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Wealth Management, Investor Suitability, Fiduciary Requirements and Financial Regulation

Webinar

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Main Points for Today

– In the 2010 Dodd Frank Act, the US securities regulator (SEC) was empowered to extend fiduciary responsibilities on broker-dealers that were previously subject only "suitability" requirements

– What sorts of investments and what combinations of investments (i.e. asset allocation) is suitable for an investor such as a specific household has been relatively little explored in the finance literature

– We will introduce three analytical techniques for implementing investor portfolios that are both jointly satisfy requirements to be both suitable and optimal.

  – The Analytic Hierarchy Process as used in Bolster and Warrick (2008)

  – The Discretionary Wealth Hypothesis as described in Wilcox (2003)

  – Personal Asset-Liability Management using Arbitrage-Free Term Structures from diBartolomeo (2011)

Let's Start with Definitions

- In the US broker-dealer personnel dealing with retail investor were historically subject to compliance with the "know your customer" rules
  - Brokers could recommend any investment that was suitable for the client's financial and personal circumstances
  - If the broker had multiple suitable investments that were suitable there was no fiduciary responsibility to do what was best for the client. As such the broker was free to sell the investment that produced the highest fees to the broker
- Investment advisers were treated as fiduciaries so they had a responsibility to do what was best for the client such as lower fee alternatives

Other Relevant Formulations

- The "Prudent Man" Rule
  - Massachusetts Supreme Court judge Samuel Putnam in 1830
  - "Those with responsibility to invest monies for others should act with prudence, discretion, intelligence and regard to the safety of capital as well as income"
  - Many US states have specific lists of "prudent investments"
  - Rules relate to the safety of individual investments not to the portfolio as a whole
- Prudent Investor Rules
  - The US Department of Labor and various states have a modified interpretation of the Prudent Man Rule that explicitly considers the suitability and safety of an investor's portfolio as a whole, explicitly considering the extent of diversification within the portfolio

Some Simple Approaches

- Asset manager Sanford Bernstein simply sent mutual fund investors a letter asking them their opinion as to how often the fund in which they have just invested might produce a negative return over a ten year span
  - If the fund's volatility is such that the probability of negative annual returns is materially larger than the investor's expectation, they send a follow up letter suggesting a more conservative fund
- Retail mutual funds in Japan have carried "risk ratings" much like a credit rating for a long time.
- Australian regulators have recently decided to creating a risk rating for "superannuation" funds and related products similar to the Japanese system

How to Quantify a Qualitative Process

- Obviously, what is considered a "suitable" investment for a given retail investor household has no universally agreed taxonomy.

- In actual practice financial have a series of approximation rules are meant to screen out overly risky investors for investors for whom the risk is too large.

- This is an explicitly qualitative process based on the opinions and views of purported experts

- To maximize the efficiency and consistency of application of such qualitative concepts, we have used the Analytic Hierarchy Process since 1995.

AHP Background

- Thomas Saaty, a professor at the University of Pittsburgh, developed the AHP as a way to improve complex decision making and to identify and weight selection criteria.

- AHP is a methodology that arises from the operations research literature. AHP is used as a non-parametric method for making complex, often qualitative decisions in a robust, consistent fashion.

- AHP provides a proven, effective means to deal with analyzing the data collected for the decision criteria and expediting the decision-making process.

- A wide body of literature indicates that the AHP is useful when making complex decisions involving multiple criteria.

AHP Finance Literature

- Khaksari, Shahriar, Ravindra Kamath and Robin Grieves. "A New Approach To Determining Optimum Portfolio Mix," Journal of Portfolio Management, 1989, v15(3), 43-49.

- Bolster, Janjigian, and Trahan, "Determining Investor Suitability Using the Analytic Hierarchy Process," *Financial Analyst's Journal*, July/August 1995

- Saraoglu and Miranda Lam Detzler, "A Sensible Mutual Fund Selection Model," *Financial Analysts Journal*, May/June 2002

- Bolster, Paul and Sandy Warrick, "Matching Investors with Suitable, Optimal and Investable Portfolios", *Journal of Wealth Management*, 2008.

Analytic Hierarchy Process: Mechanics

- For *each* evaluation criterion, usually expressed as a multiple choice question, the AHP creates a comparison matrix.

- The upper triangle holds the relative ratings (1-9, with 1 being best) of the alternatives: asset classes or fund managers.

- The diagonal of the matrix is ones – every fund compared with itself is a 1!

- The lower triangle is the reciprocal of the upper triangle:
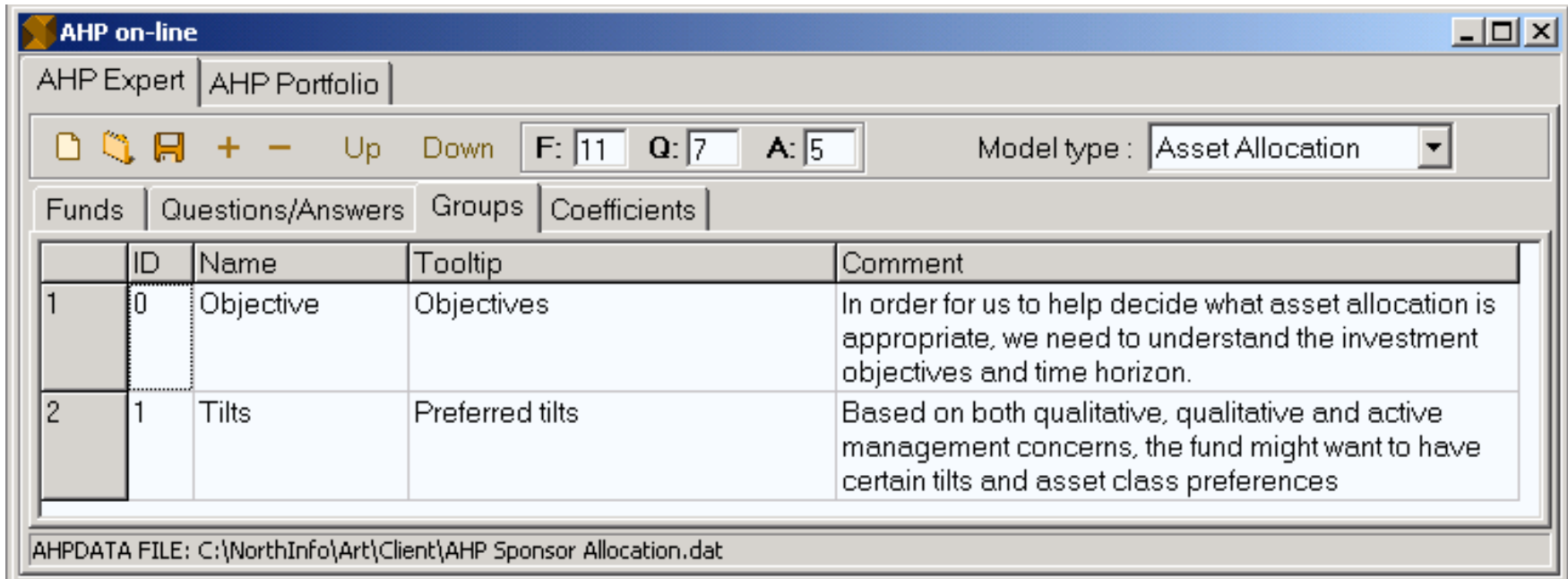 $$x(i, j) = 1 / x(j, i)$$
  - If A is 9 times as good as B, then B is 1/9 as good as A

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AHP Mechanics

- When the comparison matrix has been filled, the matrix's first eigenvector will contain the weights to assign to each choice.

- For this application we use these weights as the asset class or manager allocation for that criterion.

- The portfolio weights for each criterion are then averaged using the weight for each criterion.

- The AHP is a form of "importance weighted" average scores.

AHP in Steps

1. Develop question categories to help focus the client on the purpose of this group of questions.

2. Develop a number of questions for each category.

3. Split the responses for each question into levels, five being typical

4. Assign weights to each question.

5. Define the set of investments available to the investor such as a range of asset classes, mutual funds or structured products

Step 1: Develop Question Categories

Step 2: Develop the Questions for Each Category

AHP on-line

AHP Expert | AHP Portfolio

F: 11   Q: 7   A: 5   Model type : Asset Allocation

Funds | Questions/Answers | Groups | Coefficients

Group: All

Question N6:   Commodities Exposure

	Question	Group	H/V	Rap	Weight	Comment
1	Duration of Liabilities	0	0	0.0100	0.2000	What is the duration of your liabilities?
2	Spending Requirements	0	0	0.0010	0.2000	What are your current spending requirements?
3	Inflation Protection	0	0	0.0100	0.2000	How important is inflation protection for your spending requirements?
4	Domestic tilt	1	0	0.0100	0.1000	What level of domestic/foreign tilt is appropriate?
5	Real Estate Exposure	1	0	0.0100	0.1000	What level of real estate exposure do you want?
6	Commodities Exposure	1	0	0.0100	0.1000	What level of commodities exposure do you want?
7	Emerging Markets	1	0	0.0100	0.1000	What level of emerging market exposure is appropriate?

	Answer	Hidden	DefA
1	No Exposure	☐	☐
2	Low Exposure	☐	☐
3	Moderate Exposure	☐	☑
4	Overweight	☐	☐
5	Maximum	☐	☐

AHPDATA FILE: C:\NorthInfo\Art\Client\AHP Sponsor Allocation.dat

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Step 3: Selection of Asset Proxies

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Now for the Hard Part

- For each combination of asset class and question response level, we assign a suitability ranking.

- The suitability ranking is an integer ranging from 1 (most suitable) to some chosen upper limit. Normally the upper limit is 9, but sometimes we use 99 to ensure minimal exposure.

- If there are twelve asset classes, five response levels and seven questions, we have:

  – Ratings = 12 • 5 • 7 = 420 suitability judgments

  – Some are automatic: If A>B and B>C then A > C

Suitability Judgments

AHP on-line

AHP Expert | AHP Portfolio

F: 11   Q: 7   A: 5   Model type : Asset Allocation

Funds | Questions/Answers | Groups | Coefficients

Sectors

Fund: US Equities   Question: Emerging Markets   A...

	Name
1	Cash
2	Investment Grade Bonds
3	High Yield Bonds
4	TIPS
5	Non US Bonds: Developed
6	Non US Bonds: Emerging
7	US Equities
8	Non US Equity: Developed
9	Non US Equity: Emerging
10	Real Estate
11	Commodities

	Questions	A1	A2	A3	A4	A5
1	Duration of Liabilities	7	3	1.5	1	1
2	Spending Requirements	7	3	1.5	1	1
3	Inflation Protection	5	5	5	5	5
4	Domestic tilt	1	3	5	7	9
5	Real Estate Exposure	9	9	9	9	9
6	Commodities Exposure	9	9	9	9	9
7	Emerging Markets	9	9	9	9	9

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Questions to Determine Objectives

AHP on-line

AHP Expert | **AHP Portfolio**

Questionnaire | Portfolio

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Objectives | Preferred tilts

In order for us to help decide what asset allocation is appropriate, we need to understand the investment objectives and time horizon.

Duration of Liabilities
What is the duration of your liabilities?

○ Less than 2 Years ○ 2 to to 5 Years ◉ 5 to 10 Years ○ 10 to 15 Years ○ More than 15 Years

Spending Requirements
What are your current spending requirements?

○ More than 5% ○ Less than 5% ◉ Less tnan 4% of assets ○ Less than 3% ○ Less than 1%

Inflation Protection
How important is inflation protection for your spending requirements?

○ No Inflation Protection ○ Minimal Protection ◉ Moderate Protection ○ Significant Inflation ○ Maximal Protection

Questions to Assess Preferences

AHP Applications

- We've used AHP based services with a number of clients
  - An online brokerage and investment adviser used an AHP based system to do asset allocation and fund selection for retail clients
  - A similar system was developed for the Asian retail branch network of a major international bank
  - We are currently working CalPERS on how to use AHP approach to evaluate asset managers on qualitative issues such as environmental, social and governance issues
  - Large scale experience and simulations suggest asset allocations formed via AHP are more *robust* than mean-variance efficient portfolios
- For a nice illustration, we have an animated video explaining AHP at:
  - http://www.northinfo.com/modelssoftware.php?service=10#details

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Why Personal ALM?

- In most countries, responsibility for provision of retirement income is shifting away from governments and corporate entities to individuals

- Many defined benefit retirement systems are being replaced with defined contribution plans where the burden of intelligently investing contributed funds to the individual

- The recent global financial crisis has raised obvious doubts about the soundness and ethics of many financial institutions.

- Households are advised to adopt the more sophisticated techniques of large pension schemes in thinking about the balance of current assets and liabilities arising from planned future consumption

Discretionary Wealth Hypothesis

- Wilcox, Jarrod. "Harry Markowitz and the Discretionary Wealth Hypothesis", *Journal of Portfolio Management*, 2003.

- diBartolomeo, Dan. 2011. "The Discretionary Wealth Hypothesis in an Arbitrage-Free Term Structure Approach to Asset-Liability Management". In: G. Mitra and K. Schwaiger, Editors. Asset and Liability Management Handbook, Palgrave MacMillan, p. 433-442.

Goals for ALM Discussion

- Describe the a new approach to asset-liability management that combines four key elements, one of which is new to the finance literature
  - The key benefit of this technique is that it dynamically reallocates assets over time in a precise way which maximizes the median, rather than the expected value of surplus

- Introduce the "Discretionary Wealth Hypothesis" (DWH) from Wilcox (2003) and illustrate how it is derived for ALM purposes

- Show how the combined technique is equally suitable as an ALM technique for both institutions and households

- Introduce a new approximation to Resolve the conflict between use of the DWH and the single period assumption in Markowitz

Review of Modern Portfolio Theory

- Markowitz, Harry. "Portfolio Selection," Journal of Finance, 1952, v7(1), 77-91.

- This theory says that an investor can form an efficient frontier of differently composed portfolios
  - Each portfolio has the maximum return for a given level of risk
  - Each portfolio has the minimum risk for a given level of return
  - Time is defined as a single long period

- But what did Markowitz say about how an investor should choose which efficient portfolio to hold?
  - Nothing

Twenty-Seven Years Later

- Levy, H. and H. M. Markowitz. "Approximating Expected Utility By A Function Of Mean And Variance," American Economic Review, 1979, v69(3), 308-317.

- Assumes investors want to maximize the expectation of the log of their wealth

- The mean-variance formulation is derived from a Taylor series approximation to the log of wealth. It's just the first two terms

$$U = \alpha - \sigma^2 / T \ \text{ or } U = \alpha - \lambda\sigma^2 \qquad \lambda = 1/T$$

λ is just the slope of the tangent line to the frontier

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Ponderable

- Have you ever asked a passer-by on the street "What is your risk tolerance parameter in mean-variance space?"
  - My grandmother would have taken great offense at an impertinent question and slapped me
- Investors constantly use terms of art such as "conservative" or "aggressive" to describe their posture without actually understanding what that means
- Portfolio compositions change for a muddle of two reasons:
  - Expectations have changed about the risk or return of various assets
  - The investor's risk aversion has changed, probably without being recognized or consciously done

The Discretionary Wealth Hypothesis

- Wilcox, Jarrod. "Harry Markowitz and the Discretionary Wealth Hypothesis", Journal of Portfolio Management, 2003.
  - Simply put it says that investors should not put more money at risk than they can afford to lose
- Equally applicable to institutional ALM or households
- *Think of your life as a balance sheet*, including the present value of future savings and the present value of the liability for expected expenditures
  - Low discount rates for important liabilities, higher discount rates for non-essential expenditures
  - What is the debt/equity ratio for your life?

More on Discretionary Wealth

- Wilcox derives that the optimal risk aversion for an investor:
  - Let L = total assets / net worth (surplus)
  - Optimal risk aversion $\lambda = L / 2$
  - Allowing time variation in λ maximizes the expected median of future wealth, rather than the mean
- This implies that optimal risk aversion varies in both unpredictable and predictable ways
  - Market volatility will change our net worth in unpredictable ways
  - Getting closer to retirement age, or having a child graduate university changes our balance sheet in predictable ways
- This implies that we have some ability to forecast our optimal asset allocation for times in the future, requiring a multi-period framework

Even More on Discretionary Wealth

- Following the Discretionary Wealth Hypothesis is similar to constant proportion portfolio insurance for investors
  - You are increasing aggressiveness when you can afford to do so
  - You are taking a more conservative posture when you must
- These changes only impact your risk tolerances
  - Changes in portfolio composition must also reflect changes in capital market expectations
- The DWH approach is now included in CFA Institute curriculum
- DWH approach can also incorporate uncertainty in the balance sheet formation
  - Individuals don't know how long we'll live
  - Will our children require financial support for education or not

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Key Elements of Personal ALM

- Use the approach from diBartolomeo (1995) to forecast the entire distribution of the surplus between assets and liabilities for all future periods
  - diBartolomeo, Dan. "An Equilibrium Term Structure Approach to Asset Liability Management, Northfield Working Paper #49, 1995.

- In each possible future state, use the "Discretionary Wealth Hypothesis" from Wilcox (2003) to determine the optimal degree of mean-variance risk aversion for the investor

- Apply traditional Markowitz mean-variance optimization to find the optimal asset allocation for each future state
  - Use a new approximation to incorporate transaction costs in a multi-period Markowitz approach

Equilibrium Term Structure Approach 1

- Traditional actuarial procedures assume a single rate for discounting future cash outflows to present value
  - Asset cash flows are priced in financial markets by a "yield curve" or term structure of interest rates that reflects investor preferences for maturities and expectations about future changes in interest rates
  - Due to this conflict of methods, a fund can have riskless incoming cash flows that *exactly meet all required outflows* but still appear to have a substantial surplus or deficit
  - Potential correlation between asset values and the present value of liabilities are often ignored, or addressed in a primitive fashion by assuming some statistical correlation

Equilibrium Term Structure Approach 2

- Assume a lognormal interest rate process in discrete time, and model the evolution of short term interest rates as a binomial tree
  - The interest rate for any maturity subsequent to any point in the tree can be calculated as the cumulative interest rate over all possible paths
  - The present value of any future cash flow at any time point in the tree can be calculated by discounting the cash flow over all possible paths
- Key Step
  - Calibrate the tree, by changing the probabilities of upward or downward moves in the short term interest rate until all riskless bonds have a present value at the root of the tree equal to their market value
  - The interest rate process is now in equilibrium as arbitrage transactions are impossible

Equilibrium Term Structure Approach 3

- Represent the price process for assets as a second binomial tree that is correlated with interest rate process

- The correlation between the two trees can be represented geometrically as in:

  – Margrabe, W. "The Value of an Option to Exchange one Asset for Another" Journal of Finance, 1978.

- Asset returns in each period are the sum of a drift term (risk premium), a effect from correlation with the interest rate process and a noise term

Moving to a Multi-Period View

- Use of the DWH requires a change to the traditional Markowitz assumption of a time being a single long period
- If we know that our portfolio will be changing over time, and those changes require transaction costs, we need to weigh the benefits of improvements in expected utility against the trading costs in the right way
- Traditional optimization procedures that assume a single period can be substantially improved by incorporating a simple approximation

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Conclusions

- Analytically sound and operationally efficient approaches to suitability of both single products and investor asset allocations can be achieved through the AHP process

- Asset allocation portfolios formed through AHP are statistically indistinguishable in terms of investor utility from mean-variance efficient portfolios are more robust

- The key input missing from most asset allocation processes for retail investors is a rational determination of risk aversion. This can be obtained through application of the Discretionary Wealth Hypothesis.

- Full scale personal asset-liability management is readily available inclusive of sophisticated approaches to liability valuation

ALM References

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