PUTTING LEARNING INTO PRACTICE: PORTFOLIO MANAGEMENT FOUNDATIONS & AN INVESTMENT SIMULATION

FENIL PATEL
Senior Vice President
Prudent Man Advisors, Inc.

JAIME SANTANA
Associate Portfolio Manager
Prudent Man Advisors, Inc.

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TAKEAWAYS

- Public fund investors often stay too liquid for various reasons...timing interest rates is one reason.
- There is an opportunity cost in liquidity
- Betting on interest rates has never been a consistent source of return
- But…diversification in a fixed income portfolio is another way to buffer rate changes

INVESTMENT STRATEGIES AND EXECUTION

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INVESTMENT DECISIONS

- Periodically Review & Update Your Investment Policy
  - Authorized investments
  - Diversification
  - Maturity
  - Asset class

INVESTMENT DECISIONS

- Assess Your Needs
  - Determine your objectives
  - Assess your expertise
  - Consider your time
  - Utilize investment professionals

INVESTMENT STRATEGY

1) Protect Principal
   - Do your homework
   - Work with people you trust
   - Do your due diligence

INVESTMENT STRATEGY

2) Maintain Liquidity

- Cash flow analysis
  - Keep it simple
  - Be realistic
- Remember unusual expenditures

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INVESTMENT STRATEGY

3) Generate Income

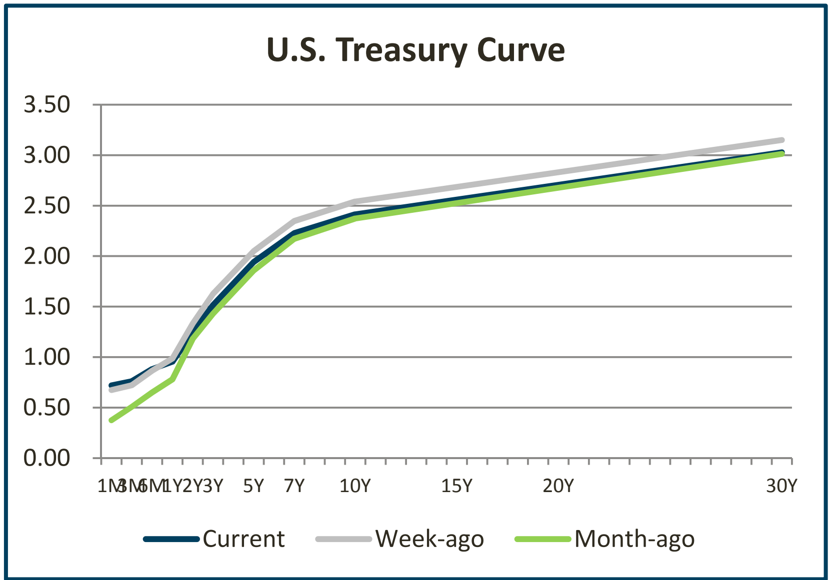
- Understand market realities
  - You can't "beat" the market over time
  - Extending maturity increases yield <u>and</u> interest rate risk
  - Match assets and liabilities to reduce risk and provide efficient investing
  - Remember, the market is efficient
- Seek best execution through competitive bids

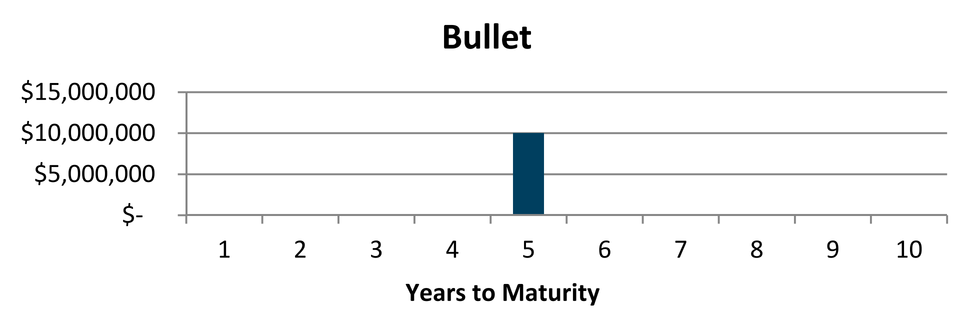
INVESTMENT STRATEGY

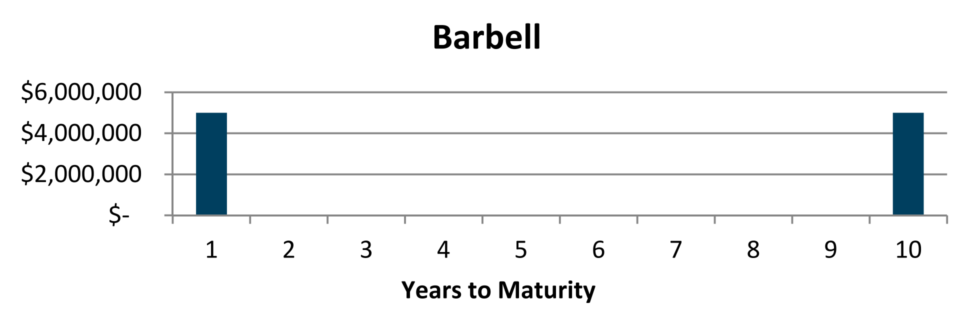
- ## Evaluate Call Risk
  - Typically seen in Agency Securities and Municipal Bonds
  - Issuer has right to redeem the security on a given date or dates - call date(s)
  - The value of the "call option" varies depending on the following factors:
    - Current market rates relative to the security's coupon rate
    - Time remaining to the call date
    - Call type
  - What are the risks?
    - Issuers exercise call options in periods of declining interest rates
    - Issuers do not exercise call option when rates rise reducing your ability to reinvest at higher yields

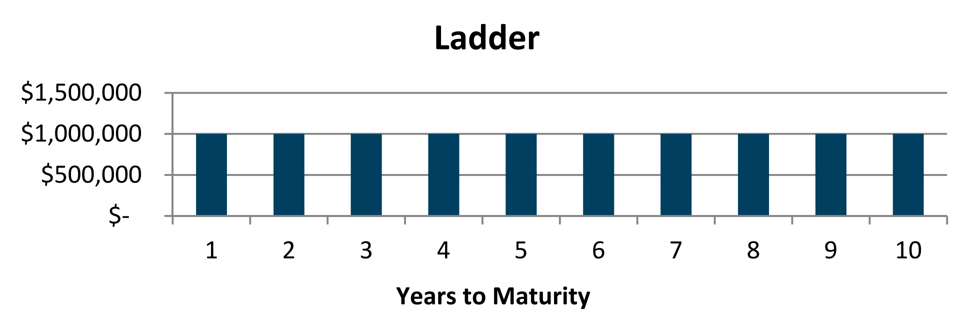
YIELD CURVE STRATEGIES

- $10 Million Portfolio
- Average Maturity: 5 Years
- Portfolio Yield:
  - Bullet: 1.45%
  - Barbell: 1.24%
  - Ladder: 1.46%









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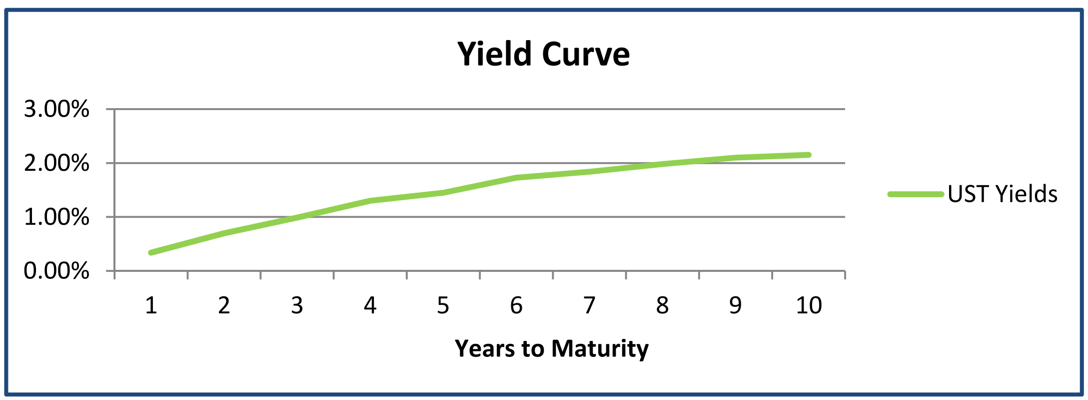
YIELD CURVE STRATEGIES

1. Power of a Ladder
   - Reinvest over time
   - Similar to dollar cost averaging in stocks
   - Works in all rate environments
     - Rates Fall: Locked in higher yields in longer maturities
     - Rates Stable: Longer maturities will enhance yield
     - Rates Rise: Reinvest at higher yields as bonds mature

YIELD CURVE STRATEGIES

2. Rolling Down the Yield Curve

- In a positively sloped yield curve environment, as the bond ages, it will be re-priced at a lower yield which leads to a higher price
- This enhances the price component of return leading to a total return that is greater than the purchase yield
  - Example: 5-year UST yield 1.45% Price: 99.68
  - Next year this bond will be a 4-year yielding 1.30% Price: 100.29
  - Price change: +.61 Total return: +1.98%
- Find the steepest part of the yield curve to maximize the roll-down strategy



IN SUMMARY…

- Safety, liquidity and then yield
- Invest with a plan
- Do your due diligence

INTRODUCTION TO OUR SIMULATION GAME

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
  - Investment Grade Corporate Bonds
  - Taxable Municipal Bonds
  - Agency Mortgage Securities
- Permanent Reserves: 5+ Years
  - Investment Grade Corporate Bonds
  - Mortgage Pass Through Bonds
  - Taxable Municipal Bonds
  - Treasury Notes / Agency Notes
- Pension / OPEB : Long Horizon
  - Corporate Bonds
  - Zero Coupon Treasury/Agency Bonds
  - Equities / Stocks

INVESTMENT CONSIDERATIONS

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

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)
  - Corporate Securities (Rated AA/A)

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.

INDICES

- iMoneyNet – A composite of domestic taxable money market mutual funds
- BofA Merrill Lynch 1-3 Year US Treasury & Agency Index
- BofA Merrill Lynch 1-3 Year US Corporate 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

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 be lower than the stated interest rate on the bond.
  - The current yield will be higher for a discount bond.

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 increase.

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

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.

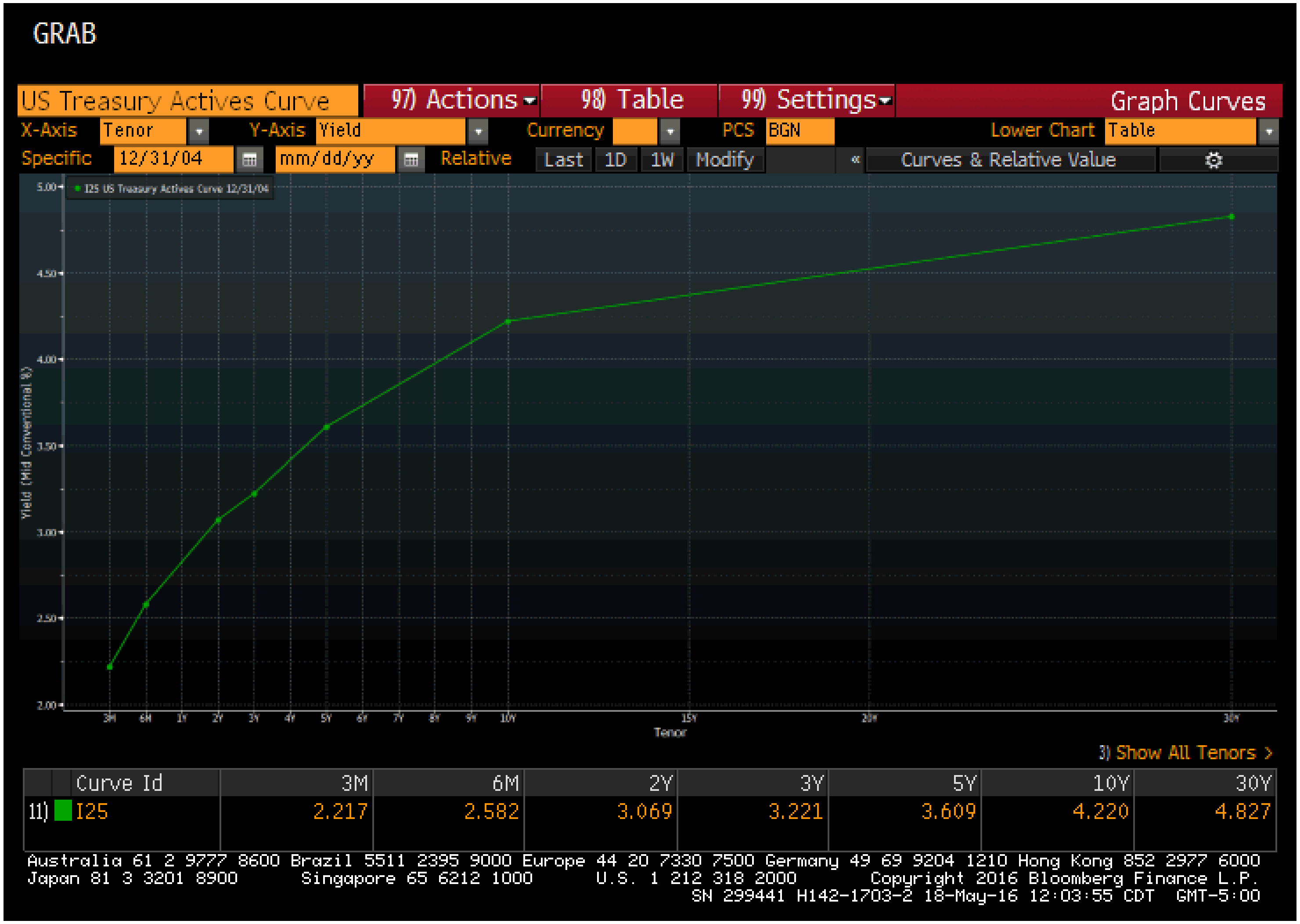
- **Standard Deviation**: A measure that is used to quantify the amount of variation or dispersion of a set of data values.
  - A low standard deviation indicates that the data points tend to be close to the mean.
  - A larger standard deviation is an indicator of greater volatility.

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

SIMULATION 1 –
RISING RATE ENVIRONMENT

12/31/04 Yield Curve



Sources: Bloomberg

MARKET INFORMATION

	DECEMBER 31, 2004	
	Yield	Duration
Money Market	1.60	0.10
1-3 Treas	3.06	1.64
1-3 Corp	3.55	1.69
3-5 Mort	4.65	2.63
1-5 Muni	2.45	2.66
1-10 Treas	3.44	3.13

Sources: Bloomberg, iMoneyNet

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

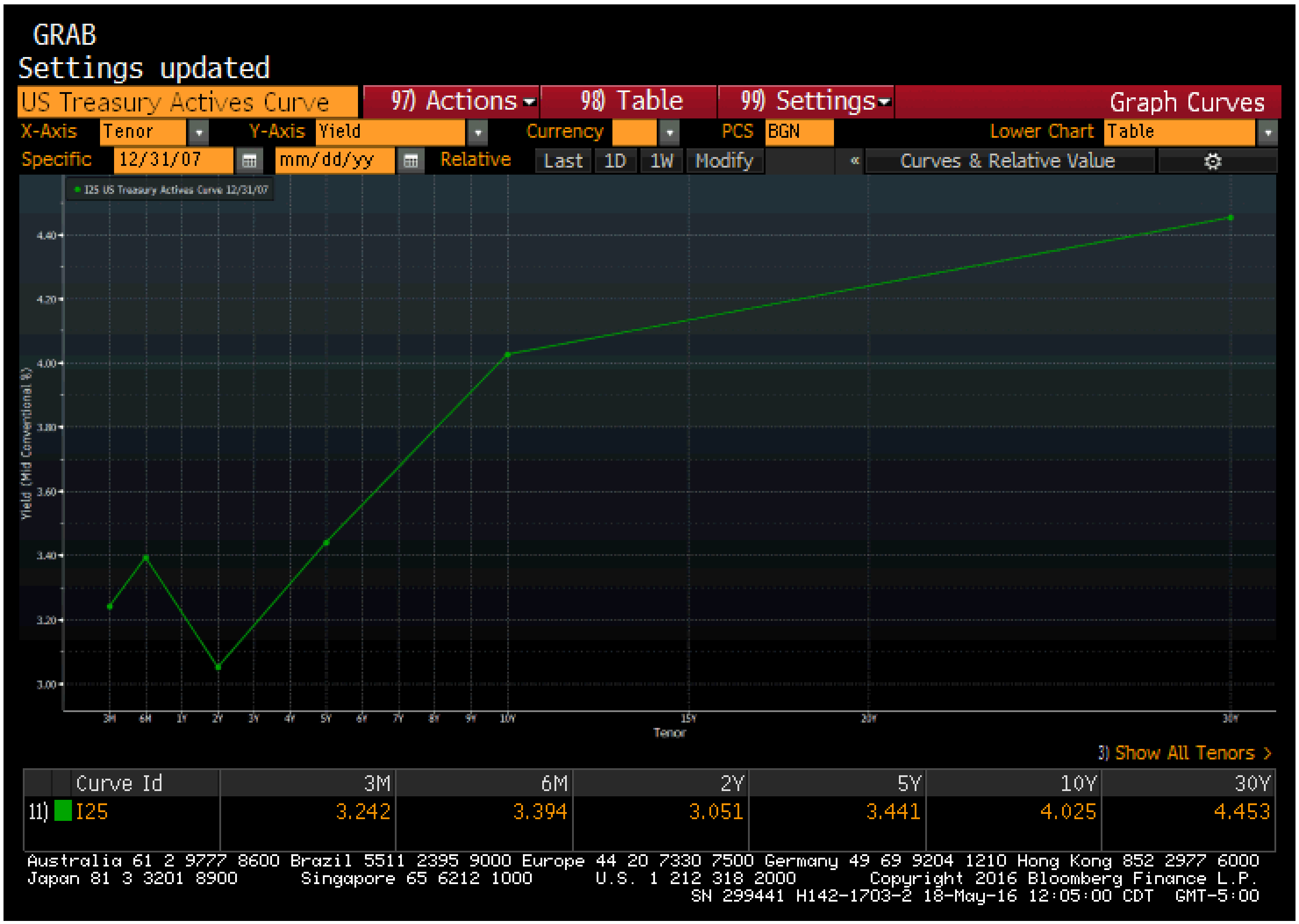
SUMMARY RESULTS

STRATEGY	Money Market	1-3 Treas	1-3 Corp	3-5 Mort	1-5 Muni	1-10 Treas	Cumulative Total Return	Avg. Excess Return	Standard Deviation	Sharpe Ratio
Diversified	10%	20%	20%	20%	20%	10%	**12.3%**	0.03%	0.004	**0.08**
I think I know	40%	30%	30%	0%	0%	0%	**12.3%**	0.03%	0.002	**0.12**
Extreme betting	100%	0%	0%	0%	0%	0%	**12.3%**	0.01%	0.001	**0.17**
Money Market	70%	10%	10%	0%	10%	0%	**11.9%**	0.01%	0.001	**0.09**

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

SIMULATION 2 –
FALLING RATE ENVIRONMENT

12/31/07 Yield Curve



Sources: Bloomberg

MARKET INFORMATION

	DECEMBER 31, 2007	
	Yield	Duration
Money Market	3.99	0.10
1-3 Treas	3.24	1.56
1-3 Corp	5.02	1.77
1-5 Muni	3.23	2.55
3-5 Mort	5.25	3.01
1-10 Treas	3.51	3.32

Sources: Bloomberg, iMoneyNet

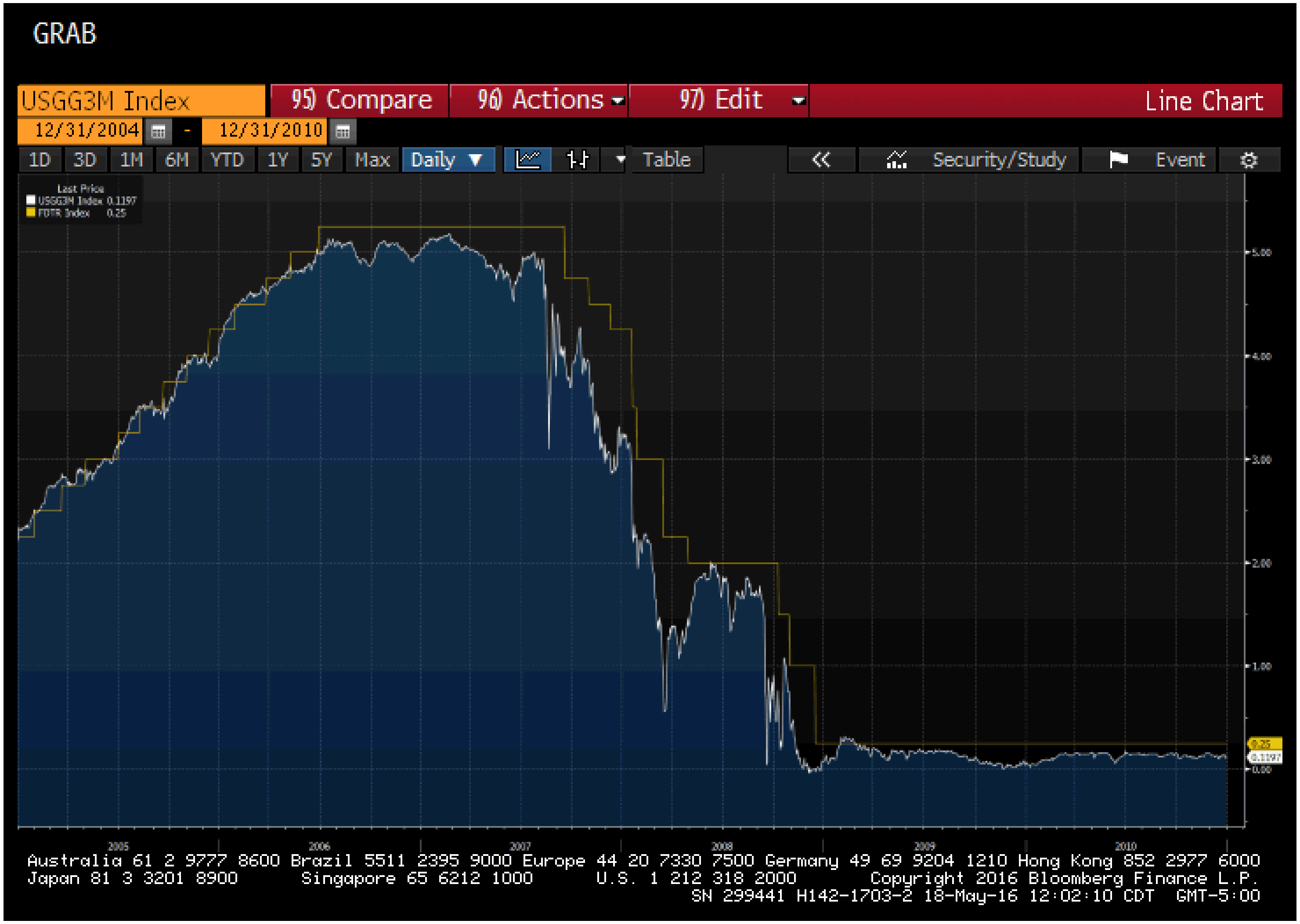
SUMMARY RESULTS

STRATEGY	Money Market	1-3 Treas	1-3 Corp	1-5 Muni	3-5 Mort	1-10 Treas	Cumulative Total Return	Avg. Excess Return	Standard Deviation	Sharpe Ratio
Diversified	10%	20%	20%	20%	20%	10%	**13.0%**	0.28%	0.006	**0.47**
I think I know	0%	0%	0%	30%	30%	40%	**15.0%**	0.33%	0.008	**0.40**
Extreme betting	0%	0%	0%	0%	0%	100%	**15.4%**	0.33%	0.011	**0.30**
Money Market	70%	10%	10%	10%	0%	0%	**5.9%**	0.09%	0.002	**0.41**

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

SIMULATION GAME – RESULTS AND SUMMARY

CHANGES IN INTEREST RATES



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	1-3 Corp	1-5 Muni	3-5 Mort	1-10 Treas	Total Return	Avg. Excess Return	Standard Deviation	Sharpe Ratio
Diversified	10%	20%	20%	20%	20%	10%	26.0%	0.021	0.015	**1.41**
Stay Short	40%	30%	30%	0%	0%	0%	22.0%	0.014	0.016	**0.84**
Go long	10%	0%	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

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

APPENDIX

6-YEAR MONTHLY DATA SUMMARY

	Money Market	1-3 Treas	1-3 Corp	1-5 Muni	3-5 Mort	1-10 Treas
Cumulative Return	15%	25%	32%	24%	36%	32%
Annual Return	2.3%	3.9%	4.7%	3.7%	5.3%	4.8%
Standard Deviation	0.16	0.43	1.01	0.59	0.78	0.90
Number of Periods with Losses	0	15	17	18	21	19

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

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Rising Rate Environment

12/31/04

Indices	Yield	Duration	Allocation
Money Market	1.60	0.10	
1-3 Treas	3.06	1.64	
1-3 Corp	3.55	1.69	
3-5 Mort	4.65	2.63	
1-5 Muni	2.45	2.66	
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Senior Vice President, Senior Relationship Officer

PMA Financial Network, Inc. | Prudent Man Advisors, Inc.
2135 CityGate Lane, 7th Fl, Naperville, IL 60563

(630) 657-6437 | fpatel@pmanetwork.com

JAIME SANTANA

Associate Portfolio Manager

Prudent Man Advisors, Inc.
2135 CityGate Lane, 7th Fl, Naperville, IL 60563

(630) 657-6486 | jsantana@pmanetwork.com

Falling Rate Environment

12/31/07

Indices	Yield	Duration	Allocation
Money Market	3.99	0.10	
1-3 Treas	3.24	1.56	
1-3 Corp	5.02	1.77	
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