Putting it all Together: An Investment Simulation Game

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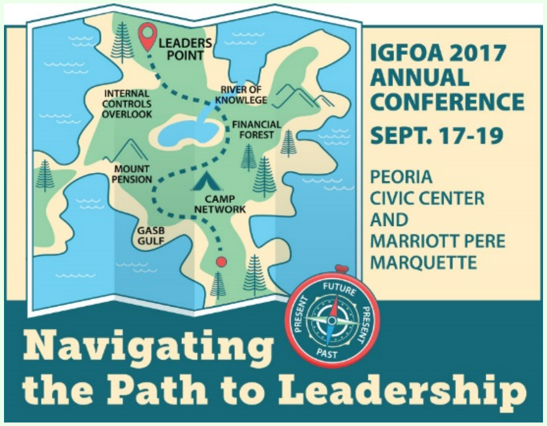

Introduction to our Simulation Game

Navigating the Path to Leadership

Successful Investment Plan Aligns Appropriate Strategy for Purpose

- Immediate Reserves: <12 months
  - T-bills/Agency Discount Notes/CD's
  - Commercial Paper
  - LGIPs
- Semi-Permanent Reserves: 1-5 Years
  - Treasury Notes/Agency Notes
  - Taxable Municipal Bonds
  - Agency Mortgage Securities
- Permanent Reserves: 5+ Years
  - Mortgage Pass Through Bonds
  - Taxable Municipal Bonds
  - Treasury Notes / Agency Notes
- Pension / OPEB : Long Horizon
  - Corporate Bonds
  - Zero Coupon Treasury/Agency Bonds
  - Equities / Stocks

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Investment Considerations

- Safety of Principal
  - Credit Risk
  - Interest Rate Risk (Price Volatility)
- Liquidity Needs
- Yield, Income, and Return Objectives

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Assumptions for Today

- Focused on Long-Term Reserves
- High Quality Emphasis; AA Overall Credit Quality
- Portfolio Duration Matching Your Goals & Objectives
- Eligible Investments:
  - Money Market Funds & Local Government Investment Pools
  - U.S. Treasury Notes
  - U.S. Agency Notes and Agency Securitized
  - Municipal Securities (Rated AA/A)

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Implementing Our Game

- We will be investing in indices instead of individual securities.

Definition

- Index: Attempts to replicate the performance of a given investment type. It can also be called a benchmark.

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Indices

- iMoneyNet – A composite of domestic taxable money market mutual funds
- BofA Merrill Lynch 1-3 Year US Treasury & Agency Index
- BofA Merrill Lynch 1-5 Year AAA-AA Municipal Securities Index
- BofA Merrill Lynch 3-5 Year US Mortgage Backed Securities Index
- BofA Merrill Lynch 1-10 Year US Treasury & Agency Index

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Key Terms

- **Current Yield**: Annual income (coupons and interest) divided by the current market price of the security.
  - This measure of yield uses the market price of a bond instead of its face value or cost.
  - When a bond sells at par, the current yield will equal the stated interest rate (coupon) of the bond.
  - When the bond sells for a premium, the current yield will lower than the stated interest rate on the bond.
  - The current yield will be higher for a discount bond.

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Key Terms

- **Duration**: The approximate percentage change in price for a 100 basis point change in rates.
  - Closely related to time to maturity
  - Generally, longer maturity bonds have a greater sensitivity to changes in interest rates.
  - Approximate Percent Price change = -duration x change in rates x 100

EXAMPLE

Using a duration of 3.00, let's see the approximate change for a small movement in rates such as a 50 basis points <u>increase</u>.

Approx. Percentage Price Change = -3.00 x (+0.0050) x 100 = **-1.50%**

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Key Terms

- **Total Return**: The actual rate of return of an investment or a pool of investments over a given time period.
  - Total return includes interest and capital gains earned over a given period of time.
- **Excess Return**: Additional return of an investment above a Treasury security of similar duration.
- **Standard Deviation**: A measure that is used to quantify the amount of variation or dispersion of a set of data values.
  - A low standard deviation indicates that the data points tend to be close to the mean.
  - A larger standard deviation is an indicator of greater volatility.

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Key Terms

- **Sharpe Ratio**: A measure for calculating risk-adjusted return. The Sharpe ratio is the average return earned in excess of the risk-free rate per unit of volatility or total risk.
  - Generally, the greater the value of the Sharpe ratio, the more attractive the risk-adjusted return.
  - This ratio has become the industry standard for such calculations.
  - **Sharpe ratio** = (Mean portfolio return − Risk-free rate)/Standard deviation of portfolio return

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Simulation 1 –
Rising Rate Environment

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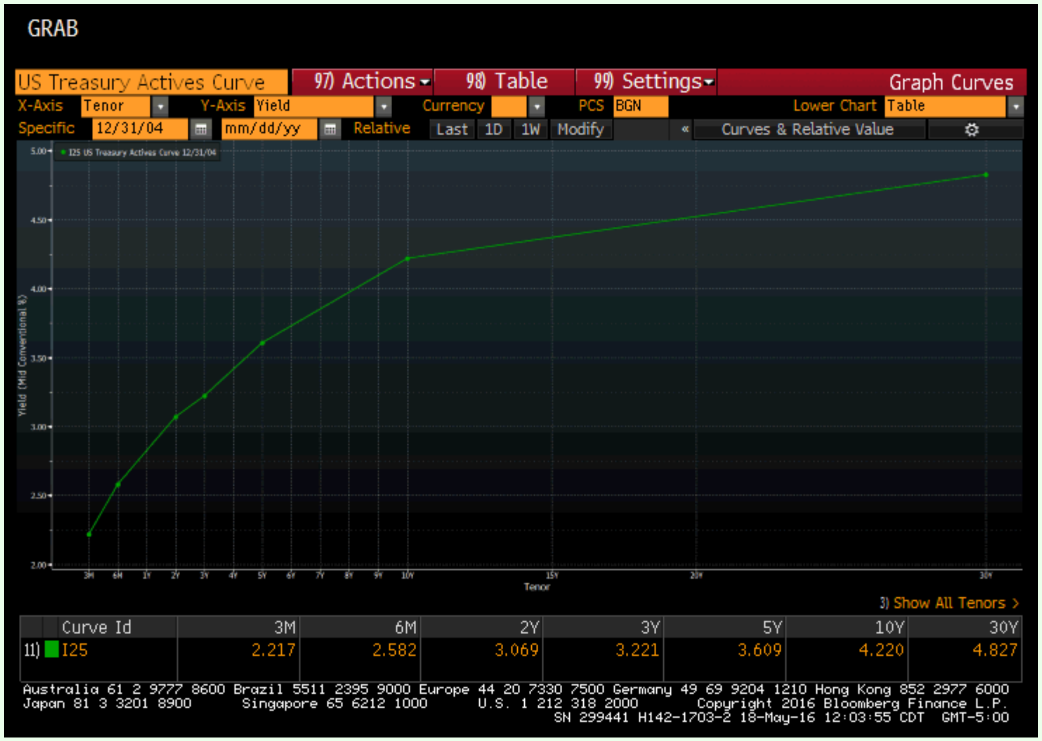
12/31/04 Yield Curve



Sources: Bloomberg

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Market Information

	DECEMBER 31, 2004	
	Yield	Duration
Money Market	1.60	0.10
1-3 Treas	3.06	1.64
3-5 Mort	4.65	2.63
1-5 Muni	2.45	2.66
1-10 Treas	3.44	3.13

Sources: Bloomberg, iMoneyNet

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What do we do?

- Break into groups of 5-7
- As a group, discuss your strategy
  - Consider data regarding each Index
    - Yield
    - Duration
  - Consider market environment
- Assign an allocation to each index (you can assign 0%)
  - What are your goals/objectives?
  - What is your risk tolerance?
- Share your group’s strategy and asset allocation with the room

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Summary Results

STRATEGY	Money Market	1-3 Treas	3-5 Mort	1-5 Muni	1-10 Treas	Cumulative Total Return	Avg. Excess Return	Standard Deviation	Sharpe Ratio
Diversified	10%	25%	25%	25%	15%	**12.4%**	0.03%	0.004	**0.08**
I think I know	50%	50%	0%	0%	0%	**12.5%**	0.03%	0.002	**0.14**
Extreme betting	100%	0%	0%	0%	0%	**12.3%**	0.01%	0.001	**0.17**
Money Market	70%	15%	0%	15%	0%	**11.8%**	0.01%	0.001	**0.06**

Sources: Bloomberg, iMoneyNet, Prudent Man Advisors, Inc.
Monthly returns used to calculate Excess Returns and Standard Deviation

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Simulation 2 –
Falling Rate Environment

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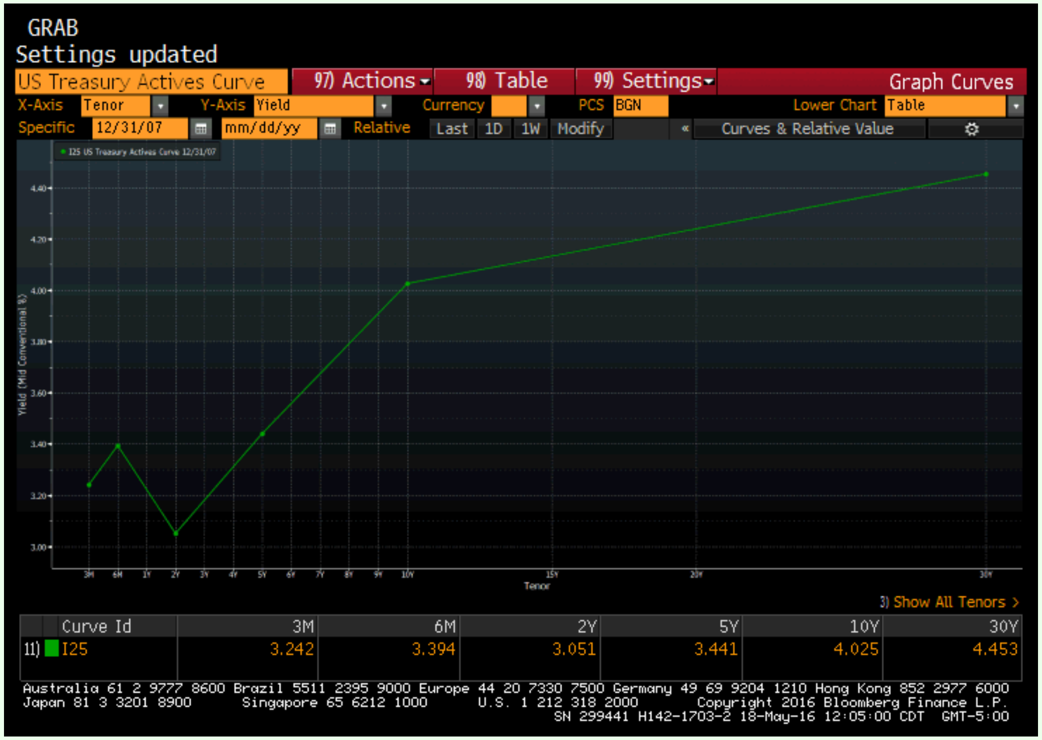
12/31/07 Yield Curve



	Curve Id	3M	6M	2Y	5Y	10Y	30Y
11)	I25	3.242	3.394	3.051	3.441	4.025	4.453

Sources: Bloomberg

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Market Information

	DECEMBER 31, 2007	
	Yield	Duration
Money Market	3.99	0.10
1-3 Treas	3.24	1.56
1-5 Muni	3.23	2.55
3-5 Mort	5.25	3.01
1-10 Treas	3.51	3.32

Sources: Bloomberg, iMoneyNet

Summary Results

STRATEGY	Money Market	1-3 Treas	1-5 Muni	3-5 Mort	1-10 Treas	Cumulative Total Return	Avg. Excess Return	Standard Deviation	Sharpe Ratio
Diversified	10%	25%	25%	25%	15%	**12.5%**	0.27%	0.006	**0.44**
I think I know	0%	0%	30%	30%	40%	**15.0%**	0.33%	0.008	**0.40**
Extreme betting	0%	0%	0%	0%	100%	**15.4%**	0.33%	0.011	**0.30**
Money Market	70%	15%	15%	0%	0%	**5.7%**	0.08%	0.002	**0.37**

Sources: Bloomberg, iMoneyNet, Prudent Man Advisors, Inc.
Monthly returns used to calculate Excess Returns and Standard Deviation

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Simulation Game – Results and Summary

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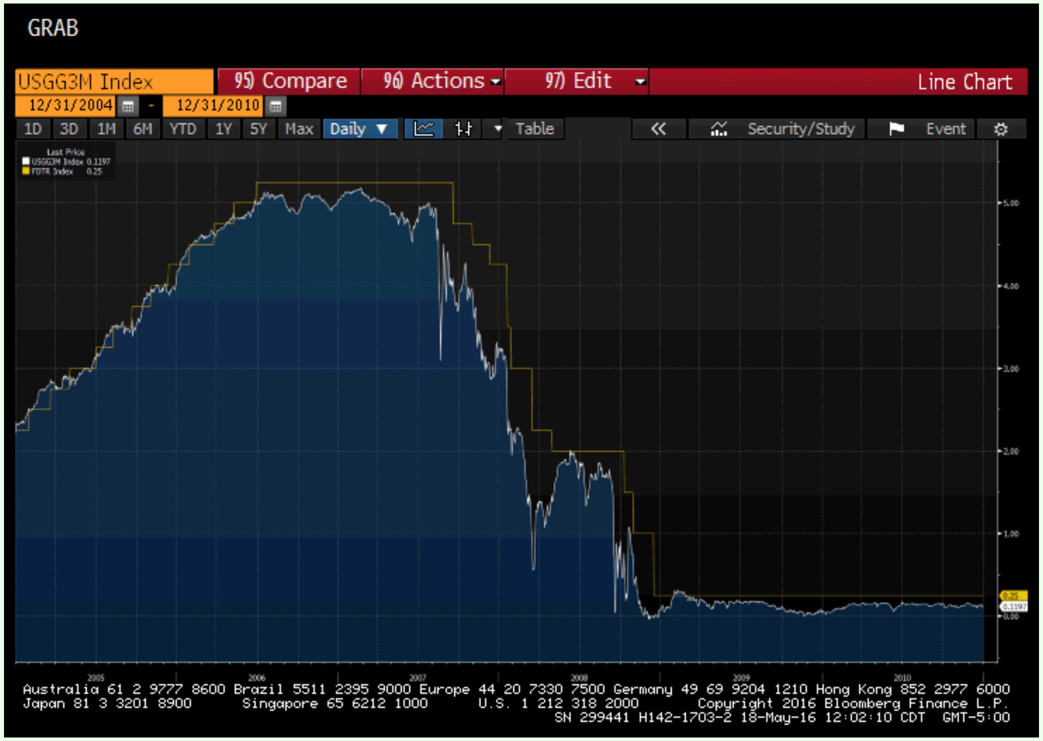
Changes in Interest Rates



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Summary

- Rates may not move as expected
  - Strong market and Fed tightening in 2005 reversed by the end of 2007
  - Financial Crisis:
    - Falling Treasury Rates
    - Rising Credit Spreads
- Diversification across allowable sectors reduces risk
  - Financial Crisis results on sector performance:
    - Treasuries outperformed (flight to safety)
    - Credit products such as corporates and munis underperformed

6-year Results

STRATEGY	Money Market	1-3 Treas	1-5 Muni	3-5 Mort	1-10 Treas	Total Return	Avg. Excess Return	Standard Deviation	Sharpe Ratio
Diversified	10%	25%	25%	25%	15%	25.6%	0.020	0.021	**0.95**
Stay Short	40%	30%	30%	0%	0%	19.7%	0.010	0.017	**0.58**
Go long	10%	0%	20%	20%	50%	27.7%	0.022	0.027	**0.82**

Sources: Bloomberg, iMoneyNet, Prudent Man Advisors, Inc.
Annual returns used to calculate Excess Returns and Standard Deviation

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Investment Lessons

- Match your investment plan to Goals and Objectives

- Measure performance based on:
  - Total Return (income and price return)
  - Risk-Adjusted Return (Sharpe ratio)

- Diversification reduces risk over time

- Avoid market timing

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Appendix

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6-year Monthly Data Summary

	Money Market	1-3 Treas	1-5 Muni	3-5 Mort	1-10 Treas
Cumulative Return	15%	25%	24%	36%	32%
Annual Return	2.3%	3.9%	3.7%	5.3%	4.8%
Standard Deviation	0.16	0.43	0.59	0.78	0.90
Number of Months with Losses	0	15	18	21	19

Sources: Bloomberg, iMoneyNet, Prudent Man Advisors, Inc.
Monthly returns used to calculate Cumulative Return and Standard Deviation

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