



Dale R. Folwell, CPA

INVESTMENT MANAGEMENT

MEMORANDUM

TO: North Carolina Supplemental Retirement Board of Trustees

FROM: Loren de Mey, Assistant Investment Director

DATE: June 14, 2018

SUBJECT: Discussion / Action: NC 401(k) and NC 457(b) Plans – Review and Evaluation of the NC Small/Mid Cap Core Fund and Replacement Options for TimesSquare

At its February 21, 2018 meeting, the Supplemental Retirement Investment Subcommittee recommended the termination of TimesSquare as a manager in the NC Small/Mid Cap Core Fund and requested that staff and Mercer review and evaluate the following three options for the Fund:

1. Replace the TimesSquare Small/Mid Cap Growth strategy with the Russell 2500 Index Fund;
2. Replace the TimesSquare Small/Mid Cap Growth strategy with the Russell 2500 Index Fund and reweight the existing managers in order to adjust for any style bias that may be created; and;
3. Replace TimesSquare with another active manager for the Small/Mid Cap Growth strategy, within the NC Small/Mid Cap Core Fund.

The Subcommittee requested that staff and Mercer provide a report of this review and evaluation, and staff and Mercer presented the report at the Subcommittee's May 23 meeting. The Supplemental Retirement Investment Subcommittee voted to recommend that the Board approve Option #1, replace the TimesSquare Small/Mid Cap Growth strategy with the Russell 2500 Index Fund.

Following this memo are three items for the Board's review:

1. Mercer's presentation, which includes an evaluation of the risks, returns, fees, and style characteristics of each of the three options; and
2. Corresponding updates to the Investment Policy Statement for each alternative.
3. Staff's memo, which shares the review and results of the active manager replacement search.

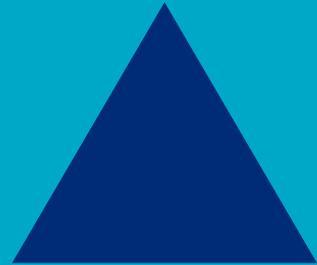
HEALTH WEALTH CAREER

NORTH CAROLINA SUPPLEMENTAL RETIREMENT PLANS

SMALL/MID CAP FUND STRUCTURE ANALYSIS

Kelly Henson
Will Dillard, CFA

BACKGROUND AND CURRENT STRUCTURE



NC CURRENT INVESTMENT STRUCTURE

Tier I Target Date Funds	Tier II - A Passive Core Options	Tier II - B Active Core Options	Tier III Specialty Options
Goal Maker		Stable Value Fund	
	Fixed Income Index	Fixed Income Fund	
		Inflation Responsive Fund	
	Large Cap Equity Index	Large Cap Core Fund	
	Small/Mid Cap Equity Index	Small/Mid Cap Core Fund	
		Global Equity Fund	
	International Equity Index	International Equity Fund	

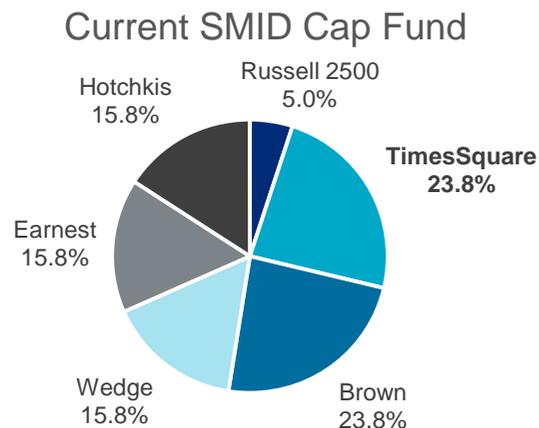
NEW GOALMAKER ALLOCATIONS

Aggressive	Pre-Retirement						Post-Retirement		
Years to Retirement	26+	21-25	16-20	11-15	6-10	0-5	0-5	6-10	11+
US Large (Passive)	34%	34%	32%	30%	28%	27%	25%	24%	21%
SMID Cap Equity (Active)	14%	14%	14%	12%	10%	10%	8%	6%	6%
International Equity (Active)	40%	40%	38%	36%	32%	24%	21%	20%	17%
Bonds (Active)	2%	2%	7%	13%	21%	27%	26%	19%	19%
Stable Value (Active)	0%	0%	0%	0%	1%	3%	8%	14%	17%
Real Assets (Active)	10%	10%	9%	9%	7%	6%	4%	3%	3%
TIPs (Passive)	0%	0%	0%	0%	1%	3%	8%	14%	17%

Moderate	Pre-Retirement						Post-Retirement		
Years to Retirement	26+	21-25	16-20	11-15	6-10	0-5	0-5	6-10	11+
US Large (Passive)	33%	30%	27%	24%	21%	19%	18%	16%	14%
SMID Cap Equity (Active)	14%	12%	12%	10%	8%	6%	6%	4%	4%
International Equity (Active)	38%	36%	32%	28%	24%	19%	15%	14%	12%
Bonds (Active)	6%	13%	21%	28%	33%	36%	34%	27%	23%
Stable Value (Active)	0%	0%	0%	3%	6%	10%	14%	19%	22%
Real Assets (Active)	9%	9%	8%	7%	6%	5%	4%	4%	3%
TIPs (Passive)	0%	0%	0%	0%	2%	5%	9%	16%	22%

Conservative	Pre-Retirement						Post-Retirement		
Years to Retirement	26+	21-25	16-20	11-15	6-10	0-5	0-5	6-10	11+
US Large (Passive)	27%	24%	20%	17%	14%	13%	11%	10%	9%
SMID Cap Equity (Active)	12%	10%	8%	8%	6%	4%	4%	2%	2%
International Equity (Active)	32%	28%	25%	18%	16%	12%	9%	9%	8%
Bonds (Active)	21%	31%	37%	41%	42%	41%	36%	33%	29%
Stable Value (Active)	0%	0%	4%	8%	12%	17%	22%	25%	26%
Real Assets (Active)	8%	7%	6%	5%	4%	3%	3%	2%	2%
TIPs (Passive)	0%	0%	0%	3%	6%	10%	15%	19%	24%

CURRENT SMID CAP FUND



- Currently the SMID Cap Fund totals \$1.024B¹ and has an investment expense ratio of 0.524%
- TimesSquare manages roughly \$244M and has an IM fee of 0.65%
- TimesSquare plays the role of the downside protector within the SMID Fund, focusing on higher quality companies with strong management and typically has biases towards companies with lower debt and higher return on equity
- NC Board voted to replace TimesSquare after continued underperformance and staff turnover, particularly within the health care sector

¹ After the GM transition in June the SMID Cap Fund is estimated to be approximately \$720M (TSCM would represent \$171M of the total Fund)

INVESTMENT MANAGERS

EARNEST (Relative Value)

- Believe stock prices follow identifiable patterns
- Value bias as a by-product of return pattern recognition and fundamental analysis
- Seeks companies with relatively strong profitability measures and higher quality characteristics

Hotchkis (Deep Value, High Beta, Momentum)

- Identify attractively valued companies with short term mispricing's
- Long-term, low turnover approach leads to deeper value bias
- More concentrated 50-100 holdings; higher volatility and tracking error

WEDGE (Higher Quality Value)

- Combination of quantitative and fundamental research
- 50/50 blend of mid and small cap strategies
- Both small and mid cap teams adhere to consistent approach to identify stocks that meet their fundamental and quality parameters

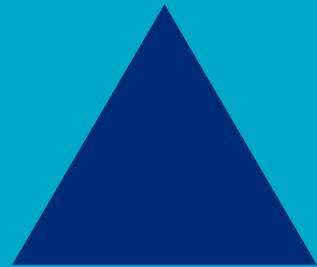
Brown (Growth at a Reasonable Price)

- Seek companies that can compound earnings for an extended period of time
- Growth engine of the SMID Cap Growth Portfolio
- Typically will hold 75 securities with modest turnover

TimesSquare (Traditional Growth, Profitability)

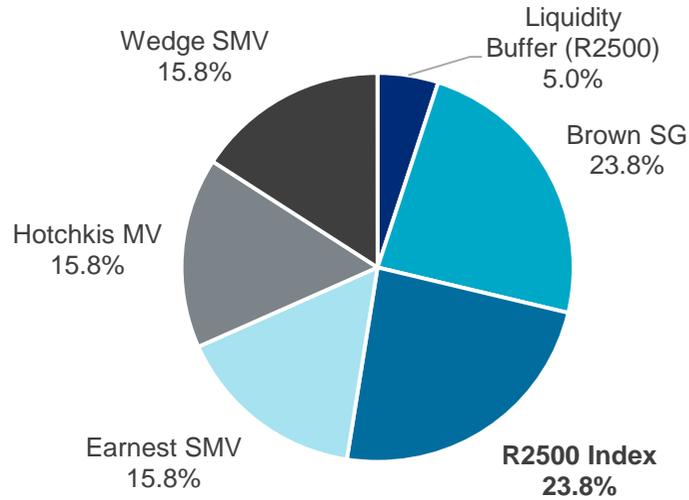
- Diversified portfolio of high quality growth companies
- Higher quality approach has protected well in down markets
- Will typically hold 90-120 securities

SCENARIO ANALYSIS

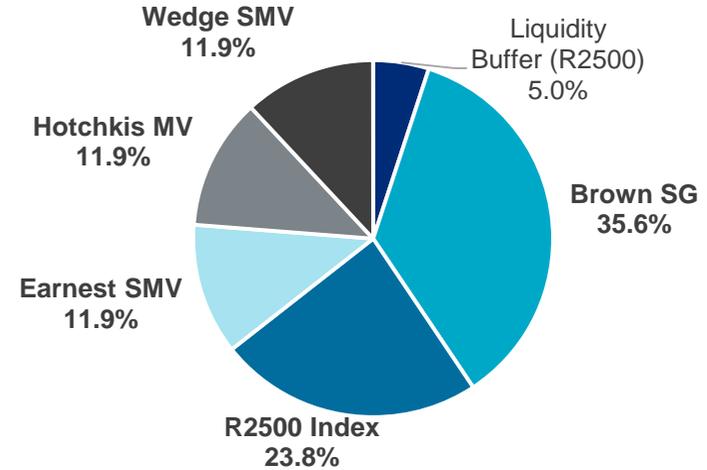


POTENTIAL SCENARIOS

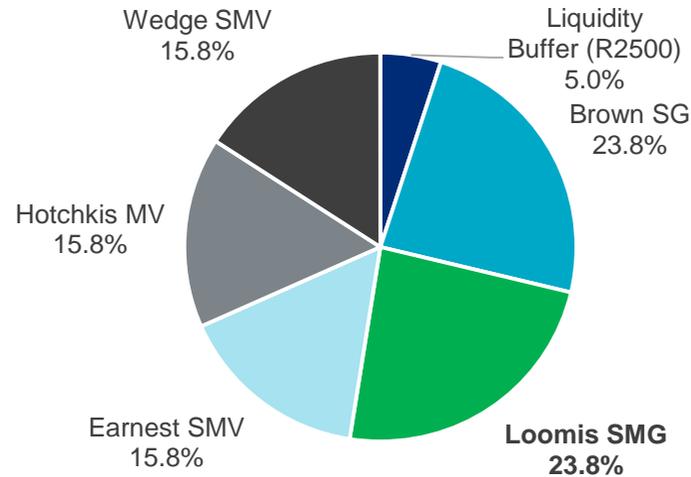
Scenario 1 - Map TSCM Assets to R2500 Index



Scenario 2 - Map TSCM Assets to R2500 Index (Re-Weight Existing Managers)



Scenario 3 - Replace TSCM with Active Loomis



SCENARIO COMPARISON SUMMARY STATISTICS VS. RUSSELL 2500 INDEX

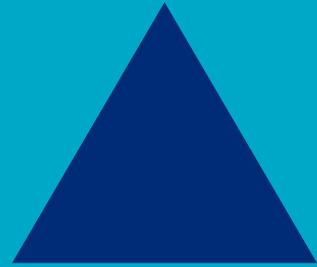
- The table below outlines key characteristics used to understand the biases in the portfolios based on the holdings of the underlying managers.
- The Value, Growth and Momentum scores are determined by averaging the score of the underlying value, growth and momentum factors for all of the holdings of the underlying managers. This was reviewed for the most recent period shown below but also for the trailing three year period. A core portfolio will have value and growth scores between -1 and 1. Style tilts in the portfolio can cause performance to deviate significantly from the benchmark.

Scenario	Active Share	Tracking Error (6 Year)	Standard Deviation (6 Year)	Value Score ¹	Growth Score ¹	Momentum Score ¹	Estimated Fees
Current	74.4%	1.4%	9.7%	0.28	-0.21	-1.57	0.550%
Scenario 1	59.4%	1.0%	9.8%	2.00	-1.76	-2.04	0.398%
Scenario 2	59.7%	1.7%	9.8%	-0.16	-0.83	-1.73	0.401%
Scenario 3	74.6%	1.6%	9.6%	-0.47	0.35	-0.35	0.537%

- Active Share is a measure of the percentage of stock holdings in a portfolio that differ from the benchmark.
 - The measure is used to highlight which active portfolios truly differ from their reference index and can correlate with the portfolio's ability to deliver on inefficiencies in the market.
- Tracking Error measures the divergence in price behavior from the benchmark.
 - Having a higher passive allocation corresponds to smaller tracking error, but also reduces the potential for outperformance.

¹ Analysis located in the Appendix

PERFORMANCE ANALYSIS



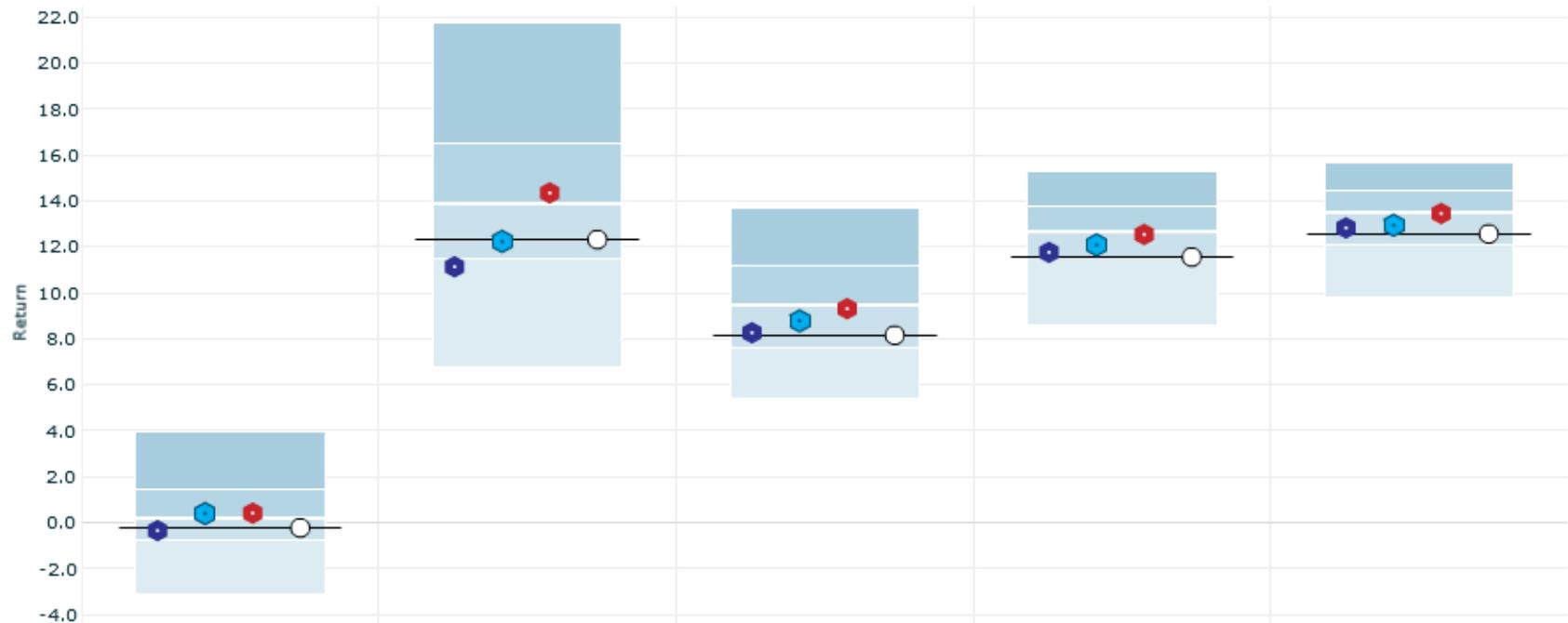
BACK-TESTED PERFORMANCE

- Actual net return history for NC utilized in each scenario
- In Scenario 3, the Loomis returns are composite results net of the quoted fee for NC

NET PERFORMANCE ANALYSIS

Return in \$US over 3 mths, 1 yr, 3 yrs, 5 yrs, 6 yrs ending March-18

Comparison with the US Equity SMID Core universe (Percentile Ranking)



	3 mths (%)	1 yr (%)	3 yrs (%pa)	5 yrs (%pa)	6 yrs (%pa)
● Scenario1	-0.3 (69)	11.1 (80)	8.3 (69)	11.8 (69)	12.8 (58)
⬢ Scenario2	0.4 (47)	12.2 (67)	8.8 (64)	12.1 (59)	12.9 (57)
⬢ Scenario3	0.4 (47)	14.3 (43)	9.3 (56)	12.5 (52)	13.5 (51)
○ RU2500	-0.2 (61)	12.3 (67)	8.2 (72)	11.5 (75)	12.6 (65)
5th Percentile	3.9	21.7	13.7	15.3	15.7
Upper Quartil	1.4	16.5	11.2	13.8	14.4
Median	0.2	13.9	9.4	12.7	13.5
Lower Quartil	-0.8	11.5	7.6	11.6	12.1
95th Percentil	-3.1	6.8	5.4	8.6	9.8
Number	59	54	50	44	42

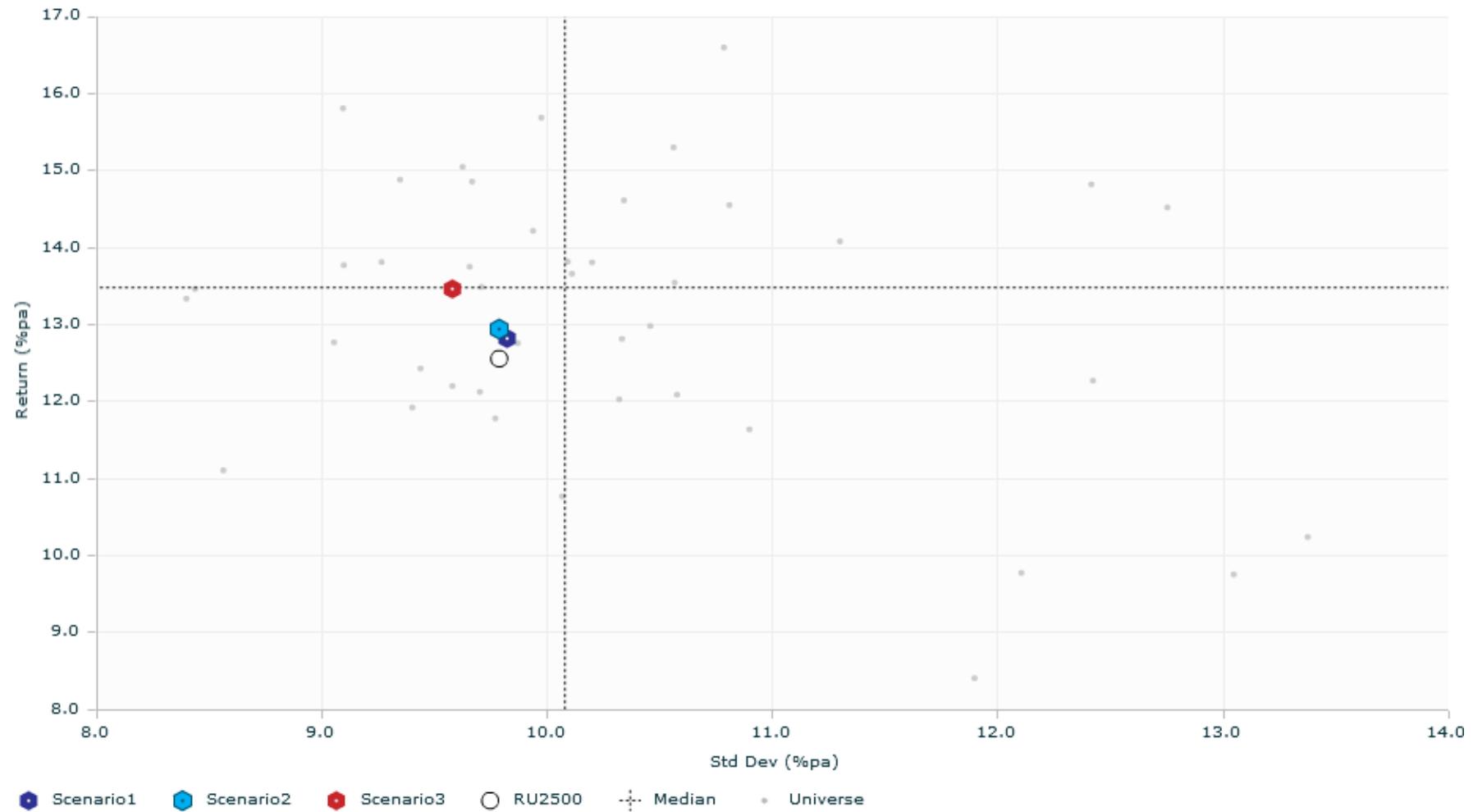
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PERFORMANCE ANALYSIS

Return and Std Deviation in \$US over 6 yrs ending March-18

Comparison with the US Equity SMID Core universe (quarterly calculations)



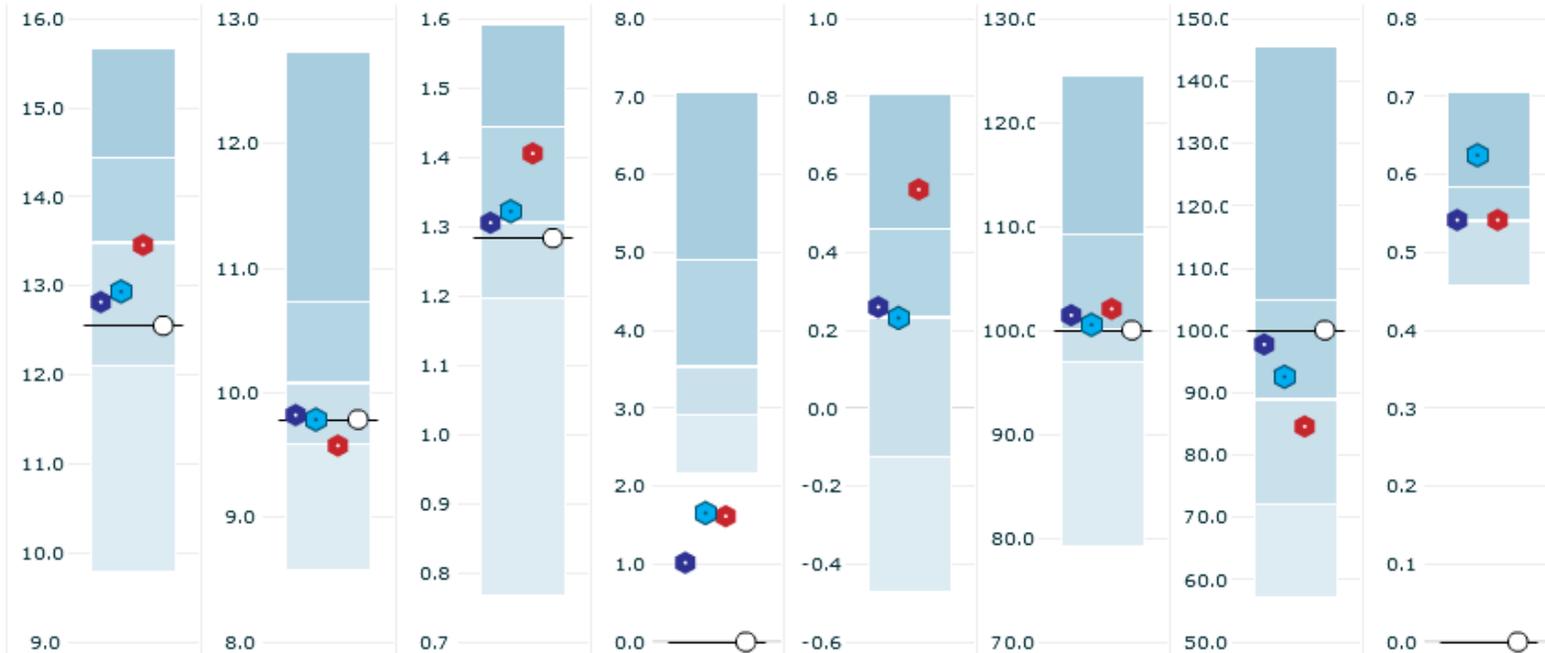
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PERFORMANCE ANALYSIS

Performance characteristics vs. Russell 2500 in \$US over 6 yrs ending March-18

Comparison with the US Equity SMID Core universe (Percentile Ranking) (quarterly calculations)



	Ret (%pa)	Std Dev (%pa)	Ret/SD	TE (%pa)	IR	Up Cap (%)	Down Cap (%)	Bat Av
Scenario1	12.8 (58)	9.8(60)	1.3(50)	1.0(1...	0.3(49)	101.5(46)	97.7 (39)	0.54 (44)
Scenario2	12.9 (57)	9.8(61)	1.3(48)	1.7(1...	0.2(50)	100.5(48)	92.6 (45)	0.63 (10)
Scenario3	13.5 (51)	9.6(76)	1.4(35)	1.6(1...	0.6(20)	102.1(45)	84.6 (55)	0.54 (44)
RU2500	12.6 (65)	9.8(61)	1.3(56)	0.0(1...	-	100.0(51)	100.0(36)	0.00 (1...
5th Percentile	15.7	12.7	1.6	7.1	0.8	124.5	145.5	0.71
Upper Quartil	14.4	10.7	1.4	4.9	0.5	109.3	104.5	0.58
Median	13.5	10.1	1.3	3.5	0.2	100.1	88.8	0.54
Lower Quartil	12.1	9.6	1.2	2.9	-0.1	96.9	72.2	0.46
95th Percentil	9.8	8.6	0.8	2.2	-0.5	79.2	57.2	0.46
Number	42	42	42	42	42	42	42	42

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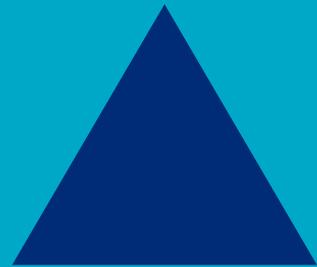


The batting average is the proportion of quarters that the portfolio outperformed the benchmark. The median SMID Cap Core manager outperformed in 54% of the past 24 quarters.

NEXT STEPS

	Scenario 1	Scenario 2	Scenario 3
Estimated Transition Costs	Commission & Taxes: \$29,872 Spread & Market Impact: \$221,945 Total Costs: \$251,817	Commission & Taxes: \$79,332 Spread & Market Impact: \$281,403 Total Costs: \$360,735	Commission & Taxes: \$54,331 Spread & Market Impact: \$682,935 Total Costs: \$737,266
Communication to Participants	<ul style="list-style-type: none"> - Letter to all participants in Fund - Fund fact sheet changes - Website notification - Signature Newsletter article - Communication cost estimate \$70-133K 	<ul style="list-style-type: none"> - Letter to all participants in Fund - Fund fact sheet changes - Website notification - Signature Newsletter article - Communication cost estimate \$70-133K 	<ul style="list-style-type: none"> - Fund fact sheet changes - Website notification - Signature Newsletter article
Update IPS	<ul style="list-style-type: none"> - Update 'Investment Objective' to reflect value tilt / Fund Name - Update underlying mandates and target allocations - See Attachment 	<ul style="list-style-type: none"> - Update 'Investment Objective' - Update underlying mandates and target allocations - See Attachment 	<ul style="list-style-type: none"> - Update underlying mandates and target allocations - See Attachment

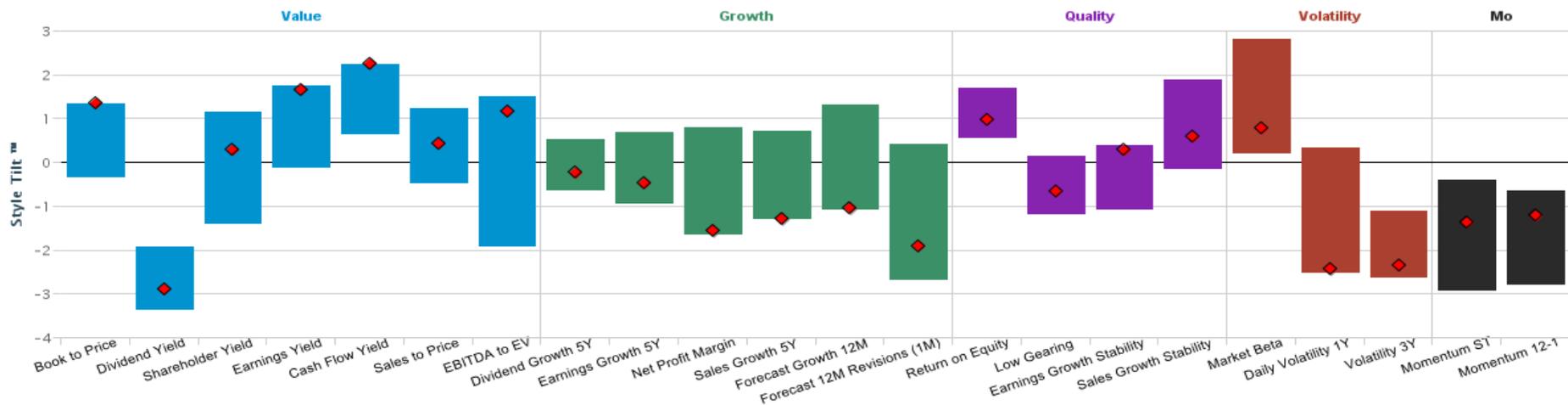
APPENDIX



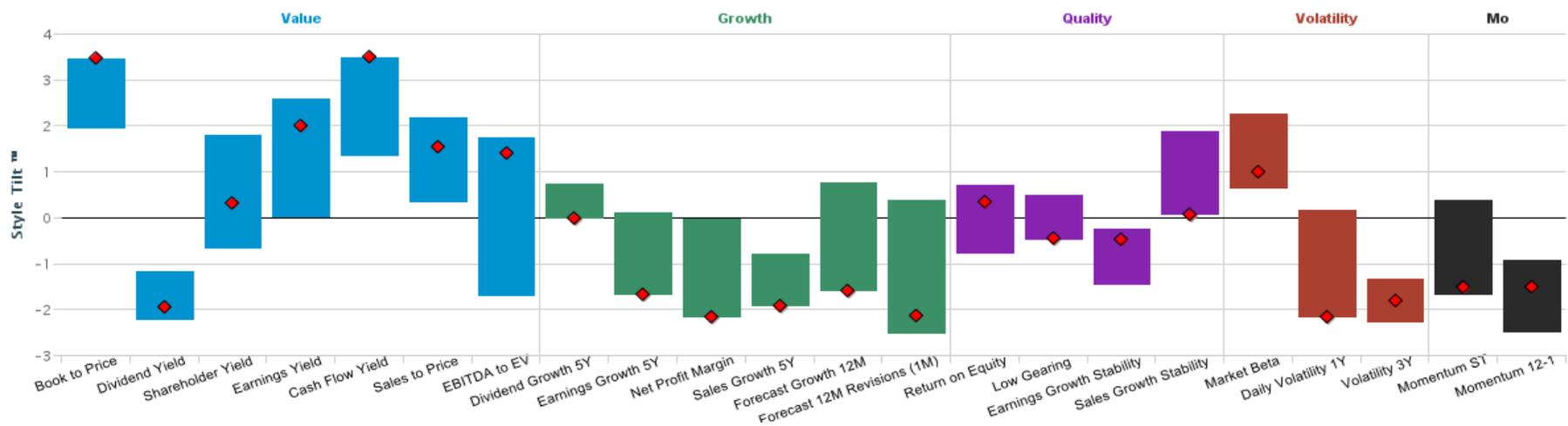
HOLDINGS BASED STYLE ANALYSIS

CURRENT AND SCENARIO 1 (TRAILING 3 YEARS)

Current SMID Core Fund



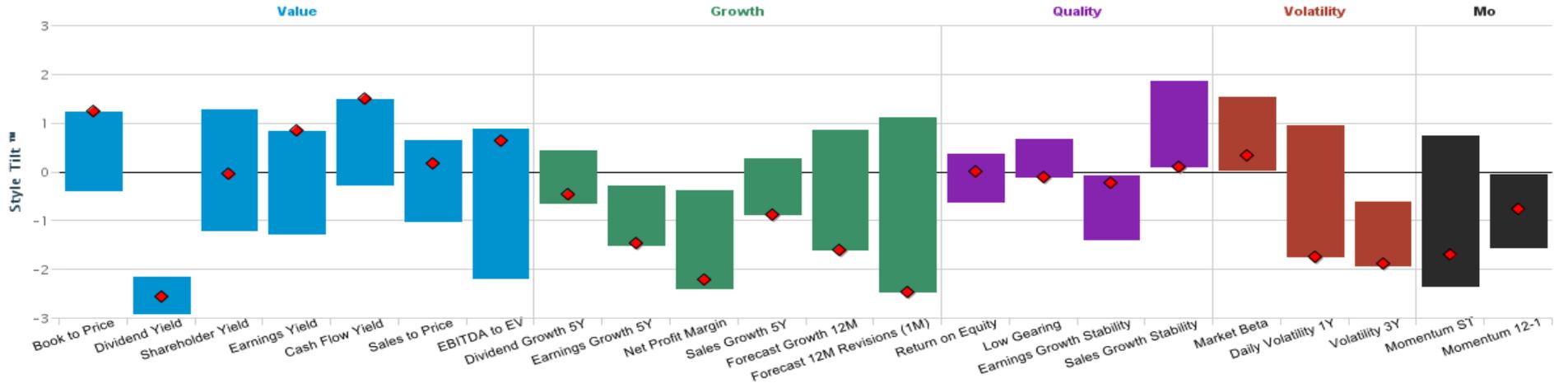
Scenario 1



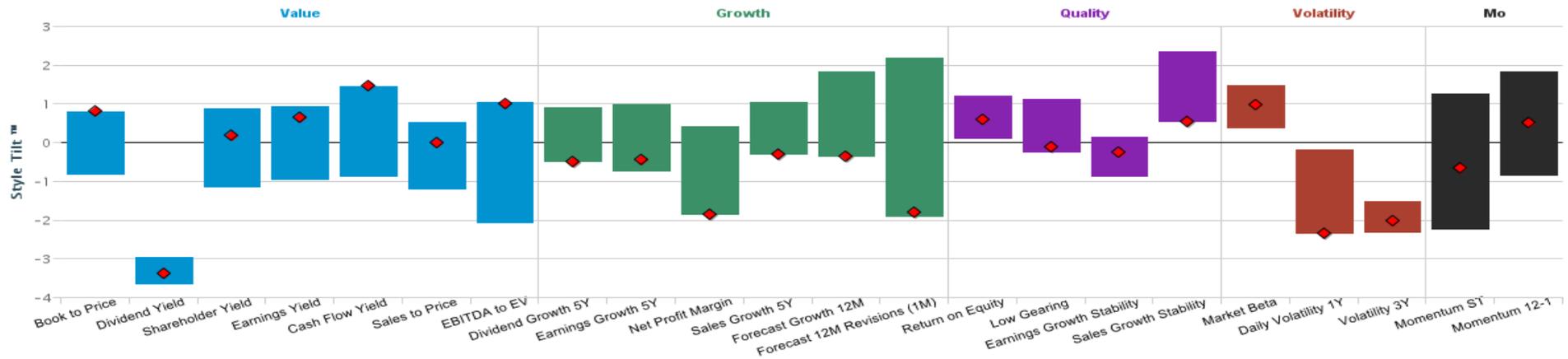
HOLDINGS BASED STYLE ANALYSIS

SCENARIO 2 AND 3 (TRAILING 3 YEARS)

Scenario 2



Scenario 3



STYLE RESEARCH BACKGROUND

The Style Research Portfolio Style Skyline™ shows how a portfolio is positioned or Tilted relative to a benchmark with respect to key themes or Styles. In addition to revealing differences in exposures to fundamental investment factors, these Style Tilts™ are also designed to capture how significant or “deliberate” these differences are and to facilitate direct comparisons of benchmark relative Style orientation between portfolios.

In the default Style Skyline™, the first six bars from the left are Value factors (shown as blue in the output). The next six bars are the Growth factors (green bars) and include four current/historic measures as well as two forward-looking Growth factors (incorporating IBES consensus earnings estimates and earnings forecast revisions). The remaining bars on the right cover Size, Beta, Momentum, Gearing/Leverage and Foreign Sales, Quality Factors, Macro Factors and ESG Factors.

The default Style Skyline™ includes 18 distinct Style factors selected from a range of 60, which can be selected by the user. See Appendix 1 for a detailed list and definitions of all available factors. The example given below (Figure 1) shows positive and significant Tilts towards Value factors and negative Tilts towards most Growth factors, identifying a traditional Value portfolio. The portfolio is also Tilted towards Smaller Cap stocks and negative Momentum on both short and medium-term measures.

A positive/negative Style Tilt indicates that the portfolio factor is higher/lower than the benchmark; i.e. a positive blue bar on Book/Price (“Value”) would mean that the portfolio has a positive bias to Value while a negative blue bar indicates “expensive” on that Value measure.

As a general rule of thumb, for any individual Style Tilt (whether “Standard” or Country/Sector Adjusted) :

- Style Tilts between -0.5 and +0.5 are probably not significant.
- Style Tilts less than -0.5 or more than +0.5 indicate a Tilt exists but may not be significant.
- Style Tilts less than -1 or more than +1 are significant. • Style Tilts less than -2 or more than +2 are very significant

FACTOR DEFINITIONS



STYLE
RESEARCH

Book to Price

The ratio of the company's book value (the sum of shareholders' equity plus accumulated retained earnings from the P & L Account) to its share price.

This factor has been one of the most successful measures of the intrinsic value of company shares.

Earnings Yield

Annual earnings (adjusted for amortizations of intangibles, extraordinary charges and credits) per share divided by the share price.

This factor measures the worth of a company's shares according to the company's ability to support each share with after tax earnings.

Cash Flow Yield

Annual cash flow per share divided by the share price.

This factor is related to earnings yield but also includes other items, specifically: depreciation, amortizations, and provisions for deferred liabilities. It is intended to capture the cash availability of the company as a multiple of the share price, and offers a value criteria based on the stream of accessible cash earnings.

Sales to Price

Net sales per share divided by the share price.

This factor measures the worth of a company's shares according to the annual sales volume supporting the company business. The item is considered by many analysts to be less susceptible to manipulation than other valuation criteria; it is however, a less comprehensive measure of a company's range of activities.

EBITA to EV

The ratio of the company's EBITDA to Enterprise Value. EBITDA is Earnings before interest, taxes and depreciation and is calculated by taking the pretax income and adding back interest expense on debt and depreciation, depletion and amortization and subtracting interest capitalized.

YIELD FACTORS

Dividend Yield

The annual dividend paid per share divided by the share price.

This factor measures the value of company shares according to the stream of dividend income resulting from share ownership.

Shareholder Yield

The sum of Net Buyback Yield, Dividend Yield and Net Debt Paydown Yield.

This factor measures the proportion of a company's value distributed to shareholders through dividend payments, share repurchases and debt reduction.

GROWTH FACTORS

Earnings Growth 5Y

The average annual growth rate of earnings (adjusted for amortizations of intangibles, extraordinary charges and credits) over a trailing five years.

Earnings Growth is, perhaps, the clearest of the growth criteria. However, it is subject to the distortions of reporting conventions and manipulation and, particularly in some markets, only known after a considerable lag.

Sales Growth 5Y

The average annual growth rate of net sales per share over a trailing five years.

Although growth in sales per share might be only a narrow measure of a company's business growth, and may be subject to a number of distortions, it is less subject to differences in reporting conventions or manipulation than many other balance sheet or profit and loss items.

Forecast Growth 12M

Consensus forecast growth of earnings over the next 12 months. The 12 month growth is calculated on a pro-rata basis from the forecasts for each of the company's next 2 annual reporting periods.

Dividend Growth 5Y

The average annual growth rate of dividends over a trailing five years.

QUALITY FACTORS

Return on Equity

Net Income after preferred dividends divided by the book value of shareholders' common equity.

RoE measures the profitability of the operations of the company as a proportion of the total amount of equity in the company. Since RoE multiplied by the reinvestment rate (the proportion of earnings not paid as dividends but reinvested in the company) gives the warranted growth rate of a company, RoE is a traditional measure of a company's growth potential.

Net Profit Margin

The "net margin", annual net income before preferred dividends (plus policyholders' surplus for insurance companies), divided by annual net sales.

This measure attempts to assess the company's potential for profitable, sustained expansion or growth.

Low Gearing

The negative of debt to equity. Low geared companies can be regarded as being of higher "quality" as they are less burdened by debt repayment costs.

Earnings Growth Stability

This 'quality' factor is calculated as the negative of the standard deviation of earnings growth over the most recent 3 years of growth data.

Sales Growth Stability

This 'Quality' factor is calculated as the negative of the standard deviation of Sales Growth over the most recent 3 years of growth data.

SIZE FACTORS

Market Cap

The market capitalization of the stock.

The average size statistic of a portfolio is the weighted (by holding value) average size of the securities held. The average size statistic of a benchmark (or total market) is the weighted (by holding value) average size of the securities within the benchmark (or total market)

VOLATILITY FACTORS

Market Beta

The "slope coefficient", (β), from the simple regression:
Security monthly return = $\alpha + \beta * \text{market monthly return} + \text{random error}$.

The regression is carried out over 36 month periods. Where sufficient information is not available, $\beta=1$ is assumed.

Daily Volatility 1Y

The standard deviation of the last year of daily total returns, expressed as an annualized percentage.

Volatility 3Y

The standard deviation of the last 36 months of total returns, expressed as an annualized percentage.

MOMENTUM FACTORS

Momentum ST

Calculated using a 6 month "memory" of monthly total returns. The past period returns are weighted using a "decay ratio" of 2/3, per month. This weighted historic return factor measures the degree of performance trend following. It is useful in recognizing trading character of specific markets and in noticing occasional changing patterns through the market cycle.

Momentum 12-1

The total return of the stock over the last 12 months, excluding the total return over the most recent month since reversal effects are often associated with one-month returns.

Forecast 12M Revisions

IBES balance of Earnings forecast revisions for the over the next 12 months.

Calculated as the difference between the number of upwards revisions minus the number of downwards revisions (as sampled over the past 1M period), expressed as a percentage of the number of estimates.

The 12 month earnings revisions is calculated on a pro-rata basis from the forecasts for each of the company's next 2 annual reporting periods.

IMPORTANT NOTICES

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Returns for periods greater than one year are annualized. Returns are calculated gross of investment management fees, unless noted as net of fees.

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North Carolina Supplemental Retirement Plans

STATEMENT OF INVESTMENT POLICY
FOR THE NC 401(k) AND NC 457(b)

EFFECTIVE ~~MARCH~~ JUNE 21, 2018

Rev 3.1

SCENARIO 1
CHANGES TO THE INVESTMENT POLICY STATEMENT

The Plans will offer an array of investment options, each with different risk and return characteristics, which will enable a participant to construct a portfolio that, in the aggregate, should meet his/her own individually desired risk and return characteristics and investment goals through separate, diversified investment options.

The following investment options, having the general investment characteristics outlined below, are authorized to be offered within the Plan:

Asset Class	Fund	Objective
Principal Preservation	Stable Value Fund	preservation of principal and stable income
Fixed Income	Fixed Income Index Fund	track the performance of the Bloomberg Barclays Capital US Aggregate Bond Index
	Fixed Income Fund	moderate principal growth with low risk of principal loss through investment in a diversified portfolio of bonds
Inflation Sensitive	Inflation Responsive Fund	provide participants of the Plan with an actively managed option focused on providing exposure to various asset classes which show a correlation or sensitivity to inflation over various market environments
Large Cap US Equity	Large Cap Index Fund	track the performance of the Standard & Poor's 500 Index
	Large Cap Core Fund	long-term capital appreciation of larger capitalization stocks while pursuing both value and growth investment styles
Small/Mid Cap US Equity	Small/Mid Cap Index Fund	track the performance of the Russell 2500 Index of smaller capitalization stocks
	Small/Mid Cap Core Fund	long-term capital appreciation of smaller capitalization stocks while pursuing both value and growth investment styles
International Equity	International Index Fund	track the performance of the MSCI ACWI ex-US Index
	International Fund	long-term growth of capital utilizing a diversified portfolio of companies located outside the United States
Global Equity	Global Equity Fund	growth of capital through investments in listed equities of companies, without geographic limitation

Small/Mid Cap ~~Core~~ Fund

The Small / Mid Cap ~~Core~~ Fund was established to provide participants with a primarily active managed equity option targeted at the Small / Mid Cap sector of the U.S. equity market managed in both value and growth styles.

Investment Objective

The primary investment objective of the Small / Mid Cap ~~Core~~ Fund is long-term capital appreciation while pursuing both value and growth investment styles, with an emphasis on value. The value portion of the fund will invest in equity securities of small / mid cap companies that are selling at discounts to their long-term intrinsic values. The growth portion of the fund will invest in small / mid cap companies that offer the potential for above average earnings growth. The fund has a value focus with an approximate 2:1 ratio of the value portion of the fund to the growth portion.

Investment Management

The Board recognizes that no investment manager is able to provide consistently superior returns in all time periods. Therefore, the Board has determined that multiple investment managers will be retained to manage portions of the option's assets. This will provide diversification for the option by investment organization. A table of the current sub-advisors for this option, their target allocations and the allocation range for each manager is shown in Appendix B.

Performance Objectives

The fund seeks to:

- Provide a rate of return that exceeds that generated by the Russel 2500 Index over rolling five year periods. The portfolio's returns should remain competitive with the Russell 2500 Index returns over rolling three year periods.
- Provide a rate of return that places above the median manager in a universe of U.S. Small / Mid Cap Core Equity managers over rolling five year periods. The portfolio's returns should remain competitive with the universe over shorter, rolling three-year periods.
- Maintain a risk level, as measured by the standard deviation of quarterly returns, which does not exceed 150% of the risk of the Russell 2500 Index over rolling fiver year periods.

Asset allocation is the most important determinant of long term investment results. In order to assist participants in making effective asset allocation decisions, the Board has elected to offer participants a set of predetermined fund allocations that have been created by investment experts which utilize the options offered in the Plans. Participants can elect to have their entire plan balance allocated in accordance with one of the models offered.

Model Allocation Determination

The Board has authorized a set of asset allocation models to be offered. These models were designed to be sensitive to the two primary drivers of optimal asset allocation: Risk Tolerance and Investment Horizon. Accordingly, the models are arrayed on these two dimensions.

Risk Tolerance

Participants are able to select their risk tolerance from one of three levels, Conservative, Moderate and Aggressive. Each model is designed to provide the highest expected long term return possible at that risk tolerance level.

Participant Investment Horizon

A participant's investment horizon is also a determinant of the level of risk that may be appropriate. Participants with longer investment horizons have more time to recover from short term losses and thus are able to accept more variability in their interim account values and potentially earn a higher long term return. For each of the three levels of general risk tolerance, four investment horizon models have been selected. These investment horizon models become more conservative, with higher allocations to bonds and stable value investments, as the horizon becomes shorter. These models were designed to be consistent with the participants' retirement date.

Model Allocation Investments

The Model Allocations are able to utilize all of the investment options offered by the Plans. However, the models are not required to make use of all of the options if it is determined that a particular option is not appropriate for a given risk tolerance and investment time horizon.

Model Allocation Implementation

These asset allocation models will be implemented by the Plans' recordkeeper. The recordkeeper will automatically allocate any contributions and distributions across the investment options in the model, in order to maintain the targeted model allocation. The recordkeeper will generally rebalance the allocation across the investment options back to the target allocation on a quarterly basis.

Model Revisions

The Board will review these target allocations periodically. If any new investment options are added to the Plans, the model allocations will be reviewed to ascertain whether the new options should be included and in what allocation.

The current Model Allocations are shown below.

Conservative

The objective of the Conservative Model Allocation is to achieve long term growth in excess of inflation with a minimal risk of capital loss over a full market cycle.

Conservative		Pre-Retirement					Post-Retirement			
		26+	21-25	16-20	11-15	6-10	0-5	0-5	6-10	11+
Fund	NC Large Cap Index Fund	27%	24%	20%	17%	14%	13%	11%	10%	9%
	NC Small / Mid Cap Core Fund	12%	10%	8%	8%	6%	4%	4%	2%	2%
	NC International Fund	32%	28%	25%	18%	16%	12%	9%	9%	8%
	NC Fixed Income Fund	21%	31%	37%	41%	42%	41%	36%	33%	29%
	NC Stable Value Fund	0%	0%	4%	8%	12%	17%	22%	25%	26%
	NC Inflation Responsive Fund	8%	7%	6%	5%	4%	3%	3%	2%	2%
	NC TIPS Fund	0%	0%	0%	3%	6%	10%	15%	19%	24%

Moderate

The objective of the Moderate Model Allocation is moderate growth of principal with limited downside risk over a market cycle.

Moderate		Pre-Retirement					Post-Retirement			
		26+	21-25	16-20	11-15	6-10	0-5	0-5	6-10	11+
Fund	NC Large Cap Index Fund	33%	30%	27%	24%	21%	19%	18%	16%	14%
	NC Small / Mid Cap Core Fund	14%	12%	12%	10%	8%	6%	6%	4%	4%
	NC International Fund	38%	36%	32%	28%	24%	19%	15%	14%	12%
	NC Fixed Income Fund	6%	13%	21%	28%	33%	36%	34%	27%	23%
	NC Stable Value Fund	0%	0%	0%	3%	6%	10%	14%	19%	22%
	NC Inflation Responsive Fund	9%	9%	8%	7%	6%	5%	4%	4%	3%
	NC TIPS Fund	0%	0%	0%	0%	2%	5%	9%	16%	22%

Aggressive

The primary investment objective of the Aggressive Model Allocation is to maximize growth of principal over the long term with a reasonable level of overall volatility.

Aggressive		Pre-Retirement					Post-Retirement			
		26+	21-25	16-20	11-15	6-10	0-5	0-5	6-10	11+
Fund	NC Large Cap Index Fund	34%	34%	32%	30%	28%	27%	25%	24%	21%
	NC Small / Mid Cap Core Fund	14%	14%	14%	12%	10%	10%	8%	6%	6%
	NC International Fund	40%	40%	38%	36%	32%	24%	21%	20%	17%
	NC Fixed Income Fund	2%	2%	7%	13%	21%	27%	26%	19%	19%
	NC Stable Value Fund	0%	0%	0%	0%	1%	3%	8%	14%	17%
	NC Inflation Responsive Fund	10%	10%	9%	9%	7%	6%	4%	3%	3%
	NC TIPS Fund	0%	0%	0%	0%	1%	3%	8%	14%	17%

Definitions

Investment option (or option): A specific investment fund offered to a participant. May be composed of one or more Commingled Funds and/or Separate Accounts.

Pooled investment: A pooled investment option or fund is a structure where multiple investment managers are responsible for managing a portion of the option's or fund's assets.

Mandate: A set of objectives and guidelines that describe a type of portfolio. Mandates are assigned to individual portfolio managers.

APPENDIX A

Asset Class	Investment Manager	Benchmark	Universe
Stable Value	Galliard	3-Year Constant Maturity Yield	Stable Value
Fixed Income	Prudential Global Investment Management	Bloomberg Barclays Capital Aggregate	Core Plus Bond
	TCW	Bloomberg Barclays Capital Aggregate	Core Plus Bond
Fixed Income Index	BlackRock	Bloomberg Barclays Capital Aggregate	Core Bond
Inflation Sensitive Fund	PIMCO	Custom ¹	None
Large Cap Index	BlackRock	S & P 500	Large Cap Core Index
Large Cap Core	Hotchkis & Wiley	Russell 1000 Value	Large Cap Value Equity
	Macquarie	Russell 1000 Value	Large Cap Value Equity
	Sands Capital	Russell 1000 Growth	Large Cap Growth Equity

¹ *Inflation Sensitive Index: 45% Bloomberg Barclays Capital U.S. TIPS Index; 20% DJ-UBS Commodity TR Index; 10% Dow Jones U.S. Select REIT Index; 15% JPM Emerging Local Market ELMI Plus Index; 10% DJ-UBS Gold TR Index.*

	Loomis Sayles & Company	Russell 1000 Growth	Large Cap Growth Equity
	BlackRock	Russell 1000	Large Cap Core Index
Small / Mid Cap Index	BlackRock	Russell 2500	SMID Cap Core Index
Small / Mid Cap Core	Hotchkis & Wiley	Russell 2500 Value	SMID Cap Value Equity
	Earnest Partners	Russell 2500 Value	SMID Cap Value Equity
	Wedge Capital Management	Russell 2500 Value	SMID Cap Value Equity
	TimesSquare Capital	Russell 2500 Growth	SMID Cap Growth Equity
	Brown Advisory	Russell 2500 Growth	SMID Cap Growth Equity
	BlackRock	Russell 2500	SMID Cap Core Index
International Equity Index	BlackRock	MSCI ACWI ex US	Non-US Equity
International Equity	Baillie Gifford	MSCI ACWI ex US	Non-US Equity
	Mondrian	MSCI ACWI ex US	
Global Equity	Arrowstreet	MSCI ACWI	Global Equity
	Wellington	MSCI ACWI	Global Equity

Appendix B

The following tables list the current investment managers utilized in each fund. Each investment manager is assigned a target allocation of the fund and a range around that target which describes the minimum and maximum allocation to that investment manager. The Board has charged the Custodian with maintaining each investment manager's allocation of the individual funds' assets within these ranges. The Board designates Departmental staff with the authority to move assets between the investment managers in order to bring the allocations more closely in line with these target allocations.

Large Cap Index Fund

Investment Manager	Target Allocation
BlackRock	100.0%

Large Cap Core Fund

Investment Manager	Target Allocation	Allocation Range
Hotchkis & Wiley	18.75%	+/- 3%
Macquarie	18.75%	+/- 3%
Sands Capital	18.75	+/- 3%
Loomis Sayles	18.75	+/- 3%
BlackRock Russell 1000 Index	25.0%	+/- 3%

Small/Mid Cap Index Fund

Investment Manager	Target Allocation
BlackRock	100.0%

Small/Mid Cap ~~Core~~ Fund

Investment Manager	Target Allocation	Allocation Range
Earnest Partners	15.83%	+/- 3%
Hotchkis & Wiley	15.83%	+/- 3%
Wedge Capital Management	15.83%	+/- 3%
TimesSquare Capital	23.75%	+/- 3%
Brown Advisory	23.75%	+/- 3%
BlackRock Russell 2500 Index	28.755.0%	+/- 3 1%

International Equity Index Fund

Investment Manager	Target Allocation
BlackRock	100.0%

International Equity Fund

Investment Manager	Target Allocation	Allocation Range
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Baillie Gifford	50.0%	+/- 3%
Mondrian	50.0%	+/- 3%

Global Equity Fund

Investment Manager	Target Allocation	Allocation Range
Arrowstreet	50.0%	+/- 3%
Wellington	50.0%	+/- 3%

Inflation Sensitive Fund

Investment Manager	Target Allocation
PIMCO	100%

Fixed Income Fund

Investment Manager	Target Allocation	Allocation Range
TCW	50.0%	+/- 3%
Prudential Global Investment Management	50.0%	+/- 3%

Fixed Income Index Fund

Investment Manager	Target Allocation
BlackRock	100%

Appendix D Investment Array

Tier I Target Date	Tier II - A Passive Core	Tier II - B Active Core	Tier III Specialty
Goal Maker		Stable Value Fund Galliard Stable Value	
	Fixed Income Passive BlackRock Debt Index	Fixed Income Fund TCW Core Plus Bond PGIM Core Plus Bond	
		Inflation Responsive Fund PIMCO IRMAF	
	Large Cap Equity Passive BlackRock Equity Index	Large Cap Core Fund Hotchkis & Wiley Large Cap Value Macquarie Large Cap Value Sands Capital Large Cap Growth Loomis Large Cap Growth BlackRock Russell 1000 Index	

	Small/Mid Cap Equity Passive BlackRock Russell 2500 Index	Small/Mid Cap Core Fund Hotchkis & Wiley SMID Cap Value Earnest Partners SMID Cap Value Wedge SMID Cap Value TimesSquare SMID Cap Growth Brown Advisory SMID Cap Growth BlackRock Russell 2500 Index
		Global Equity Fund Wellington Global Opportunities Arrowstreet Global Equity ACWI
	International Equity Passive BlackRock MSCI ACWI ex US Index	International Equity Fund Baillie Gifford ACWI ex US Growth

IPS Revision History

Version	Approved	Summary of Changes
1.4	Dec 2011	<ul style="list-style-type: none"> ▪ Change Stable Value guidelines to refer to “manager” generically and not Galliard specifically
1.5	June 2012	<ul style="list-style-type: none"> ▪ Change consultant reporting to quarterly ▪ Change global equity from “Opportunistic” to just Global Equity Fund, updated guidelines to traditional long equity ▪ Add Max 10% security limit to all equity funds ▪ Add new managers and update fund target allocations: ▪ Neuberger, Robeco, Wedge, Arrowstreet
1.6	June 2013	<ul style="list-style-type: none"> ▪ Move Global Equity country max limit to 60% from 50% (Approved Nov 2012) ▪ Add Inflation Fund ▪ Add revision history
1.7	September 2013	<ul style="list-style-type: none"> ▪ Clarify language around use of leverage in general; leverage prohibited except where permission granted by the Board. ▪ Add prohibition against purchasing initial offerings from affiliated entities of the investment manager ▪ Add Exceptions Granted table ▪ Modify global equity fund guidelines to allow smaller cap companies and frontier market countries
1.8	December 2013	<ul style="list-style-type: none"> ▪ Prohibited from purchasing securities from affiliates of the Manager in an initial offering, unless granted permission by the Board
2.0	December 2015	<ul style="list-style-type: none"> ▪ Removed detailed investment guidelines for each of the funds
2.1	May 2016	<ul style="list-style-type: none"> ▪ Separate and revise duties of investment consultant and IMD ▪ Revise duties of RSD ▪ Add delegated glidepath provider to definition of investment manager
3.0	September 2017	<ul style="list-style-type: none"> ▪ Eliminate Large Cap Growth, Large Cap Value, Small/Mid Cap Growth, and Small/Mid Cap Value Funds ▪ Add Large Cap Core and Small/Mid Cap Core Funds ▪ Separate and revise duties of investment

		<p>consultant and IMD</p> <ul style="list-style-type: none"> ▪ Add glidepath review, recommendation, and approval ▪ Make other revisions and clarification
3.1		<ul style="list-style-type: none"> ▪ Change default retirement age for asset allocation model ▪ Correct the weighting of the JPM Emerging Local Market ELMI Plus Index in the Inflation Sensitive Index in the footnote of Appendix A
<u>3.2</u>	<u>June 21, 2018</u>	<ul style="list-style-type: none"> ▪ <u>Change the Small/Mid Cap Core Fund to the Small/Mid Cap Fund</u>

SCENARIO 2
CHANGES TO THE INVESTMENT POLICY STATEMENT

APPENDIX A

Asset Class	Investment Manager	Benchmark	Universe
Stable Value	Galliard	3-Year Constant Maturity Yield	Stable Value
Fixed Income	Prudential Global Investment Management	Bloomberg Barclays Capital Aggregate	Core Plus Bond
	TCW	Bloomberg Barclays Capital Aggregate	Core Plus Bond
Fixed Income Index	BlackRock	Bloomberg Barclays Capital Aggregate	Core Bond
Inflation Sensitive Fund	PIMCO	Custom ¹	None
Large Cap Index	BlackRock	S & P 500	Large Cap Core Index
Large Cap Core	Hotchkis & Wiley	Russell 1000 Value	Large Cap Value Equity
	Macquarie	Russell 1000 Value	Large Cap Value Equity
	Sands Capital	Russell 1000 Growth	Large Cap Growth Equity
	Loomis Sayles & Company	Russell 1000 Growth	Large Cap Growth Equity
	BlackRock	Russell 1000	Large Cap Core Index
Small / Mid Cap Index	BlackRock	Russell 2500	SMID Cap Core Index
Small / Mid Cap Core	Hotchkis & Wiley	Russell 2500 Value	SMID Cap Value Equity
	Earnest Partners	Russell 2500 Value	SMID Cap Value Equity
	Wedge Capital Management	Russell 2500 Value	SMID Cap Value Equity
	TimesSquare Capital	Russell 2500 Growth	SMID Cap Growth Equity
	Brown Advisory	Russell 2500 Growth	SMID Cap Growth Equity
	BlackRock	Russell 2500	SMID Cap Core Index

¹ Inflation Sensitive Index: 45% Bloomberg Barclays Capital U.S. TIPS Index; 20% DJ-UBS Commodity TR Index; 10% Dow Jones U.S. Select REIT Index; 15% JPM Emerging Local Market ELMI Plus Index; 10% DJ-UBS Gold TR Index.

International Equity Index	BlackRock	MSCI ACWI ex US	Non-US Equity
International Equity	Baillie Gifford	MSCI ACWI ex US	Non-US Equity
	Mondrian	MSCI ACWI ex US	
Global Equity	Arrowstreet	MSCI ACWI	Global Equity
	Wellington	MSCI ACWI	Global Equity

Appendix B

The following tables list the current investment managers utilized in each fund. Each investment manager is assigned a target allocation of the fund and a range around that target which describes the minimum and maximum allocation to that investment manager. The Board has charged the Custodian with maintaining each investment manager's allocation of the individual funds' assets within these ranges. The Board designates Departmental staff with the authority to move assets between the investment managers in order to bring the allocations more closely in line with these target allocations.

Large Cap Index Fund

Investment Manager	Target Allocation
BlackRock	100.0%

Large Cap Core Fund

Investment Manager	Target Allocation	Allocation Range
Hotchkis & Wiley	18.75%	+/- 3%
Macquarie	18.75%	+/- 3%
Sands Capital	18.75	+/- 3%
Loomis Sayles	18.75	+/- 3%
BlackRock Russell 1000 Index	25.0%	+/- 3%

Small/Mid Cap Index Fund

Investment Manager	Target Allocation
BlackRock	100.0%

Small/Mid Cap Core Fund

Investment Manager	Target Allocation	Allocation Range
Earnest Partners	11.915.83%	+/- 3%
Hotchkis & Wiley	11.915.83%	+/- 3%
Wedge Capital Management	11.915.83%	+/- 3%
TimesSquare Capital	23.75%	+/- 3%
Brown Advisory	35.623.75%	+/- 3%
BlackRock Russell 2500 Index	28.755.0%	+/- 3 1%

International Equity Index Fund

Investment Manager	Target Allocation
BlackRock	100.0%

International Equity Fund

Investment Manager	Target Allocation	Allocation Range
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Baillie Gifford	50.0%	+/- 3%
Mondrian	50.0%	+/- 3%

Global Equity Fund

Investment Manager	Target Allocation	Allocation Range
Arrowstreet	50.0%	+/- 3%
Wellington	50.0%	+/- 3%

Inflation Sensitive Fund

Investment Manager	Target Allocation
PIMCO	100%

Fixed Income Fund

Investment Manager	Target Allocation	Allocation Range
TCW	50.0%	+/- 3%
Prudential Global Investment Management	50.0%	+/- 3%

Fixed Income Index Fund

Investment Manager	Target Allocation
BlackRock	100%

Appendix D Investment Array

Tier I Target Date	Tier II - A Passive Core	Tier II - B Active Core	Tier III Specialty
Goal Maker		Stable Value Fund Galliard Stable Value	
	Fixed Income Passive BlackRock Debt Index	Fixed Income Fund TCW Core Plus Bond PGIM Core Plus Bond	
		Inflation Responsive Fund PIMCO IRMAF	
	Large Cap Equity Passive BlackRock Equity Index	Large Cap Core Fund Hotchkis & Wiley Large Cap Value Macquarie Large Cap Value Sands Capital Large Cap Growth Loomis Large Cap Growth BlackRock Russell 1000 Index	
	Small/Mid Cap Equity Passive BlackRock Russell 2500 Index	Small/Mid Cap Core Fund Hotchkis & Wiley SMID Cap Value Earnest Partners SMID Cap Value Wedge SMID Cap Value TimesSquare SMID Cap Growth Brown Advisory SMID Cap Growth BlackRock Russell 2500 Index	



International Equity Passive
BlackRock MSCI ACWI ex
US Index



Global Equity Fund
Wellington Global Opportunities
Arrowstreet Global Equity ACWI

International Equity Fund
Baillie Gifford ACWI ex US
Growth
Mondrian ACWI ex US Value

IPS Revision History

Version	Approved	Summary of Changes
1.4	Dec 2011	<ul style="list-style-type: none"> ▪ Change Stable Value guidelines to refer to “manager” generically and not Galliard specifically
1.5	June 2012	<ul style="list-style-type: none"> ▪ Change consultant reporting to quarterly ▪ Change global equity from “Opportunistic” to just Global Equity Fund, updated guidelines to traditional long equity ▪ Add Max 10% security limit to all equity funds ▪ Add new managers and update fund target allocations: ▪ Neuberger, Robeco, Wedge, Arrowstreet
1.6	June 2013	<ul style="list-style-type: none"> ▪ Move Global Equity country max limit to 60% from 50% (Approved Nov 2012) ▪ Add Inflation Fund ▪ Add revision history
1.7	September 2013	<ul style="list-style-type: none"> ▪ Clarify language around use of leverage in general; leverage prohibited except where permission granted by the Board. ▪ Add prohibition against purchasing initial offerings from affiliated entities of the investment manager ▪ Add Exceptions Granted table ▪ Modify global equity fund guidelines to allow smaller cap companies and frontier market countries
1.8	December 2013	<ul style="list-style-type: none"> ▪ Prohibited from purchasing securities from affiliates of the Manager in an initial offering, unless granted permission by the Board
2.0	December 2015	<ul style="list-style-type: none"> ▪ Removed detailed investment guidelines for each of the funds
2.1	May 2016	<ul style="list-style-type: none"> ▪ Separate and revise duties of investment consultant and IMD ▪ Revise duties of RSD ▪ Add delegated glidepath provider to definition of investment manager
3.0	September 2017	<ul style="list-style-type: none"> ▪ Eliminate Large Cap Growth, Large Cap Value, Small/Mid Cap Growth, and Small/Mid Cap Value Funds ▪ Add Large Cap Core and Small/Mid Cap Core

		<p>Funds</p> <ul style="list-style-type: none"> ▪ Separate and revise duties of investment consultant and IMD ▪ Add glidepath review, recommendation, and approval ▪ Make other revisions and clarification
3.1		<ul style="list-style-type: none"> ▪ Change default retirement age for asset allocation model ▪ Correct the weighting of the JPM Emerging Local Market ELMI Plus Index in the Inflation Sensitive Index in the footnote of Appendix A
<u>3.2</u>	<u>June 21, 2018</u>	<ul style="list-style-type: none"> ▪ <u>Increase the allocation to the BlackRock Russell 2500 in the Small/Mid Cap Core Fund</u>

SCENARIO 3
CHANGES TO THE INVESTMENT POLICY STATEMENT

APPENDIX A

Asset Class	Investment Manager	Benchmark	Universe
Stable Value	Galliard	3-Year Constant Maturity Yield	Stable Value
Fixed Income	Prudential Global Investment Management	Bloomberg Barclays Capital Aggregate	Core Plus Bond
	TCW	Bloomberg Barclays Capital Aggregate	Core Plus Bond
Fixed Income Index	BlackRock	Bloomberg Barclays Capital Aggregate	Core Bond
Inflation Sensitive Fund	PIMCO	Custom ¹	None
Large Cap Index	BlackRock	S & P 500	Large Cap Core Index
Large Cap Core	Hotchkis & Wiley	Russell 1000 Value	Large Cap Value Equity
	Macquarie	Russell 1000 Value	Large Cap Value Equity
	Sands Capital	Russell 1000 Growth	Large Cap Growth Equity
	Loomis Sayles & Company	Russell 1000 Growth	Large Cap Growth Equity
	BlackRock	Russell 1000	Large Cap Core Index
Small / Mid Cap Index	BlackRock	Russell 2500	SMID Cap Core Index
Small / Mid Cap Core	Hotchkis & Wiley	Russell 2500 Value	SMID Cap Value Equity
	Earnest Partners	Russell 2500 Value	SMID Cap Value Equity
	Wedge Capital Management	Russell 2500 Value	SMID Cap Value Equity
	Loomis Sayles Times Square Capital	Russell 2500 Growth	SMID Cap Growth Equity

¹ Inflation Sensitive Index: 45% Bloomberg Barclays Capital U.S. TIPS Index; 20% DJ-UBS Commodity TR Index; 10% Dow Jones U.S. Select REIT Index; 15% JPM Emerging Local Market ELMI Plus Index; 10% DJ-UBS Gold TR Index.

	Brown Advisory	Russell 2500 Growth	SMID Cap Growth Equity
	BlackRock	Russell 2500	SMID Cap Core Index
International Equity Index	BlackRock	MSCI ACWI ex US	Non-US Equity
International Equity	Baillie Gifford	MSCI ACWI ex US	Non-US Equity
	Mondrian	MSCI ACWI ex US	
Global Equity	Arrowstreet	MSCI ACWI	Global Equity
	Wellington	MSCI ACWI	Global Equity

Appendix B

The following tables list the current investment managers utilized in each fund. Each investment manager is assigned a target allocation of the fund and a range around that target which describes the minimum and maximum allocation to that investment manager. The Board has charged the Custodian with maintaining each investment manager's allocation of the individual funds' assets within these ranges. The Board designates Departmental staff with the authority to move assets between the investment managers in order to bring the allocations more closely in line with these target allocations.

Large Cap Index Fund

Investment Manager	Target Allocation
BlackRock	100.0%

Large Cap Core Fund

Investment Manager	Target Allocation	Allocation Range
Hotchkis & Wiley	18.75%	+/- 3%
Macquarie	18.75%	+/- 3%
Sands Capital	18.75	+/- 3%
Loomis Sayles	18.75	+/- 3%
BlackRock Russell 1000 Index	25.0%	+/- 3%

Small/Mid Cap Index Fund

Investment Manager	Target Allocation
BlackRock	100.0%

Small/Mid Cap Core Fund

Investment Manager	Target Allocation	Allocation Range
Earnest Partners	15.83%	+/- 3%
Hotchkis & Wiley	15.83%	+/- 3%
Wedge Capital Management	15.83%	+/- 3%
TimesSquare Capital <u>Loomis Sayles</u>	23.75%	+/- 3%
Brown Advisory	23.75%	+/- 3%
BlackRock Russell 2500 Index	5.0%	+/- 1%

International Equity Index Fund

Investment Manager	Target Allocation
BlackRock	100.0%

International Equity Fund

Investment Manager	Target Allocation	Allocation Range
Baillie Gifford	50.0%	+/- 3%
Mondrian	50.0%	+/- 3%

Global Equity Fund

Investment Manager	Target Allocation	Allocation Range
Arrowstreet	50.0%	+/- 3%
Wellington	50.0%	+/- 3%

Inflation Sensitive Fund

Investment Manager	Target Allocation
PIMCO	100%

Fixed Income Fund

Investment Manager	Target Allocation	Allocation Range
TCW	50.0%	+/- 3%
Prudential Global Investment Management	50.0%	+/- 3%

Fixed Income Index Fund

Investment Manager	Target Allocation
BlackRock	100%

Appendix D Investment Array

Tier I Target Date	Tier II - A Passive Core	Tier II - B Active Core	Tier III Specialty	
Goal Maker		Stable Value Fund Galliard Stable Value		
	Fixed Income Passive BlackRock Debt Index	Fixed Income Fund TCW Core Plus Bond PGIM Core Plus Bond		
		Inflation Responsive Fund PIMCO IRMAF		
	Large Cap Equity Passive BlackRock Equity Index	Large Cap Core Fund Hotchkis & Wiley Large Cap Value Macquarie Large Cap Value Sands Capital Large Cap Growth Loomis Large Cap Growth BlackRock Russell 1000 Index		
		Small/Mid Cap Equity Passive BlackRock Russell 2500 Index	Small/Mid Cap Core Fund Hotchkis & Wiley SMID Cap Value Earnest Partners SMID Cap Value Wedge SMID Cap Value Loomis Sayles Times Square SMID Cap Growth Brown Advisory SMID Cap Growth BlackRock Russell 2500 Index	



International Equity Passive
BlackRock MSCI ACWI ex
US Index



Global Equity Fund
Wellington Global Opportunities
Arrowstreet Global Equity ACWI

International Equity Fund
Baillie Gifford ACWI ex US
Growth
Mondrian ACWI ex US Value

IPS Revision History

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3.0	September 2017	<ul style="list-style-type: none"> ▪ Eliminate Large Cap Growth, Large Cap Value, Small/Mid Cap Growth, and Small/Mid Cap Value Funds ▪ Add Large Cap Core and Small/Mid Cap Core Funds ▪ Separate and revise duties of investment

		<p>consultant and IMD</p> <ul style="list-style-type: none"> ▪ Add glidepath review, recommendation, and approval ▪ Make other revisions and clarification
3.1		<ul style="list-style-type: none"> ▪ Change default retirement age for asset allocation model ▪ Correct the weighting of the JPM Emerging Local Market ELMI Plus Index in the Inflation Sensitive Index in the footnote of Appendix A
<u>3.2</u>	<u>June 21, 2018</u>	<ul style="list-style-type: none"> ▪ <u>Replace manager in the Small/Mid Cap Core Fund</u>



Dale R. Folwell, CPA

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MEMORANDUM

TO: North Carolina Supplemental Retirement Board of Trustees

FROM: Loren de Mey, Assistant Investment Director

DATE: June 7, 2018

SUBJECT: Discussion / Action: NC 401k and NC 457b Plans – SMID Cap Growth Active Manager Search Recommendation

As directed by the Supplemental Investment Subcommittee, Investment Management Division (IMD) staff and Mercer have conducted a search for an active manager as a potential replacement for TimesSquare in the NC Small/Mid Cap (SMID) Core Fund. If the Supplemental Investment Subcommittee and Board decide to pursue an active option for this replacement, then Staff and Mercer recommend Loomis Sayles as the fund manager. Loomis Sayles currently manages a Large Cap Growth strategy within the NC Large Cap Core Fund. As of May 31, 2018, the size of this mandate was approximately \$409 million. Note that the Large Cap Growth strategy is managed by a Loomis Sayles investment team that is different from the team managing its Small/Mid Cap Growth strategy, and being recommended, here, as the replacement for TimesSquare.

The key reasons supporting Loomis Sayles as the manager to replace TimesSquare include:

1. Disciplined investment process
2. Experienced investment team and strong track record
3. Strong risk management culture with solid downside protection
4. Backing of a strong organization
5. Competitive fees within the active SMID Cap Growth universe

Due Diligence Search Process

Mercer worked with IMD to screen the universe of the more than 70 SMID cap growth investment managers. Managers were evaluated on a number of essential factors, including Mercer rating, assets under management, performance net of fees, and complementary styles with the other investment strategies within the NC SMID Cap Core Fund. The initial list was reviewed with staff and a thorough review of the detailed search report prepared by Mercer was conducted, which included significant quantitative and qualitative analysis. As a result of this work, three managers were selected as finalists. Conference calls were conducted with the three finalists. In addition to the conference calls, staff reviewed firm materials including due diligence questionnaires, manager presentations, consultant reports, and performance and risk statistics. Loomis was selected as the preferred manager, based on its team's strong track record, disciplined investment process and strong risk management culture. Consistent with SRP's manager search and selection policy, staff, accompanied by Mercer, conducted an onsite due diligence meeting with Loomis Sayles in its Boston office.



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Organization

Loomis, Sayles & Company, L.P. (Loomis Sayles), structured as a limited partnership, is a wholly-owned subsidiary of Natixis Investment Managers, L.P., the US-based subsidiary of Natixis, a French corporate and investment bank. Natixis Investment Managers, L.P., headquartered in Boston, has several investment management affiliates and other securities-related firms both in and outside of the United States. Loomis Sayles had over \$266 billion in assets under management as of March 31, 2018.

Investment Team

The Loomis Sayles SMID Cap Growth team is comprised of two portfolio managers, Mark Burns and John Slavik, four dedicated analysts, and a product manager. Biographies are included in Appendix A.

SMID Cap Growth Strategy - Investment Philosophy and Process

The SMID Cap Growth strategy currently has \$730 million in assets, with capacity of \$3 billion. The team also manages a Small Cap Growth strategy with assets of \$2.3 billion and is currently closed to new investors.

The investment team's goal is a low volatility approach to high growth SMID cap investing. They employ a bottom-up, fundamental investment process and strive to make active stock selection the primary driver of returns. Given the breadth and scope of the SMID cap growth universe, the investment team believes the asset class is largely inefficient. They seek to exploit market inefficiency by identifying what they call "emerging winners." These are businesses that, in the team's view, have strong fundamentals, but are under-recognized by the market.

Given the inherent volatility of SMID cap growth stocks, the team believes it is important to apply risk management from the stock level to the portfolio level and from the buy decision to the sell decision. The team seeks to provide outperformance over full market cycles with portfolio volatility at or below benchmark volatility.

Idea Generation and Analysis

The team sources investment ideas through traditional fundamental analysis and a proprietary growth screen. First, the team leverages their experience in fundamental research and their network of industries and company contacts. The team's proprietary growth screen ranks the investable universe according to three criteria: earnings power, relative strength and share turnover. About 40-50 percent of the team's ideas are sourced through the growth screen.

Each investment idea is then vetted and researched through rigorous fundamental analysis. The team looks for visibility and predictability of growth drivers with strong competitive advantages. The team uses discounted cash flow modeling as their primary tool to better understand and compare the reward to risk in high growth businesses across sectors and industries.

Once the team identifies investment candidates that meet their criteria, they seek to initiate positions that they believe are priced to offer a minimum 25 percent upside potential. Position sizes are typically 0.75 - 3.0 percent, with 65-85 holdings in the portfolio.



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Risk Management

The team integrates risk management into their investment process. They believe that quality companies will tend to participate less in down markets than the broader investable universe. Through their valuation analysis, the team seeks to select stocks that offer a return potential of 2:1, upside-to-downside to help manage downside volatility and facilitate greater return sustainability. They also ensure position size is commensurate with their estimate of the business model risk and their level of conviction.

To help minimize volatility at the strategy level, they attempt to manage factor and sector risks. Adhering to constraints on sector weights and position sizes during portfolio construction can further enhance risk management. Combining relatively tight constraints with an active, bottom-up stock selection process can help ensure the importance of stock selection for potential alpha generation rather than sector bets.

A clearly defined stop/loss discipline is an important part of their risk management. The team actively monitors all holdings in the strategy. Sell decisions are typically a function of deterioration in the fundamentals of their investment thesis or somewhat less frequently, price target attainment. The stop/loss discipline, however, relies on both absolute and relative price measure to help identify when and where their view is significantly at odds with the market. Significant price deterioration of a holding over the trailing month can lead to further review and potentially a sale. Not only does the stop/loss discipline help remove emotion from their decision process, it can be important to capital preservation. Additionally, the stop loss discipline can allow the team to move on from mistakes and reallocate time and capital to better ideas. This feature has also contributed to the portfolio's overall downside protection characteristics.

The portfolio managers are ultimately responsible for risk management, but there is oversight from Chief Investment Officer (CIO), Jae Park, and his team. While general oversight of each investment team and strategy is provided, the CIO and his team are not involved in direct money management. The CIO ensures that risk management is integrated into the investment process occurring concurrently with investment decisions, while also confirming the strategy is within its historical risk profile. The investment teams, which report to the CIO, are responsible for constructing portfolios that are appropriate given the investment objectives, investment restrictions, and risk tolerances of clients. In doing so, they rely on comprehensive, fundamental research in which risk assessment plays a key role.

Expected Performance in Different Market Environments

The team favors quality companies with differentiated growth opportunities that they believe are positioned to benefit from longer-term, secular growth drivers. The Loomis Sayles SMID Cap Growth strategy would be expected to outperform in markets where returns are driven primarily by quality, growth fundamentals.

The strategy may underperform relative to the benchmark in markets where returns are driven by low-quality stocks and in narrow markets where a sector or small group of industries drive returns.



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Investment Management Fee

59 basis points

This fee is an 18% discount from the firm's standard fee schedule.

Performance *(net of fees ending March 2018):*

	Q1 2018	1 YR	3 YR	5 YR	6 YR
Loomis SMID	3.0	26.5	12.5	14.7	15.2
R2500 Growth	2.4	19.9	9.1	13.4	13.4
Excess	0.6	6.6	3.4	1.3	1.8

Risk Statistics *(versus the Russell 2500 Growth Index for 6 years ending March 2018)*

Standard Deviation	9.9
Sharpe Ratio	1.6
Information Ratio	0.7
Upside Capture	109.7
Downside Capture	74.3



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Appendix A: Biographies

Portfolio Management

Mark F. Burns, CFA

Mark Burns is a vice president of Loomis, Sayles & Company and co-portfolio manager of the Loomis Sayles Small Cap Growth and Small/Mid Cap Growth funds and the Loomis Sayles Small Cap Growth and Small/Mid Cap Growth strategies. Mark has 21 years of investment industry experience. He joined Loomis Sayles in 1999 as a small cap growth analyst working on a range of sectors, including technology, consumer and healthcare. Mark was instrumental in developing the Loomis Sayles diversified approach to small cap management. He previously worked as an investment analyst for New England Pension Consultants, where he researched small cap strategies, developed risk/return assumptions for all asset classes and performed asset allocation studies. Mark earned his undergraduate degree at Colby College and an MBA from the Johnson School of Management at Cornell University.

John J. Slavik, CFA

John Slavik is a vice president of Loomis, Sayles & Company and co-portfolio manager of the Loomis Sayles Small Cap Growth and Small/Mid Cap Growth funds and the Loomis Sayles Small Cap Growth and Small/Mid Cap Growth strategies. He has 26 years of investment industry experience. Before joining Loomis Sayles in 2005, John was a portfolio manager for Westfield Capital Management, LLC where he helped manage small and small/ mid cap growth assets. John was also vice president of equity research at Harbor Capital Management, where he held research responsibilities and was a member of the growth product portfolio management team. Prior to that, he was an associate portfolio manager and research analyst at Phoenix Investment Counsel. John is a member of CFA Society Boston and a graduate of the University of Connecticut.

Dedicated Resources

James W. Lamb, CFA

James Lamb is a vice president and senior equity research analyst for the small-SMID cap growth team at Loomis, Sayles & Company. Prior to joining Loomis Sayles in 2008, he was an investment associate in fundamental equity research at Putnam Investments. James earned an AB in engineering sciences from Dartmouth College.

Chris O'Brien, CFA, CMT

Chris O'Brien is a vice president and senior equity research analyst for the small-smid cap growth team at Loomis, Sayles & Company. He joined Loomis Sayles in 2013 from John Hancock Asset Management, where he was a portfolio manager for their small and mid cap equity group. Previously, Chris was a small cap analyst at State Street Research and Baring Asset Management, Inc. He earned an undergraduate degree from Trinity College and his MBA from Babson College.

Nathaniel C. Roberts

Nate Roberts is a vice president and senior equity research analyst for the small-smid cap growth team at Loomis, Sayles & Company. He joined Loomis Sayles in 2007 from J.L. Kaplan Associates, where he was an equity analyst responsible for covering industrials, aerospace & defense and building products. Previously, Nate was a junior analyst at Putnam Investments, and an associate in Cantor Fitzgerald's environmental brokerage services area. Nate earned a



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BA from Bucknell University and an MBA from the Sloan School of Management at the Massachusetts Institute of Technology.

Anand Vankawala

Anand Vankawala is a senior equity analyst for the small-smid cap growth team at Loomis, Sayles & Company. He joined Loomis Sayles in 2017 and has eight years of investment industry experience. Previously, Anand was at Century Capital Management, first as a junior equity analyst assisting in models and research across all sectors, and later as a senior equity analyst covering small cap and smid cap healthcare companies and analyzing general sector trends. Prior to this, he was at Avondale Partners, where he was responsible for covering stocks that fell within the healthy living category. Before this, Anand held medical research positions at the INC Research Contract Clinical Research Organization and the Illinois Institute of Technology Engineering Research Center. He earned a BS in biomedical engineering from the Illinois Institute of Technology and an MS in finance from Vanderbilt University.

Product Management

Noreen A. Drohan

Noreen Drohan is a vice president of Loomis, Sayles & Company and product manager for the small cap and small/mid growth portfolios. Noreen joined Loomis Sayles in 2005 as a portfolio assistant. She was promoted to product specialist in 2006, and later to associate product manager. Noreen earned a BS from Northeastern University and an MBA from University College Cork in Cork City, Ireland.