

# Asset Allocation

JUNE 13, 2024

### The Council's Role in Asset Allocation

- The primary investment objective for SDRS assets is to achieve and exceed the return of the Council's Capital Markets Benchmark over the long term
- The key investment policy decision relates to asset allocation
- The Council establishes:
  - Benchmark asset allocation which considers expected long-term returns and risk
  - Minimum and maximum for each asset category



# Discussion Topics

- Return and Risk Assessment
- Benchmark Recommendation
- Expected Return
- Valuation Analysis
- Asset Allocation Implementation

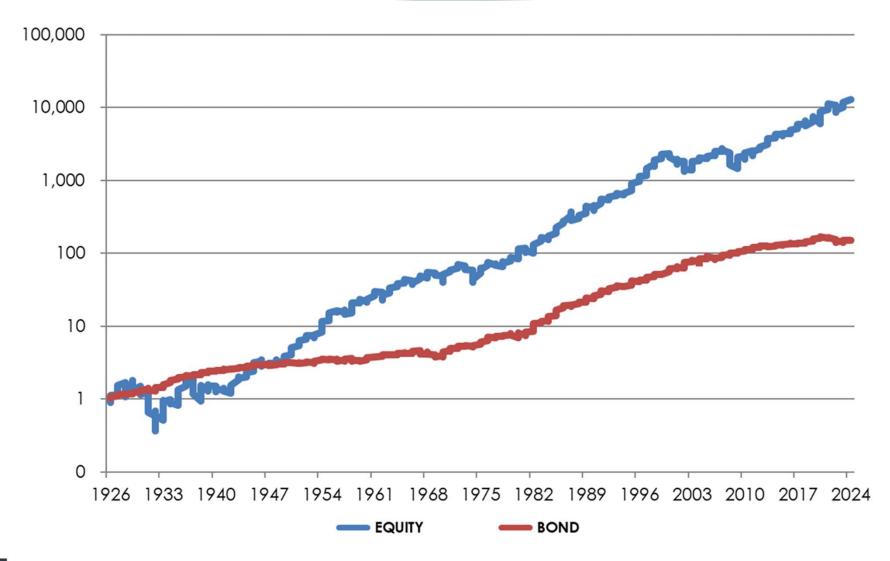


# Return and Risk Assessment Equity and Bonds

- Long-term return history is available only for equity, bonds, and cash
- Equity returns
  - Best over the very long term, but are volatile
- Bond returns
  - Lower over the long term compared to equities
  - Provide diversification
- Return/risk tradeoff depends on willingness to endure volatility



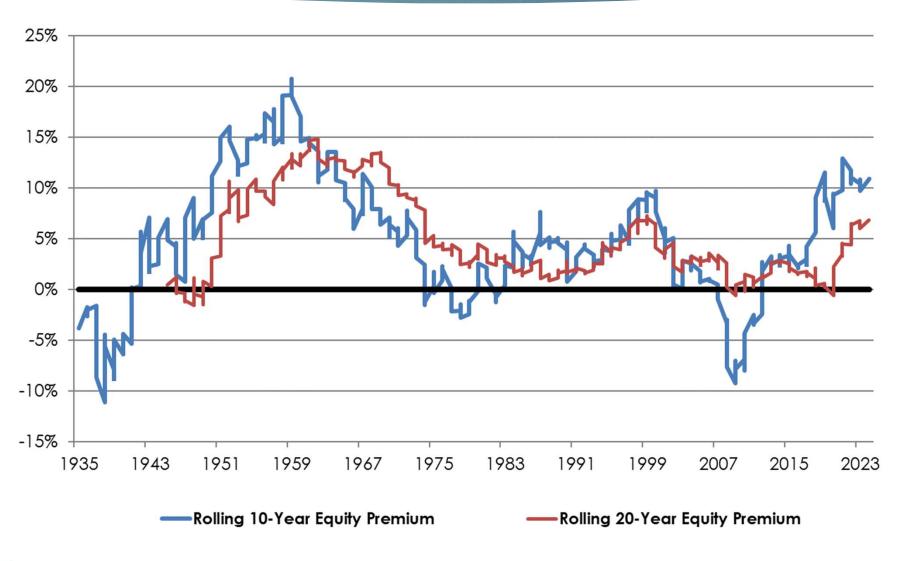
# Long-Term Equity Returns Exceed Bond Returns





# Equity Less Bond Return

Historical Rolling Periods

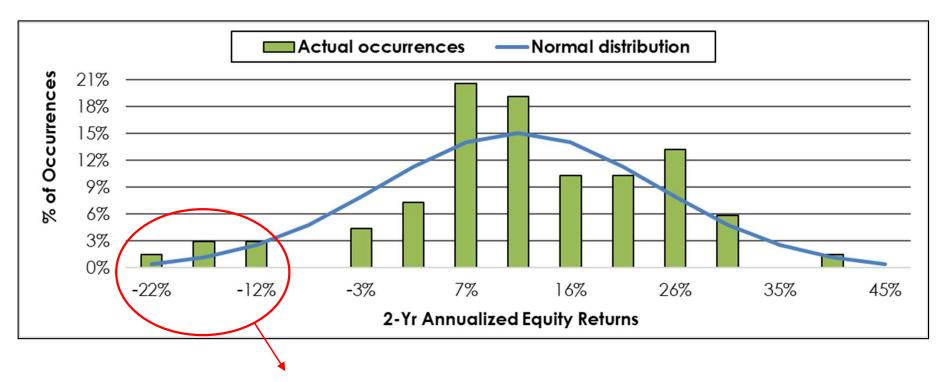




### Risk Measurement

Example: Actual vs Expected Equity Returns

- Conventional statistical measures of risk
  - Standard deviation and correlations are calculated



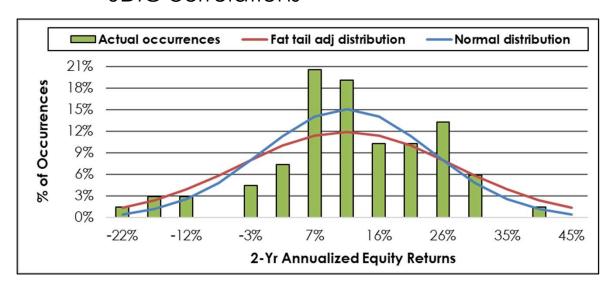
Risk is focused on severe adverse outcomes which are not represented well by conventional statistics

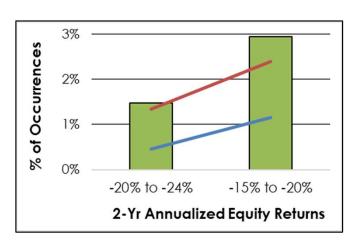


### Risk Measurement

Example: Actual vs Expected Equity Returns

- SDIC adjustment to conventional risk measures
  - SDIC volatility
  - SDIC correlations



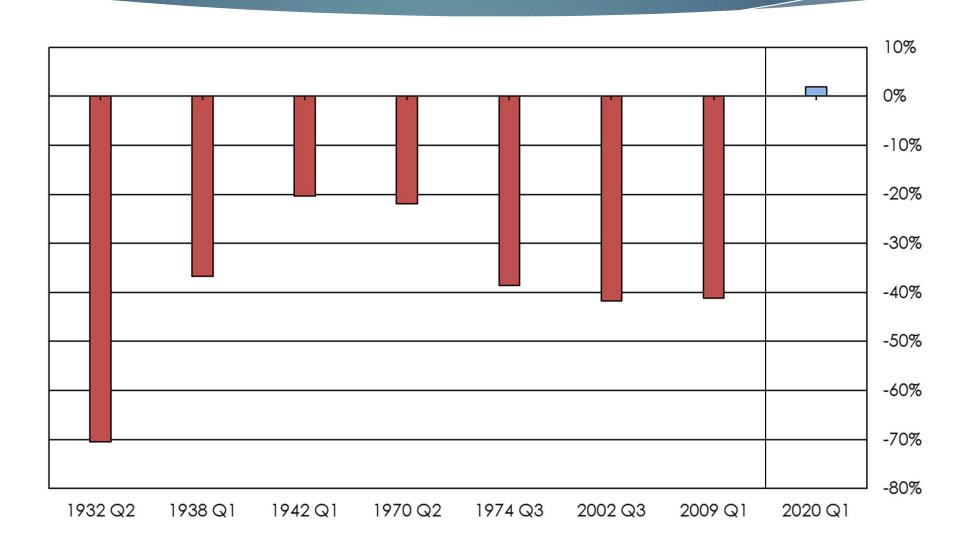


- Focus on equity-like and bond-like risk
  - Withstanding a two-year adverse outlier event



# Equity Downturns Can Be Severe

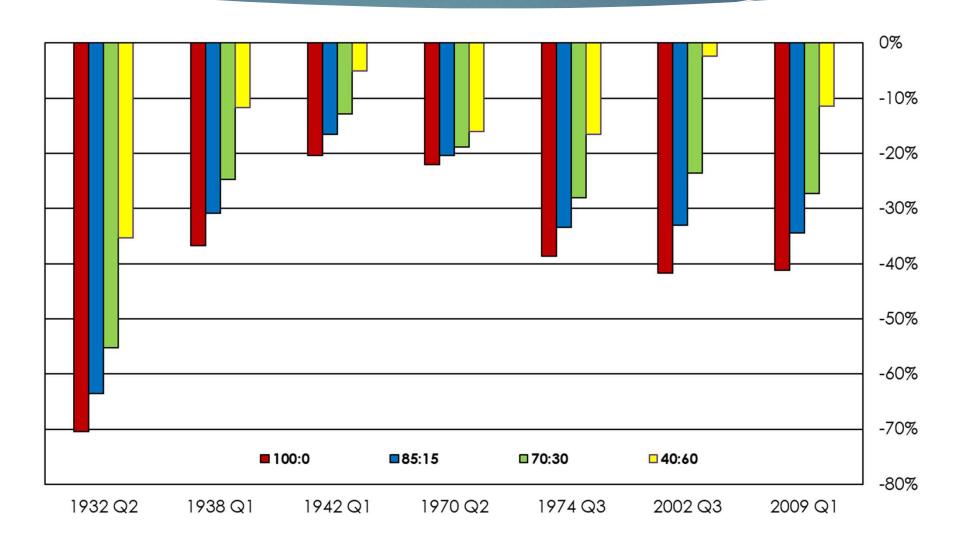
Two-year periods with equity returns below negative 20%





# Risk of Various Equity Allocations

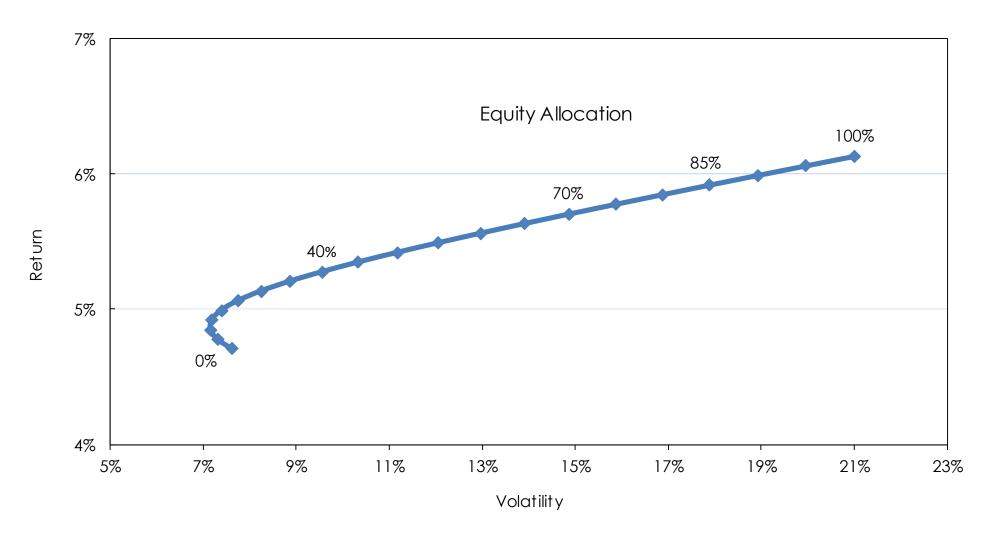
Two-year periods with equity returns below negative 20%





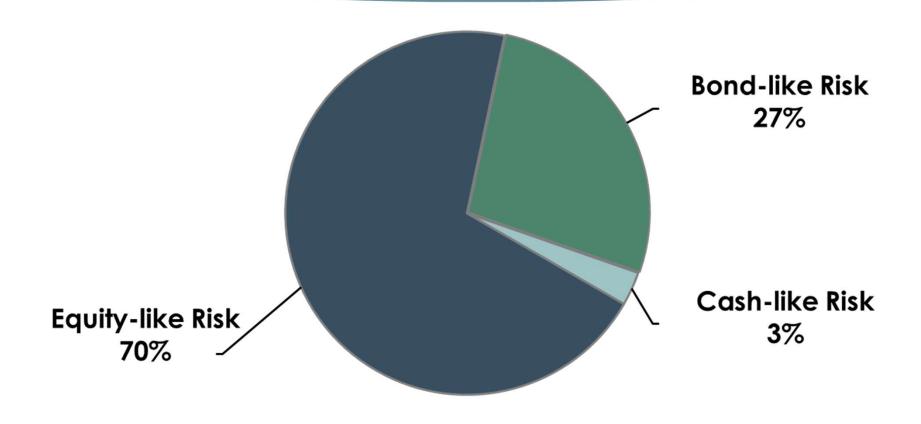
### Return and Risk for Stock/Bond Allocations

Using SDIC long-term expected returns and fat tail adjusted volatility





### Benchmark Recommendation



Balances long-term returns and drawdown risk



### Benchmark Ranges

#### Goal

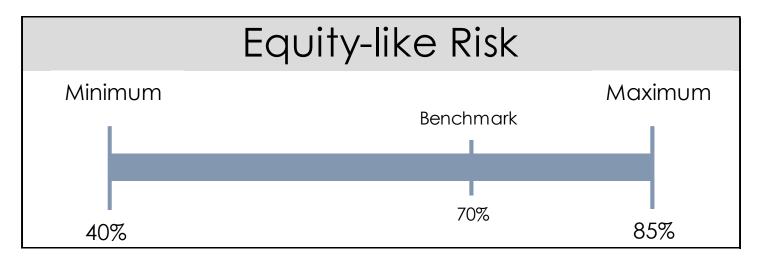
- Enter market downturns with near minimum equity-like risk
- Increase equity-like risk toward maximum during equity downturns to benefit from an eventual rebound

### The Importance of Patience

- Markets typically continue to rise or fall further after reaching minimum or maximum risk thresholds
  - Essential to be patient for 5 years or more



### Benchmark Range Recommendation



#### Minimum

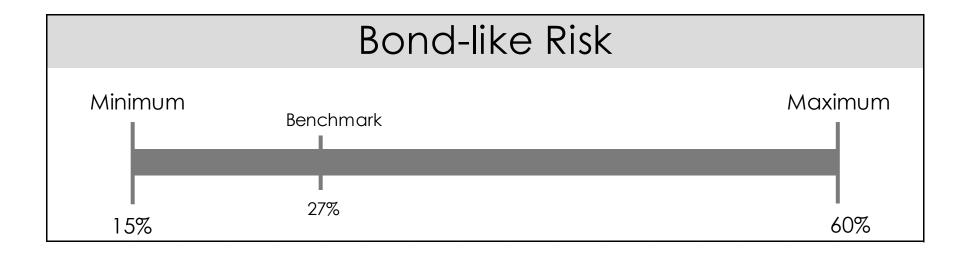
- Increases underperformance risk but also reduces absolute risk when markets are extremely expensive
- Still provides meaningful exposure if wrong or early

#### **Maximum**

- For when markets are very cheap (on our valuation measures)
- Cheapness would suggest much of a potential decline had already occurred
- Weathered this maximum during the financial crisis



# Benchmark Range Recommendation



#### Minimum

Provides diversification

#### **Maximum**

 For when bonds are very cheap (on our valuation measures)



# Risk of Other Asset Categories

- Other categories are mapped to equivalent equity-like / bond-like / cash-like risk
  - REITS mapped primarily to equity with remainder mapped to short duration bonds
  - High yield debt mapped to equity and short duration bonds depending on credit quality
  - Private equity treated as leveraged equity
  - Opportunistic Real Estate treated as leveraged REITs
- Exposures embedded in other categories are accounted for when targeting overall equity-like / bond-like / cash-like risk



### Benchmark Construction

- Categories in the benchmark are significant and passively implementable
  - Public Equity, Investment Grade Debt, Cash, High Yield Debt, REITs
- Secondary categories are excluded from the benchmark, but have permitted ranges
  - Private Equity, Opportunistic Real Estate, Aggressive Absolute Return Strategies, High Yield Real Estate Debt
- Equivalent stock/bond/cash risk is accounted for and offset when investing in other asset categories
- Benchmark constructed to achieve 70% equity-like, 27% bond-like, and 3% cash-like risk exposures



# SDRS Capital Markets Benchmark

#### Proposed FY 25

		Primary Asset Categories								
	Equity-Like <u>Risk</u>	<u>Public</u> Equity <sup>1</sup>	Real Estate REIT/Core <sup>2</sup>	HY Corp Debt	Investment Grade Debt <sup>1</sup>	<u>Cash<sup>3</sup></u>				
Minimum	40%	20%	0%	0%	13%	0%				
Maximum	85%	75%	20%	15%	60%	45%				
Proposed 2025 BM	70%	56.3%	12%	7%	22.8%	1.9%				
Benchmark Index		(3/4) custom MSCI ACWI IMI ex Real Estate + (1/4) custom MSCI USA IMI ex Real Estate	MSCI US REIT	FTSE US High Yield Market	FTSE US BIG Bond	FTSE US 3- mo. Treasury Bill				
Benchmark H	listory									
	2023-2024 2016-2022		12% 10%	7% 7%	22.8% 23%	1.9% 2%				

	Other Categories <sup>5</sup>			
Private Equity	Opportunistic Real Estate <sup>2</sup>	HY Real Estate Debt	Aggressive Absolute Return	
0% 12%	0% 15%	0% 10%	0% 5%	0% 5%

- 1. Buffer for market drift of 1% for public equity and 1/2% for debt (example: Investment Grade debt minimum of 13% can drift to 12.5%)
- 2. Real Estate(RE) min/max applies to REITS/Core RE and Opportunistic combined. Opportunistic RE counts 1.3x against RE max. Projected base case allocation used for partnerships
- 3. Cash to provide liquidity for benefits payments and rebalancing
- 4. Since 2015, secondary asset categories have not been included in the BM. This change allowed the BM to consist solely of well fitting, investable indexes. These categories continue to have a permitted range to invest in opportunistically.
- 5. Other categories, such as TIPS, commodities, and arbitrage have been considered or used in the past. They are not in the BM. Future use would be limited to 5% or less.



# SDRS Return and Volatility Analysis

Using JP Morgan inputs

				Correlo				ation Matrix			
	Expected Return	Standard Deviation*	Public Equity	•		REITs	Private Equity	RE Opp			
Public Equity	7.0%	17%	100%								
Hedge Funds	5.0%	8%	18%	100%							
Investment Grade Debt	5.1%	4%	21%	-5%	100%						
Cash	2.9%	1%	-4%	-5%	10%	100%					
High Yield Debt	6.5%	8%	74%	11%	35%	-7%	100%				
REITS	8.2%	16%	77%	12%	35%	-6%	67%	100%			
Private Equity	9.7%	20%	79%	27%	-3%	0%	73%	54%	100%		
Real Estate Opportunistic	9.7%	18%	38%	0%	-8%	-17%	38%	52%	36%	100%	

	Public Equity	Hedge Funds	IG Debt	Cash	HY Debt	REITs	Private Equity	RE Opp	Expected Return	Standard Deviation (1yr)*
100:0 Equity/Debt 70:27:3 Equity/Debt/Cash	100% 70%		27%	3%					7.00% 6.36%	16.91% 12.13%
add REITs add High Yield Debt	7 0 7 0		27 70	370	7%	12%			6.55% 6.60%	11.97% 11.80%
Benchmark FY25 (proposed)	56.3%	0.0%	22.8%	1.9%	7.0%	12.0%	0.0%	0.0%	6.60%	11.80%
A about 2/21/04	00.007	0.00	10.707	27.00	4 107	0.007	11.007	10.107	F 0707	7.070
Actual 3/31/24	22.9%	0.9%	12.6%	36.0%	4.6%	0.0%	11.0%	12.1%	5.87%	7.27%

<sup>\*</sup> Standard deviation is a measure of volatility. There is a 68% chance of being within +/-1 standard deviation and a 95% chance of being within +/-2 standard deviations.



### SDRS Return and Volatility Analysis

Using South Dakota Inputs

	Expected Return	Est. Volatility*
Public Equity	6.1%	21%
Hedge Funds	4.0%	11%
Investment Grade Debt	4.7%	8%
Cash	3.3%	2%
High Yield Debt	5.3%	12%
REITS	6.7%	25%
Private Equity	6.6%	30%
Real Estate Opportunistic	8.3%	33%

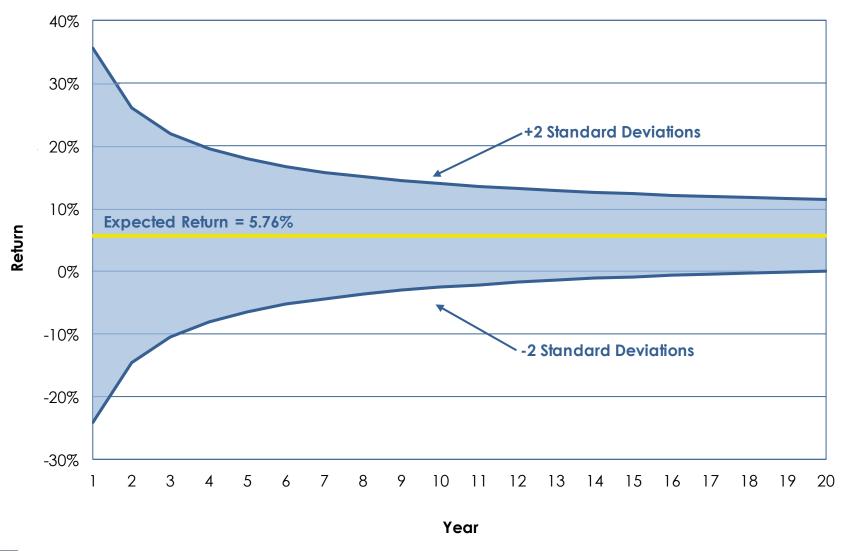
	Public Equity	Hedge Funds	IG Debt	Cash	HY Debt	REITs	Private Equity	RE Opp	Expected Return	Est. Volatility (1yr)*
100:0 Equity/Debt	100%								6.13%	21.00%
70:27:3 Equity/Debt/Cash	70%		27%	3%					5.66%	14.84%
add REITs add High Yield Debt					7%	12%			5.76% 5.76%	14.97% 14.95%
Benchmark FY25 (proposed)	56.3%	0.0%	22.8%	1.9%	7.0%	12.0%	0.0%	0.0%	5.76%	14.95%
Actual 3/31/24	22.9%	0.9%	12.6%	36.0%	4.6%	0.0%	11.0%	12.1%	5.19%	11.43%

<sup>\*</sup> Standard deviation is a measure of volatility. There is a 68% chance of being within +/-1 standard deviation and a 95% chance of being within +/-2 standard deviations. This measure has been adjusted to better reflect frequency and magnitude of adverse events.



# SDRS Return and Volatility Analysis

Using South Dakota Inputs





# SDRS Expected Long-Term Return Recap

- Benchmark asset allocation expected return is 5.76%
  - Uses SDRS inflation assumption which can vary from SDIC inflation assumption
  - Does not incorporate any negative dollar cost averaging effect nor added value from the long-term contrarian investment approach
- Expected returns are the midpoint of a wide distribution with a 50% chance of being higher and a 50% chance of being lower
- Standard deviation is 15.0% and is adjusted to reflect realworld frequency of severe negative returns and correlations during severe periods
  - Conventionally measured standard deviation is 11% to 12%



# Asset Category Valuation

- Equity-like and bond-like risk
  - Equity and bond valuation processes
- Real estate (REITS)
  - REIT valuation versus underlying equity and bond components
- High yield debt
  - High yield valuation versus underlying equity and bond components
- Private equity
  - Subjective and data assessment of risk-adjusted added value versus equity
- Opportunistic real estate
  - Subjective and data assessment of risk-adjusted added value versus REITS
- Arbitrage and other strategies
  - Monitor for signs of distress and bottom-up underwriting of proxy transactions



# Equity Valuation

- Estimated future cash flows
  - Normal earnings
  - Growth rate
- Discount rate comprised of
  - Inflation + real cash yield + term premium + risk premium
- Value is discounted value of future cash flows
- Adjustments to value
  - Monetary stimulus/restraint
  - Earnings strength



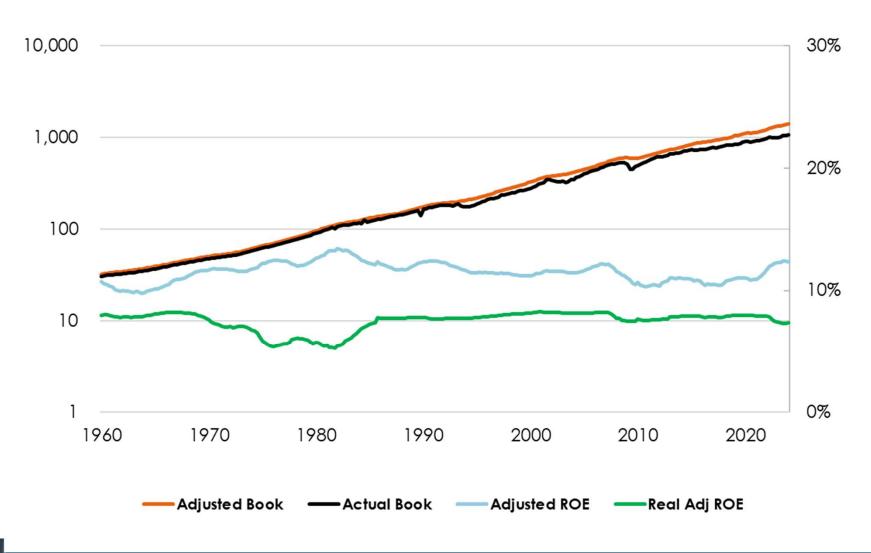
# Normal Earnings

- Normal earnings
  - Adjusted book value multiplied by normal return on equity
- Adjusted book value
  - Book value is balance sheet reported value of assets net of liabilities
  - Book value may not track retained earnings due to index changes, mergers, and buybacks. These leakages must be addressed.
  - Book value write-downs are smoothed
- Normal return on equity = Historic Real ROE + Expected Inflation + ROE Adjustments
  - Return on equity is earnings divided by adjusted book value
  - Real ROE is return on equity less inflation
  - Historic Real ROE is the historic average Real ROE
  - Expected inflation is drawn from long term and recent history
- ROE Adjustments
  - Inflation can impact the level of real ROE
  - Governance can also impact real ROE



### Book Value and Return on Equity

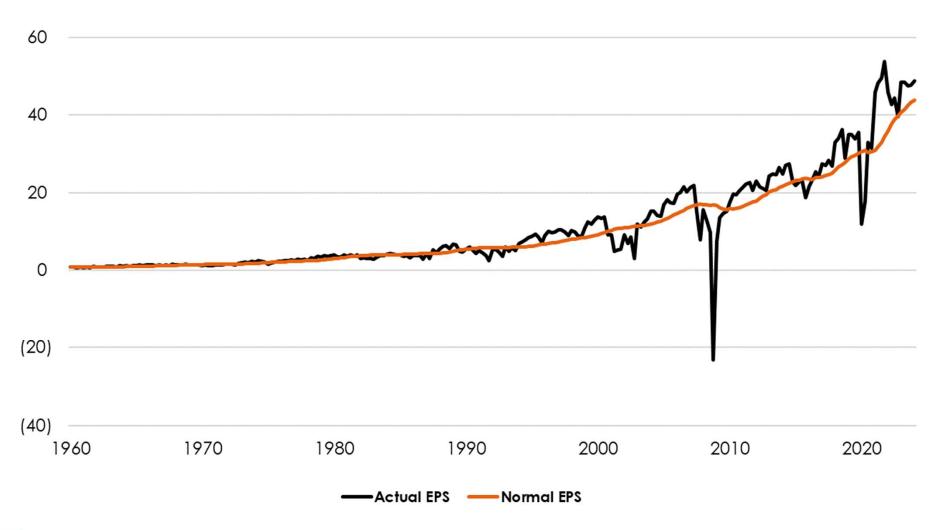
Incorporates book value adjustments





### Normal EPS

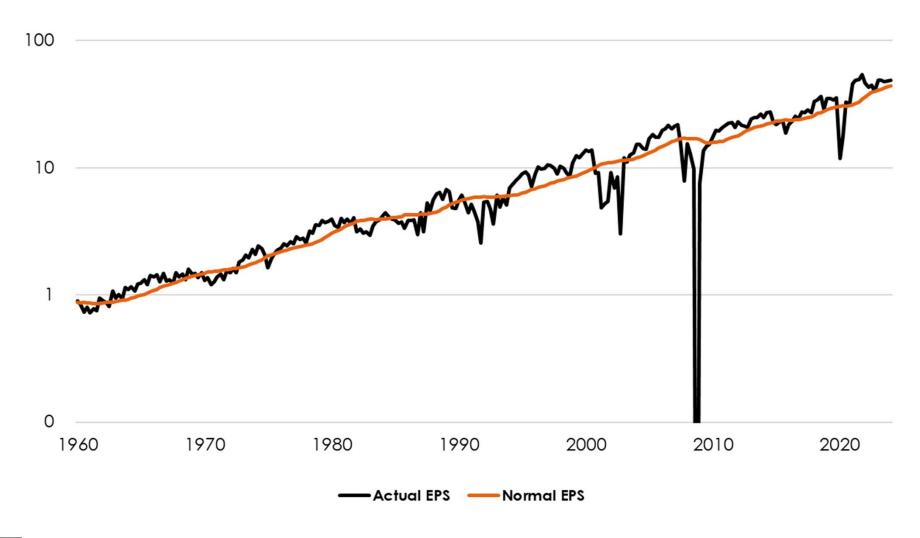
### Book value multiplied by adjusted ROE





### Normal EPS

Book value multiplied by adjusted ROE (log scale)





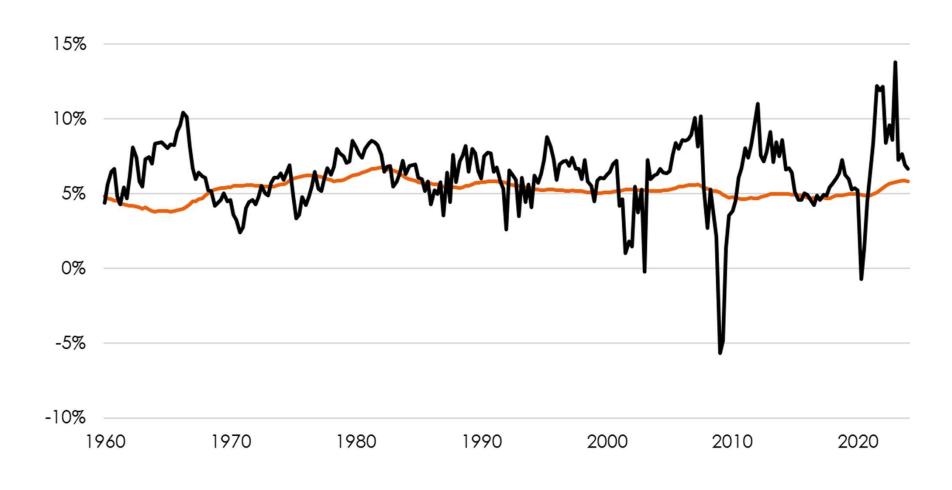
### Normal Growth

- Normal Growth = organic + acquisition + inflation pass-through attrition
  - Organic growth = organic reinvestment times normal ROE
    - Organic reinvestment = portion of earnings reinvested excluding acquisitions
    - Normal ROE adjusted to avoid double counting of inflation pass-through effect
  - Acquisition growth = acquisition investment times cost of capital
    - Acquisition investment = portion of earnings invested in acquisitions
    - Return of acquisitions based on cost of capital
  - Inflation pass-through = expected inflation × pass-through percentage
    - Expected Inflation = same as used for Normal ROE
    - Pass-through percentage = percent of expected inflation estimated to pass through as an increase in normal earnings
  - Attrition = estimated mortality rate of normal earnings
    - Adjust for bias of earnings power (absent further investment) to be at risk of erosion
    - Attrition rate helps reconcile historic actual growth with the growth otherwise expected



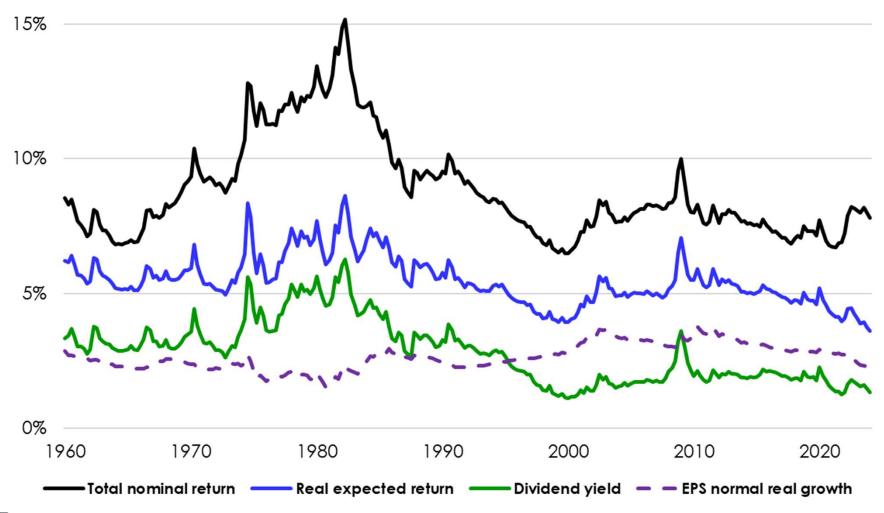
### EPS Growth

#### Normal versus 20-year actual





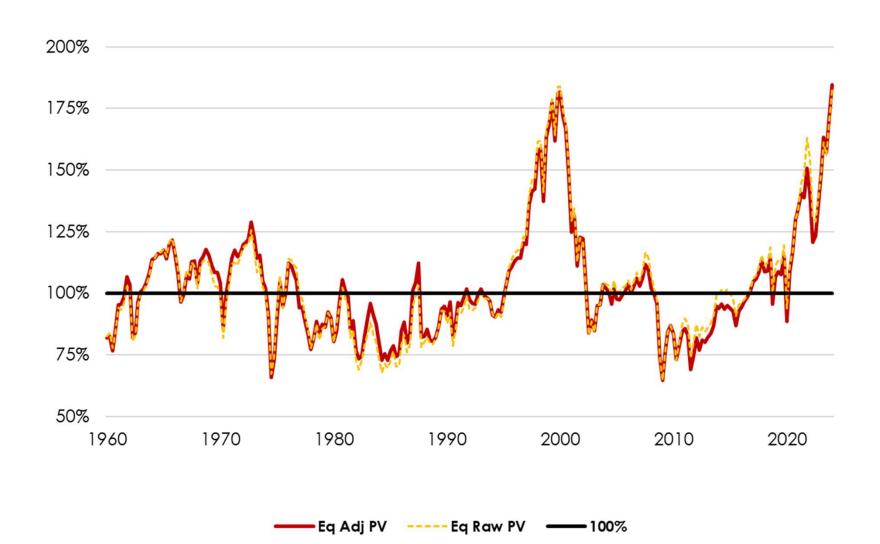
# Equity Expected Return





# Equity Price to Value

Raw and with monetary and earnings adjustments





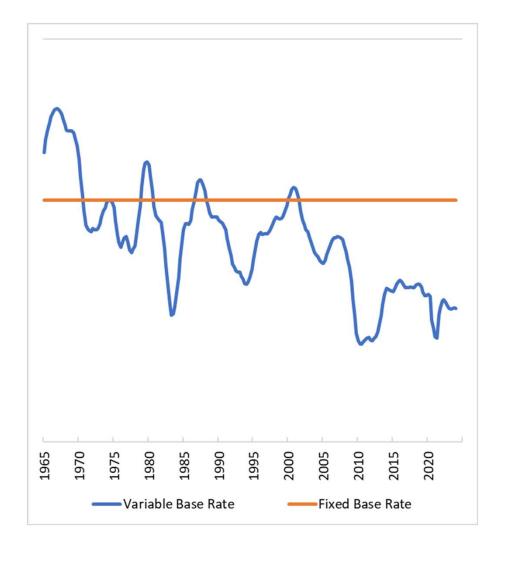
### **Bond Valuation**

- Equilibrium yield components include
  - Inflation
  - Real cash yield
  - Term premium
- Bond value based on equilibrium yield
- Adjustments to value
  - Monetary stimulus/restraint
  - Earnings strength



### Discount Rate Revisions

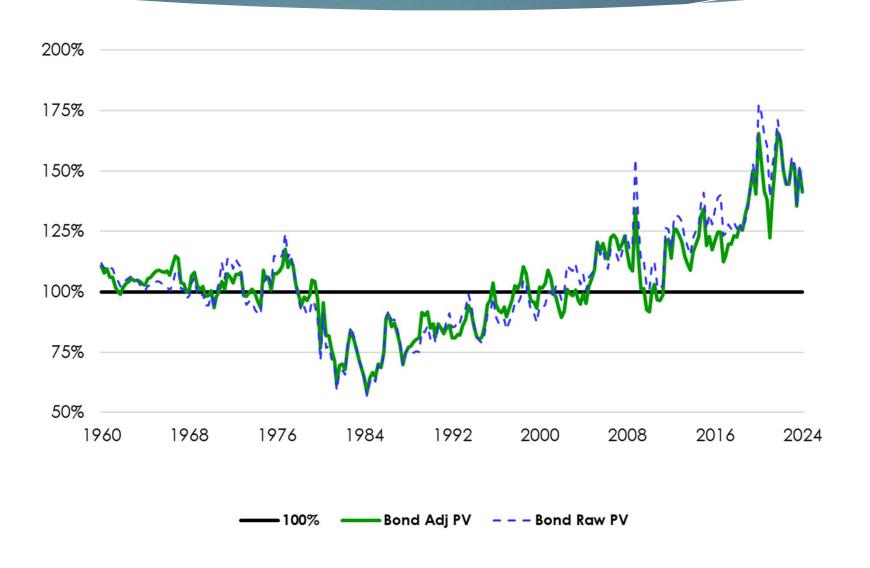
- Recent work includes changes to the real rate, term premium, and equity risk premium
- Real rate varies with real GDP growth
- Increased term premium between T-bills and 10yr, reduced from 10yr to 30yr resulting in slight total increase
- Equity risk premium adjusted to offset above adjustment





### Bond Price to Value

Raw and with monetary and earnings adjustments





### Real Estate Valuation

- Real estate capitalization rate is adjusted to a typical equity/debt structure
- Discount rate is linked to the equity discount rate
- Difference between leverage-adjusted cap rate and discount rate is converted into price to value



#### High Yield Spread Model

- Fair spread to treasuries based on long-term average spread and internal credit modeling research
- Difference between current spread and fair spread is converted into price to value



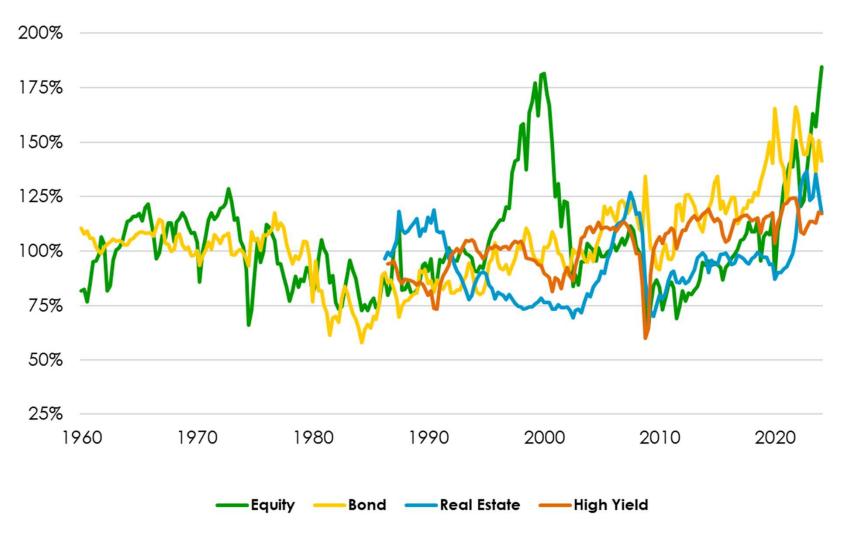
#### High Yield Valuation Model

- Fair yield
  - Fair yield of similar duration treasuries plus
  - Fair yield spread to treasuries
- Current yield is compared to fair yield
- Yield difference is converted to price to value



#### Price to Value

Equity, Bond, Real Estate, High Yield



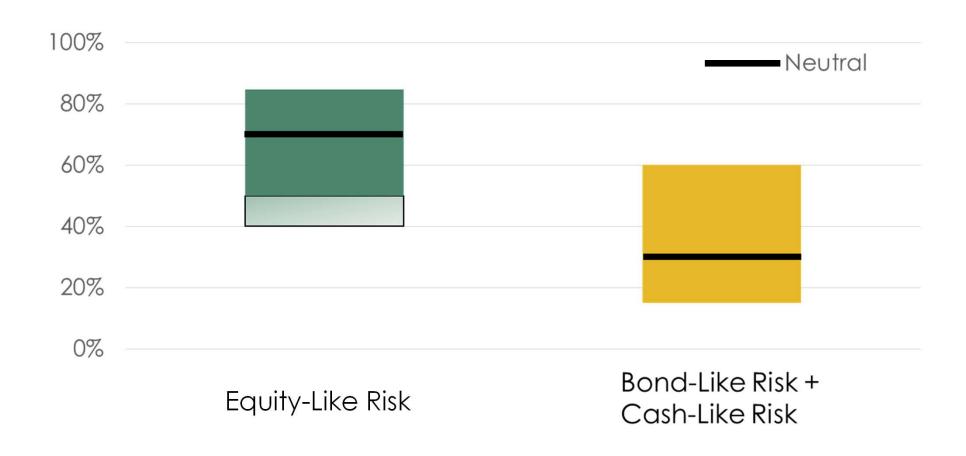


## Asset Allocation Implementation

- Equity-like and bond-like risk
  - Meaningfully cheap or expensive to initiate over- or under-weight
  - Move back toward fair value to remove over- or under-weight
  - Several steps between the benchmark and minimum and maximum levels
- Other category over- and under-weights depend on valuation relative to risk mapping
  - Equity-like, bond-like, and cash-like risk is offset by adjusting weight of stocks, bonds, or cash

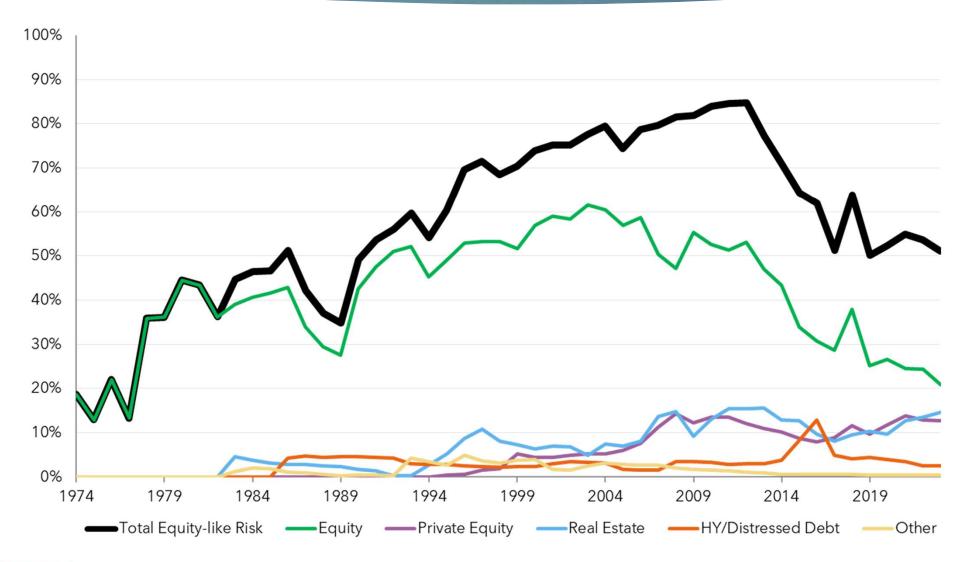


## Risk Allocation Ranges



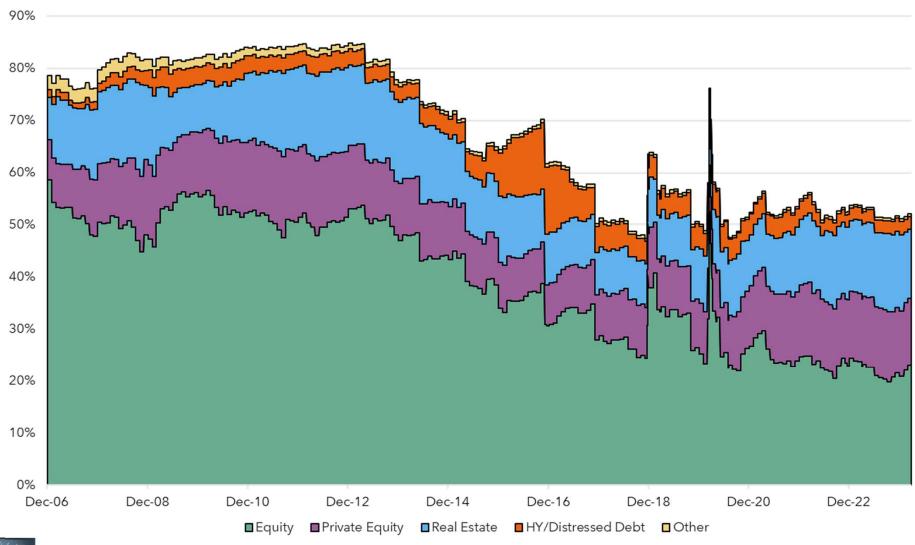


# Equity-Like Risk Contribution





# Equity-Like Risk Contribution





Risk Category	F	Policy Detail	s		Current Estimated ₩gts	Complianc e Check	Risk Category	Current Estimated Wgts	Target Ex Buffer		Drift Reb Thresh		Rebaland	e Trigger	Rebalance Suggested?
		Absolute Policy Minimum	Absolute Policy Maximum	FY24 Benchmark	4/30/24 Est Elisk Wgt			4130124 Est Risk Wat	4130124 Est Risk Wgt	Model Suggested Bisk Wgt	When Below Min / Above Max	All Other Largets	Increase Position at	Decrease Position at	
Equity Like Risk (ELR)		40%	85%	70%		Pass	Equity Like Risk (ELR)				1%	2%			No
Bond Like Risk (BLR)		15%	60%	27%		Pass	Bond Like Risk (BLR)				0.5%	1%			No
Cash Like Risk (CLR)		0%	45%	3%		Pass	Cash Like Risk (CLR)								
Asset Category	Benchmark Index	Absolute Policy Minimum	Absolute Policy Maximum	FY24 Benchmark	4/30/24 Est Port, Mgr		Asset Category	4/30/24 Est Part. Wgt	Iarget Es Buller	Achievable Minimum <sup>2</sup>	Belox Min / Above	All Other Largets	Increase Position at	Decrease Position at	Rebalance?
Public Equity <sup>1</sup>	MSCI ACWI IMI eNEM eNRE (34) + MSCI USA IMI eNEM eNRE	20%	75%	56.3%		Pass	Public Equity <sup>1</sup>				1%	2%			No
Real Estate REIT/Core	MSCI US REIT	0%	20%	12%		Pass	Real Estate REIT/Core								
Opportunistic Real Estate	2=2	0%	15%	0%		Pass	Opportunistic Real Estate								
Combined Real Estate  Enposure 5	MSCIUS REIT	0%	20%	12%		Pass	Combined Real Estate Exposure 5	"							
HY Corp Debt	FTSE High Yield	0%	15%	7%		Pass	HY Corp Debt								
Investment Grade Debt	FTSEUS BIG	13%	60%	22.8%		Pass	Investment Grade Debt				0.5%	1%			No
Cash	FTSE3mo TSYBill	0%	45%	1.9%		Pass	Cash								
Private Equity	-	0%	12%	0%		Pass	Private Equity								
HY Real Estate Debt Aggressive	-	0%	10%	0%		Pass	HY Real Estate Debt Aggressive								
		0%	5%	0%		Pass	Aggressive Absolute Return								
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Policy Details & Compliance Check

Absolute   Policy   Minimum   Maximum   Benchmark   Risk Wgt	Risk Category		Policy Details	S		Current Estimated Wgts	Compliance Check
Description			Policy	Policy			
Asset Category   Benchmark Index   Absolute Policy Minimum   Policy Mini	Equity Like Risk (ELR)		40%	85%	70%		Pass
Public Equity   Benchmark Index   Policy Minimum   Policy Maximum   Poli	Bond Like Risk (BLR)		15%	60%	27%		Pass
Policy   Maximum   Policy   Policy   Maximum   Policy   Pol	Cash Like Risk (CLR)		0%	45%	3%		Pass
Policy   Maximum   Policy   Policy   Maximum   Policy   Pol							
Public Equity¹         exRE (3/4) + MSCI USA IMI exEM exRE (1/4)         20%         75%         56.3%           Real Estate REIT/Core         MSCI US REIT         0%         20%         12%           Opportunistic Real Estate         -         0%         15%         0%           Combined Real Estate Exposure⁵         MSCI US REIT         0%         20%         12%           HY Corp Debt         FTSE High Yield         0%         15%         7%           Investment Grade Debt         FTSE US BIG         13%         60%         22.8%           Cash         FTSE 3mo TSY Bill         0%         45%         1.9%           Pass           Private Equity         -         0%         12%         0%           HY Real Estate Debt Aggressive         -         0%         10%         0%	Asset Category	Benchmark Index	Policy	Policy			
Real Estate REIT/Core         MSCI US REIT         0%         20%         12%         Pass           Opportunistic Real Estate         -         0%         15%         0%         Pass           Combined Real Estate Exposure 5         MSCI US REIT         0%         20%         12%         Pass           HY Corp Debt         FTSE High Yield         0%         15%         7%         Pass           Investment Grade Debt         FTSE US BIG         13%         60%         22.8%         Pass           Cash         FTSE 3mo TSY Bill         0%         45%         1.9%         Pass           Private Equity         -         0%         12%         0%         Pass           HY Real Estate Debt Aggressive         -         0%         10%         0%         Pass	Public Equity <sup>1</sup>	exRE (3/4) + MSCI USA	20%	75%	56.3%		Pass
Combined Real Estate Exposure 5         MSCI US REIT         0%         20%         12%         Pass           HY Corp Debt         FTSE High Yield         0%         15%         7%         Pass           Investment Grade Debt         FTSE US BIG         13%         60%         22.8%         Pass           Cash         FTSE 3mo TSY Bill         0%         45%         1.9%         Pass           Private Equity         -         0%         12%         0%         Pass           HY Real Estate Debt Aggressive         -         0%         10%         0%         Pass	Real Estate REIT/Core		0%	20%	12%		Pass
HY Corp Debt	Opportunistic Real Estate	-	0%	15%	0%		Pass
Investment Grade Debt	Combined Real Estate Exposure 5	MSCI US REIT	0%	20%	12%		Pass
Cash         FTSE 3mo TSY Bill         0%         45%         1.9%         Pass           Private Equity         -         0%         12%         0%         Pass           HY Real Estate Debt Aggressive         -         0%         10%         0%         Pass	HY Corp Debt	FTSE High Yield	0%	15%	7%		Pass
Private Equity         -         0%         12%         0%         Pass           HY Real Estate Debt Aggressive         -         0%         10%         0%         Pass	Investment Grade Debt	FTSE US BIG	13%	60%	22.8%		Pass
HY Real Estate Debt Aggressive - 0% 10% 0% Pass	Cash	FTSE 3mo TSY Bill	0%	45%	1.9%		Pass
33	Private Equity	-	0%	12%	0%		Pass
Aggressive Absolute Return - 0% 5% 0% Pass	HY Real Estate Debt Aggressive	-	0%	10%	0%		Pass
	Aggressive Absolute Return	-	0%	5%	0%		Pass



2. Achievable Minimum reflects subjective assumptions on asset category weight preferences, liquidity issues, and I or acceptable levels of disruption to overall investment process which may cause
3. Target @ Minimum and Target @ Maximum are used to go further out of bounds I in the buffer. Otherwise use All Other Targets (for example if at 20% Public Equity, only allow drift to 19.0%; but allow
4. ELR and BLR rebalance depends on room available in the primary asset categories, first driven by Public Equity for ELR and Investment Grade Debt for BLR; and then by considering room available

5. ELR impact from combined Opp RE and Core RE exposures. Opp RE is 130% the ELR of Core RE

Rebalance Threshold Monitor

Current Estimated Wgts	Target Ex Buffer		Drift Rebalanc	e Thresholds <sup>3</sup>	Rebaland	e Trigger	Rebalance Suggested? <sup>4</sup>
4/30/24 Est Risk Wgt	4/30/24 Est Risk Wgt	Model Suggested Risk Wgt	When Below Min / Above Max	All Other Targets	Increase Position at	Decrease Position at	
	•		1% 0.5%	2% 1%			No No
							`
4/30/24 Est Port. Wgt	Target Ex Buffer	Achievable Minimum <sup>2</sup>	When Below Min / Above Max	All Other Targets	Increase Position at	Decrease Position at	Rebalance?
			1%	2%			No
			0.5%	1%			No
	4/30/24 Est Risk Wgt  4/30/24 Est Port.	Estimated Wgts  4/30/24 Est Risk Wgt  4/30/24 Est Risk Risk Wgt  4/30/24 Est Port.  Target Ex	4/30/24 Est Risk Wgt  Wgt  4/30/24 Est Risk Risk Wgt  Model Suggested Risk Wgt  4/30/24 Est Port. Target Ex  Achievable	Estimated Wgts  ### Buffer  ### Buffer    Model   Suggested   Risk Wgt	Estimated Wgts  Buffer    Model   Suggested   Risk Wgt   Min / Above   Max	Estimated Wgts  Buffer  Model Suggested Risk Wgt  Min / Above Max  Model Suggested Risk Wgt  Min / Above Min / Abo	Estimated Wgts    A/30/24 Est Risk   Wgt   When Below   Min / Above   Max   Model   Suggested   Risk Wgt   Max   Max   Max   Model   Min / Above   Max   Max

- 1. Public Equity Minimum will be the lower of 25% or 50% of the model suggested target for ELR (if achievable, if not, 50% of the achievable target), which can be as low as 40
- 2. Achievable Minimum reflects subjective assumptions on asset category weight preferences, liquidity issues, and / or acceptable levels of disruption to overall investment process.
- 3. Target @ Minimum and Target @ Maximum are used to go further out of bounds/in the buffer. Otherwise use All Other Targets (for example if at 20% Public Equity, only allo
- 4. ELR and BLR rebalance depends on room available in the primary asset categories, first driven by Public Equity for ELR and Investment Grade Debt for BLR; and then by co
- 5. ELR impact from combined Opp RE and Core RE exposures. Opp RE is 130% the ELR of Core RE



Rebalance Threshold Monitor (cont'd)

Equity Like Risk Details	ELR Impact Using Pub Eq Target	ELR Impact if Pub Eq Hits Buy Trigger	ELR Impact if Pub Eq Hits Sell Trigger	Bond Like Risk Details	Using Model Suggested ELR	Adj for Achievable ELR	IG Rebalance Range
Model Suggested ELR				Model Suggested BLR			
Public Equity				IG Debt			
Current HY (+ Core REIT)				HY Debt			
Current Hedge Fund Wgts				Core REIT + Opp RE			
Current Partnership Wgts				HY RE Debt Aggr			
ELR Total				BLR Total			
	0.712	17%	-1.25%	Drift relative to Stretch Ref Pt	NZA	-0.25%	
ELR Buildup (Curr Wgt * ELR o	of each category)	Equity Like R	isk Mix (as %	of total ELR)			
Public Equities		Public Equities		% of	ELR by Asset C	ategory	
Other (HY/Reits/HF)		Other (HY/Reits/	HF)				
Private Equity (120%)		Private Equity			)	Public Equities	
Real Estate Partnerships (110%)		Real Estate Partr	erships				
Total Equity Like Risk						Other (HY/Reits/HF)	
						■ Private Equity	
						Real Estate Partnerships	



Private Partnerships

	Projected 5 yr E	Curr FV + All Uncalled Commitments				
Private Real Estate Risk Check	12/31/2023 <sup>6</sup>	<u>Limit</u>	Risk Check	12/31/2023	<u>Limit</u>	Risk Check
Opportunistic Real Estate Partnerships		15.00%	PASS			
Uncalled Commitments						
Opp RE Wgt + Uncalled Commitments					22.5%	PASS
Private Equity Risk Check	12/31/2023	Limit	Risk Check	12/31/2023	Limit	Risk Check
Private Eq Wgt		12.00%	PASS			
Uncalled Commitments						
Total PE Wgt + Uncalled Commitments					18.00%	PASS

<sup>6.</sup> Partnership FV are as of date shown. No estimates to FV are used for these calculations. Uncalled Comm is from Qtry LP summary. #s use current month FV for denominator



# Model Suggested Positioning

	Asset Allocation Weights Matrix						
Equity Position	max	steps	neutral	steps	regular min	steps	absolute min
Equity Wgt	85%		70%		50%		40%
Bond Position			<u>B</u>	ond Weig	ghts		
max							
steps							
neutral							
steps							
min							

Equity Position	Equity Entry	Equity Exit	Equity Weight	Bond Position	Bond Entry	Bond Exit	Bond Weight
1 0310011	Lilu y	LAIL		1 0310011	Liluy	LAIL	
max			85%	max			
steps				steps			
neutral			70%	neutral			
steps				steps			
regular min			50%	min			
steps							
absolute min			40%				

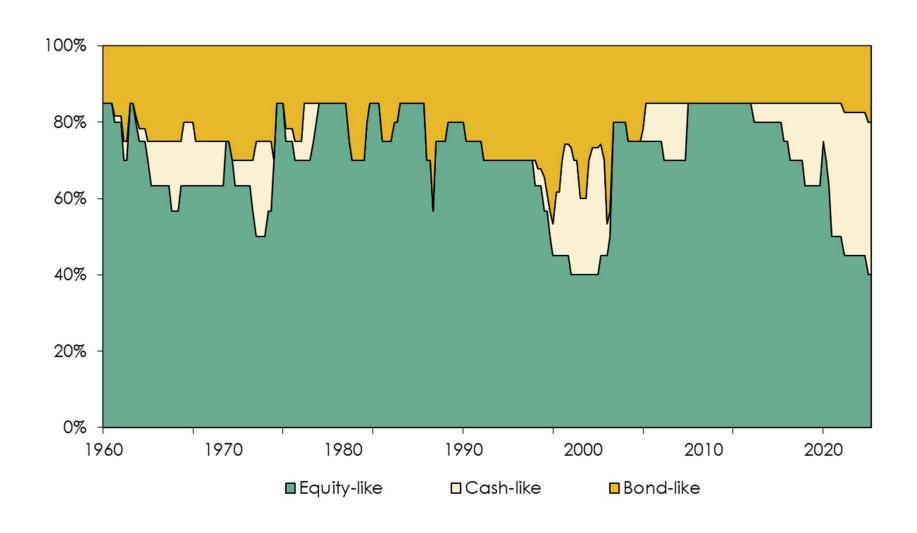
Input Tab	ole	
Date:	31-Mar-24	
Equity Position		*
Target Equity Wgt		
Bond Position		
Target Bond Wgt		
Target Cash Wgt		
Equity Fair Value		
Bond FV Yld		

Allocation Triggers Summary							
	Incr Wgt At Target Wgt Decr Wgt At Target Wgt						
Equity							
Bond							



#### Model Suggested Allocations

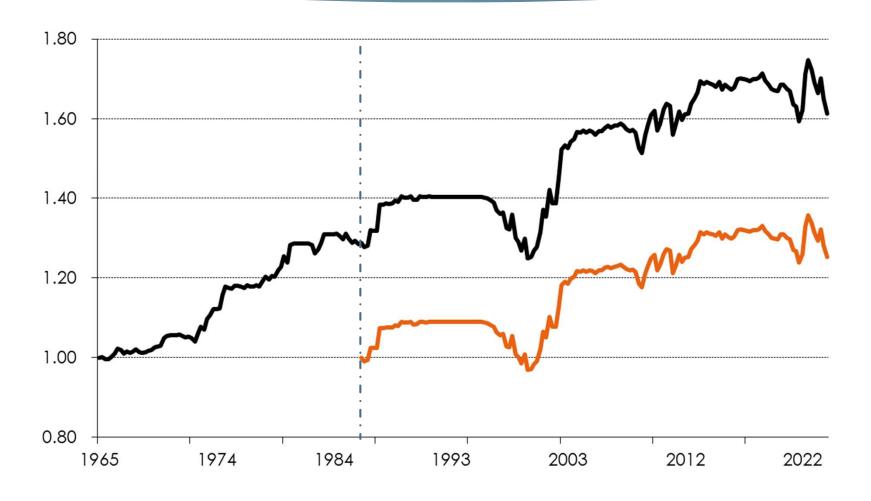
Equity-like, bond-like, cash-like





#### Model Return vs 70/30 Stock/Bond

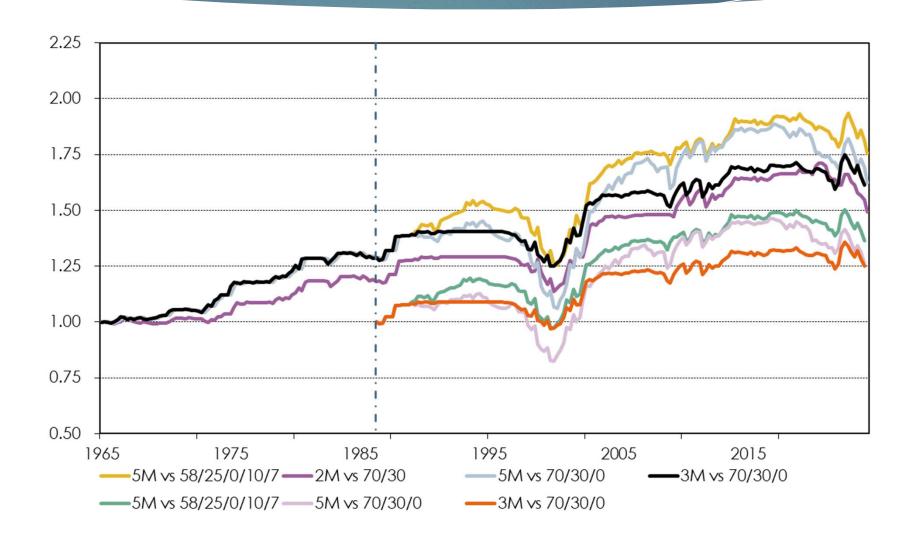
From 1965 to now and from 1986 initial use





#### Model Return From 1965 and From 1986 Initial Use

Eq/Bd/Ca vs 70/30/0, Eq/Bd vs 70/30, and Eq/Bd/Ca/REIT/HY vs 58/25/0/10/7





# Equity Valuation and Thresholds

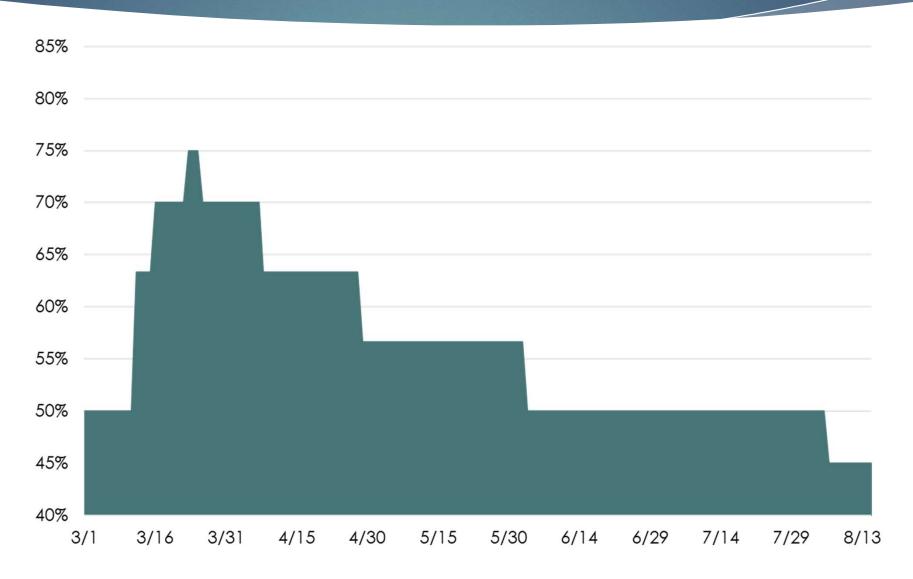
Daily Snapshot from March 2020

Date	S&P500 Price	Equity Position	Next Buy Price	Next Sell Price
8-Mar-20	2972.37	Min	2700	At Min
9-Mar-20	2746.56		2700	At Min
10-Mar-20	2882.23		2700	At Min
11-Mar-20	2741.38		2700	At Min
12-Mar-20	2480.64	Increased	2500	3100
13-Mar-20	2711.02		2500	3100
14-Mar-20	2711.02		2500	3100
15-Mar-20	2711.02		2500	3100
16-Mar-20	2386.13	Increased	2400	2900
17-Mar-20	2529.19		2200	2700
18-Mar-20	2398.10		2200	2700
19-Mar-20	2409.39		2200	2700
20-Mar-20	2304.92		2200	2700
21-Mar-20	2304.92		2200	2700
22-Mar-20	2304.92		2200	2700
23-Mar-20	2237.40	Increased	2100	2600
24-Mar-20	2447.33		2100	2600
25-Mar-20	2475.56		2100	2600
26-Mar-20	2630.07	Decreased	2200	2700
27-Mar-20	2541.47		2200	2700
_				



## Model Suggested Equity-Like Risk

3/1/2020 through 8/15/2020





## Implementation

SDRS Equity-Like Risk FYTD 2024







## Risk Control Summary

- Risk control
  - Risk managed by broad diversification and reducing amounts in expensive assets
  - Adequate liquidity maintained to avoid liquidations of depressed assets and to allow rebalancing
- Strength and determination to handle tough markets
  - Participation in the free enterprise economic system provides highest longterm rewards but must endure short-term bumps in the road
- Strong funding and benefit design help manage downside volatility
  - In very difficult circumstances, benefits may require further adjustment to maintain funding



#### Evolution of Asset Allocation Process

- Ranges and asset categories have evolved over time
  - Initial implementation subjectively phased in
  - Highlighted importance of disciplined implementation
- Developed internal risk metrics for alternative asset categories to further quantify underlying risk of portfolio
- Good luck/ bad luck

