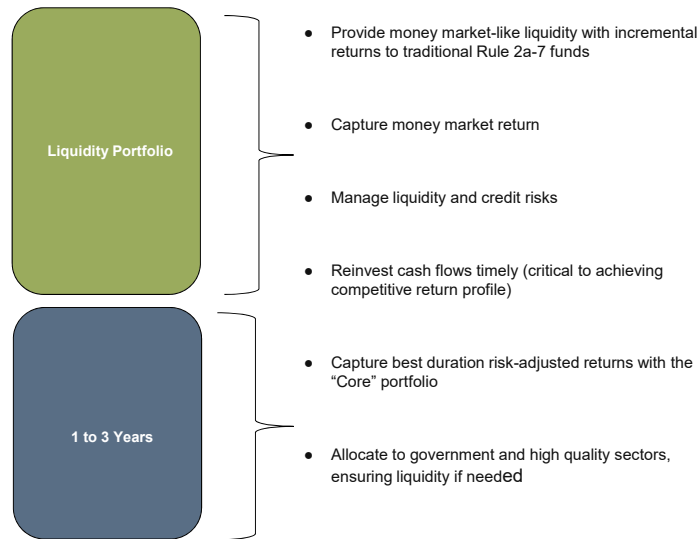
The transaction issue can be reduced by splitting the portfolio into liquid funds and core funds.



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Traditional Portfolio Structure



Portfolio Performance



- **Portfolio return is linked to portfolio safety and portfolio liquidity**
- **If held to maturity the total return of the bond equals the purchase yield**
- **Amortized cost returns or yields make it more difficult to measure risk**
- **Optionality embedded in the portfolio needs to be taken into consideration**
- **Risk measurement is just as important as performance**
- **A bond's price captures all "known" information, including risk**