EMPIRICAL
ASSET MANAGEMENT

# EAM Asset Allocation

## Portfolio Construction Methodology

Powered by *Rules Based Investing*®

# Asset Classes

Step 1

## Selecting Asset Classes

Defining an Asset Class
Identification of Characteristics
Requirements for Inclusion
Benchmark Representation

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# Defining an Asset Class



## Asset classes are defined by common characteristics

| Financial Claim | Security Issuer | Unique Attributes |
|---|---|---|
| Equity | Corporations | Risk Profile |
| Debt | Governments | Obligation Term |
| Cash | | Liquidity |
| Alternatives | | |

## Securities must fit into only one asset class

Ensures securities within each asset class react similarly to changes in economic circumstances

# Identification of Characteristics

Step 1

## Asset classes must be accessible and improve the risk-return

| | | | |
|---|---|---|---|
| **Equity** | Market Size | → | Large Cap, Mid Cap, Small Cap |
| | Geography | → | US, Developed, Emerging Markets |
| **Debt** | Issuer | → | Government, Corporate, Mortgages |
| | Geography | → | US, Developed, Emerging Markets |
| | Duration | → | Short-Term, Medium-Term, Long-Term, Inverse, Managed |
| | Quality | → | Investment Grade, High Yield |
| **Cash** | Cash | → | US, Currency Hedge |
| **Alternatives** | Real Assets | → | Real Estate, Gold, Commodities |
| | Derivatives | → | Managed Futures |
| | Hedge Fund | → | Multi-strategy replication, Long/Short Market Neutral |

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# Requirements for Inclusion

Step 1

Asset classes must be accessible with at least:

- Representative indices with 15+ years of historical returns
- Two ETFs meeting asset class exposure with over 3 years live performance
- $1 Billion invested in representative Mutual Funds and ETFs

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# Benchmark Representation: Equity

Step 1

## Equity Asset Classes Considered

| | |
|---|---|
| US Large Core | S&P 500 TR |
| US Large Growth | S&P 500 Growth TR |
| US Large Value | S&P 500 Value TR |
| US Mid Core | S&P Mid-Cap 400 TR |
| US Mid Growth | S&P Mid-Cap 400 Growth TR |
| US Mid Value | S&P Mid-Cap 400 Value TR |
| US Small Core | Russell 2000 w/ Dividends |
| US Small Growth | Russell 2000 Growth w/ Dividends |
| US Small Value | Russell 2000 Value w/ Dividends |
| Developed Markets | MSCI EAFE NR |
| Developed Markets Currency Hedged | MSCI EAFE USD Hedged NR |
| Emerging Markets | MSCI Emerging Markets NR |
| Emerging Markets Currency Hedged | MSCI Emerging Markets USD Hedged NR |

No exposure to US Micro-Cap, International Regions or Individual Countries due to:

- Cost of product
- Liquidity of product
- Excessive volatility

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# Benchmark Representation: Debt

Step 1

## Debt Asset Classes Considered

| | |
|---|---|
| US Short Term Treasuries | Barclays US 1-3 Year Treasury |
| US Medium Term Treasuries | Barclays US 7-10 Year Treasury |
| US Long Term Treasuries | Barclays US 20+ Year Treasury |
| US Inflation Protection | Barclays US Treasury Inflation Protected Securities |
| Int'l Government Bonds | Barclays Global Treasury Ex-US Capped |
| Int'l Inflation Protected | Barclays World Government Inflation-Linked Bond |
| Negative/Hedged Duration | Credit Suisse Mgd Futures Liquid TR |
| High Yield Corporate | Barclays US High Yield Corporate |

No exposure to Investment Grade Corporate Bonds due to:

- Typical flight to quality (safety) when markets decline

No exposure to Emerging Market Debt due to:

- Cost of product
- Liquidity of product
- Excessive volatility

No exposure to Municipal Bonds due to:

- Client preference for local municipal bonds

No exposure to Securitized Debt due to:

- Desired tranche exposure difficult to access in broad product

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# Benchmark Representation: Cash



## Cash Asset Classes Considered

| | |
|---|---|
| US Dollar | Citigroup 3-Month US Treasury Bill |

No international currency exposure due to

- USD is standard bearer
- Excessive volatility
- Foreign translation cost

# Benchmark Representation: Alts.

Step 1

## Alternative Asset Classes Considered

| | |
|---|---|
| Real Estate | DJ US Select REIT |
| Commodities | Bloomberg Commodity |
| Gold | Bloomberg Commodity Gold |
| Hedge Funds | HFRX Equal Weighted Strategies |
| Managed Futures | Barclays CTA Index |

No exposure to individual commodities through futures (other than gold) due to:

- Inaccessibility
- Volatility
- Price of product

No private equity or venture capital exposure due to:

- Cost of product
- Products do not have a history of reasonably representing the asset class
- Frequency of pricing

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# Optimization



## Mean-Variance Optimization

Determine Returns, Risk, Correlations
Addressing Non-Normality
Rebalancing & Tax Efficiency
2018 Asset Allocations

# Determine Returns, Risk, Correlations

Step 2

Returns, risk, and correlations are identified by the history of the representative benchmark for each asset class

- Equity risk, size, and style premiums
- Debt rate sensitivity, probability of default, and time premiums
- Cash drag, and foreign translation premiums
- Alternative liquidity and ability to represent asset class premiums

Asset classes must provide diversification benefits including:

- Increase in return without negatively impacting risk
- Decrease in risk without negatively impacting return

# Addressing Non-Normality



Asset allocation frameworks typically assume that asset class returns are normally distributed - this is not the case.

Many asset classes have a history of non-normal returns with three issues:

| | | |
|---|---|---|
| **Serial Correlation** | → | Last month's returns will influence this month's return |
| **Fat Tails** | → | Large negative returns occur more frequently than large positive returns |
| **Correlation Breakdown** | → | Asset class correlations change over time |

# Rebalancing and Tax Efficiency



## Mean-Variance Optimizer is re-run every 12 months

- Allows for enough new information to be considered by the optimizer to generate a material change in allocations.

## Asset Allocation Portfolios are rebalanced every 15 months

- Realized gains/losses are all long term
- Tax event occurs 3 out of every 4 years
- Position weights are adjusted up/down, positions rarely sold in entirety

# Asset Allocation

As of April 2020

| | Conservative | Moderate Conservative | Moderate | Moderate Aggressive | Aggressive |
|---|---|---|---|---|---|
| **Equity** | **30%** | **40%** | **56%** | **68%** | **78%** |
| Large Cap | 8% | 10% | 14% | 16% | 19% |
| Mid Cap | 7% | 8% | 11% | 14% | 16% |
| Small Cap | 5% | 6% | 9% | 12% | 13% |
| International (Developed) | 6% | 9% | 12% | 14% | 16% |
| International (Emerging Markets) | 4% | 7% | 10% | 12% | 14% |
| **Fixed Income** | **45%** | **37%** | **23%** | **13%** | **5%** |
| Short Term Treasury | 12% | 9% | 3% | 1% | 0% |
| Medium Term Treasury | 7% | 5% | 2% | 1% | 0% |
| Long Term Treasury | 2% | 2% | 1% | 1% | 0% |
| Duration Managed | 6% | 6% | 5% | 4% | 3% |
| International | 3% | 2% | 1% | 0% | 0% |
| TIPS (Domestic and International) | 13% | 11% | 9% | 4% | 0% |
| CASH | 2% | 2% | 2% | 2% | 2% |
| **Alternatives** | **25%** | **23%** | **21%** | **19%** | **17%** |
| REITs | 2% | 2% | 2% | 2% | 2% |
| Commodities | 5% | 4% | 4% | 3% | 3% |
| Hedge Funds | 4% | 4% | 3% | 3% | 2% |
| Gold | 10% | 9% | 9% | 8% | 7% |
| Managed Futures | 4% | 4% | 3% | 3% | 3% |

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# Security Selection

Step 3

## ETF Selection

Requirements for Inclusion
History and Risk Assessment
Short-term risk-adjusted return profile
Current Partners

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# Requirements for Inclusion and Risk Assessment

Step 3

ETFs must have at least:

- A 3+ year track record

Returns, risk, and correlations are identified by the history  of each ETF

ETF selection and replacement requires

- Increase in return without negatively impacting risk
- Decrease in risk without negatively impacting return
- Both

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# Additional Risks

Step 3

## Additional risks controlled within the Asset Allocation framework

- Currency – hedge
- Credit – flight to quality
- Interest rate risks, rising and falling – duration management
- Factor selection and concentration – EAM’s Short-Term Alpha indicator
- Emotion – rules
- Liquidity – category and security AUM, provider stability
- Converging correlation – non-normality optimization, correlation analysis, diverging correlation assets
- Serial correlation - non-normality optimization, EAM’s Short-Term Alpha indicator, rebalancing
- Fat Left Tail distribution - non-normality optimization, EAM’s Short-Term Alpha indicator, rebalancing
- Hot/Star managers performance and discipline drift – rules
- Taxation – ETFs use, extremely tax conscious 15-month rebalance process
- Inflation – asset class inclusion
- Transparency, cost, concentration – use of ETFs

# Current Partners

Leveraging the intellectual capital of prominent firms:

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