

Module 5: AA w/ Real-World Constraint

Module 5.1. Real World Issues

Asset Size

- Capital Market impose local legislation to investors w/ given level of capital or experience
- Smaller fund may use commingled inv. a/c. (i.e. pooling money from a small grp of investors)
- Funds that are too big may not be able to take advantage of asset classes that lack capacity to absorb funds.
(e.g. small-cap stocks & active eq. strategy)
- Very large funds might choose FoF.
(fund of fund) b/c of this.

Liquidity Needs.

High liquidity need => Invest in high-quality, short-term, liquid asset.

Low liquidity need => Invest in asset classes w/ higher liquidity premium
(e.g. real estate)

Portfolio Owner	Typical Liquidity Needs
Banks	High liquidity needed to support day to day operations and stand ready to repay deposits
Sovereign Wealth Funds, Endowments, Pension Plans, Foundations	Longer time horizons and lower liquidity needs
Property and Casualty Insurance	Relatively high due to unpredictability of claims
Life and Auto Insurance	Relatively low due to predictability of claims
Individuals	Varies by individual circumstance

Time Horizon

- defined by liability to be paid & goal to be funded
- associated with the ability to take on risk.
- Portfolios with longer time horizon will invest in risky assets which will revert to mean over time (i.e. TIME DIVERSIFICATION)

EXAMPLE: Older retired individual

Barry Garland is 70 years old and recently retired. He has two goals that require funding from his current portfolio:

- Goal 1: To maintain a constant standard of living to age 85.
- Goal 2: To maintain a constant standard of living from age 85 to 100.

Goal 1 is fully funded, but Goal 2 is only partially funded. Barry's life expectancy at age 70 is 17.5 years.

Goal 1 will have the higher priority as his chances of living decline as he ages. Goal 1 is fully funded and higher priority so the subportfolio will emphasize more conservative investments.

Goal 2 is of a lower priority and currently not fully funded. This subportfolio can be invested more aggressively with more growth potential.

EXAMPLE: Families with multiple funding goals

Jane and Arthur Bigstone are both 52 years old and work as lawyers in their home town. The Bigstones have a daughter, Alice, age 16, who they intend to send to college, and a son Mark, a promising young politician, age 27, who aims to run for mayor of the nearest city in 8 years. If their financial situation allowed it, they would like to make a donation to any campaign he ran. They would also like to set up a scholarship at the local school to fund talented children from underprivileged neighborhoods. Ideally, they would like to do this when they are 80 years old to celebrate the 40th anniversary of Arthur setting up his own practice.

The Bigstones have four goals for their portfolio:

1. Funding lifestyle and consumption needs.
2. Funding Alice's college education.
3. Donating to Mark's mayoral campaign.
4. Funding the scholarship.

A typical allocation could split the lifestyle/consumption goal into a worst-case scenario of reduced standard-of-living, a baseline case maintaining standard-of-living, and an aspirational case where the standard-of-living improves. This would mean the Bigstones would have 6 subportfolios with risk preferences similar to those shown in Figure 5.1.

Figure 5.1: Subportfolios

Goals	Risk	Allocation	% of Total Portfolio
Minimum	Conservative	100% Bonds & Cash	65%
Maintain	Moderate	60% Equity & 40% Bonds	12%
Aspirational	Aggressive	100% Equity	8%
College Fund	Conservative	100% Bonds & Cash	6%
Campaign Donation	Aggressive	100% Equity	6%
Scholarship	Aggressive	100% Equity	3%
Aggregate		25% Equity & 75% Bonds	100%

In another 15 years, the allocation for the Bigstones would look very different. With fewer years of consumption to fund, the assets required to fund future consumption are much lower. The college and mayoral campaign have been funded and only the scholarship remains as an aspirational goal. The allocation may now look similar to Figure 5.2, assuming the goals as defined earlier have not changed. Clearly, as the Bigstones' children grow up and pursue careers, it is entirely possible that new goals (e.g., a run for congress for Mark) would replace the aspirational goal of the scholarship.

Figure 5.2: Subportfolios 15 Years Later

Goals	Risk	Allocation	% of Total Portfolio
Minimum	Conservative	100% Bonds & Cash	60%
Maintain	Moderate	60% Equity & 40% Bonds	10%
Aspirational	Aggressive	100% Equity	0%
Scholarship	Aggressive	100% Equity	24%
Aggregate		35% Equity & 65% Bonds	100%

Regulatory & Other External Constraints.

Insurance Companies

- accounting constraint to state FI investment by book value to keep focus on CF projection matching policyholder claims.
- Cap equity investment to 10% of asset mix.

Pension Funds

- Funding constraint : will compare the risk of funding cost exceeding certain threshold vs. the PV of expected contribution.

e.g. Higher allocation to equity vs. bond

⇒ Increase risk of lower returns

increasing required contribution

BUT!

⇒ Higher $E(R)$ decreases the PV(exp. cont.)

In Pension Fund term,

Risk (\Rightarrow) contribution exceed given level

Return (\Rightarrow) PV (expected contributions)

Endowment & Foundation

- very few regulatory constraints

Sovereign Wealth Funds

- not looking to match asset & liab. but subject to scrutiny of the citizens which may lead to lower long-term risk.

- Potential self-overning Constraints:

- min. investment in socially acceptable assets (ESG).
- max investment in risky asset
- limits on currency

5.b. Tax considerations

- Should always consider AFTER-TAX characteristics
- Common Tax characteristics:
 - Interest Income Tax > Cap Gain Tax
so tax-exempt bonds might form a large part of FI asset allocation.
 - Interest Income Tax > Dividend Tax.
makes preferred stock more attractive
 - Cap gains are taxed at a lower rate & used to offset cap. losses.
 - Most heavily taxed investment should be placed in the most tax-advantaged a/c.

EXAMPLE: After-tax return

An investor subject to income tax on interest earned at a rate of 40% is considering investing in a bond with a 5% coupon that is expected to be held to maturity. What return should the investor use as an input into the asset allocation process?

$$\text{Answer: } 5\% \cdot (1 - 40\%) = 3\%$$

EXAMPLE: Multi-step after-tax return calculation

An investor is subject to income tax at a rate of 30% on dividend income and 20% on capital gains. One potential investment under consideration is a stock with an estimated pre-tax return of 16%. Ten percent of this return is expected be realized in the form of dividend income and 90% as price appreciation (capital gains are assumed to be realized annually). What is the after-tax return to be used in the asset allocation process?

$$\begin{aligned} & 16\% \cdot 10\% \cdot (1 - 30\%) \\ & + 16\% \cdot 90\% \cdot (1 - 20\%) \\ & = 1.12\% + 11.52\% \\ & = 12.64\% \end{aligned}$$

Unrealized Gain \Leftrightarrow Embedded Tax Loss
Unrealized Losses \Leftrightarrow Embedded Tax Gain

3 Ways to adjust current MV:

① Subtract the value of embedded cap.

gain tax
(as if it's sold today)

② Subtract the PV(future cap gain tax)
(r = asset's after-tax return).

③ Subtract the PV(future cap gain tax)
(r = after-tax risk-free rate)

(as if it's sold in the future).

Also adjust Risk/S.D. by tax. rate !!

EXAMPLE: After-tax standard deviation of return

A security has an expected pre-tax standard deviation of 12% and is under consideration for purchase by an investor who suffers capital gains tax at a rate of 20%. What is the after-tax standard deviation?

Answer : $12\% (1 - 20\%) = 9.6\%$

Portfolio Rebalancing

PM must balance the need to maintain the strategic asset allocation w/ desire to avoid taxable gains via frequent rebalancing

Reverse-engineer the acceptable rebalancing range w/ after-tax deviation:

$$\text{after-tax deviation} = \frac{\text{pre-tax deviation}}{(1-t)}$$

↑
NOT. S.D.,

it's deviation FROM TARGET WEIGHT

EXAMPLE: Pretax vs. after-tax deviation from target allocation weight

A tax-exempt investor's strategic asset allocation calls for a 40% investment in fixed income, $\pm 5\%$ for a range of 35–45%. If fixed income returns are subject to a 30% tax rate, calculate the equivalent after-tax rebalancing range.

$$\text{pre-tax deviation} = 5\%$$

$$\begin{aligned}\text{post-tax deviation} &= 5\% / (1 - 30\%) \\ &= 7.14\%\end{aligned}$$

$$\Rightarrow \text{final range} = 40\% \pm 7.14\%$$

$$= 32.86\% \pm 47.14\%$$

/ /

2 strategies to reduce tax impact:

- tax loss harvesting
- Strategic asset location
 - tax exempt a/c. (no taxation)
 - tax deferred a/c (taxation upon distribution, tax-free afterwards)

tax-deferred a/c & taxable a/c should be reduced by tax burden.

(also consider the frequency of withdrawal)

General Rule:

- Asset w/ the lowest taxable rate should be allocated to taxable GIC.
- visa versa.

**MODULE QUIZ 5.1**

1. An extremely large fund seeking to make a large allocation to an asset class will *most likely* face a liquidity constraint when investing in:
 - A. hedge funds.
 - B. global equity.
 - C. investment-grade bonds.

2. A fund manager oversees a tax-exempt fund and a taxable fund. The strategic asset allocation for both funds is 60% equity and 40% fixed income, with an after-tax rebalancing range of $\pm 12.5\%$, assuming a tax rate of 20%. The current allocation in both funds is 71% equity and 29% fixed income. Which of the following statements is *most accurate*?
 - A. Only the tax-exempt fund is outside its applicable rebalancing range.
 - B. Both funds are outside their respective rebalancing ranges.
 - C. Neither fund is outside its applicable rebalancing range.

1.C. **(A)**

2.C **(A)** After-tax rebalancing deviation specified is 12.5%, pretax deviation = $12.5\% \times 0.8$
 $= 10\%$

Equity range = 70% - 50%
 (tax-exempt)

$$\text{deviation}_{AT} (1-t) = \text{deviation}_{PT}$$

5.2. Adjusting the Strategic Asset Alloc

Change in goals.

- may be triggered by business cycle (for institutions)

- (for individuals) chg. in employment status. life events

Chg in Constraints

Chg in Beliefs.

5.d : Use of short-term shifts in AA. (aka. TAA)

Objective : exploit short-term opportunities. & assume short-term return is predictable & based on mkt timing

Constraints : judged against the BM of SAA size of deviation might be limited

Evaluation :

- Compare sharpe ratio of TAA against SAA
- compare information ratio / t-stat.
- compare realized risk/return of TAA lying on SAA's efficient frontier
- attribution analysis on contribution of specific over/under weighting

Drawbacks:

- incurs additional trading costs
- concentrates risk & loses diversification

TAA approaches:

- relies on qualitative analysis of macroeconomic variables.
- To assist w/ forecasting, a manager will use:
 - ① **macro data** (e.g. bond yield, credit spread, monetary policy, GDP growth, inflation prediction)
 - ② **fundamental data** (e.g. deviation of P/E, P/B ratios, dividend yield)
 - ③ **economic sentiment** (e.g. consumer confidence index)

3 ways of assessing market sentiments:

① Margin Borrowing:

- increases purchases on margin (drives up prices)
⇒ bullish
- too much will show overenthusiastic.

② Short Interest (aggregate amt of short selling)

- opposite of ①
- too much short interest (⇒) market near the low

③ Volatility indices

- indication of fear in the market
- calc. by bid-ask spread on index options

Discretionary TAA uses quantitative data **but**
requires PM. to prioritize/interpret. them.

Systematic approach:

Capture excess return using historically proven strategies
(e.g. value, momentum)

Value approach:

Capture excess return of value stock over growth

Momentum approach:

Assumes trend will persist, which is why recent price movements are used to indicate whether to underweight or overweight an asset class

Module 5.3. Behavioral Biases.

Loss Aversion

- HATE LOSSES. > LIKE GAINS.
- goal-based investing address this (risk analytics usually focus on downside measure such as shortfall risk)

Illusion of Control

- think they are in control
- combined w/ overconfidence => failing to diversify & trading too often

Mental Accounting

- separating asset & liab. based on SUBJECTIVE CRITERIA.

Recency Bias

Framing Bias.

Availability Bias.

- occurs when personally experienced / easily recalled events influence decisions.
- Familiarity Bias :
- Home Bias : invest too much domestically



MODULE QUIZ 5.2, 5.3

1. A target date mutual fund being used by an individual with a goal of retiring at age 65 will *most likely*:
 - A. increase the allocation to inflation-protected bonds later in the glide path.
 - B. have a larger allocation to nominal bonds earlier in the glide path as opposed to later.
 - C. allocate more of the portfolio to cash in the early phases of the glide path.
2. Which of the following statements regarding the relative success of a tactical asset allocation (TAA) against the strategic asset allocation (SAA) is *most likely* correct?
 - A. The TAA is successful if it has a positive Sharpe ratio.
 - B. The TAA is unsuccessful if the information ratio is negative.
 - C. The TAA is successful if it has a lower standard deviation than that of the SAA.
3. Ellie Rotheram is a 42-year-old real estate broker. Through patient saving, she has accumulated a retirement portfolio worth \$720,000. Her investment approach is very conservative, with 88% allocated to fixed income and 12% to equity. She does not want to take the higher risk of equity in this retirement portfolio. Recently, Rotheram inherited \$500,000 and placed this in a separate portfolio. She realizes she has been very conservative in her retirement portfolio and plans to invest this portfolio more aggressively, in an effort to improve her lifestyle. So far, she has invested \$225,000 in real estate investment trusts with holdings in her home state. She also invested \$50,000 in the equity of a property development company, because she used to work there several years ago. Which of the following behavioral biases is Rotheram *most clearly* exhibiting?
 - A. Mental accounting.
 - B. Familiarity bias.
 - C. Framing bias.

1. A

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2. A

8 A negative IR certainly indicates failure
as the goal of TAA is positive value added (the numerator of the IR ratio should be positive) A positive sharpe ratio

3. B /

/ /