BOARD OF TRUSTEES
Cobb County Government Employees' Pension Plan Trust
Other Post Employment Benefits (OPEB) Trust
Meeting of June 3, 2020
Virtual Meeting 8:00 A.M. to 10: A.M.

Agenda

I. Invitation for Public Comment

II. Approval of Minutes – *Hagler*

III. Invoice Payments Approval – *Volckmann*

IV. Actuary Report – Joseph Walls

V. Advisor Report – UBS – *Earle Dodd, Van Price, Allen Wright, and Austin Dodd*

VI. New Business
   a. New Capital Market Assumptions.
   b. Updated allocations with projected returns.
   c. Discussion of Managers lagging their peers.

VII. Adjourn

VIII. Next Trustee Meeting – Wednesday September 9, 2020 – 8:00 a.m. to 9:00 a.m.

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Cobb County Government Employees Pension Plan & Retiree Health Benefit Plan (OPEB)

January 1, 2020 Valuation Results

June 3, 2020 Board Meeting

Alisa Bennett, FSA, EA, FCA, MAAA
President

Joseph Walls
Senior Consultant

Benefit Financing

- Basic Retirement Funding Equation

$$C + I = B + E$$

C	=	Contributions
I	=	Investment Income
B	=	Benefits Paid
E	=	Expenses (administration)

Comments on Pension Plan Valuation

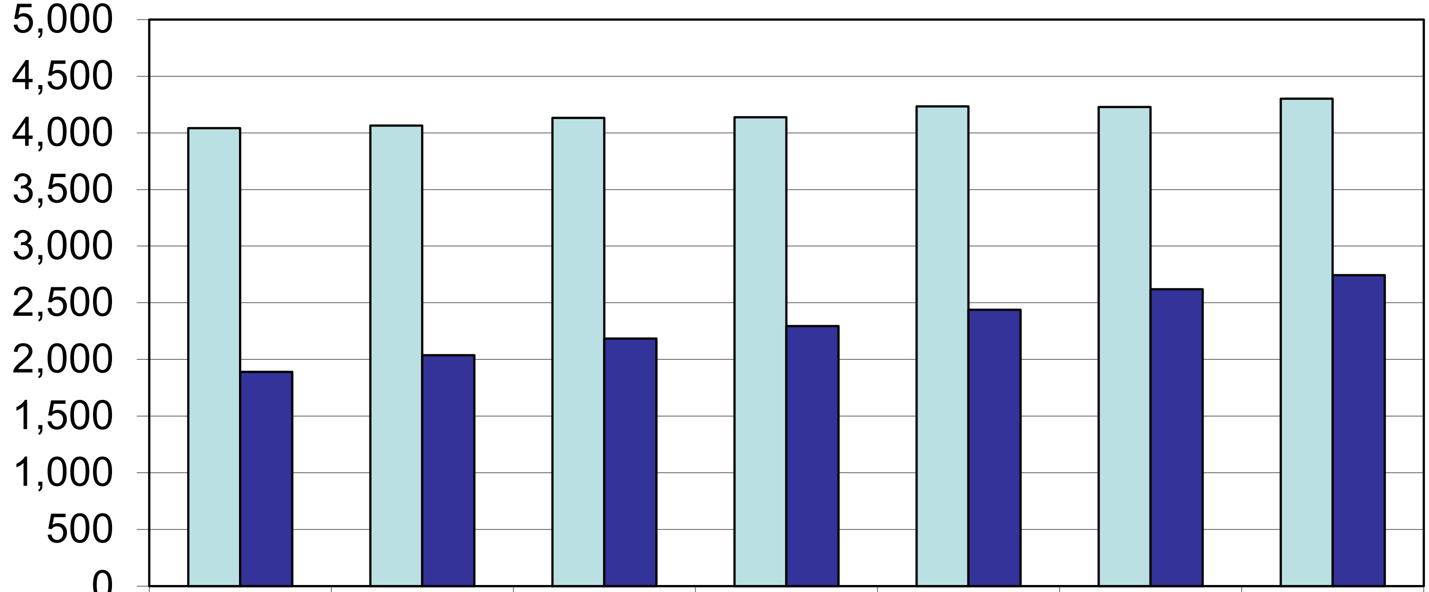
- Asset returns
  - Market asset return 22.81% vs. 7.50% expected return (15.31% more than expected).
  - Actuarial asset return 7.34% vs. 7.50% expected (0.16% less than expected).
- Pay increases
  - Individual pay increases average 6.33% vs. 3.33% expected.
  - Total valuation payroll increased 4.88%.
- Traditional Participants and Hybrid Participants
  - Hybrid Participants make up 29.2% of total membership (54.3% of active membership)
  - Traditional Participants account for approximately 98.7% of total Actuarial Accrued Liability (AAL)

Comments on Pension Plan Valuation (cont.)

- Employee contribution rate for participants in traditional plan increased from 7.75% to 8.00% in March 2020
  - Scheduled to increase 0.25% per year until reaching 8.75% in 2023
  - Hybrid Plan participants contribute 3.00% of compensation
- Investment return assumption decreased from 7.50% to 7.25%.
  - Increased Unfunded Actuarial Accrued Liability (UAAL) by $34.0 million and increased the County’s contribution rate by 0.81% of compensation
- Plan Amendment to allow certain former employees of City of Powder Springs Water & Sewer System to become pension plan participants effective April 7, 2019
  - Immaterial to overall pension valuation results.

Pension Plan Membership Data

Active and Retired Membership



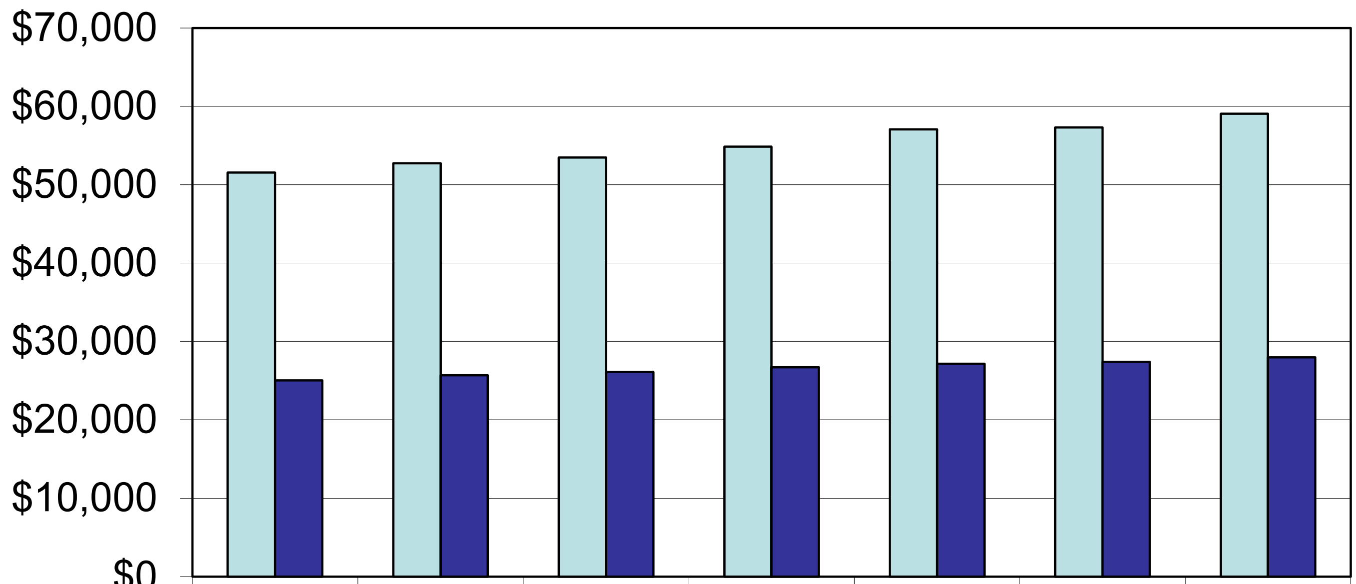
	2014	2015	2016	2017	2018	2019	2020
Actives	4,041	4,064	4,132	4,136	4,233	4,228	4,302
Retirees	1,892	2,039	2,185	2,295	2,438	2,620	2,744

1.0% annual increase for active members since 2014; 1.8% increase for 2020.

6.4% annual increase for retired members since 2014; 4.7% increase for 2020.

0.5 retirees per active 6 years ago; 0.6 retirees per active now.

Average Salary and Benefits

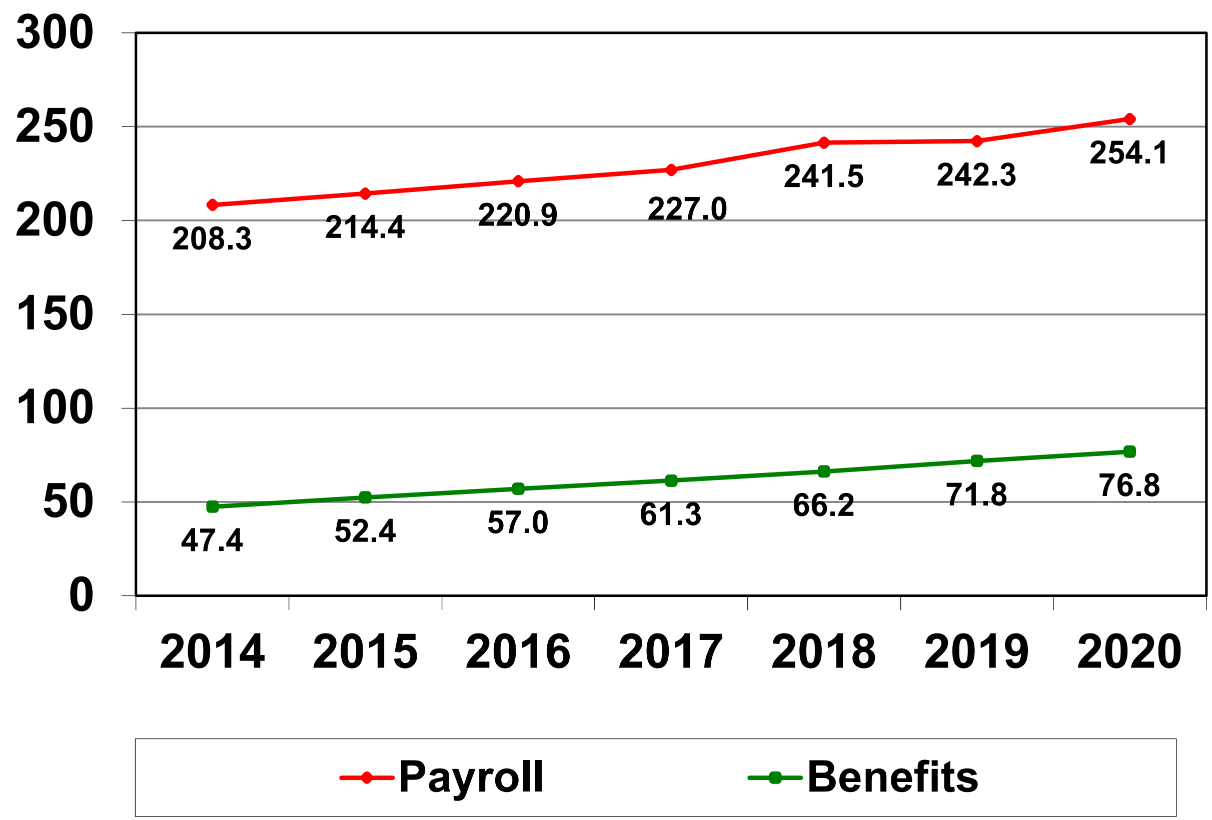


	2014	2015	2016	2017	2018	2019	2020
Average Salary	$51,555	$52,745	$53,473	$54,878	$57,057	$57,303	$59,067
Average Benefit	$25,056	$25,707	$26,107	$26,690	$27,166	$27,414	$27,993

2.3% annual increase for average salary since 2014; 3.1% increase for 2020.

1.9% annual increase for average benefits since 2014; 2.1% increase for 2020.

Payroll & Benefits
($ Millions)

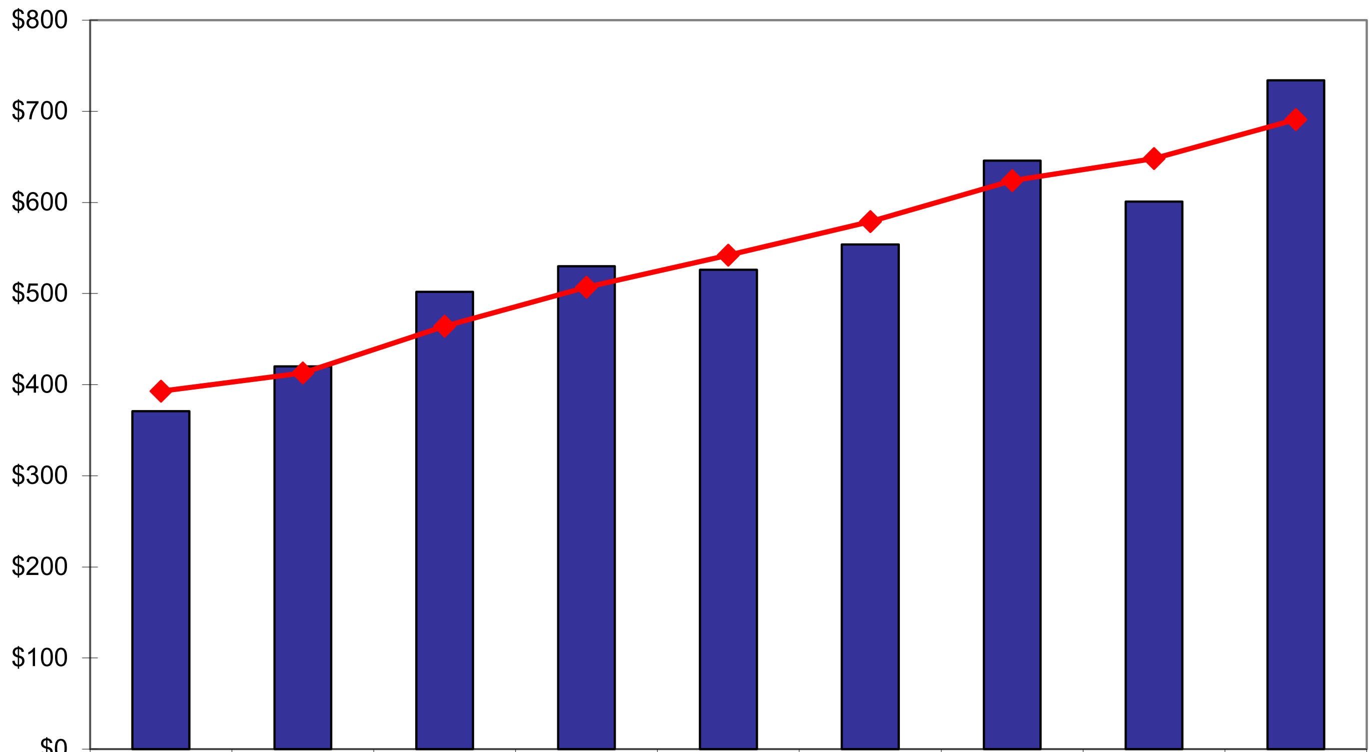


Average Age & Service

	January 1, 2019	January 1, 2020
Active Average Age	42.9	43.0
Active Average Service	10.7	10.5
Average Age Retirees	68.1	68.3
Average Age Beneficiaries	69.6	70.2

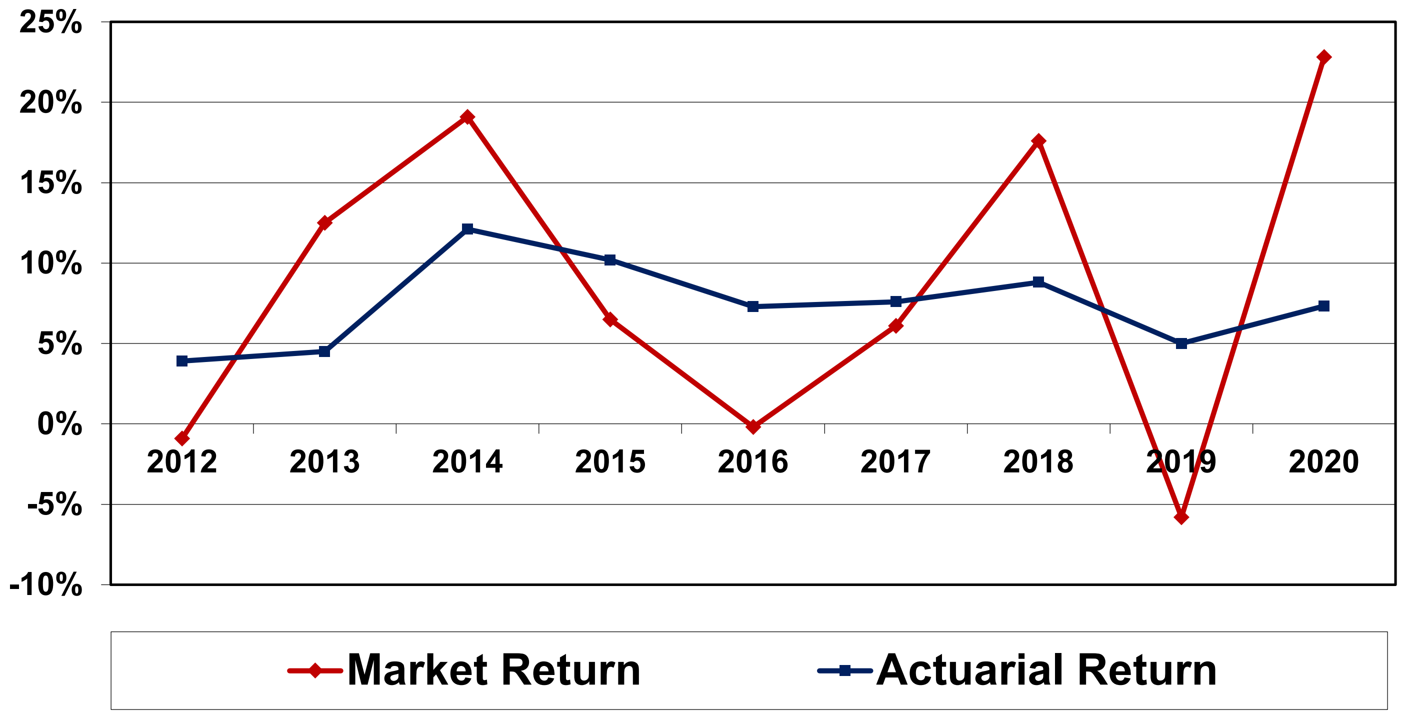
Pension Plan
Market and Actuarial Value of Assets

Pension Assets (excluding CIGNA)
($ Millions)



	2012	2013	2014	2015	2016	2017	2018	2019	2020
Market Value	$371	$420	$502	$530	$526	$554	$646	$601	$734
Actuarial Value	$393	$413	$464	$507	$542	$579	$624	$648	$691

Asset Returns (excluding CIGNA)



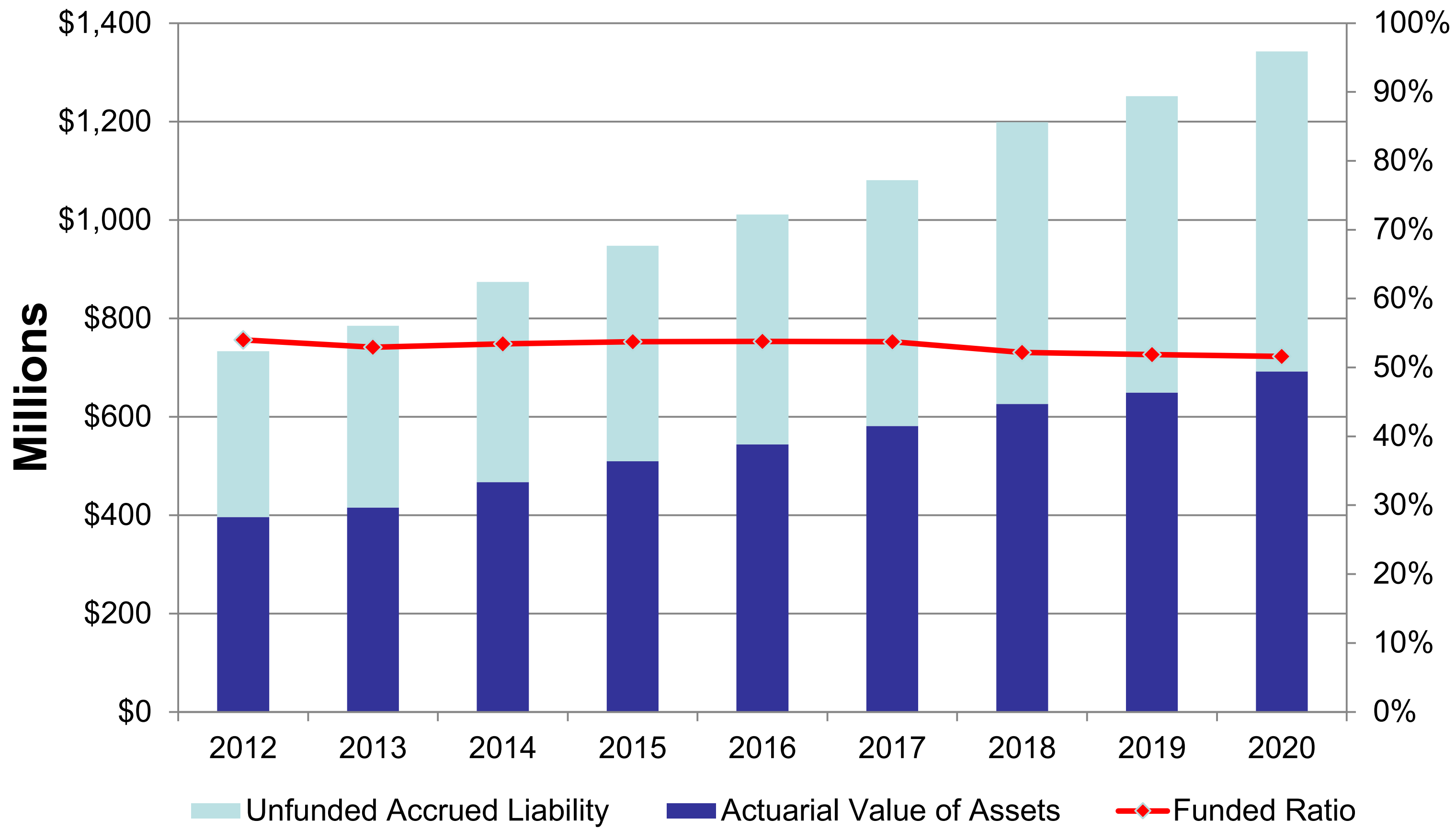
	2012	2013	2014	2015	2016	2017	2018	2019	2020
Market Return	(0.9)%	12.5%	19.1%	6.5%	(0.2)%	6.1%	17.6%	(5.8)%	22.8%
Actuarial Return	3.9%	4.5%	12.1%	10.2%	7.3%	7.6%	8.8%	5.0%	7.3%

Pension Plan Funding Results

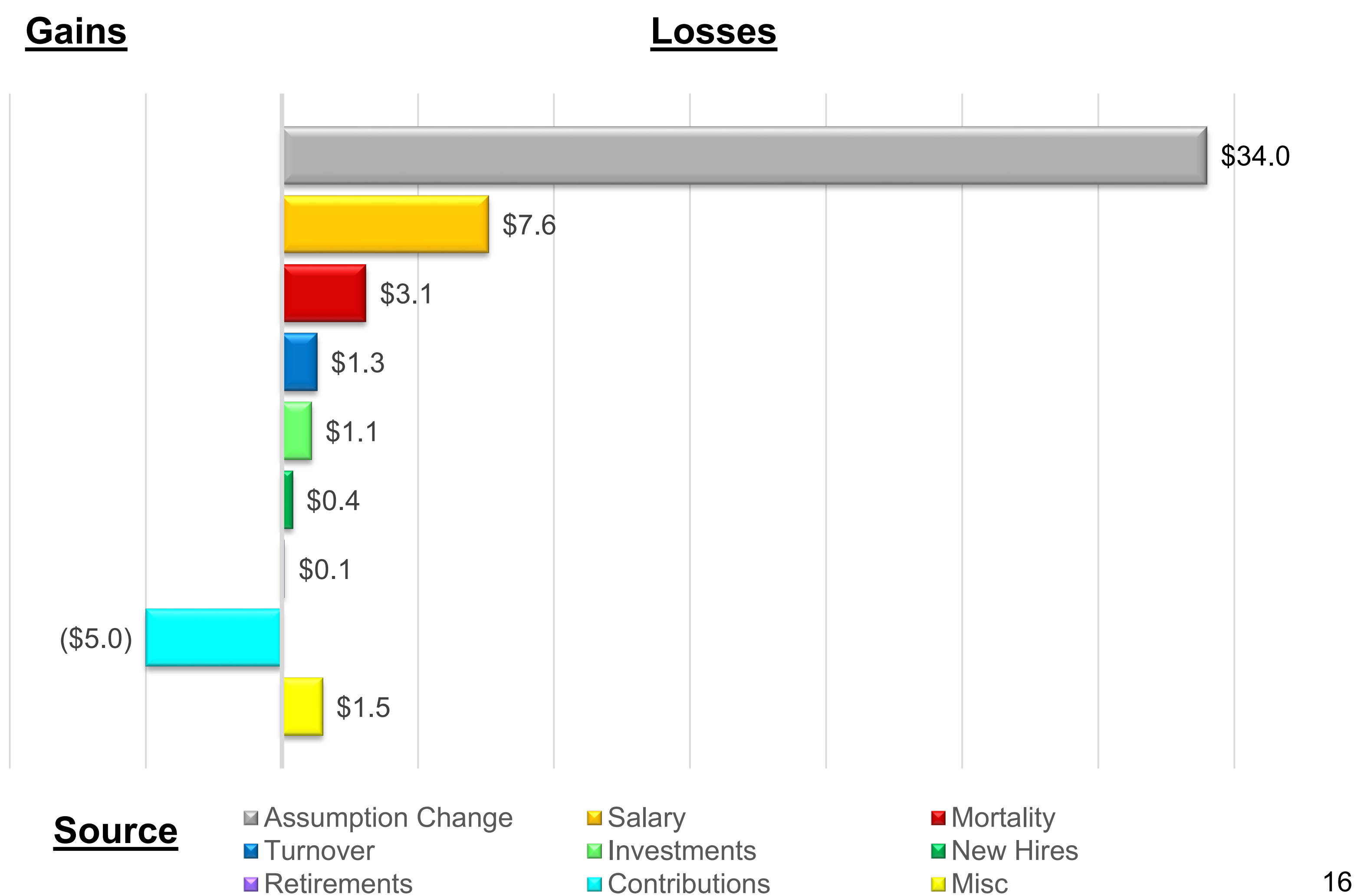
Results of Pension Plan Valuation

	January 1, 2019 Valuation (Fiscal Year 2019/2020 Contributions)	January 1, 2020 Valuation (Fiscal Year 2020/2021 Contributions)
(1) Covered Compensation for Active Participants	$242,278,837	$254,105,154
(2) Actuarial Accrued Liability (AAL)	$1,250,149,337	$1,341,185,189
(3) Actuarial Value of Assets	$647,892,847	$690,950,889
(4) Unfunded Actuarial Accrued Liability (UAAL) [(2) - (3)]	$602,256,490	$650,234,300
(5) Amortization of UAAL as % of Covered Payroll	18.25%	18.78%
(6) Normal Cost as % of Covered Payroll	11.06%	11.07%
(7) Expected Employee Contribution Rate (Blended)	5.76%	5.70%
(8) Net Normal Cost Rate [(6) - (7)]	5.30%	5.37%
(9) Total County Actuarially Determined Contribution (ADEC) [(5) + (8)]	23.55%	24.15%
(10) Funded Ratio (including CIGNA)	51.9%	51.6%
(11) UAAL Amortization Period	24 years	23 years

Historical Accrued Liability and Funded Ratio (including CIGNA)



Changes in Unfunded Actuarial Accrued Liability (UAAL) ($ Millions)



Health Benefit Plan Funding Results

Comments on OPEB Valuation

- OPEB valuation includes 121 active employees eligible for health but not pension whose compensation totals $7.4 million.
- UAL amortization period is 23 years, closed.
- UAL is amortized as a level percentage of pay. Total payroll is assumed to increase by 2.50% per year.
- Projected Unit Credit cost method is used for funding. GASB 74/75 will require Entry Age Normal (EAN) funding method, similar to GASB 67/68.
- Investment return assumption decreased from 7.50% to 7.25%.

Comments on OPEB Valuation

- As of last year, assets are now calculated using a five-year smoothing method.
- Using the 5-year smoothing method, we recognize a \$3.3 million investment gain this valuation and each of the following four years. Similarly, we recognize a \$3.5 million investment loss due to asset experience in the prior year.
- \$18.7 million gain due to favorable claims experience and the HSA stipend remaining the same.
- Actuarially determined contribution as a percentage of payroll decreased from 7.56% last year to 6.71%.
- Funded ratio increased from 41.9% last year to 47.6%.

OPEB Valuation Headcounts and Liabilities

Active Headcounts and Liabilities

	Grandfathered		Non-Grandfathered		Total	
Service needed for benefit	**Number**	**Liability**	**Number**	**Liability**	**Number**	**Liability**
10	24	$1,455,465	664	$70,546,966	688	$72,002,431
15	1	76,002	758	43,086,822	759	43,162,824
20	0	0	467	11,945,606	467	11,945,606
30	0	0	2,509	4,815,070	2,509	4,815,070
TOTAL	25	$1,531,467	4,398	$130,394,464	4,423	$131,925,931

1,808 retirees with liability totaling $165,883,860.

Results of Health Benefit Plan Valuation

	January 1, 2019 Valuation (Fiscal Year 2019/2020 Contributions)	January 1, 2020 Valuation (Fiscal Year 2020/2021 Contributions)
(1) Covered Compensation for Active Participants	$249,164,033	$261,550,378
(2) Actuarial Accrued Liability (AAL)	$303,687,370	$297,809,791
(3) Actuarial Value of Assets	$127,334,118	$141,661,828
(4) Unfunded Actuarial Accrued Liability (UAAL) [(2) - (3)]	$176,353,252	$156,147,963
(5) Amortization of UAAL as % of Covered Payroll	4.83%	4.09%
(6) Normal Cost as % of Covered Payroll	2.73%	2.62%
(7) Expected Employee Contribution Rate	0.00%	0.00%
(8) Net Normal Cost Rate [(6) - (7)]	2.73%	2.62%
(9) Total County Actuarially Determined Contribution (ARC) [(5) + (8)]	7.56%	6.71%
(10) Funded Ratio	41.9%	47.6%
(11) UAAL Amortization Period	24 years	23 years
(12) Discount Rate	7.50%	7.25%

DEVELOPMENT OF THE ACTUARIAL (GAIN)/LOSS

		($ millions)
1. UNFUNDED ACCRUED LIABILITY (UAL) 1/1/2019	$	176.4
2. NORMAL COST 1/1/2019	$	6.8
3. EXPECTED EMPLOYER CONTRIBUTIONS (Beginning of Year)	$	18.8
(ADC calculated in 1/1/2019 valuation)		
4. INTEREST ACCRUAL	$	12.3
[(1) + (2) – (3)] x .075		
5. EXPECTED UAL 1/1/2020	$	176.6
[(1) + (2) - (3) + (4)]		
6. GAIN DUE TO CLAIMS AND PREMIUM EXPERIENCE	$	(18.7)
7. LOSS DUE TO ASSUMPTION CHANGES	$	1.8
8. GAIN DUE TO DATA CHANGES	$	(5.3)
9. LOSS DUE TO CHANGE IN DISCOUNT RATE	$	8.2
10. GAIN DUE TO ASSET EXPERIENCE	$	(1.1)
11. EXPECTED UAL 1/1/2020 AFTER CHANGES	$	161.4
(5) + (6) + (7) + (8) + (9) + (10)		
12. ACTUAL UAL AS OF 1/1/2020	$	156.1
13. EXPERIENCE (GAIN)/LOSS	$	(5.3)
(12) – (11)		
14. GAIN AS A % OF LY AL		(1.74%)

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Cobb County Government
Health Benefit Plan
Report of Actuary on the Other Post-Employment Benefit Valuation

Prepared as of January 1, 2020

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May 21, 2020

Mr. Tony Hagler
Human Resources Director
Cobb County
Human Resources Department
100 Cherokee Street
Marietta, GA 30090-9679

Dear Mr. Hagler:

We are pleased to submit the results of the annual actuarial valuation of the Cobb County Government Health Benefit Plan prepared as of January 1, 2020. The purpose of this report is to provide a summary of the funded status of the Plan as of January 1, 2020 and recommend rates of employer contribution.
While not verifying the data at source, the actuary performed tests for consistency and reasonability. Separate reports will be prepared to provide accounting information under Governmental Accounting Standards Board Statements No. 74 and 75 when applicable.

The amortization period was closed at 30 years as of January 1, 2013. For the current valuation, the amortization period used is therefore 23 years. Additionally, in 2017, an Experience Study was completed for the period ending December 31, 2016. As a result of this investigation, the mortality rates, retirement rates, withdrawal rates, and salary merit scale were modified effective January 1, 2018.

The medical and drug benefits of the current Plan as of January 1, 2020 are included in the actuarially calculated contribution rates which are developed using the unit credit actuarial cost method with projected benefits. The annual actuarially determined employer contribution (ADC) of the County for the year beginning October 1, 2020 is 6.71% of payroll, which is expected to liquidate the unfunded accrued liability over a 23-year period.

As of January 1, 2020, the Plan has assets in trust solely to provide benefits to retirees and their beneficiaries. It is our understanding that trust contributions will be greater than or equal to the ADC each year. Since the asset allocation for the OPEB trust is similar to the asset allocation for the pension trust, the discount rate was decreased from 7.50% to 7.25% to match the discount rate used in the pension valuation. Gains and losses are reflected in the unfunded accrued liability that is assumed amortized by regular annual contributions as a level percentage of payroll within a closed 30-year period (23 years for the current valuation), on the assumption that payroll will increase by 2.50% annually. Based on our understanding that it is the policy of Cobb County to make annual contributions at least equal to the ADC, the assumptions recommended by the actuary are, individually and in the aggregate, reasonably related to the experience under the Plan and to reasonable expectations of anticipated experience under the Plan.

Future actuarial results may differ significantly from the current results presented in this report due to such factors as the following: plan experience differing from that anticipated by the economic or demographic assumptions; changes in economic or demographic assumptions; increases or decreases expected as part of the natural operation of the methodology used for these measurements (such as the end of an amortization period or additional cost or contribution requirements based on the plan's funded status); and changes in plan provisions or applicable law. Since the potential impact of such factors is outside the scope of a normal annual actuarial valuation, an analysis of the range of results is not presented herein.

The impact of the Affordable Care Act (ACA) was addressed in this valuation in our long term trend assumption. Review of the information currently available did not identify any specific provisions of the ACA that are anticipated to significantly impact results. While the impact of certain provisions should be recognized in the determination of liabilities, overall future plan costs and the resulting liabilities are driven by amounts employers and retirees can afford (i.e., trend). The trend assumption forecasts the anticipated increase to initial per capita costs, taking into account health care cost inflation, increases in benefit utilization, plan changes, government-mandated benefits and technological advances. Given the uncertainty regarding the ACA's implementation (e.g., changes in participation resulting from the implementation of state-based health insurance exchanges), continued monitoring of the ACA's impact on the Plan's liability will be required.

This is to certify that the independent consulting actuary is a member of the American Academy of Actuaries and has experience in performing valuations for public retirement systems, that the valuation was prepared in accordance with principles of practice prescribed by the Actuarial Standards Board, and that the actuarial calculations were performed by qualified actuaries in accordance with accepted actuarial procedures, based on the current provisions of the medical plans and on actuarial assumptions that are internally consistent and reasonably based on the actual experience of the Plan.

The current assets and future anticipated contributions are in our opinion sufficient to meet all the benefit obligations of the plan for current active and retired members

Sincerely yours,

Alisa Bennett, FSA, EA, FCA, MAAA
President

Joseph Walls
Senior Consultant

TABLE OF CONTENTS

COBB COUNTY GOVERNMENT
HEALTH BENEFIT PLAN
REPORT OF ACTUARY ON THE OTHER POST-EMPLOYMENT BENEFIT VALUATION
PREPARED AS OF JANUARY 1, 2020

SECTION I - SUMMARY OF PRINCIPAL RESULTS

1. For convenience of reference, the principal results of the valuation are summarized below:

Valuation Date Discount Rate	1/1/2020 7.25%	1/1/2019 7.50%
Number Active*	4,423	4,342
Number Retired	1,808	1,743
Total	6,231	6,085
Annual Salaries**	$ 261,550,378	$ 249,164,033
Assets:		
Market Value	$ 144,256,799	$ 113,159,714
Actuarial Value	$ 141,661,828	$ 127,334,118
Unfunded Actuarial Accrued Liability	$ 156,147,963	$ 176,353,252
Amortization Period (Years)	23	24
Fiscal Year	**2021**	**2020**
Actuarially Determined Contribution (ADC) in dollars:		
Normal	$ 6,843,056	$ 6,805,244
Accrued Liability***	10,685,246	12,041,883
Total	$ 17,528,302	$ 18,847,127
ADC as a Percent of Active Payroll		
Normal	2.62%	2.73%
Accrued Liability	4.09%	4.83%
Total	6.71%	7.56%
Discount Rate	7.25%	7.50%

* Before participation assumption is applied. The 2019 number includes 4,228 active in the pension plan and 114 actives who could potentially receive post-employment health benefits but who are not in the pension plan. The 2020 number includes 4,302 active in the pension plan and 121 actives who could potentially receive post-employment health benefits but who are not in the pension plan.

** Before participation assumption is applied. The 2019 number includes $242,278,837 for the 4,228 active in the pension plan and $6,885,196 for the 114 actives who could potentially receive post-employment health benefits but who are not in the pension plan. The 2020 number includes $254,105,154 for the 4,302 active in the pension plan and $7,445,224 for the 121 actives who could potentially receive post-employment health benefits but who are not in the pension plan.

*** Calculated using an annual increasing payroll assumption of 2.50%.

The table below shows the active headcounts and liabilities broken down by grandfathered status and service needed to receive health benefits, which is based on date of hire.

ACTIVE HEADCOUNTS AND LIABILITIES

	Grandfathered		Non-Grandfathered		Total	
Service Needed for Benefit	Number	Liability	Number	Liability	Number	Liability
10	24	$1,455,465	664	$70,546,966	688	$72,002,431
15	1	76,002	758	43,086,822	759	43,162,824
20	0	0	467	11,945,606	467	11,945,606
30	0	0	2,509	4,815,070	2,509	4,815,070
TOTAL	25	$1,531,467	4,398	$130,394,464	4,423	$131,925,931

2. The valuation indicates that the Actuarially Determined Contribution (ADC) is 6.71% of active payroll payable for the fiscal year 2021. Any employer claims or premiums paid for retiree health care in the current year are considered contributions toward the ADC. Comments on the valuation results as of January 1, 2020 are given in Section IV and further discussion of the contribution levels is set out in Sections V and VI.

3. Since the asset allocation for the OPEB trust is similar to the asset allocation for the pension trust, the discount rate was lowered from 7.50% to 7.25%, as was also adjusted in the pension valuation. Schedule D of this report outlines the full set of actuarial assumptions and methods employed in the current valuation.

SECTION II - MEMBERSHIP DATA

Data regarding the membership of the Plan for use as a basis of the valuation were furnished by Cobb County.

The following table summarizes the members' age and service.

Active Employees*								
	Service							
Age	< 5	5 to 9	10 to 14	15 to 19	20 to 24	25 to 29	> 29	Total
< 25	218	3						221
25 to	443	72	1					516
30 to	317	191	70	5				583
35 to	202	98	146	70	2			518
40 to	129	70	123	140	68	2		532
45 to	134	53	98	143	173	60	3	664
50 to	107	71	80	114	127	97	19	615
55 to	86	45	72	81	71	26	25	406
60 to	56	43	54	47	34	13	10	257
> 64	18	17	26	22	8	9	11	111
Total	1,710	663	670	622	483	207	68	4,423

*Before participation assumption is applied. Includes 4,302 active in the pension plan and 121 actives who could potentially receive post-employment health benefits but who are not in the pension plan.

SECTION III - ASSETS

Schedule C shows information regarding assets for valuation purposes. As of January 1, 2020, the plan has $144,256,799 in assets held in trust solely to provide benefits to retirees and their beneficiaries in accordance with the terms of the plan. The actuarial value of assets uses a 5-year smoothing method and the value is $141,661,828 as of January 1, 2020.

SECTION IV - COMMENTS ON THE VALUATION

1. Schedule A of this report outlines the results of the actuarial valuation. The results are shown based on a discount rate of 7.25%. The valuation was prepared in accordance with the actuarial assumptions and the actuarial cost method, which are described in Schedule D.
2. Effective January 1, 2020, the investment return assumption was decreased from 7.50% to 7.25%.
3. Effective January 1, 2019, the asset valuation method was changed from Market Value of Assets to 5-year smoothed Market Value.
4. Since the previous valuation, certain employees of the City of Powder Springs Water and Sewer System became participants of the Pension Plan. They will also be eligible for retiree medical under the OPEB provisions. The impact to the plan is immaterial to the overall results.
5. Based on the 7.25% discount rate, the valuation shows that the Plan has an actuarial accrued liability of $131,925,931 for benefits expected to be paid on account of the present active membership, based on service to the valuation date. The liability on account of benefits payable to retirees and covered spouses amounts to $165,883,860. The total actuarial accrued liability of the Plan amounts to $297,809,791. Against these liabilities, the Plan has present assets for valuation purposes of $141,661,828. Therefore, the unfunded actuarial accrued liability is equal to $156,147,963.
6. The normal contribution is equal to the actuarial present value of benefits accruing during the current year. The normal contribution is determined to be 2.62% of total active payroll.
7. The amortization period was closed at 30 years as of January 1, 2013. The amortization period as of January 1, 2020 is 23 years.

SECTION V - CONTRIBUTIONS PAYABLE UNDER THE PLAN

ACTUARIALLY DETERMINED CONTRIBUTION
For 2021 Fiscal Year

Actuarially Determined Contribution (ADC) As a Percentage of Total Active Payroll:	
Normal	2.62%
Accrued Liability	4.09%
Total	6.71%

1. The valuation indicates that a normal contribution of 2.62% of total active payroll is required to meet the cost of benefits currently accruing.
2. The unfunded actuarial accrued liability amounts to $156,147,963 as of the valuation date. An accrued liability contribution of 4.09% of total active payroll is sufficient to amortize the unfunded actuarial accrued liability over a 23-year period, based on a 7.25% investment rate of return and the assumption that the payroll will increase by 2.50% annually.
3. The total Actuarially Determined Contribution is, therefore, 6.71% of total active payroll.

SECTION VI - COMMENTS ON LEVEL OF FUNDING

1. The monthly contribution for retirees to opt into the medical plan is based on plan, tier election, date of hire, and date of retirement.

2. The valuation indicates that a recommended employer contribution rate of 6.71% of payroll is required to fund the plan. This corresponds to a contribution required to meet the cost of benefits currently accruing and provide for the amortization of the unfunded actuarial accrued liability over a period of 23 years.

SECTION VII – ADDITIONAL DISCLOSURES

1. Below is a chart showing the Schedule of Funding Progress.

SCHEDULE OF FUNDING PROGRESS

Actuarial Valuation Date	Actuarial Value of Assets* (a)	Actuarial Accrued Liability (AAL) Projected Unit Credit (b)	Unfunded AAL (UAAL) (b – a)	Funded Ratio (a / b)	Covered Payroll (c)	UAAL as a Percentage of Covered Payroll ((b - a) / c)
1/1/2012	46,486,981	247,611,907	201,124,926	18.8%	208,621,922	96.4%
1/1/2013**	58,975,301	186,733,213	127,757,912	31.6%	211,553,134	60.4%
1/1/2014^	84,726,947	200,118,641	115,391,694	42.3%	212,799,730	54.2%
1/1/2015^^	91,440,896	224,352,661	132,911,765	40.8%	218,979,561	60.7%
1/1/2016^^^	91,619,032	245,265,481	153,646,449	37.4%	227,955,687	67.4%
1/1/2017^^^^	98,362,896	271,992,978	173,630,082	36.2%	232,958,602	74.5%
1/1/2018***	117,114,714	299,448,170	182,333,456	39.1%	248,606,290	73.3%
1/1/2019	127,334,118	303,687,370	176,353,252	41.9%	249,164,033	70.8%
1/1/2020+	141,661,828	297,809,791	156,147,963	47.6%	261,550,378	59.7%

* Prior to January 1, 2019, Market Value of Assets was used as the asset valuation method. The Market Value of Assets as of January 1, 2018 is listed here as reported in the January 1, 2018 actuarial valuation report. Calculations for this report us an updated market value of assets as of January 1, 2018 of $117,114,764.
** Includes plan changes effective January 1, 2013 and change in discount rate to 7.90%.
^ In 2014, the discount rate was changed from 7.9% to 7.8%, as well as demographic assumptions for pre-retirement mortality, withdrawal and retirement.
^^ In 2015, the discount rate was changed from 7.8% to 7.7%.
^^^ In 2016, the discount rate was changed from 7.7% to 7.6%
^^^^ In 2017, the discount rate was changed from 7.6% to 7.5%
*** In 2018, decrements were changed due to an experience study.
+ In 2020, the discount rate was changed from 7.50% to 7.25%.

2. The information presented was determined as part of the actuarial valuation at January 1, 2020. Additional information as of the latest actuarial valuation follows.

Valuation date	1/1/2020
Actuarial cost method	Projected unit credit
Amortization method	Level percent of pay, closed
Remaining amortization period	23 years
Asset valuation method	5-year smoothed Market Value
Actuarial assumptions	
Investment Rate of Return*	7.25%
Medical cost trend rate*	
Pre-Medicare	7.00%
Medicare Eligible	5.25%
Ultimate trend rate*	
Pre-Medicare	4.50%
Medicare Eligible	4.50%
Year of Ultimate trend rate	
Pre-Medicare	2027
Medicare Eligible	2023
*Includes inflation at	2.50%

* Since the asset allocation for the OPEB trust is similar to the asset allocation for the pension trust, the annual investment rate of return is assumed to be 7.25%, which is the assumption used for the pension valuation. This rate reflects the County's establishment of an OPEB trust and intent to fully pre-fund OPEB benefits.

Schedule A

RESULTS OF THE VALUATION
PREPARED AS OF JANUARY 1, 2020

			7.25% Discount Rate
1.	**PAYROLL**	$	261,550,378
2.	**ACTUARIAL ACCRUED LIABILITY**		
	(a) Present active members:	$	131,925,931
	(b) Present retired members and surviving spouses:		165,883,860
	(c) Total actuarial accrued liability	$	297,809,791
3.	**PRESENT ASSETS FOR VALUATION PURPOSES**		141,661,828
4.	**UNFUNDED ACTUARIAL ACCRUED LIABILITY [(2)(C) – (3)]**	$	156,147,963
5.	**AMORTIZATION PERIOD**		23
6.	**NORMAL CONTRIBUTION**	$	6,843,056
7.	**ACCRUED LIABILITY CONTRIBUTION**		10,685,246
8.	**TOTAL CONTRIBUTION (6) + (7)**	$	17,528,302
9.	**NORMAL CONTRIBUTION AS A PERCENT OF PAYROLL (6) ÷ (1)**		2.62%
10.	**ACCRUED LIABILITY CONTRIBUTION AS A PERCENT OF PAYROLL (7) ÷ (1)**		4.09%
11.	**TOTAL CONTRIBUTION AS A PERCENT OF PAYROLL (9) + (10)**		6.71%

The chart below shows the projected benefit payments for current retirees and for future payments to current active employees after retirement. The chart does not take into account future entrants to the plan.

Projected Benefit Payments

	Current Retirees	Grandfathered Actives	Non-Grandfathered Actives	Total
2020	15,140,949	48,029	438,241	15,627,219
2021	15,366,859	85,582	1,386,787	16,839,228
2022	15,678,642	104,699	2,464,675	18,248,016
2023	15,742,941	129,659	3,755,211	19,627,811
2024	15,537,181	151,195	5,223,964	20,912,340
2025	15,440,674	142,736	6,852,870	22,436,280
2026	15,224,698	146,845	8,679,836	24,051,379
2027	14,728,260	150,265	10,506,600	25,385,125
2028	14,135,330	153,132	12,528,733	26,817,195
2029	13,606,962	155,476	14,616,022	28,378,460
2030	12,606,584	157,922	16,492,643	29,257,149
2031	11,901,875	158,928	18,488,784	30,549,587
2032	10,990,669	159,309	20,175,361	31,325,339
2033	10,499,587	158,975	21,592,681	32,251,243
2034	10,141,492	157,861	22,739,299	33,038,652
2035	9,876,195	155,909	23,348,281	33,380,385
2036	9,515,548	153,082	23,659,481	33,328,111
2037	9,249,195	149,345	23,843,136	33,241,676
2038	8,894,660	144,644	23,751,916	32,791,220
2039	8,571,281	138,945	23,437,611	32,147,837
2040	8,241,541	132,250	23,669,627	32,043,418
2041	7,913,707	124,646	23,634,669	31,673,022
2042	7,564,420	116,255	23,667,574	31,348,249
2043	7,165,750	107,216	24,076,631	31,349,597
2044	6,780,293	97,718	24,392,946	31,270,957
2045	6,383,060	87,957	24,642,992	31,114,009
2046	5,977,660	78,157	25,176,003	31,231,820
2047	5,567,617	68,552	26,020,976	31,657,145
2048	5,156,516	59,355	26,694,474	31,910,345
2049	4,747,754	50,741	28,167,978	32,966,473

Schedule B

DEVELOPMENT OF THE ACTUARIAL (GAIN)/LOSS

1.	**UNFUNDED ACCRUED LIABILITY (UAL) 1/1/2019**	$ 176,353,252
2.	**NORMAL COST 1/1/2019**	$ 6,805,244
3.	**EXPECTED EMPLOYER CONTRIBUTIONS (Beginning of Year) (ADC calculated in 1/1/2019 valuation)**	$ 18,847,127
4.	**INTEREST ACCRUAL [(1) + (2) – (3)] x .075**	$ 12,323,353
5.	**EXPECTED UAL 1/1/2020 [(1) + (2) - (3) + (4)]**	$ 176,634,722
6.	**GAIN DUE TO CLAIMS AND PREMIUM EXPERIENCE**	$ (18,721,389)
7.	**LOSS DUE TO ASSUMPTION CHANGES**	$ 1,824,870
8.	**GAIN DUE TO DATA CHANGES**	$ (5,327,164)
9.	**LOSS DUE TO CHANGE IN DISCOUNT RATE**	$ 8,157,061
10.	**GAIN DUE TO ASSET EXPERIENCE**	$ (1,136,987)
11.	**EXPECTED UAL 1/1/2020 AFTER CHANGES (5) + (6) + (7) + (8) + (9) + (10)**	$ 161,431,113
12.	**ACTUAL UAL AS OF 1/1/2020**	$ 156,147,963
13.	**EXPERIENCE (GAIN)/LOSS (12) – (11)**	$ (5,283,150)
14.	**(GAIN) AS A % OF LY AL**	(1.74%)

Schedule C

PLAN ASSETS

Plan assets are resources, usually in the form of stocks, bonds, and other classes of investments, that have been segregated and restricted in a trust, or equivalent arrangement, in which (a) employer contributions to the plan are irrevocable, (b) assets are dedicated to providing benefits to retirees and their beneficiaries, and (c) assets are legally protected from creditors of the employers or plan administrator, for the payment of benefits in accordance with the terms of the plan.

As of January 1, 2020, the market value of such assets amounted to $144,256,799 in assets held in trust solely to provide benefits to retirees and their beneficiaries in accordance with the terms of the plan. It is our understanding that trust contributions will be greater than or equal to the ADC each year. Since the asset allocation for the OPEB trust is similar to the asset allocation for the pension trust, the annual discount rate has been decreased from 7.50% to 7.25% to match the discount rate used in the pension valuation.

The Actuarial Value of Assets (AVA) was used for the measurement of Unfunded Accrued Liability. The actuarial value of assets recognizes a portion of the difference between the market value of assets and the expected market value of assets, based on the assumed valuation rate of return. The amount recognized each year is 20% of the difference between market value and expected market value. This process is known as a 5-year smoothing method. Using this process, the AVA as of January 1, 2020 is $141,661,828. The development of the AVA is shown on the following page.

DEVELOPMENT OF THE ACTUARIAL VAUE OF ASSETS

Valuation Date January 1:	2018	2019	2020	2021	2022	2023
1. Actuarial Value Beginning of Year	$ 117,114,764	$ 127,334,118				
2. Market Value End of Year	$ 113,159,714	$ 144,256,799				
3. Market Value Beginning of Year	$ 117,114,764	$ 113,159,714				
4. Cash Flow						
a. Contributions	$ 22,115,946	$ 23,743,730				
b. Benefit Payments	(18,115,946)	(18,743,730)				
c. Administrative Expenses	-	-				
d. Net	$ 4,000,000	$ 5,000,000				
5. Investment Income						
a. Market Total	$ (7,955,050)	$ 26,097,085				
b. Assumed Rate	7.50%	7.50%				
c. Amount for Immediate Recognition	9,762,955	9,564,868				
d. Amount for Phased-In Recognition	$ (17,718,005)	$ 16,532,217				
6. Phased-In Recognition of Investment Income						
a. Current Year: 0.20 * 5d	$ (3,543,601)	$ 3,306,443	$ -	$ -	$ -	$ -
b. First Prior Year	-	(3,543,601)	3,306,443	-	-	-
c. Second Prior Year	-	-	(3,543,601)	3,306,443	-	-
d. Third Prior Year	-	-	-	(3,543,601)	3,306,443	-
e. Fourth Prior Year	-	-	-	-	(3,543,601)	3,306,445
f. Total Recognized Investment Gain	$ (3,543,601)	$ (237,158)	$ (237,158)	$ (237,158)	$ (237,158)	$ 3,306,445
7. Actuarial Value End of Year	$ 127,334,118	$ 141,661,828				
8. Difference Between Market & Actuarial Values	$ (14,174,404)	$ 2,594,971	$ 2,832,129	$ 3,069,287	$ 3,306,445	$ -
9. Rate of Return on Actuarial Value	5.22%	7.18%				

Schedule D

OUTLINE OF ACTUARIAL ASSUMPTIONS AND METHODS

VALUATION DATE: January 1, 2020

DISCOUNT RATE: 7.25% per annum, compounded annually.

HEALTH CARE COST TREND RATES: Following is a chart detailing trend assumptions.

Year	Pre-Medicare Medical Trend	Medicare-Eligible Medical Trend
2020	7.00%	5.25%
2021	6.50%	5.00%
2022	6.00%	4.75%
2023	5.50%	4.50%
2024	5.25%	4.50%
2025	5.00%	4.50%
2026	4.75%	4.50%
2027 and beyond	4.50%	4.50%

AGING ADJUSTMENT: Per capita pre-Medicare eligible costs are adjusted to reflect expected cost changes related to age. Following is a chart detailing the assumed increase to the net incurred claims.

Participant Age	Annual Increase
< 50	0.0%
50 – 54	3.3
55 – 59	3.6
60 – 64	4.2

FUTURE PARTICIPATION AND COVERAGE ELECTIONS

Current inactives are assumed to maintain current plan and coverage tier elections. Current active employees are assumed to make the following plan, coverage tier and participation elections:

Future Retiree Plan Election

Pre-Medicare		Medicare Eligible	
65%	Anthem HMO	100%	Extend Health
15%	Anthem POS		
5%	Anthem HRA		
15%	Kaiser HMO		

Future Retiree Participation: (If currently electing coverage, 0% if currently waiving coverage)

Grandfathered Future Retirees 95%

Non - Grandfathered Future Retirees: Based on service at retirement

10 – 14 years service at retirement	60%
15 – 19 years service at retirement	70%
20 – 24 years service at retirement	80%
25 – 29 years service at retirement	90%
30+ years service at retirement	95%

Future Retiree Spouse Coverage: 70% for Males; 25% for Females

Wives are assumed to be 3 years younger than their husbands.

MONTHLY MEDICAL/RX CLAIMS (HMO, PPO, OAP, MA): Following is a chart detailing expected claims for pre-Medicare retirees for the year following the valuation date. Claims are age-adjusted to age 65.

	Anthem Open Access HMO	Anthem Open Access POS	Anthem Open Access HRA	Kaiser Permanente HMO
Pre-65	$ 1,392.55	$ 1,549.94	$ 1,128.88	$ 900.31

In 2020 the monthly stipend was $348.40 for retirees and $265.20 for spouses. We have assumed the stipend will increase with Medicare-eligible medical trend.

MONTHLY MEDICAL/RX CONTRIBUTIONS: Following is a chart detailing expected premium or stipend amounts upon which the service based contributions will be based for the year following the valuation date. Amounts shown are for Single coverage as of January 1, 2020.

Anthem Open Access HMO	Anthem Open Access POS	Anthem Open Access HRA	Kaiser Permanente HMO	Medicare Eligible
$713.92	$883.46	$731.03	$560.49	$348.40

Effective January 1, 2012, a spousal surcharge of $100 per month will be charged to all employees who elect spousal coverage if the spouse has coverage available. It is assumed that 5% of pre-Medicare eligible retirees who cover spouses pay the spousal surcharge. The spousal surcharge is not assumed to increase.

ACTUARIAL METHOD: Costs were determined using the Projected Unit Credit Actuarial Cost Method. The annual service cost is the present value of the portion of the projected benefit attributable to participation service during the upcoming year, and the Actuarial Accrued Liability (AAL) is equal to the present value of the portion of the projected benefit attributable to service before the valuation date. Service from hire date through full retirement eligibility date was used in allocating costs.

ASSET VALUATION METHOD: Actuarial Value of Assets with 5-year smoothing. The actuarial value of assets recognizes a portion of the difference between the market value of assets and the expected market value of assets, based on the assumed valuation investment rate of return. The amount recognized each year is 20% of the difference between actual market value and expected market value.

MORTALITY: Pre-retirement mortality:

RP-2000 Employee projected to 2025 using scale BB, sex distinct
No Set back / Set forward

Post-retirement mortality:

RP-2000 Combined projected to 2025 using scale BB, sex distinct
Set forward 2 years for both Male & Female lives

Representative values of the assumed annual rates of withdrawal are shown in the following tables.

General Employees – Male

Age	Years of Service											
	< 1	1	2	3	4	5	6	7	8	9	10	11+
20	30.00%	25.00%	20.00%	13.00%	12.00%	12.00%	10.00%	10.00%	6.00%	6.00%	6.00%	4.00%
25	27.00	25.00	20.00	13.00	12.00	12.00	10.00	10.00	6.00	6.00	6.00	4.00
30	26.00	25.00	20.00	13.00	12.00	12.00	10.00	10.00	6.00	6.00	6.00	4.00
35	25.00	20.00	15.00	13.00	12.00	10.50	10.00	10.00	6.00	6.00	6.00	3.00
40	24.00	17.50	13.00	13.00	12.00	9.00	9.00	9.00	5.00	5.00	5.00	2.00
45	20.00	15.00	10.00	9.00	7.00	6.00	8.00	8.00	4.00	4.00	4.00	2.00
50	15.00	12.50	8.00	8.00	5.00	3.00	5.00	5.00	3.00	3.00	3.00	2.00
55	7.50	8.00	6.00	7.00	5.00	2.00	3.00	3.00	2.00	2.00	2.00	1.50
60	2.50	4.00	3.00	6.00	5.00	1.50	1.50	1.50	1.00	1.00	1.00	1.00
65	0.00	0.00	0.00	5.00	5.00	1.00	1.00	1.00	0.50	0.50	0.50	0.25

General Employees – Female

Age	Years of Service											
	< 1	1	2	3	4	5	6	7	8	9	10	11+
20	30.00%	22.50%	17.00%	17.00%	14.00%	12.00%	9.00%	9.00%	9.00%	7.00%	6.00%	4.50%
25	30.00	22.50	17.00	17.00	14.00	12.00	9.00	9.00	9.00	7.00	6.00	4.50
30	30.00	22.50	17.00	17.00	13.00	12.00	9.00	8.00	8.50	7.00	6.00	4.50
35	30.00	22.50	13.00	15.00	9.00	12.00	7.50	7.00	7.50	7.00	6.00	3.75
40	25.00	22.50	9.00	9.00	7.00	10.50	6.50	6.00	6.00	6.00	5.00	2.75
45	20.00	16.00	9.00	7.00	7.00	7.00	5.50	4.50	4.50	4.50	4.00	2.00
50	15.00	12.00	9.00	6.00	6.00	6.00	4.50	3.00	3.50	3.50	3.00	1.50
55	15.00	8.00	9.00	5.00	5.00	5.00	3.50	2.00	2.00	2.00	2.00	1.00
60	15.00	8.00	9.00	4.00	4.00	4.00	2.50	1.00	1.50	1.50	1.00	0.75
65	15.00	8.00	9.00	4.00	4.00	4.00	1.50	0.50	0.50	0.50	0.50	0.50

Public Safety

Age	Years of Service											
	< 1	1	2	3	4	5	6	7	8	9	10	11+
20	15.00%	8.00%	10.00%	8.00%	7.50%	5.00%	6.50%	6.00%	2.50%	3.50%	2.50%	2.50%
25	15.00	8.00	10.00	8.00	7.50	5.00	6.50	6.00	2.50	3.50	2.50	2.50
30	15.00	8.00	10.00	8.00	7.50	5.00	6.50	5.00	2.50	3.50	2.50	2.50
35	15.00	8.00	10.00	8.00	7.50	5.00	6.50	4.00	2.50	3.50	2.50	2.35
40	15.00	8.00	10.00	8.00	7.50	5.00	6.50	3.00	2.50	3.50	2.50	1.25
45	15.00	8.00	10.00	8.00	7.50	5.00	6.50	2.00	2.50	3.50	2.50	0.85
50	15.00	8.00	10.00	8.00	7.50	5.00	6.50	1.00	2.50	3.50	2.50	0.25

Superior Court and State Court Judges

Age	Rate
20	4.0%
25	4.0
30	4.0
35	4.0
40	6.0
45	4.0
50	3.0
55	2.5
60	2.5
65	2.5

Representative values of the assumed annual rates of retirement are shown in the following tables.

Traditional & Hybrid Plan General Employees hired prior to January 1, 2007

Age	Years of Service				
	10	15	20	25	30
50	0.0%	0.0%	0.0%	0.0%	60.0%
55	5.0	5.0	5.0	35.0	20.0
60	5.0	5.0	35.0	5.0	5.0
65	35.0	35.0	35.0	35.0	35.0
66	31.0	31.0	31.0	31.0	31.0
67	27.5	27.5	27.5	27.5	27.5
68	27.5	27.5	27.5	27.5	27.5
69	27.5	27.5	27.5	27.5	27.5
70	100.0	100.0	100.0	100.0	100.0

Traditional & Hybrid Plan General Employees hired on or after January 1, 2007

Age	Years of Service				
	10	15	20	25	30
55	5.0%	5.0%	5.0%	35.0%	35.0%
60	5.0	5.0	35.0	5.0	5.0
65	35.0	35.0	35.0	35.0	35.0
66	31.0	31.0	31.0	31.0	31.0
67	27.5	27.5	27.5	27.5	27.5
68	27.5	27.5	27.5	27.5	27.5
69	27.5	27.5	27.5	27.5	27.5
70	100.0	100.0	100.0	100.0	100.0

Traditional & Hybrid Plan Public Safety Employees hired prior to January 1, 2007

Age	Years of Service				
	10	15	20	25	30
50	0.0%	0.0%	0.0%	0.0%	70.0%
55	7.5	7.5	7.5	50.0	25.0
60	3.5	3.5	45.0	25.0	25.0
65	50.0	50.0	50.0	50.0	50.0
66	50.0	50.0	50.0	50.0	50.0
67	100.0	100.0	100.0	100.0	100.0

Traditional & Hybrid Plan Public Safety hired on or after January 1, 2007

Age	Years of Service				
	10	15	20	25	30
55	7.5%	7.5%	7.5%	50.0%	50.0%
60	3.5	3.5	45.0	25.0	25.0
65	50.0	50.0	50.0	50.0	50.0
66	50.0	50.0	50.0	50.0	50.0
67	100.0	100.0	100.0	100.0	100.0

Superior Court and State Court Judges

Age	Rate
60	15%
61	10
62	12
63-64	10
65-69	15
70-74	25
75	100

Schedule E

SUMMARY OF MAIN PLAN PROVISIONS
AS INTERPRETED FOR VALUATION PURPOSES

ELIGIBILITY: Eligible employees will include employees retiring from Cobb County and electing medical coverage at retiree rates.

RETIREMENT:

Normal Retirement

For employees hired before January 1, 2009, the first day of the calendar month coinciding with or next following the participant's 65^{th} birthday, or if later, the day the participant completes 7 years of service. However, for any participant who has met all of the requirements to be eligible to retire under the Normal Retirement or Rule of 80 provisions as of December 31, 2008, the Normal Retirement Date shall remain the later of age 65 and the completion of 5 years of service.

For employees hired on or after January 1, 2009, the later of age 65 or 10 years of service.

For employees hired on or after January 1, 2010, the later of Social Security Normal Retirement Age or 10 years of service.

Rule of 80 Retirement

For employees hired before January 1, 2007, age and service must total 80.

Employees hired on or after January 1, 2007 will only qualify for the Rule of 80 if they reach a minimum of age 55 or 35 years of service in addition to satisfying the other requirements.

Early Retirement

For employees hired before January 1, 2009: 55 with 7 years of service

For employees hired on or after January 1, 2009: 55 with 10 years of service

Disability

10 years of service

ELIGIBILITY FOR HEALTH BENEFITS:

Effective January 1, 2007 (for Employees hired prior to January 1, 2006):

- All full-time employees with seven (7) or more years of service as of the effective date will be eligible to continue medical coverage with ten (10) years of service at termination of employment immediately before commencement of retirement benefits.

- All full-time employees with less than seven (7) years of service as of the effective date will be eligible to continue medical coverage with fifteen (15) years of service at termination of employment immediately before commencement of retirement benefits.

- Effective January 1, 2010 – Employees within this definition of eligibility who elect to retire prior to age 65 and prior to 15 years of service may participate in the health benefit until the end of the month of their 65th birthday. Cobb County will contribute 2.5 percent of health premium cost for each full year of service up to a maximum of 30 years of service (75%).

Effective January 1, 2006 (Employees hired on or after January 1, 2006):

- All full-time new hires will be eligible to continue medical coverage with twenty (20) years of service at termination of employment to immediately commence retirement.

Effective January 1, 2009:

- All full-time new hires or rehires will be eligible to continue medical coverage with thirty (30) years of service at termination of employment to immediately commence retirement.

Effective January 1, 2010:

- Cobb County will continue 2.5 percent of health premium cost for each year of service up to a maximum of 30 years of service (75%). Those employees meeting eligibility requirements for retiree health coverage prior to January 1, 2010 will not be subject to this provision.

- All disabled Employees of Cobb County Government if:
  - They were disabled on or after November 1, 1998;
  - They are eligible and receive monthly compensation benefits from the Cobb County Government Board of Commissioners group Long Term Disability Plan; and
  - They have been continuously covered for medical care benefits for at least ten years as an Employee (or as his Spouse's dependent) under the Health Benefit Plan or under any other policy or plan sponsored or arranged by the sponsor, just before the date of his disability.

RETIREE CONTRIBUTIONS: Effective January 1, 2013, Cobb County Medicare Eligible retirees will no longer be covered under the Cobb County Group Plan and instead will be extended coverage through individual health insurance policies administered by Extend Health. Premiums will be reimbursed by Cobb County through a stipend into a non-taxable HRA (health reimbursement account). In 2013 the monthly stipend was $335 for retirees and $255 for spouses. This amount remained level for 2014 and increased 4% for 2015 to $348.40 for retirees and $265.20 for spouses. The amount has remained level through 2020. We have assumed the stipend amount will increase with Medicare-eligible medical trend. Pre-Medicare eligible retiree premiums are determined based on a cost-sharing arrangement and, therefore, increase with medical trend as claims costs increase.

Effective January 1, 2010, Cobb County will contribute 2.5% of the health premium cost or stipend for each year of service up to a maximum of 30 years of service. Therefore, Cobb County will pay a portion of the retiree health premium or stipend, up to a maximum of 75%, with the retiree paying the remaining premium amount. Current retirees or those eligible to retire by January 1, 2010 with at least 10 years of service are not impacted by the change.

Effective January 1, 2012, a spousal surcharge of $100 per month will be charged to all employees who elect spousal coverage if the spouse has coverage available. The spousal surcharge is not assumed to increase.

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Report of the Actuary on the Annual Valuation of Cobb County Government Employees' Pension Plan

Prepared as of January 1, 2020

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May 15, 2020

Board of Trustees
Cobb County Government Employees' Pension Plan
100 Cherokee Street, Suite 200
Marietta, GA 30090-9679

Dear Members of the Board:

We are pleased to submit herewith the results of the annual actuarial valuation of the Cobb County Government Employees' Pension Plan prepared as of January 1, 2020. The purpose of this report is to provide a summary of the funded status of the Plan as of January 1, 2020 and recommend rates of employer contribution for the fiscal year beginning October 1, 2020. While not verifying the data at source, the actuary performed tests for consistency and reasonability. Separate reports will be prepared to provide accounting information under Governmental Accounting Standards Board Statements No. 67 and 68.

The promised benefits of the Plan are included in the actuarially determined employer contribution rates which are developed using the projected unit credit cost method. Gains and losses are reflected in the unfunded actuarial accrued liability that is being amortized by regular annual contributions as a level percentage of compensation over a 23-year period. The assumptions recommended by the actuary are in the aggregate reasonably related to the experience under the Plan and to reasonable expectations of anticipated experience under the Plan.

The valuation has been prepared in accordance with the parameters set forth in the Plan's funding policy. Since the previous valuation, the assumed rate of return was lowered from 7.50% to 7.25%. The annual actuarially determined contribution (ADC) of the County for the year beginning October 1, 2020 is 24.15% of compensation, which is expected to liquidate the unfunded actuarial accrued liability over a 23-year period. The amortization of the unfunded actuarial accrued liability uses a level percentage of compensation method, assuming compensation will grow 2.50% annually.

Assuming that the annual required employer contributions to the Plan are made by the County from year to year in the future at the rates recommended on the basis of the successive actuarial valuations, the continued sufficiency of the retirement fund to provide the benefits called for under the Plan may be safely anticipated.

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Future actuarial results may differ significantly from the current results presented in this report due to such factors as the following: plan experience differing from that anticipated by the economic or demographic assumptions; changes in economic or demographic assumptions; increases or decreases expected as part of the natural operation of the methodology used for these measurements (such as the end of an amortization period or additional cost or contribution requirements based on the plan's funded status); and changes in plan provisions or applicable law. Since the potential impact of such factors is outside the scope of a normal annual actuarial valuation, an analysis of the range of results is not presented herein.

The actuarial computations presented in this report are for purposes of determining the recommended funding amounts for the Plan. Use of these computations for purposes other than meeting these requirements may not be appropriate.

This is to certify that the independent consulting actuaries listed below are Members of the American Academy of Actuaries and have experience in performing valuations for public retirement systems. The valuation was prepared in accordance with principles of practice prescribed by the Actuarial Standards Board and the actuarial calculations were performed by qualified actuaries in accordance with accepted actuarial procedures, based on the current provisions of the Plan and on actuarial assumptions that are internally consistent and reasonably based on the actual experience of the Plan.

We trust that the report will meet the approval of the Board and will furnish the desired information concerning the financial condition of the Plan.

Respectfully submitted,

Joseph Walls

Joseph Walls
Senior Consultant

Ben Mobley

Ben Mobley, ASA, FCA, MAAA
Senior Actuary

Edward J. Koebel

Edward J. Koebel, EA, FCA, MAAA
Chief Executive Officer

Table of Contents

Section I - Summary of Principal Results

Summary of Results

For convenience of reference, the principal results of the current valuation and the preceding valuation are summarized below.

Valuation Date		January 1, 2020		January 1, 2019
Active Participants:				
a. Traditional Plan				
Number		1,946		2,100
Valuation compensation	$	139,562,691	$	143,775,525
b. Hybrid Plan				
Number		2,338		2,110
Valuation compensation	$	112,202,317	$	96,104,629
c. Judges Plan				
Number		18		18
Valuation compensation[1]	$	2,340,146	$	2,398,683
d. Total Active Participants				
Number		4,302		4,228
Valuation compensation	$	254,105,154	$	242,278,837
Retired Participants and Beneficiaries:[2]				
a. Number		2,744		2,620
b. Total Annual Benefits	$	76,812,336	$	71,824,197
Number of Terminated Vested Participants		955		962
Assets:[3]				
a. Market Value	$	733,800,611	$	601,439,567
b. Actuarial Value	$	690,950,889	$	647,892,847
Actuarial Accrued Liability	$	1,341,185,189	$	1,250,149,337
Unfunded actuarial accrued liability	$	650,234,300	$	602,256,490
Amortization Period		23 years		24 years
Contribution Rates for Fiscal Year Beginning		October 1, 2020		October 1, 2019
Total Actuarially Determined Contribution (ADC) Rates				
a. Employer Contribution Rate		24.15%		23.55%
b. Employee Contribution Rate		5.70%		5.76%
c. Total Contribution Rate		29.85%		29.31%
County ADC				
a. Net Normal Cost Rate		5.37%		5.30%
b. Unfunded Accrued Liability Rate		18.78%		18.25%
c. Total County ADC		24.15%		23.55%

1 Valuation compensation includes total salary for State Court Judges, including amounts subject to the State Judge Salary Limit.

2 Retirees and beneficiaries covered under an annuity contract with CIGNA are not included above.

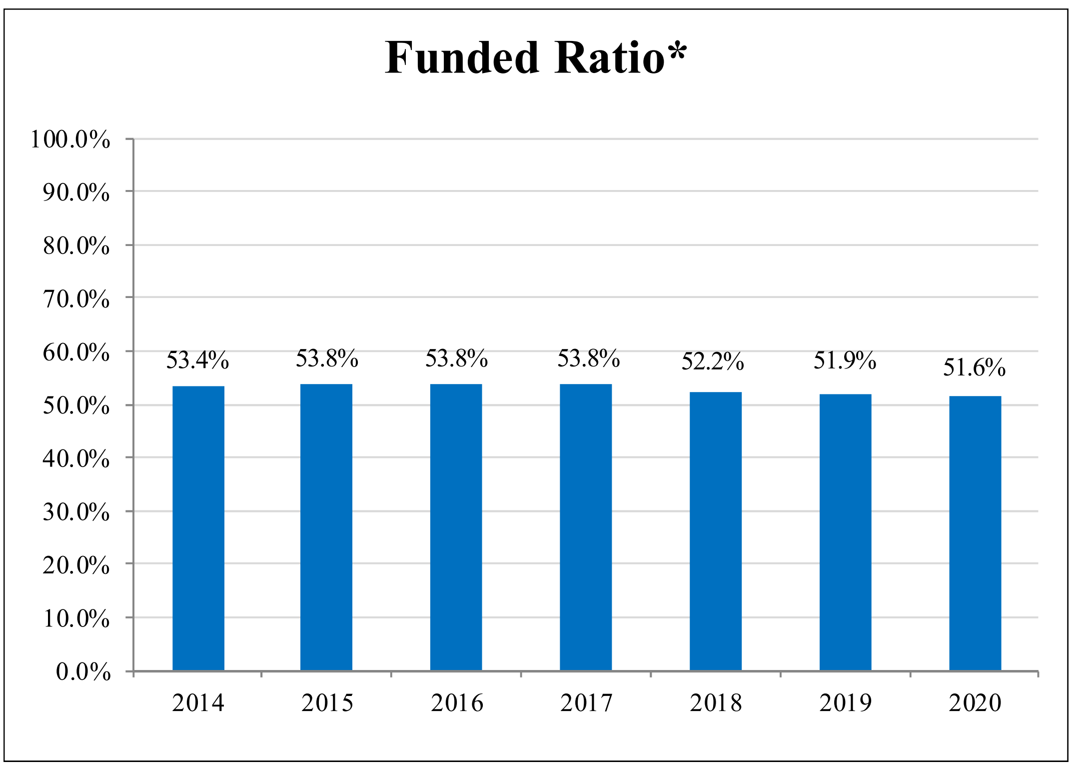
3 The assets do not include the CIGNA annuity contract amounts of $1,200,000 as of December 31, 2019 and $1,400,000 as of December 31, 2018.

Section I - Summary of Principal Results

A. The promised benefits of the Cobb County Government Employees' Pension Plan are included in the actuarially calculated contribution rates which are developed using the projected unit credit cost method. Annual gains and losses from investment and demographic experience are reflected in the unfunded actuarial accrued liability that is being amortized by regular annual contributions as a level percentage of compensation over a 23-year period. The assumptions recommended by the actuary are in the aggregate reasonably related to the experience under the Plan and to reasonable expectations of anticipated experience under the Plan.

The valuation has been prepared in accordance with Georgia funding standards as set forth in Code Section 47-20-10 of the Georgia Public Retirement System Standards and the funding policy adopted by the County. The actuarially determined contribution (ADC) of the County for the fiscal year beginning October 1, 2020 is 24.15% of compensation, which is expected to liquidate the unfunded actuarial accrued liability over a 23-year period.

The following table represents the County's historical funded ratio for the past seven years. The funded ratio represents the percentage of the plan actuarial accrued liability that is covered by the actuarial value of plan assets as of the valuation date.



* The funded ratios above reflect the CIGNA annuity contract balances.

B. The major benefit and contribution provisions of the County as reflected in the valuation are summarized in Section IX. Section X provides a summary of recent plan provision changes during the last few plan years.

Since the previous valuation, certain former employees of the City of Powder Springs Water and Sewer System became participants of the Pension Plan. The impact to the plan is immaterial to the overall results.

C. Section VII of this report outlines the full set of actuarial assumptions and methods used in the valuation. Section VIII provides a summary of recent changes during the last few plan years.

Effective January 1, 2020, the investment return assumption was decreased from 7.50% to 7.25% per year. The effect of the decrease in the investment return assumption by 0.25% for this valuation resulted in an increase in the actuarial accrued liability of $34,046,496 and increased the County's contribution rate by 0.81% of compensation.

There have been no other changes in actuarial assumptions and methods since the previous valuation.

D. The projected unit credit cost method was used to prepare the valuation. Section VII contains a brief description of the actuarial cost method.

E. Comments on the valuation results as of January 1, 2020 are given in Section I and further discussion of the contributions is set out in Section II.

Section I - Summary of Principal Results

Contributions Payable

A. The Cobb County Government Employees' Pension Plan states that each participant shall contribute an amount equal to the Compensation multiplied by a specified percentage. Effective March 2020 the employee contribution rate will be set at 8.00% of compensation for employees participating in the Traditional Plan. For employees in the Hybrid Plan, the employee contribution rate is 3.00% of compensation. Therefore, the blended employee contribution rate in aggregate for this valuation is 5.70% of compensation.

B. The County contribution consists of two components. The first component is the normal cost. Under the projected unit credit cost method, the normal cost represents the cost of benefits for active participants that accrue over a one year period. Thus, for this year's valuation, this number represents the value of benefits accruing during the 2020 plan year. The normal cost is 11.07% of covered compensation. Of the 11.07%, the employees are expected to pay 5.70% which leaves 5.37% as the employer normal cost rate.

C. The second component of the County contribution is the amortization of the unfunded actuarial accrued liability. According to the current Official Code of Georgia 47-20-10 the minimum funding standards are deemed to have been met if level percentage of compensation amortization method is used and the employer contribution is equal to or greater than the annual required contribution as determined in accordance with the provisions of GASB No. 25 and No. 27 as in effect on June 15, 2013. On this basis, the amortization cost for the fiscal year beginning October 1, 2020 is 18.78% of covered compensation based on a closed 23-year amortization period.

D. Therefore, the total actuarially determined contribution to the Plan for the fiscal year beginning October 1, 2020 is 29.85% of covered compensation. The employee portion of this required contribution is 5.70% of covered compensation, while the County's portion of this required contribution is 24.15% of covered compensation.

E. The following table summarizes the employer contribution which was determined as of January 1, 2020.

County Actuarially Determined Contribution (ADC)
For Fiscal Year Beginning October 1, 2020

Contribution	Percentage of Active Participants' Compensation
a. Net Normal Cost Rate	5.37%
b. Unfunded Actuarial Accrued Liability Rate	18.78%
c. Total County Contribution Rate	24.15%

F. The employer contribution rate has increased from 23.55% in last year's valuation to 24.15% in the current valuation. The principal reason for the contribution rate increase was due to the change in the assumed rate of return from 7.50% to 7.25%. See page 10 of this report for a complete breakdown of actuarial gains and losses for the year.

Assets

A. As of January 1, 2020 the total Market Value of Assets amounted to $733,800,611. The Actuarial Value of Assets used for the current valuation was $690,950,889. The rate of return on market values of assets was 22.81% for calendar year 2019, while the rate of return on actuarial value of assets was 7.34%. Section IV shows the development of the Actuarial Value of Assets as of January 1, 2020. The method for determining the Actuarial Value of Assets recognizes investment gains and losses over a five year period. The Plan assets exclude the value of the CIGNA annuity contract of $1,200,000 as of January 1, 2020. Asset information was provided by the Plan's Custodian.

Comments on the Valuation

A. Section II of this report contains the valuation balance sheet which shows the present assets and liabilities of the Plan as of January 1, 2020. The valuation was prepared in accordance with the actuarial assumptions and the actuarial cost method set forth in Section VII. The valuation balance sheet shows that the Plan has a total actuarial accrued liability of $1,341,185,189. The liability on account of present retired participants and beneficiaries of deceased participants is $775,187,091. Terminated participants account for $46,043,696 of the liability and $519,954,402 of the actuarial accrued liability is associated with the active participants. Against these liabilities, the Plan has actuarial value of assets of $690,950,889 as of January 1, 2020.

There remains $650,234,300 as the amount of unfunded actuarial accrued liability. The amount necessary to fully amortize the unfunded actuarial accrued liability over a 23-year period is 18.78% of compensation. The development of the unfunded actuarial accrued liability is shown in Section II.

The normal cost contribution rate is equal to the actuarial present value of benefits accruing during the current year divided by the annual active participant's compensation. For the 2020 plan year, the total normal cost contribution rate is determined to be 11.07% of compensation and is determined under the projected unit credit method.

B. The valuation does not include actuarial liabilities or assets with respect to retiree and beneficiary benefits payable from a CIGNA annuity contract. The valuation does include cost-of-living increases payable from the Plan with respect to these retirees and beneficiaries.

Section II - Plan Contribution Development

Normal Cost

The Normal Cost component of the contribution represents active participant benefits accruing during the 2020 plan year. The following tables show the Normal Cost attributable to plan benefits under the current plan.

		January 1, 2020	January 1, 2019
1.	**Normal Cost (End of Year)**		
	a. Retirement Benefits	$ 26,166,754	$ 24,905,323
	b. Termination Benefits	1,489,526	1,457,832
	c. Death Benefits	461,797	448,392
	d. Total	**$ 28,118,077**	**$ 26,811,547**
2.	**Valuation Compensation**	**$254,105,154**	**$ 242,278,837**
3.	**Normal Cost as a Percent of Compensation (1) ÷ (2)**	**11.07%**	**11.06%**

	Normal Cost by Employee/Employer and Plan Type			
		Total	**Employee**	**Employer**
1.	**Normal Cost Dollar Amount (End of Year)**			
	a. Traditional Plan	$24,169,191	$11,106,864	$13,062,327
	b. Hybrid Plan	3,926,537	3,366,070	560,467
	c. Judges Plan	22,349	0	22,349
	d. Total	**$28,118,077**	**$14,472,934**	**$13,645,143**
2.	**Valuation Compensation**			
	a. Traditional Plan	$139,562,691	$139,562,691	$139,562,691
	b. Hybrid Plan	112,202,317	112,202,317	112,202,317
	c. Judges Plan	2,340,146	2,340,146	2,340,146
	d. Total	**$254,105,154**	**$254,105,154**	**$254,105,154**
3.	**Normal Cost as a Percent of Compensation**			
	a. Traditional Plan [1(a) / 2(a)]	17.32%	7.96%	9.36%
	b. Hybrid Plan [1(b) / 2(b)]	3.50%	3.00%	0.50%
	c. Judges Plan [1(c) / 2(c)]	0.96%	0.00%	0.96%
	d. Total [1(d) / 2(d)]	**11.07%**	**5.70%**	**5.37%**

Section II - Plan Contribution Development

Actuarial Accrued Liability

The Actuarial Accrued Liability represents the obligations of the plan as of the valuation date for active and inactive participant benefits. The following table shows the components of the liability.

		January 1, 2020 (7.25% Discount Rate)	January 1, 2019 (7.50% Discount Rate)
1.	**Actuarial Accrued Liability**		
	a. Inactive Participants		
	i. Retired Participants and Beneficiaries	$ 775,187,091	$ 714,478,481
	ii. Terminated Vested Participants Deferred	46,043,696	42,224,040
	iii. Total Inactive	821,230,787	756,702,521
	b. Active Participants		
	i. Traditional & Judges Plan	$ 502,227,932	$ 479,949,720
	ii. Hybrid Plan	17,726,470	13,497,096
	iii. Total Active	519,954,402	493,446,816
2.	**Total Actuarial Accrued Liability**	**$ 1,341,185,189**	**$ 1,250,149,337**

Section II - Plan Contribution Development

Development of the Unfunded Actuarial Accrued Liability

The Unfunded Actuarial Accrued Liability represents the Actuarial Accrued Liability less the Actuarial Value of Assets. The Unfunded Actuarial Accrued Liability as of January 1, 2020 is $650,234,300. In other words, the plan liabilities exceed the plan assets by this amount as of the valuation date. The following table shows the components of the Unfunded Actuarial Accrued Liability of the plan.

		January 1, 2020	January 1, 2019
1.	**Actuarial Accrued Liability**		
	a. Present Active Participants	$ 519,954,402	$ 493,446,816
	b. Present retired participants, beneficiaries and terminated participants entitled to deferred vested benefits	821,230,787	756,702,521
	c. Total	$1,341,185,189	$1,250,149,337
2.	**Actuarial Value of Assets**	$ 690,950,889	$ 647,892,847
3.	**Unfunded Actuarial Accrued Liability (1c.) - (2)**	**$650,234,300**	**$602,256,490**

Development of the Unfunded Actuarial Accrued Liability *(Continued)*

(1)	Unfunded Accrued Liability (UAL) as of January 1, 2019	$ 602,256,490
(2)	Interest at 7.50%	45,169,237
(3)	Expected unfunded accrued liability contribution at end of year	41,308,541
(4)	Expected UAL at January 1, 2020 (1) + (2) - (3)	606,117,186
(5)	Actual UAL at January 1, 2020	650,234,300
(6)	Total Gain / (Loss) (4) - (5)	(44,117,114)
(7)	Actuarial Asset Gain / (Loss)	(1,057,400)
(8)	Contribution Surplus / (Shortfall)	5,024,974
(9)	Plan Changes	0
(10)	Assumption and Method Changes	(34,046,496)
(11)	Liability Gain / (Loss) * (6) - (7) - (8) - (9) - (10)	$ (14,038,192)

* 1.0% of total actuarial accrued liability

Analysis of Total Gain / (Loss)
January 1, 2019 to January 1, 2020
($ Millions)

(1)	Actuarial assets (return of 7.34%)	$ (1.1)
(2)	Contribution surplus (shortfall) due to timing	5.0
(3) a.	Salary less (more) than expected	(7.6)
b.	Retirements and benefits different than expected	(0.1)
c.	New Plan participants	(0.4)
d.	Mortality	(3.1)
e.	Termination	(1.3)
f.	Data changes	(0.8)
g.	Rehires	(0.5)
h.	Miscellaneous	(0.2)
i.	Liability Gain/(Loss)	(14.0)
(4)	Plan changes	0.0
(5)	Assumption and method changes	(34.0)
(6)	Total Gain/(Loss) [item (1) + (2) + (3)i. + (4) + (5)]	$ (44.1)

Section II - Plan Contribution Development

Development of the Annual Contribution

The following exhibits show the development of the annual contribution. This contribution was developed using level percent of compensation amortization of the unfunded actuarial accrued liability with a closed amortization period.

		January 1, 2020	January 1, 2019
1.	**Actuarial Accrued Liability**		
	a. Active Participants	$ 519,954,402	$ 493,446,816
	b. Retirees & Beneficiaries	775,187,091	714,478,481
	c. Deferred Vested	46,043,696	42,224,040
	d. Total	$ 1,341,185,189	$ 1,250,149,337
2.	**Covered Compensation for Active Participants**	$ 254,105,154	$ 242,278,837
3.	**Actuarial Value of Assets**	$ 690,950,889	$ 647,892,847
4.	**Unfunded Actuarial Accrued Liability**	$ 650,234,300	$ 602,256,490
5.	**Amortization of Item (4) as a Percent of Covered Compensation**	18.78%	18.25%
6.	**Normal Cost as a Percent of Covered Compensation**	11.07%	11.06%
7.	**Total Contribution Rates**		
	a. Employer Contribution Rate	24.15%	23.55%
	b. Estimated Employee Contribution Rate	5.70%	5.76%
	c. Total Contribution Rate to the Plan	29.85%	29.31%
8.	**County ADC**		
	a. Net Normal Cost Rate	5.37%	5.30%
	b. Unfunded Actuarial Accrued Liability Rate	18.78%	18.25%
	c. Total County ADC	24.15%	23.55%

Section II - Plan Contribution Development

Valuation Balance Sheet

The actuarial value of assets and actuarial accrued liabilities of the Plan as of January 1, 2020.

1.	**Actuarial Accrued Liabilities**		
	Active Participants		
	a. Retirement	$ 501,291,151	
	b. Termination	12,108,173	
	c. Death	6,555,078	
	d. Total		$ 519,954,402
	Inactive Participants		
	a. Retiree	$ 748,777,101	
	b. Deferred Vested	46,043,696	
	c. Survivor	26,409,990	
	d. Total		$ 821,230,787
	Total Actuarial Accrued Liabilities		$ 1,341,185,189
2.	**Assets**		
	Actuarial Value of Assets		$ 690,950,889
3.	**Unfunded Actuarial Accrued Liability (item 1 - item 2)**		$ 650,234,300

Section III – Additional Disclosures

Governmental Accounting Standards Board (GASB) sets forth certain items of required supplementary information and notes to be disclosed in the financial statements of the employer. The following exhibits are necessary for public sector defined benefit plans financial statements:

A. Plan Description:

The Cobb County Government Employees' Pension Plan is a single-employer defined benefit plan and the contributing entity is Cobb County. The employees covered are general employees and public safety employees. The Plan provides retirement benefits to participants according to provisions of the plan document normally in the form of a life annuity. The Plan may be amended at any time, at the sole discretion of the County.

The distribution of the number of employees by type of membership is as follows:

Number of Participants as of January 1, 2020		
1.	Retired participants and beneficiaries currently receiving benefits*	2,744
2.	Terminated participants entitled to benefits but not yet receiving benefits	955
3.	Active Participants	4,302
4.	Total	8,001

* Retirees and beneficiaries as of January 1, 2020 covered under an annuity contract with CIGNA are not included in the above counts.

B. Actuarial Methods and Assumptions are as follows:

Valuation date	January 1, 2020
Actuarial cost method	Projected Unit Credit
Amortization method	Level Percent of Compensation – Closed
Remaining amortization period	23 years
Asset valuation method	Five-year smoothed market value
Actuarial assumptions:	
Investment rate of return (includes inflation)	7.25%
Projected salary increases (includes inflation)	3.00-4.00% depending on age
Inflation	2.50%

C. Required Supplemental Information for the purpose of Financial Statements as of January 1, 2020

Schedule of Funding Progress

Actuarial Valuation Date	Actuarial Value of Assets (a)	Actuarial Accrued Liability (AAL) (b)	Unfunded AAL (UAAL) (b - a)	Funded Ratio (a / b)	Valuation Compensation (c)	UAAL as a Percentage of Valuation Compensation ((b - a) / c)
January 1, 2020	$ 692,150,889	$ 1,342,385,189	$ 650,234,300	51.6%	$ 254,105,154	255.9%
January 1, 2019	649,292,847	1,251,549,337	602,256,490	51.9%	242,278,837	248.6%
January 1, 2018	625,682,110	1,198,525,887	572,843,777	52.2%	241,522,135	237.2%
January 1, 2017	580,962,327	1,080,758,421	499,796,094	53.8%	226,975,245	220.2%
January 1, 2016	543,806,316	1,011,120,170	467,313,854	53.8%	220,949,172	211.5%
January 1, 2015	509,457,081	947,634,599	438,177,518	53.8%	214,354,687	204.4%
January 1, 2014	466,937,665	873,883,393	406,945,728	53.4%	208,332,028	195.3%

The actuarial value of assets and the actuarial accrued liability above include the following CIGNA annuity contract balances:

Actuarial Valuation Date	CIGNA Annuity Contract Balances
January 1, 2020	$ 1,200,000
January 1, 2019	$ 1,400,000
January 1, 2018	1,600,000
January 1, 2017	1,814,527
January 1, 2016	2,069,526
January 1, 2015	2,346,370
January 1, 2014	2,644,766

Section IV – Assets

Reconciliation of Market Value of Assets*

Reconciliation of Market Value of Assets*

1.	Market Value of Assets as of January 1, 2019	$	601,439,567
2.	Expenditures		
	a. Benefit Payments	$	(74,562,770)
	b. Administrative Expenses		(253,215)
	c. Total	$	(74,815,985)
3.	Income		
	a. Employer Contributions	$	54,347,819
	b. Employee Contributions		13,005,514
	c. Other Receipts		3,147,932
	d. Total	$	70,501,265
4.	Investment Income		
	a. Investment gains/losses	$	138,560,268
	b. Investment expense		(1,884,504)
	c. Total	$	136,675,764
5.	Asset Adjustment		0
6.	Market Value of Assets as of January 1, 2020	$	733,800,611
7.	Estimated Rate of Return on Market Value of Assets [(2 x 4.c.) / (1. + 6. - 4.c.)]		22.81%

* The amounts above do not include the CIGNA annuity contract amounts of $1,200,000 as of December 31, 2019 and $1,400,000 as of December 31, 2018.

Development of Actuarial Value of Assets

The actuarial value of assets recognizes assumed investment income (line 5c) fully each year. Differences between actual and assumed investment income (line 5d) are phased in over a closed 5 year period. During periods when investment performance exceeds the assumed rate, the actuarial value will tend to be less than market value. During periods when investment performance is less than assumed, the actuarial value will tend to be greater than the market value.

	Valuation Date January 1:	2019	2020	2021	2022	2023	2024
1.	Actuarial Value Beginning of Year	$ 624,082,110	$ 647,892,847				
2.	Market Value End of Year	$ 601,439,567	$ 733,800,611				
3.	Market Value Beginning of Year	$ 645,795,635	$ 601,439,567				
4.	Cash Flow						
	a. Contributions	$ 62,382,072	$ 67,353,333				
	b. Other Revenue	20,148	3,147,932				
	c. Benefit Payments	(69,267,999)	(74,562,770)				
	d. Administrative Expenses	(256,950)	(253,215)				
	e. Investment Expenses	(1,665,675)	(1,884,504)				
	f. Net	$ (8,788,404)	$ (6,199,224)				
5.	Investment Income						
	a. Market Total	$ (35,567,664)	$ 138,560,268				
	b. Assumed Rate	7.50%	7.50%				
	c. Amount for Immediate Recognition	49,833,245	46,830,670				
	d. Amount for Phased-In Recognition	$ (85,400,909)	$ 91,729,598				
6.	Phased-In Recognition of Investment Income						
	a. Current Year: 0.20 *5.d.	$ (17,080,182)	$ 18,345,920	$ 0	$ 0	$ 0	$ 0
	b. First Prior Year	11,160,119	(17,080,182)	18,345,920	0	0	0
	c. Second Prior Year	(1,613,648)	11,160,119	(17,080,182)	18,345,920	0	0
	d. Third Prior Year	(8,385,613)	(1,613,648)	11,160,119	(17,080,182)	18,345,920	0
	e. Fourth Prior Year	(1,314,780)	(8,385,613)	(1,613,648)	11,160,119	(17,080,182)	18,345,920
	f. Total Recognized Investment Gain	$ (17,234,104)	$ 2,426,596	$ 10,812,209	$ 12,425,857	$ 1,265,738	$ 18,345,920
7.	Preliminary Actuarial Value End of Year	$ 647,892,847	$ 690,950,889				
8.	Actuarial Value Corridor						
	a. 80% of Market Value End of Year	$ 481,151,654	$ 587,040,489				
	b. 120% of Market Value End of Year	$ 721,727,480	$ 880,560,733				
9.	Final Actuarial Value End of Year [7. not less than 8.a. or greater than 8.b.]	$ 647,892,847	$ 690,950,889				
10.	Difference Between Market & Actuarial Values	$ (46,453,280)	$ 42,849,722	$ 32,037,515	$ 19,611,658	$ 18,345,920	$ -
11.	Rate of Return on Actuarial Value	4.99%	7.34%				

Section V – Risk Assessment

Overview

Actuarial Standards of Practice (ASOP) No. 51, issued by the Actuarial Standards Board, provides guidance on assessing and disclosing risks related to pension plan funding. This guidance is binding on all credentialed actuaries practicing in the United States. This standard was issued as final in September 2017 with application to measurement dates on or after November 1, 2018.

The term "risk" frequently has a negative connotation, but from an actuarial perspective, it may be thought of as simply the fact that what actually happens in the real world will not always match what was expected, based on actuarial assumptions. Of course, when actual experience is better than expected, the favorable risk is easily absorbed. The risk of unfavorable experience will likely be unpleasant, and so there is an understandable focus on aspects of risk that are negative.

Risk usually can be reduced or eliminated at some cost. Consumers, for example, buy auto and home insurance to reduce the risk of accidents or catastrophes. Another way to express this concept, however, is that there is generally some reward for assuming risk. Thus, retirement plans invest not just in US Treasury bonds which have almost no risk, but also in equities which are considerably riskier – because they have an expected reward of a higher return that justifies the risk.

Under ASOP 51, the actuary is called on to identify the significant risks to the pension plan and provide information to help those sponsoring and administering the plan understand the implications of these risks. In this section, we identify some of the key risks for the Plan and provide information to help interested parties better understand these risks.

Investment Risk

The investment return on assets is the most obvious risk – and usually the largest risk – to funding a pension plan. To illustrate the magnitude of this risk, please review the following chart showing the Asset Volatility Ratio (AVR), defined as the market value of assets divided by covered compensation.

Valuation	Market Value of Assets*	Valuation Compensation	Asset Volatility Ratio
2014	$502,039,182	$208,332,028	2.41
2015	$530,109,603	$214,354,687	2.47
2016	$526,392,135	$220,949,172	2.38
2017	$554,303,423	$226,975,245	2.44
2018	$645,795,635	$241,522,135	2.67
2019	$601,439,567	$242,278,837	2.48
2020	$733,800,611	$254,105,154	2.89

* The amounts above do not include the CIGNA annuity contract amounts

The asset volatility ratio is especially useful to compare across plans or through time. It is also frequently useful to consider how the AVR translates into changes in the Required Contribution Rate (actuarially determined contribution rate). For example, the following table demonstrates that with an AVR of 3.00, if the market value return is 10% below assumed, or -2.75% for Cobb County, there will be an increase in the Required Contribution Rate of 0.44% compensation in the first year. Without asset smoothing or without returns above the expected return in the next four years, the impact on the required contribution rate would be 2.20%. A higher AVR would produce more volatility in the required contribution rate.

AVR	Unsmoothed Amortization	Smoothed Amortization
1.0	0.73%	0.15%
2.0	1.47%	0.29%
3.0	2.20%	0.44%
4.0	2.94%	0.59%

Sensitivity Measures

Valuations are generally performed with a single set of assumptions that reflects the best estimate of future conditions, in the opinion of the actuary and typically the governing board. Note that under actuarial standards of practice, the set of economic assumptions used for funding must be consistent. To enhance the understanding of the importance of an assumption, a sensitivity test can be performed where the valuation results are recalculated using a different assumption or set of assumptions.

The following tables contains the key measures for Cobb County under the valuation assumption for investment return of 7.25%, along with the results if the assumption were 6.25% or 8.25%. In this analysis, only the investment return assumption is changed. Consequently, there may be inconsistencies between the investment return and other economic assumptions such as inflation or compensation increases. In addition, simply because the valuation results under alternative assumptions are shown here, it should not be implied that Cavanaugh Macdonald Consulting believes that either assumption (6.25% or 8.25%) would comply with actuarial standards of practice.

($ in Millions)

As of January 1, 2020	Current Discount Rate (7.25%)	-1% Discount Rate (6.25%)	+1% Discount Rate (8.25%)
Plan's Normal Rate	5.37%	7.27%	3.84%
Accrued Liability	$1,341.2	$1,501.4	$1,208.0
Unfunded Liability	$650.2	$810.4	$517.1
Funded Ratio	51.6%	46.1%	57.2%

Mortality Risk

The mortality assumption is a significant assumption for valuation results, second only to the investment assumption in most situations. The Cobb County mortality assumption utilizes a mortality table with separate rates for males and females.

The future, however, is not known, and actual mortality improvements may occur at a faster rate than expected, or at a slower rate than expected (or even decline). Although changes in mortality will affect the benefits paid, this assumption is carefully studied through annual improvements to smoothly reflect unfolding experience.

Contribution Risk

The Cobb County Government Employees' Pension Plan is funded by member and employer contributions to the trust fund, together with the earnings on these accumulated contributions. The annual valuation determines the employer's required contribution rate, or Actuarial Determined Contribution (ADC) rate, based on the County's funding policy. The ADC rate is the sum of the rates for the normal cost for the plan and the amortization of the UAL. Since the County is obligated to make 100% of the ADC by statute, there is no contribution risk for the Pension Plan.

Section VI – Data

A. Data regarding the participants in the Plan for use as a basis of the valuation were furnished by the County and plan administrator. The valuation included 4,302 active participants with annualized compensation totaling $254,105,154.

B. The following table shows the number of retired participants and beneficiaries as of January 1, 2020 together with the amount of their annual retirement benefits payable under the Plan as of that date.

The Number and Average Annual Benefits of Retired Participants and Beneficiaries as of January 1, 2020

Group	Number*	Average Annual Benefits*
Service Retirements	2,535	$ 29,174
Beneficiaries of Deceased Members	209	13,669
Total	2,744	$ 27,993

* Retirees and beneficiaries as of January 1, 2020 covered under an annuity contract with CIGNA are not included in the above.

C. Table 1 on the next page shows the distribution by age and years of service of the number of active participants included in the valuation, while Table 2 shows the number and annual benefits of retired participants and beneficiaries included in the valuation, distributed by age. Table 3 shows the reconciliation of valuation data from last year's valuation carried forward to this year's valuation. Table 4 provides a breakdown of vested and non-vested active participants as of the valuation date.

Section VI – Data

Table 1: Distribution of Active Participants by Age and Service Groups as of January 1, 2020

Attained Age	Completed Years of Service										
	Under 1	1 to 4	5 to 9	10 to 14	15 to 19	20 to 24	25 to 29	30 to 34	35 or More	Total	Valuation Compensation
Under 25	122	95	3							220	$ 8,659,229
25 to 29	109	329	71	1						510	22,406,788
30 to 34	78	233	187	71	4					573	28,281,170
35 to 39	48	144	98	145	68	2				505	29,263,834
40 to 44	31	90	69	127	138	64	2			521	33,252,938
45 to 49	41	90	53	103	145	174	48	2		656	45,895,964
50 to 54	34	67	70	80	118	134	85	12	1	601	41,471,284
55 to 59	23	57	41	77	75	65	26	17	5	386	24,779,943
60 to 64	15	34	41	56	39	28	13	4	1	231	13,709,151
65 to 69	7	7	13	16	17	9	5	3	3	80	5,066,014
70 & up	1	2	3	6	3		2	1	1	19	1,318,839
Total	509	1,148	649	682	607	476	181	39	11	4,302	$254,105,154

Average Age:	42.96
Average Service:	10.52
Average Valuation Compensation:	$59,067

Table 2: Number of Retired Participants and Beneficiaries and their Benefits as of January 1, 2020

Attained Age	Number of Members	Total Annual Benefits	Average Annual Benefit
50 & Under	24	$ 835,750	$ 34,823
51 – 55	232	10,595,629	45,671
56 – 60	387	15,073,846	38,951
61 – 65	531	16,660,155	31,375
66 – 70	540	14,071,790	26,059
71 – 75	487	11,296,688	23,196
76 – 80	298	5,113,442	17,159
80 – 85	164	2,430,249	14,819
Over 85	81	734,787	9,071
Total	**2,744**	**$ 76,812,336**	**$ 27,993**

* Retirees and beneficiaries as of January 1, 2020 covered under an annuity contract with CIGNA are not included in the above.

Table 3: Reconciliation of Plan Participants as of January 1, 2020

	Active Participants	Inactive Participants with Deferred Benefits	Inactive Participants Receiving Benefits	Total
January 1, 2019	**4,228**	**962**	**2,620**	**7,810**
Retirements	(125)	(29)	154	
Deaths	(4)	(3)	(37)	**(44)**
Terminations (Refunded)	(278)	(2)		**(280)**
Non-Vested Terminations (Not Refunded)				
Vested Terminations (Not Refunded)	(34)	34		
Rehires	8	(8)		
Benefits Expired			(1)	**(1)**
New Entrants	507			**507**
New Beneficiaries			8	**8**
Data Adjustments		1		**1**
Net Change	74	(7)	124	**191**
January 1, 2020	**4,302**	**955**	**2,744**	**8,001**

Table 4: Number of Vested and Non-Vested Active Plan Participants as of January 1, 2020

Active Plan Participants by Vested & Non-Vested Status as of January 1, 2020

	Vested	Non-Vested	Totals
Traditional Plan	1,943	3	1,946
Hybrid Plan	39	2,299	2,338
Judges	13	5	18
Totals	1,995	2,307	4,302

Section VII - Actuarial Assumptions and Methods

A. Investment Return:

7.25% per year, compounded annually, net of expenses paid by trust.

B. Salary Increases:

- Representative values of the assumed annual rates of salary increases for Public Safety and General Employees are shown in the following table.

Age	Annual Increase*
20	4.00%
25	4.00
30	4.00
35	3.50
40	3.25
45	3.25
50 & Over	3.00

* Includes allowance for inflation of 2.5% per year

- Salary increases for Superior Court and State Court Judges are assumed to be 4.5% annually

C. Mortality:

Pre-retirement mortality:

RP-2000 Employee projected to 2025 using scale BB, sex distinct
No Set back / Set forward

Post-retirement mortality:

RP-2000 Combined projected to 2025 using scale BB, sex distinct
Set forward 2 years for both Male & Female lives

D. Separation from Active Service:

Representative values of the assumed annual rates of withdrawal are shown in the following tables.

General Employees – Male

Age	Years of Service											
	< 1	1	2	3	4	5	6	7	8	9	10	11+
20	30.00%	25.00%	20.00%	13.00%	12.00%	12.00%	10.00%	10.00%	6.00%	6.00%	6.00%	4.00%
25	27.00	25.00	20.00	13.00	12.00	12.00	10.00	10.00	6.00	6.00	6.00	4.00
30	26.00	25.00	20.00	13.00	12.00	12.00	10.00	10.00	6.00	6.00	6.00	4.00
35	25.00	20.00	15.00	13.00	12.00	10.50	10.00	10.00	6.00	6.00	6.00	3.00
40	24.00	17.50	13.00	13.00	12.00	9.00	9.00	9.00	5.00	5.00	5.00	2.00
45	20.00	15.00	10.00	9.00	7.00	6.00	8.00	8.00	4.00	4.00	4.00	2.00
50	15.00	12.50	8.00	8.00	5.00	3.00	5.00	5.00	3.00	3.00	3.00	2.00
55	7.50	8.00	6.00	7.00	5.00	2.00	3.00	3.00	2.00	2.00	2.00	1.50
60	2.50	4.00	3.00	6.00	5.00	1.50	1.50	1.50	1.00	1.00	1.00	1.00
65	0.00	0.00	0.00	5.00	5.00	1.00	1.00	1.00	0.50	0.50	0.50	0.25

General Employees – Female

Age	Years of Service											
	< 1	1	2	3	4	5	6	7	8	9	10	11+
20	30.00%	22.50%	17.00%	17.00%	14.00%	12.00%	9.00%	9.00%	9.00%	7.00%	6.00%	4.50%
25	30.00	22.50	17.00	17.00	14.00	12.00	9.00	9.00	9.00	7.00	6.00	4.50
30	30.00	22.50	17.00	17.00	13.00	12.00	9.00	8.00	8.50	7.00	6.00	4.50
35	30.00	22.50	13.00	15.00	9.00	12.00	7.50	7.00	7.50	7.00	6.00	3.75
40	25.00	22.50	9.00	9.00	7.00	10.50	6.50	6.00	6.00	6.00	5.00	2.75
45	20.00	16.00	9.00	7.00	7.00	7.00	5.50	4.50	4.50	4.50	4.00	2.00
50	15.00	12.00	9.00	6.00	6.00	6.00	4.50	3.00	3.50	3.50	3.00	1.50
55	15.00	8.00	9.00	5.00	5.00	5.00	3.50	2.00	2.00	2.00	2.00	1.00
60	15.00	8.00	9.00	4.00	4.00	4.00	2.50	1.00	1.50	1.50	1.00	0.75
65	15.00	8.00	9.00	4.00	4.00	4.00	1.50	0.50	0.50	0.50	0.50	0.50

Public Safety

Age	Years of Service											
	< 1	1	2	3	4	5	6	7	8	9	10	11+
20	15.00%	8.00%	10.00%	8.00%	7.50%	5.00%	6.50%	6.00%	2.50%	3.50%	2.50%	2.50%
25	15.00	8.00	10.00	8.00	7.50	5.00	6.50	6.00	2.50	3.50	2.50	2.50
30	15.00	8.00	10.00	8.00	7.50	5.00	6.50	5.00	2.50	3.50	2.50	2.50
35	15.00	8.00	10.00	8.00	7.50	5.00	6.50	4.00	2.50	3.50	2.50	2.35
40	15.00	8.00	10.00	8.00	7.50	5.00	6.50	3.00	2.50	3.50	2.50	1.25
45	15.00	8.00	10.00	8.00	7.50	5.00	6.50	2.00	2.50	3.50	2.50	0.85
50	15.00	8.00	10.00	8.00	7.50	5.00	6.50	1.00	2.50	3.50	2.50	0.25

Superior Court and State Court Judges

Age	Rate
20	4.0%
25	4.0
30	4.0
35	4.0
40	6.0
45	4.0
50	3.0
55	2.5
60	2.5
65	2.5

Representative values of the assumed annual rates of retirement are shown in the following tables.

Traditional & Hybrid Plan General Employees hired prior to January 1, 2007

Age	Years of Service				
	10	15	20	25	30
50	0.0%	0.0%	0.0%	0.0%	60.0%
55	5.0	5.0	5.0	35.0	20.0
60	5.0	5.0	35.0	5.0	5.0
65	35.0	35.0	35.0	35.0	35.0
66	31.0	31.0	31.0	31.0	31.0
67	27.5	27.5	27.5	27.5	27.5
68	27.5	27.5	27.5	27.5	27.5
69	27.5	27.5	27.5	27.5	27.5
70	100.0	100.0	100.0	100.0	100.0

Traditional & Hybrid Plan General Employees hired on or after January 1, 2007

Age	Years of Service				
	10	15	20	25	30
55	5.0%	5.0%	5.0%	35.0%	35.0%
60	5.0	5.0	35.0	5.0	5.0
65	35.0	35.0	35.0	35.0	35.0
66	31.0	31.0	31.0	31.0	31.0
67	27.5	27.5	27.5	27.5	27.5
68	27.5	27.5	27.5	27.5	27.5
69	27.5	27.5	27.5	27.5	27.5
70	100.0	100.0	100.0	100.0	100.0

Traditional & Hybrid Plan Public Safety Employees hired prior to January 1, 2007

Age	Years of Service 10	15	20	25	30
50	0.0%	0.0%	0.0%	0.0%	70.0%
55	7.5	7.5	7.5	50.0	25.0
60	3.5	3.5	45.0	25.0	25.0
65	50.0	50.0	50.0	50.0	50.0
66	50.0	50.0	50.0	50.0	50.0
67	100.0	100.0	100.0	100.0	100.0

Traditional & Hybrid Plan Public Safety hired on or after January 1, 2007

Age	Years of Service 10	15	20	25	30
55	7.5%	7.5%	7.5%	50.0%	50.0%
60	3.5	3.5	45.0	25.0	25.0
65	50.0	50.0	50.0	50.0	50.0
66	50.0	50.0	50.0	50.0	50.0
67	100.0	100.0	100.0	100.0	100.0

Superior Court and State Court Judges

Age	Rate
60	15%
61	10
62	12
63-64	10
65-69	15
70-74	25
75	100

E. Actuarial Value of Assets:

The actuarial value of assets recognizes a portion of the difference between the market value of assets and the expected market value of assets, based on the assumed valuation rate. The amount recognized each year is 20% of the difference between market value and expected market value. The actuarial value of assets cannot be less than 80% or greater than 120% of market value.

F. Actuarial Cost Method:

Projected Unit Credit. This cost method measures past service liabilities as the actuarial present value of benefits accrued for service up to the valuation date, but based on salaries projected to the date of assumed retirement for the plan.

Effective January 1, 2013, the unfunded actuarial accrued liabilities are amortized over a closed 30-year period assuming annual total compensation growth of 2.5%.

G. Percent Married:

For the purposes of valuing the spouse pre-retirement survivor annuity, 90% of the plan participants are assumed married with males three years older than females.

Section VIII - Actuarial Assumption & Method Changes

The following assumptions have been changed during the last few plan years:

1. Effective January 1, 2007:
   a. Inflation rate was changed from 4% to 3%.
   b. Salary merit scale was changed to 0-2% depending on age of participant

2. Effective January 1, 2008:
   a. The actuarial value of assets method was changed to recognize the difference between actual and expected market value of assets over a five year period.
   b. The mortality table was updated to RP 2000.
   c. Rates of retirement were increased.
   d. The unfunded actuarial accrued liability was consolidated and will be amortized over an open 30-year period.

3. Effective January 1, 2011:
   a. Inflation rate was changed from 3% to 2.5% per year.
   b. Annual rates of salary increases were decreased by 1%, with a minimum salary increase of 2.5% per year.
   c. Compensation growth assumption used to amortize the unfunded actuarial accrued liability was changed from 3% to 2.5% per year.

4. Effective January 1, 2013:
   a. The investment return assumption was decreased from 8% to 7.9% per year. The investment return assumption will be decreased by 0.1% per year until reaching 7.5% effective with the January 1, 2017 valuation.
   b. The method to amortize the unfunded actuarial accrued liability was changed from an open 30 year period to a closed 30 year period effective January 1, 2013.

5. Effective January 1, 2014:
   a. As a result of the Experience Study for the 5 year period ending December 31, 2012, the following assumptions were changed:
      1) Pre-retirement Mortality Table was updated to RP-2000 Employee projected to 2013 with set forward 4 years for Male Lives and set back 2 years for Female Lives
      2) Retirement rates were updated for Public Safety and General Employees
      3) Withdrawal rates were modified for both Public Safety and General Employees

6. Effective January 1, 2018:
   a. As a result of the Experience Study for the 5 year period ending December 31, 2016, the following assumptions were changed:
      1) Pre-Retirement Mortality Table was updated to RP-2000 Employee projected to 2025 using scale BB with No Set back / Set forward
      2) Post-retirement Mortality Table was updated to RP-2000 Combined projected to 2025 using scale BB; Set forward 2 years for both Male & Female lives
      3) Retirement rates were updated for Public Safety and General Employees
      4) Withdrawal rates were modified for both Public Safety and General Employees
      5) Salary merit scale was updated for all members

7. Effective January 1, 2020:
   a. The investment return assumption was decreased from 7.50% to 7.25% per year.

Section IX – Plan Provisions

A. Effective Date

January 1, 1971

B. Participation

Any Employee who is employed in the Eligible Class shall be a participant in this plan. An individual is in the Eligible Class at any time if he or she is an Employee and:

a) does not participate in any retirement plan sponsored by the State of Georgia under which contributions are made in his/her behalf; or
b) is an elected Commissioner of Cobb County; or
c) is employed by the Cobb County District Attorney's Office or in another Salary-Share Position that is paid in part by the Employer.

An Employee who has qualified for participation in the Plan is defined as either a Traditional or Hybrid Participant as follows:

a) A Traditional Participant is a Participant who either:
    i. had 7 or more years of Service for vesting purposes as of December 31, 2009
    ii. had less than 7 years of Service for vesting purposes as of December 31, 2009 and did not elect to become a Hybrid Participant.
b) Hybrid Participant is a Participant who either:
    i. was first hired on or after January 1, 2010, or rehired on or after January 1, 2010 (a "New Hire Hybrid Participant")
    ii. had less than 7 years of Service for vesting purposes as of December 31, 2009 and elected to become a Hybrid Participant (an "Electing Hybrid Participant").

C. Accrued Benefit

The pension payable at normal retirement based on the Participant's Final Average Compensation and Credited Service at the date of determination.

D. Credited Service

The period of a Participant's service that is used to determine his/her eligibility for benefits under the Plan and the amount of benefits payable, excluding service in excess of 35 years. Service prior to December 16, 1984 is excluded for employees employed by Marietta-Cobb Community Service Center prior to that date. Service prior to February 1, 1997 is excluded for former employees of the City of Marietta 911 Services who had already vested with the City's retirement plan prior to that date. Service prior to January 1, 2005 is excluded for former employees of the City of Kennesaw Water and Sewer Department who had already vested with the City's retirement plan prior to that date. A Participant will be granted Credited Service for unused Sick Leave after reaching the retirement eligibility (Normal, Early, Late, or Rule of 80) at the time of retirement in accordance with the following schedule, provided they have made contributions for at least one year.

Unused Hours of Sick Leave

40 Hour	56 Hour	Credited Service
Less than 173 hours	Less than 242 hours	0
173-345	243-484	1/12
346-519	485-727	2/12
520-692	728-969	3/12
693-865	970-1,212	4/12
866-1,039	1,213-1,455	5/12
1,040 or more hours	1,456 or more hours	6/12

E. Compensation

The Participant's W-2 earnings including salary reduction amounts.

F. Final Average Compensation (FAC)

The average of the 5 highest consecutive years of compensation out of the last 10 years. No overtime will be used in the final average compensation calculation for Hybrid Participants.

G. Normal Retirement Pension

Eligibility

Traditional Participants hired before January 1, 2009: the first day of the calendar month coinciding with or next following the participant's 65th birthday, or if later, the day the participant completes 7 years of service. However, for any participant who has met all of the requirements to be eligible to retire under the Normal Retirement or Rule of 80 provisions as of December 31, 2008, the Normal Retirement Date shall remain the later of age 65 and the completion of 5 years of service.

Traditional Participants hired on or after January 1, 2009: the later of age 65 or 10 years of service.

Hybrid Participants: the later of Social Security Normal Retirement Age or 10 years of service.

Benefit Amount

Traditional Participants: 2.5% of a participant's FAC multiplied by years of Credited Service. A Participant's benefit shall not be less than $76 multiplied by the Participant's total years of Credited Service.

Electing Hybrid Participants: 2.5% of FAC multiplied by years of Credited Service up to December 31, 2009 plus 1.0% of FAC multiplied by years of Credit Service accrued after December 31, 2009.

Hybrid Participants: 1.0% of FAC multiplied by years of Credited Service.

Credited service cannot exceed 35 years for all Participants.

H. Rule of 80 Retirement

Eligibility

Traditional Participants hired before January 1, 2007: age and service must total 80.

Traditional Participants hired on or after January 1, 2007 and Hybrid Participants: must attain a minimum of age 55 or 35 years of service in addition to the meeting Rule of 80 age and service requirement

Benefit Amount

Normal Retirement Pension

I. Early Retirement Pension

Eligibility

Traditional Participants and Electing Hybrid Participants hired before January 1, 2009: age 55 and 7 years of service.

Traditional Participants, Electing Hybrid & New Hire Hybrid Participants hired on or after January 1, 2009: age 55 and 10 years of service.

Benefit Amount

Normal Retirement Pension accrued to Early Retirement Date, reduced for the number of years the Early Retirement Date precedes the Normal Retirement Date.

J. Late Retirement Pension

Eligibility

Date participant actually retires from employment with the County after his/her Normal Retirement Date.

Benefit Amount

Computed as the sum of:

a) The Participant's Accrued Benefit as of the Participant's Retirement Date based only upon the Credited Service and Final Average Compensation as of their Normal Retirement Date.

b) The sum of the greater, determined for each Plan Year (or portion thereof) ending after the Participant's Normal Retirement Date:

   i. The excess, if any, of (a) the Accrued Benefit as of the end of such Plan Year over (b) the Accrued Benefit as of the immediately preceding Plan Year, but with such excess being reduced (but not below zero) by (c) the actuarial value of any benefit payments made or due to be made from the Plan during such Plan Year, or
   ii. The excess, if any, of (a) the Accrued Benefit as of the end of the immediately preceding Plan Year adjusted by the applicable late retirement Adjustment Factor over (b) the Accrued Benefit as of the immediately preceding Plan Year.

K. Pre-Retirement Spouse Death Benefit

Active Employees

Eligibility

Seven years of service (or 10 depending on date of hire) and has been married one full year prior to death. If the Participant was killed in the line of duty, there is no minimum service requirement.

Benefit Amount

45% of the Participant's Accrued Benefit determined as if death had occurred at their Normal Retirement Date, assuming Credited Service continued until Normal Retirement Date and Compensation remained the same. The benefit commences immediately and is reduced if the spouse is more than 10 years younger than the Participant.

L. Terminated Vested Participants

Eligibility

Terminated Participant who is entitled to a Deferred Vested Benefit and has been married one full year prior to death.

Benefit Amount

If the Participant has less than 15 years of service, the benefit is 30% of the Accrued Benefit payable when the Participant could have first retired.

If the Participant has 15 or more years of service, the benefit is 45% of the Accrued Benefit payable when the Participant could have first retired.

M. Vested Termination

Eligibility

Traditional Participants and Electing Hybrid Participants hired before January 1, 2009: 7 years of service.

Traditional Participants, Electing Hybrid & New Hire Hybrid Participants hired on or after January 1, 2009: 10 years of service.

Benefit Amount

Accrued Benefit as of the date of termination payable at the Normal Retirement Date.

N. Non-Vested Termination

A participant terminating from the plan who is not 100% vested in the Accrued Benefit is entitled to a refund of their employee contributions with interest. The annual interest crediting rate for Employee Contributions changed from 5% to 2.5% for periods on or after January 1, 2013. Interest is compounded annually from the end of the Plan Year to which such Employee Contributions are attributable through the month preceding distribution.

O. Cost-of-Living Adjustments

As approved by the Board.

P. Normal Form of Benefit

Single Life Annuity

Q. Optional Forms of Benefit

In lieu of the Normal Form of benefit, a participant may elect to receive one of the following optional forms of payment:

- Contingent Pensioner Option – Participant receives a reduced pension during their lifetime so that after their death, 100%, 66-2/3%, or 50% of the Participant's benefit will be paid for the life of the surviving Contingent Pensioner designated by the Participant.
- Years Certain and Life Option – Participant receives a reduced Pension during their lifetime so that if their death occurs within the years certain period (5, 10, or 15 years), the pension will continue to the Beneficiary for the balance of the period.
- Social Security Option – Participant receives an increased pension before Social Security commences and a reduced pension thereafter, so that the total benefit under this Plan and the Social Security Act will be paid in a generally level amount throughout retirement.

R. Employee Contributions

Effective March 2020, the employee contribution rate will increase from 7.75% to 8.00% of compensation for employees participating in the Traditional Plan. The employee contribution rate will increase 0.25% per year until reaching 8.75% in 2023.

For employees in the Hybrid Plan, the employee contribution rate is 3.00% of compensation.

S. Superior Court and State Court Judge Supplemental Retirement Benefit

These benefit provisions described below apply only to Superior and State Court Judges eligible for membership in the Plan:

- Credited Service includes the service recognized by the Georgia Judicial Retirement System, not to exceed 24 years.
- Final Salary equals the annual amount of the salary supplement paid by Cobb County in excess of the state salary cap for Judges.
- Normal Retirement Date is the later of age 60 or the completion of 10 years of service.
- Vesting requires 10 years of completed service.
- Supplemental Retirement Benefit is calculated as 4.167% of Final Salary for Credited Service up to 16 years, plus 1% for each additional year of Credited Service, up to a maximum of 24 years.
- The Supplemental Retirement Benefit is paid as a single life annuity.
- Late retirement increases are applied if the Judge continues employment after his/her Normal Retirement Date.
- No benefit is payable upon the death of the Judge, whether such death occurs before or after commencement of the Supplemental Retirement Benefit.
- The Judge is not required or permitted to make contributions to the Plan.

Section X – Plan Provision Changes

The following plan amendments have been adopted within the past few plan years:

1. Effective January 1, 2007:
   Employees hired on or after this date will only qualify for the Rule of 80 retirement provision if they reached a minimum of age 55 or 35 years of service.

2. Effective January 1, 2009:
   a. Employees hired before January 1, 2009:
      i. For benefit calculation purposes the final average compensation will consist of the average of the 5 highest consecutive years of compensation out of the last 10 years, provided that the final average compensation used shall not be less than the 3 year final average compensation calculated as of December 31, 2008. However, any participant who has met all of the requirements to be eligible to retire under the Normal Retirement or Rule of 80 provisions as of December 31, 2008 shall always be calculated using the 3 highest consecutive years of compensation.
      ii. The Normal Retirement Date is redefined as the first day of the calendar month coinciding with or next following the participant's 65th birthday, or if later, the day the participant completes 7 years of service. However, for any participant who has met all of the requirements to be eligible to retire under the Normal Retirement or Rule of 80 provisions as of December 31, 2008, the Normal Retirement Date shall remain the later of age 65 and the completion of 5 years of service.

   b. Employees hired on or after January 1, 2009:
      i. The final average compensation will consist of the average of the 5 highest consecutive years of compensation out of the last 10 years.
      ii. 10 years shall be required to be vested in the pension plan.
      iii. The Normal Retirement Date is defined as the first day of the calendar month coinciding with or next following the participant's 65th birthday, or if later, the day the participant completes 10 years of service.

3. Effective January 1, 2010
   a. Employees hired before January 1, 2010:
      i. The employee contribution rate changed from 5.00% to 5.50% effective February 2010. The employee contribution rate will also increase over a 13 year period from 5.00% in 2009 to 8.75% in 2023.
      ii. Current non-vested employees as of December 31, 2009 were given the option to converting to the new Hybrid Defined Benefit/Defined Contribution Plan (see 3(b) below).

b. Employees hired on or after January 1, 2010 and any employees not vested as of January 1, 2010 who chose to enter the new Hybrid Plan:

Defined Benefit Component

i. The employee contribution rate will be 5.00% of earnings and should not increase over time. No employee contributions will be based on overtime earnings.
ii. The final average compensation will consist of the average of the 5 highest consecutive years of compensation out of the last 10 years. No overtime will be used in the final average compensation calculation.
iii. 10 years shall be required to be vested in the pension plan. (7 years is required for employees hired before January 1, 2009 and elect to enter the Hybrid Plan.)
iv. Employees hired before January 1, 2007 are eligible for Rule of 80 unreduced early retirement. If hired on or after January 1, 2007, employees are eligible for Rule of 80 unreduced early retirement with a minimum of 35 years of service or attainment of age 55.
v. The Normal Retirement Date is defined as the first day of the calendar month coinciding with or next following the participant's 65th birthday for non-vested members transferring to the Hybrid Plan and Social Security Normal Retirement Age for employees hired on or after January 1, 2010, or if later, the day the participant completes 10 (or 7) years of service.
vi. Employees are eligible for reduced early retirement on the first day of the calendar month coinciding with or next following the participant's 55th birthday, or if later, the day the participant completes 10 (or 7) years of service.
vii. The benefit multiplier will be 1% times final average compensation times years of service.
viii. A current non-vested employee who chooses the new Hybrid Plan will receive a benefit that is equal to the greater of:
    1. Current benefit (2.5% multiplier) for years up to the change to the new plan plus new plan benefit (1.0% multiplier) for remaining years or,
    2. New Plan benefit (1.0% multiplier) for entire period of service.
ix. Military service prior to employment will no longer count as service time. Only service and benefits required to be granted under applicable federal law will be provided.

<u>Defined Contribution Component (Presented for information purposes only. Does not impact actuarial valuation of Pension Plan.)</u>

i. In addition to the 5.00% employee contribution rate for the Defined Benefit Plan, employees may contribute a portion of their salary each year into the Defined Contribution Plan up to the maximum amount permitted by the IRS. The employee's contribution will be incorporated into the County's current 457 Deferred Compensation Plan and the County's contribution will go to a new 401(a) Plan per IRS rules.

ii. The County will make a 50% matching contribution up to maximum of 2%. Employees will be required to contribute at least 4% of earnings to receive the maximum 2% matching contribution.

iii. Vesting will be a graduated schedule of 20% vesting per year of service with 100% vested after 5 years of service.

iv. Current non-vested employees who elect to move to the new Hybrid Plan will be vested in the Defined Contribution component based on the graduated vesting schedule above based on their years of service as of January 1, 2010. However, employer contributions to the Defined Contribution component will not be retroactive.

4. Reflected January 1, 2011 valuation:

   Members eligible to retire by the end of 2011 were offered an opportunity to retire in 2010 and receive a lump sum benefit of 2% of compensation times years of service in addition to their accrued Pension Plan benefit. The lump sum benefit was not payable from the Pension Plan.

5. Effective January 1, 2013:

   The annual interest crediting rate for Employee Contributions changed from 5% to 2.5% for periods on or after January 1, 2013. Interest is compounded annually from the end of the Plan Year to which such Employee Contributions are attributable through the month preceding distribution.

6. Effective January 1, 2014:

   The employee contribution rate for Hybrid Plan Participants decreased from 5.00% to 3.00%.

7. Effective January 1, 2017:
    a. The benefits provided under Appendix A for Superior Court Judges were extended to certain State Court Judges. The benefits for these Judges are outlined in Appendix B.
        i. Credited Service includes the service recognized by the Georgia Judicial Retirement System, not to exceed 24 years.
        ii. Final Salary equals the annual amount of the salary supplement paid by Cobb County in excess of the state salary cap for Judges.
        iii. Normal Retirement Date is the later of age 60 or the completion of 10 years of service.
        iv. Vesting requires 10 years of completed service.
        v. Supplemental Retirement Benefit is calculated as 4.167% of Final Salary for Credited Service up to 16 years, plus 1% for each additional year of Credited Service, up to a maximum of 24 years.
        vi. The Supplemental Retirement Benefit is paid as a single life annuity.
        vii. Late retirement increases are applied if the Judge continues employment after his/her Normal Retirement Date.
        viii. No benefit is payable upon the death of the Judge, whether such death occurs before or after commencement of the Supplemental Retirement Benefit.
        ix. The Judge is not required or permitted to make contributions to the Plan.

8. Effective April 7, 2019:

    Each former employee of the City of Powder Springs responsible for services and tasks related to the operation of the water and/or sewer system who is an employee of the Cobb County Board of Commissioners as of April 7, 2019 shall become a Participant. Service for vesting under the Plan will be counted from the Participant's original date of hire with the City of Powder Springs. Benefit Accrual Service shall be counted from April 7, 2019 for those employees who have a vested benefit under the City of Powder Springs' retirement plan on April 7, 2019. Employees who are not vested under the City of Powder Springs' retirement plan will receive Benefit Accrual Service from their original date of hire with the City of Powder Springs.

2020 Cobb County
Retirement Activity Report thru March 2020

Active Retirees	**First Quarter 2020**	**Year End 2019**	**Year End 2018**	**Year End 2017**	**Year End 2016**	**Year End 2015**	**Year End 2014**	**Year End 2013**	**Year End 2012**	**Year End 2011**	**Year End 2010**
SunTrust Retirees	2,760	2,725	2,524	2,375	2,162	2,017	1,938	1,789	1,608	1,531	1,494
SunTrust Beneficiaries	191	190	181	169	168	155	147	150	150	145	138
CIGNA Retirees	29	29	30	33	37	41	46	48	56	63	72
CIGNA Beneficiaries	14	15	17	18	20	23	26	26	27	25	25
Retirement Payment Amount Totals	$ 21,521,818	$ 83,252,810	$78,651,232	$70,192,268	$67,932,325	$60,771,504	$53,500,938	47,176,313	$41,666,992	$40,334,913	$37,398,392
Average Monthly Benefit Payment	$ 2,920	$ 2,834	$2,602	$2,286	$2,163	$2,095	$2,093	$2,095	$1,936	$1,925	$1,881
Lowest Monthly Payment	$22	$22	$22	$22	$22	$22	$22	$19	$27	$27	$27
Highest Monthly Payment	$23,892	$23,892	$23,892	$23,892	$10,991	$10,991	$10,991	$10,991	$10,339	$9,564	$9,564
Median Payment	$ 2,467	$ 2,323	$2,165	$1,951	$1,846	1,732	1,730	$ 1,697	$1,698	$1,625	$1,617
Traditional Plan Total Enrollment (Active)	**1,882**	**1,924**	**2,067**	**2,243**	**2,431**	**2,613**	**2,725**	**3086**	**3327**	**3544**	**3734**
Vested Active Employees	1,882	1,924	2,067	2,243	2,427	2,526	2,423				
Non Vested Active Employees	0	0	0	0	4	186	302				
Vested Terminations	1039	1042	1031	1007	1000	941	839	876	819	800	795
Hybrid Plan Total Enrollment (Active)	**2,363**	**2,252**	**2,099**	**1,830**	**1,625**	**1,497**	**1,230**	**955**	**712**	**505**	**354**
Vested Active	58	38	37	35	12	2	2				
Non Vested Active	2,305	2,214	2,062	1,795	1,637	1,495	1,228				
Vested Terminations	4	4	2	2	0	0	0				
Defined Contribution Enrollment (Active)	**2,022**	**1,914**	**1,744**	**1,580**	**1,277**	1,025	766	533	235	137	108
Enrollment %	85.57%	84.99%	83.09%	86.34%	78.58%	68.47%	62.28%	55.81%	33.01%	27.13%	30.51%
# Emp. Enrollment @ 1%	283	276	330	286	254	152	108	86	19	7	7
# Emp. Enrolled @ 2%	267	257	285	236	205	158	136	93	31	18	16
# Emp. Enrolled @ 3%	106	99	112	88	75	54	35	15	6	5	7
#Emp. Enrolled @ 4%	1366	1282	1017	864	743	661	487	339	179	107	78
Contribution refunds - Non vested	**89**	**365**	**310**	**260**	**264**	**233**	**228**	**269**	**248**	**276**	**239**
Contribution Refund Payments	85	347	298	232	233	210	200	163	204	229	192
Contribution IRA Rollovers	4	18	12	28	31	23	28	35	44	47	47
Contribution Disbursement Amount Total	$ 239,365	$ 1,321,666	$981,677	$812,600	$1,125,784	$1,017,613	$939,836	$1,288,609	$1,289,297	$1,163,648	$829,188
Average Amount of Contribution Payments	$ 3,672	$3,733	$3,775	$4,577	$4,695	$4,587	$4,271	$3,392	$5,199	$4,216	$3,469
Deferred Comp Enrollment (Traditional)	**1,135**	**1,157**	**1,085**	**1,176**	**1,165**	**1,347**	**1,362**	**1,235**	**1,317**	**1,428**	**1,498**
Total in Deferred Comp (Traditional/Non DC)	$129,569,841	$149,899,490	$125,884,225	$135,428,065	$119,927,958	$114,083,472	$115,450,059	$111,489,820	$96,128,376	$89,039,114	$89,342,309
Deferred Comp Enrollment (DC) (Active/Inactive)	**2,801**	**2,689**	**2,472**	**2,150**							
Total in Deferred Comp (Defined Contribution)	$12,755,002	$14,330,443	$9,695,333	$8,800,772							
Retiree Healthcare											
Pre-65 in group healthcare	767	750	744	740	744	721	729				
Spouse in group healthcare	303	291	299	302	292	262	284				
Post 65 - Medicare Exchange	951	947	886	848	754	817	785				
Post 65 - Medicare Exchange Spouse	429	423	403	382	350	384	323				

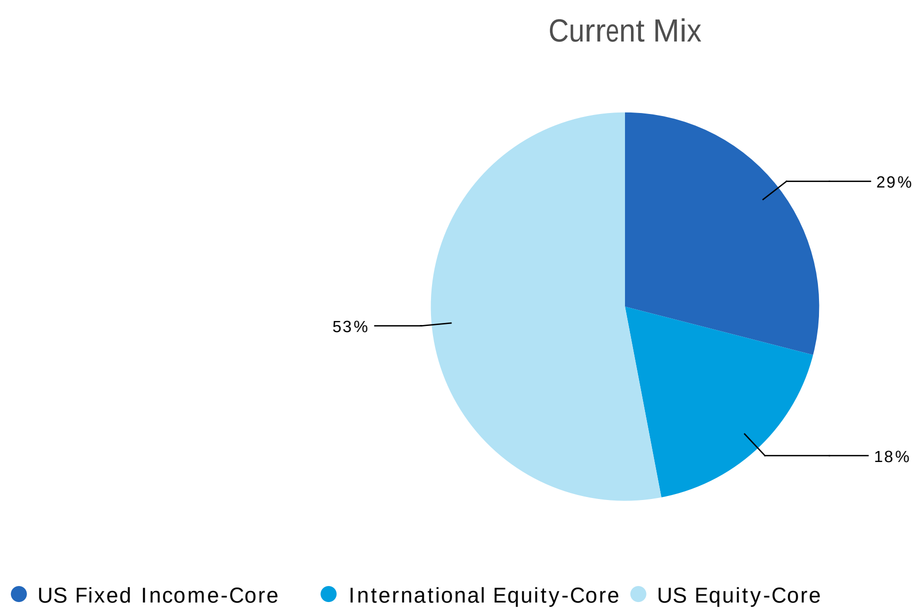
Investment Solutions Portfolio Analysis

Cobb County: CMAs Equilibrium

May 27, 2020

Prepared By : UBS Institutional Consulting

Portfolio Allocations



	CURRENT MIX - **Equilibrium Assumptions**
Return	6.87%
Standard Deviation	11.02%
Sharpe Ratio	0.56

	CURRENT Mix - Strategic Assumptions
Return	4.82%
Standard Deviation	11.02%
Sharpe Ratio	0.37

Allocation Case: Cobb County

Calculated results are based on UBS forward-looking assumptions of risk, return and correlation, are hypothetical, do not reflect actual investment results, do not include impact of taxes, cost, fees, and is not a guarantee of future results. See Appendix for important information and calculation definitions.

UBS

2020 Strategic Asset Allocation and Capital Market Assumptions Update

Contents

At UBS, our Capital Market Assumptions (CMAs) and Strategic Asset Allocations (SAAs) are the fundamental underpinnings that inform our investment advice. The Chief Investment Office (CIO) and the Wealth Management USA (WM USA) Asset Allocation Committee (AAC) regularly review our CMAs and SAAs as asset class expected returns and risks change over time. The latest review determined that it is appropriate to update the CMAs, which last occurred in February 2019, as well as make changes to the recommended institutional SAAs, which last happened in February 2017.

For the strategic CMAs, meant for one full business cycle, most equity returns are relatively unchanged, while fixed income returns have declined significantly in this update. Overall, these CMAs should result in notably lower expected returns for more conservative SAAs over the cycle, a lower expected return for moderate SAAs, while aggressive risk portfolio expected returns are only modestly impacted. The equilibrium CMA returns, which are applicable for a multi-business cycle horizon, are modestly lower for fixed income and comparably higher for equities. The risk CMAs are the same for both the strategic and equilibrium returns, and the risk estimates are relatively unchanged in this update. Consequently, the impact on SAAs' estimated total risk is modest.

The SAA updates reflect changes in the CMAs and include structural modifications designed to enhance portfolio performance and alignment with UBS's goals-based planning framework. The structural changes include reductions in the cash and hedge fund allocations and breaking the US government bond allocation into three maturity categories. As a result of these changes, the total equity allocation increases between 1% and 5% across all SAAs. There is a small reallocation from US investment grade corporate credit into US high yield corporate credit and emerging markets fixed income in a few SAAs.

The following sections explain what the CMAs are, the differences between strategic and equilibrium CMAs, the economic assumptions driving the CMA update, and explanations for the major asset class CMAs. Following that is an explanation of SAAs and their objective, the changes made in this update and their rationale, and a review of the SAAs' new estimated returns and risks, resulting from both CMA and SAA changes.

Capital Market Assumptions: The Basics

Prudent asset allocation decision-making starts with reasonable assumptions about the risk and return prospects for a range of asset classes. In total, we estimate CMAs for over 100 distinct asset classes, including stocks, bonds, hedge fund strategies, private equity, and private real estate. The return assumptions represent the average annual estimated return we expect from a particular asset class. The risk assumptions include the volatilities, which measure the dispersion of returns, and correlations, which estimate how asset classes move together over time. Our process of developing CMAs is not a "hard science" using repeated, controlled experiments, but our methodology combines both objective and subjective elements to use the most dependable aspects of a data-driven approach and enable us to overlay expert judgment in the process where necessary.

Return assumptions represent the average annual estimated return we expect from a particular asset class. They do not represent the return of any particular security or investment. To derive strategic expected returns, we explicitly model the expected returns individually for the coming years.

Our *volatility* estimates seek to quantify the dispersion we expect in the asset class returns on a year-by-year basis. Of course, expected volatility for any particular asset class comes with a range of caveats. For example, an investment manager or a fund structure might be more or less volatile than the asset class as a whole depending on factors like the investment objective, manager style, or constraints. Additionally, we're also making an assumption that asset classes themselves will be diversified; one particular position within an asset class can certainly exhibit different risk and return characteristics than the asset class as a whole.

Finally, *correlation* measures the interaction of two asset classes over time. Positively correlated asset classes tend to increase or decrease in value at the same time, whereas negatively correlated asset classes tend to move in opposite directions. Correlations fall on a range from –1 to 1, where –1 indicates a perfectly negative correlation, 0 indicates no correlation, and 1 indicates a perfectly positive correlation between the asset classes.

In our last CMA update, we introduced equilibrium return assumptions. The difference between the strategic and equilibrium return assumptions is their investment time horizons. Specifically:

Strategic returns reflect our expectation for the average annual total return for various asset classes over one full business cycle. This includes the recovery, expansion, slowdown, and recession stages of the cycle. The length of business cycles isn't fixed, though in advanced economies they have been getting longer on average. The starting points for estimating returns are typically current values, such as bond yields or equity price-to-earnings ratios, and then we project a future path for this return driver to a long-term sustainable level.

Equilibrium returns are expectations for average annual returns over multiple business cycles. We assume that asset class return drivers eventually converge to their long-run level, which is the economy's sustainable steady state. Furthermore, we assume that it takes at least 10 but not more than 20 years for the economy to reach this steady state. The expected return is calculated assuming return drivers and returns themselves are in equilibrium. By definition, equilibrium returns are not influenced by cyclical developments or current circumstances. Instead, they reflect structural assumptions about the economy, including the long-term potential growth rate and the neutral rate of interest.

The purpose of having two sets of CMA return assumptions is to distinguish the average annual return estimates for investors when their investment horizon changes from one to multiple business cycles. The strategic returns are applicable for short- to long-term investment horizons over a cycle, such as when constructing strategic asset allocations. In contrast, equilibrium returns are appropriate for analyzing an asset allocation over a multi-cycle investment horizon, which is typical for organizations such as public/corporate pension plans, health/welfare plans, decommissioning trusts, or long-term educational endowments.

We have only one set of volatility and correlation assumptions. Unlike expected returns that can vary quite a bit depending on starting economic conditions and valuations, risk properties tend to be stable and mean-reverting over time, and are unlikely to change from one economic cycle to the next.

For the primary asset classes, Fig. 1 lists the updated strategic and equilibrium CMA return assumptions and the updated risks, which represent the annualized standard deviation of expected returns. The full set of CMAs can be found in Appendix 1. The updated strategic return CMAs are significantly lower for fixed income; moderately lower for hedge funds, private equity, and private real estate; but are the same or higher for equities. Since our last CMA update, US interest rates across most of the yield curve have fallen to historically low levels, greatly reducing fixed income returns. In contrast, equity valuations relative to bonds have become considerably more attractive, but the prospect for earnings growth in the US and internationally has deteriorated.

The equilibrium returns are generally higher than the strategic returns, with a few exceptions. For fixed income, the higher equilibrium returns reflect the fact that US Treasury bond yields are significantly below our estimate for their steady state values. Once yields have converged to the steady state, the annual returns for US government fixed income will be higher than our strategic return CMA estimates. To estimate the equilibrium returns for all other asset classes, we add an appropriate risk premium to these risk-free equilibrium returns, which results in higher equilibrium returns than strategic returns.

Both the strategic and equilibrium returns are point estimates, but the actual annual returns can deviate quite a bit from these returns. An investment that increases in value by 20% one year might easily decline by 10% the following year. Combining the return and volatility estimates for an asset class provides a more realistic outlook for "normal" returns. For example, US large-cap equity returns could fall between –9.8% (i.e., 5.7% – 15.5%) and 21.2% (i.e., 5.7% + 15.5%) over 12 months. This range of estimated "normal" equity returns is illustrated in Fig. 2 with a number of simulated paths for US large-cap equities over one year.

Fig 1

Primary asset class risk and return assumptions

In %

	Strategic	Equilibrium	
Asset Class	**Ann'l total return**	**Ann'l total return**	**Ann'l risk**
US Cash	1.6%	2.6%	0.2%
US Government Fixed Income	0.4%	3.4%	3.8%
US Municipal Fixed Income	0.4%	2.8%	2.8%
US Corporate Investment Grade Fixed Income	1.3%	4.6%	5.3%
US Corporate High Yield Fixed Income	3.6%	6.4%	9.7%
International Developed Markets Fixed Income	0.0%	1.8%	7.9%
Emerging Markets Fixed Income (Blend)	4.2%	5.2%	9.8%
US Large-cap Equity	5.7%	7.7%	15.5%
US Large-cap Growth Equity	5.2%	7.4%	15.6%
US Large-cap Value Equity	6.2%	7.9%	15.9%
US Mid-cap Equity	6.2%	7.8%	17.7%
US Small-cap Equity	6.3%	7.9%	20.0%
International Developed Markets Equity	8.2%	9.3%	15.9%
International Developed Markets Value Equity	8.7%	9.5%	16.3%
Emerging Markets Equity	9.2%	9.2%	20.7%
Senior Loans	3.6%	6.4%	9.7%
Preferreds	2.1%	4.9%	7.6%
MLPs	8.6%	8.0%	17.8%
US Real Estate	6.6%	9.1%	22.3%
Hedge Funds	4.9%	5.7%	6.0%
Private Equity	8.4%	10.2%	12.5%
Private Real Estate	5.9%	8.1%	10.3%
Inflation		**2.2%**	

Note: These CMAs are not guaranteed and do not represent the return of a particular security or investment.

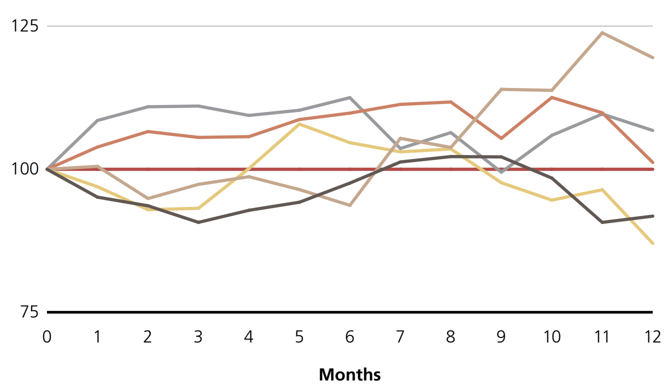
Source: UBS WM USA Asset Allocation Committee, as of 27 April,2020.

See Important Information and Disclosures section, Wealth Management USA Asset Allocation Committee and the UBS Capital Market Assumptions and Strategic Asset Allocation Models, for more information.

Fig. 2

Simulated paths beginning with USD 100 invested in US large-cap equities over a 12-month period

Monte Carlo simulated returns for US large-cap equities using UBS Wealth Management Americas CMAs, in USD



For illustrative purposes only; this is not a guarantee of the minimum or maximum level of losses or gains that can be incurred. Monte Carlo simulations are used to visualize the set of possible random returns for assets.

Source: UBS WM USA Asset Allocation Committee, as of 27 April 2020

Why a CMA update was necessary

The drivers behind the CMA changes stem from the significant evolution of the global economic and policy environment over the past year. Above-trend economic growth and expected monetary tightening gave way to a deep US recession and substantial monetary and fiscal policy stimulus globally in response to the COVID-19 pandemic. Many developed market government bond yields are near record lows below 1%, which doesn't bode well for the asset class's short- to medium-term return prospects (Fig. 3). Meanwhile, corporate earnings are set to decline sharply, while the speed of their recovery is uncertain.

Fig. 3

10-year Treasury yield is near record lows

In %

Source: Bloomberg, UBS, as of 7 April 2020

A gradual process of normalization for the global economy should be underway by the second half of 2020, with a more sustainable recovery beginning in 2021[1]. While inflation fell during the recession, it's likely to eventually turn moderately higher in order to help finance elevated government debt levels.

Changes to the major asset class CMAs

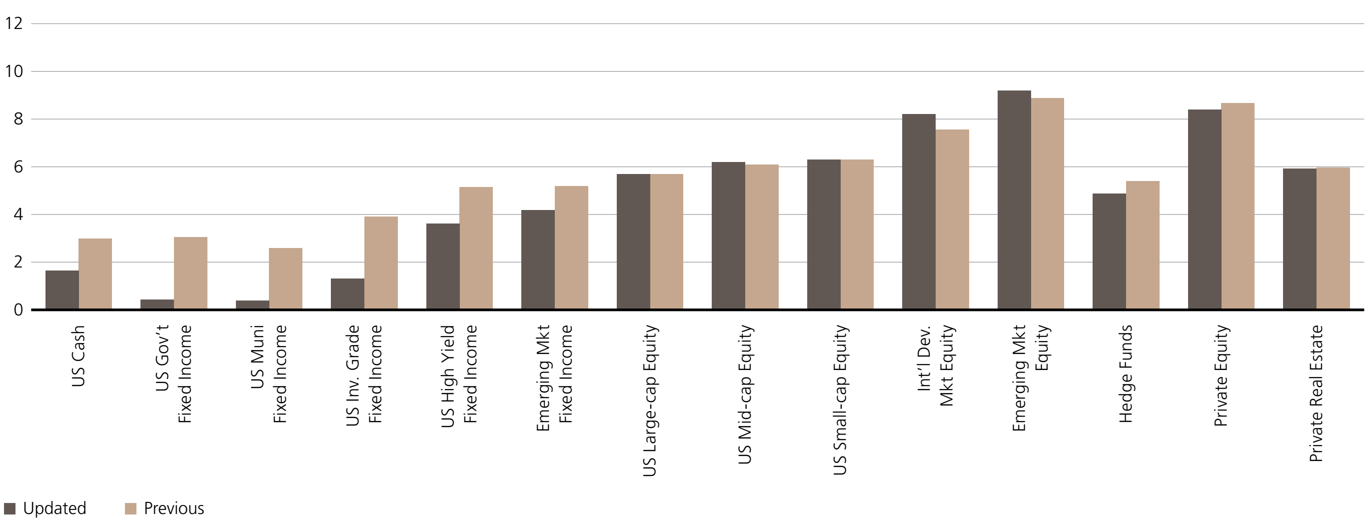
In our strategic CMAs, US fixed income returns have come down between 100 and 300 basis points (bps), while equity returns have generally stayed the same or increased slightly (Fig. 4). The most significant declines in fixed income expected returns are in longer maturity bonds, which we now expect will be negative over the next full cycle. Interest rates are likely to recover moderately from their current, cyclically depressed levels. The decline in bond prices stemming from the rise in rates will be largest for longer maturity bonds, enough so that it results in negative total returns. Expected equity returns remain roughly unchanged on aggregate. We project around 7% total return per year for global equities. A somewhat higher valuation upside in a low-yield environment is balanced by a lower earnings growth outlook. Overall, expected returns for most traditional asset classes are either significantly or moderately below the historical levels realized over the last 15 years.

[1] See *UBS House View Monthly Letter: Looking past the peak*, published on 16 April 2020, for more information.

Fig. 4

Small changes in equity return assumptions, but much lower for fixed income

Strategic return estimates for select asset classes, updated vs. previous CMAs, in %



Source: UBS WM-USA Asset Allocation Committee, as of 27 April 2020

Credit spreads widened to typical recession levels during the global COVID-19 pandemic, but we expect them to be at long-term average levels by the start of 2021. At that point, investors' search for yield, with rates at exceptionally low levels, could continue to squeeze spreads and thus future returns. Consequently, the strategic returns are 1.3% for US investment grade corporate bonds, 3.6% for US high yield bonds, and 4.2% for emerging market fixed income.

Our assumptions for private equity are virtually unchanged at 8.4%. It has delivered a 12% yearly return in recent decades and 14% since 2004, though its outperformance of public equity has declined of late. The strategic return for private equity is lower than its historical performance, but in line with the somewhat elevated valuation and high levels of "dry powder" (private equity capital committed but not yet drawn). For private real estate, our strategic expected return of 6% is a result of real estate prices being close to their cyclical highs, boosted by the low interest rates during the last couple of years.

How we use CMAs

Capital Market Assumptions can be used in a range of activities, including Strategic Asset Allocation, financial planning, risk monitoring, and custom portfolio analysis. The strategic and equilibrium CMAs were designed not only for different investment horizons, as discussed earlier, but also with different intended applications.

First, our strategic CMAs form a core input for creating our Strategic Asset Allocations (SAAs). The SAAs are created to provide an attractive return-risk trade-off over the next full economic cycle. We discuss Strategic Asset Allocation in greater depth later in this report.

Second, we use our strategic CMAs as a starting point for portfolio customization. Some investors hold portfolios that follow the UBS Strategic Asset Allocation models, but many others use these allocations as a starting point to customize an allocation that reflects the investor's particular situation or need. For instance, an organization might need to produce a higher level of income than estimated by our SAA model portfolios. Our CMAs provide a baseline to help analytically customize portfolios in these situations.

Finally, our equilibrium CMAs are intended for longer-term time horizons. A well-constructed long-term Investment Policy Statement integrates asset modeling (the investment portfolio asset allocation) and liability modeling (the organization's obligations, goals and objectives) to develop a prudent strategy. Equilibrium CMAs play a vital role in that process. Based on this CMA update, organizations should revisit their Investment Policy Statements to determine if any changes are necessary.

SAAs: Allocations are changing for CMA and structural reasons

Strategic Asset Allocations are diversified portfolios that we expect to produce a reasonable risk and return trade-off over a full economic cycle. We design the SAAs to be efficient and intending to provide the highest estimated return for a target level of risk, based on the CMA strategic return and risk assumptions. We publish SAAs risk profile, ranging from Conservative to Aggressive. These include portfolios for taxable and non-taxable investors; investors that only want to use traditional, publicly traded liquid assets; and those who want to also include non-traditional assets such as hedge funds, private equity, and private real estate. These SAAs provide a reference point for tactical shifts based on short-term considerations, and are a starting point for financial planning analysis.

We updated the SAAs to reflect the new CMA return and risk assumptions and to make structural changes intended to enhance portfolio performance and alignment with UBS's goals-based planning framework. Specifically, the Asset Allocation Committee decided to make the following changes:

First, the cash allocation was reduced in all risk profiles to 2% from 5%. One reason for this reduction was to better align the SAAs with UBS's long-term planning framework. We recommend investors hold enough cash and cash equivalents to cover 2–3 years of required liquidity, freeing up capital to be more fully invested in their remaining portfolio. We deem a 2% cash allocation in the SAAs to be sufficient for portfolio management purposes. Keeping a 2% allocation is also consistent with the strategic return for cash being slightly higher than that for US fixed income, with a lower level of volatility. Most of the 3% that was moved out of cash went into credit and equities in order to raise the SAA expected returns and offset the decline in US government bonds returns.

Second, the hedge fund allocation in SAAs with non-traditional asset classes was reduced between 0% and 5%. The main reason for reducing the allocation was to re-risk the portfolios in an environment of lower returns. The allocation shift occurred almost entirely into equities, which increased the SAAs estimated returns and risks. Expected hedge fund returns did decline modestly, but a diversified hedge fund strategy remains a beneficial source of diversification in a multi-asset portfolio, providing robustness and potentially improving risk-adjusted expected returns. Importantly, our estimates are composite returns for the average manager in the industry. But successful hedge fund investing generally depends on individual fund and strategy selection.

Third, the US government fixed income allocation was divided into three maturity categories: short, intermediate, and long with horizons of roughly 1–3, 3–10, and 20+ years, respectively. These maturity categories allow the US government bond allocation to be tailored to the SAA's risk profile in order to better manage the portfolio's interest rate and equity risks. In Conservative portfolios with small equity allocations, the US government bond allocation is mostly to short maturities and the rest to intermediate maturities. This reduces the portfolio volatility due to interest rate swings. In contrast, in Aggressive SAAs the allocation is only to long maturity US government bonds because they most efficiently diversify against equity risk. In Moderate risk SAAs, the allocation is more symmetric across maturity categories.

Fourth, the total equity allocations increased by 1–5% and by 2–4% for the total fixed income allocation, depending on the strategy type and risk profile, as a result of these structural changes to the SAAs. The allocation to investment grade corporate credit was reduced by 4% in the Conservative to Moderate SAAs without non-traditional assets. Most of this allocation went into US high yield corporate bonds and US dollar-denominated emerging market sovereign bonds in order to diversify the credit allocation and to increase the SAA expected return.

Fig. 5 shows SAA for an institutional investor with allocations to hedge funds, private equity, and private real estate assets.

Fig. 5

SAA for Instituional investor with non-traditional assets

In %

	Conservative	Moderately Conservative	Moderate	Moderately Aggressive	Aggressive
Cash	**2.0%**	**2.0%**	**2.0%**	**2.0%**	**2.0%**
Fixed Income	**56.0%**	**42.0%**	**30.0%**	**17.0%**	**10.0%**
US Fixed Income	**51.0%**	**40.0%**	**28.0%**	**15.0%**	**10.0%**
US Gov't FI (short)	21.0%	15.0%	5.0%	0.0%	0.0%
US Gov't FI (intermediate)	16.0%	12.0%	10.0%	6.0%	0.0%
US Gov't FI (long)	0.0%	2.0%	4.0%	6.0%	10.0%
US IG Corp FI	9.0%	7.0%	6.0%	0.0%	0.0%
US HY Corp FI	5.0%	4.0%	3.0%	3.0%	0.0%
Int'l Fixed Income	**5.0%**	**2.0%**	**2.0%**	**2.0%**	**0.0%**
EM FI (Hard)	3.0%	1.0%	1.0%	1.0%	0.0%
EM FI (Local)	2.0%	1.0%	1.0%	1.0%	0.0%
Equity	**12.0%**	**26.0%**	**38.0%**	**51.0%**	**58.0%**
US Equity	**8.0%**	**13.0%**	**19.0%**	**25.0%**	**28.0%**
US Large cap growth	3.0%	4.5%	6.5%	8.5%	9.5%
US Large cap value	3.0%	4.5%	6.5%	8.5%	9.5%
US Mid cap	2.0%	3.0%	4.0%	5.0%	6.0%
US Small cap	0.0%	1.0%	2.0%	3.0%	3.0%
International Equity	**4.0%**	**13.0%**	**19.0%**	**26.0%**	**30.0%**
Int'l Developed Markets	4.0%	9.0%	13.0%	18.0%	21.0%
Emerging Markets	0.0%	4.0%	6.0%	8.0%	9.0%
Non-traditional	**30.0%**	**30.0%**	**30.0%**	**30.0%**	**30.0%**
Hedge Funds	13.0%	10.0%	8.0%	5.0%	0.0%
Private Equity	10.0%	14.0%	17.0%	20.0%	25.0%
Private Real Estate	7.0%	6.0%	5.0%	5.0%	5.0%
Estimated return	**3.38%**	**4.36%**	**5.23%**	**6.17%**	**6.66%**
Estimated risk	**5.14%**	**6.99%**	**8.87%**	**10.95%**	**12.01%**

Note: Asset allocation does not assure profits or prevent against losses from an investment portfolio or accounts in a declining market.
Source: Source: UBS WM USA Asset Allocation Committee, as of 27 April 2020

Fig. 6 demonstrates the consequences of the CMA changes on the estimated return and risk for all five risk profiles of the institutional SAAs. The conservative SAA now has a much lower expected return while its risk is almost unchanged; the decline in expected return for the moderate SAA was about half of that for the conservative SAA with a similarly small change in risk; while the aggressive SAA return and risk profiles both decreased slightly. In short, the CMA changes made the efficient frontier (which compares the risk-return trade-off of the portfolios) steeper. The full set of SAAs, typically applicable to institutions, can be found in Appendix 2.

Final thoughts: What does this mean for investors?

The important question for investors is simply, "What do I need to do now?" The SAAs reflect the portfolios that we are most comfortable holding in the current environment, so we recommend evaluating current positioning relative to these allocation models, and making adjustments as appropriate, given your current circumstances.

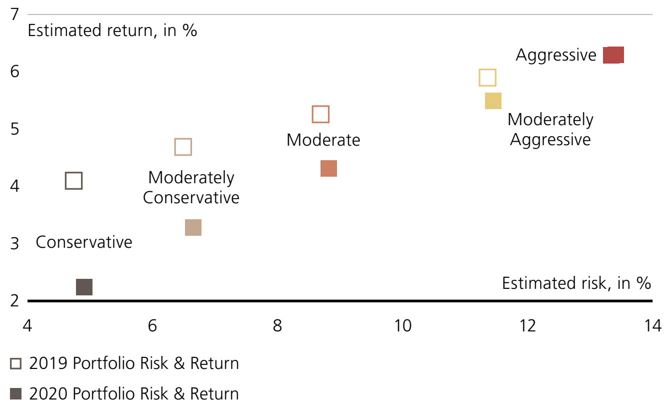
With some changes to the CMAs, we also believe it is a good time to revisit your Investment Policy Statement and Risk Profile as part of the portfolio review. Assess whether the equilibrium CMAs have impacted your plan results and whether there are allocation adjustments or opportunities to consider that may help improve the plan's probability of success.

Contact your UBS Institutional Consultant to review your investment portfolio, update or create an asset allocation study, and discuss any changes you might be considering. Your Institutional Consultant can help you assess the impact of these changes and guide you through the investment decision-making process.

Fig. 6

The efficient frontier has steepened at lower risk levels

Non-taxable SAAs without non-traditional assets, using updated strategic CMAs



Note: The CMAs used to estimate portfolio risk and return are not guaranteed and do not represent the return of a particular security or investment.
Source: UBS WM-USA Asset Allocation Committee, as of 27 April 2020

Appendix 1: Capital Market Assumptions

Broad Asset Class	Asset Class	Subclass	Style	Capital Market Assumptions, in % Strategic Return	Equilibrium Return	Risk
Cash	Cash	US	US Cash	1.6	2.6	0.2
		International	International Cash	2.5	2.8	7.5
Fixed Income	US	US Fixed Income	Core	0.9	3.9	3.5
			Short	1.4	3.0	1.2
			Intermediate	1.3	3.5	2.8
			Long	-0.6	4.4	9.5
			Other	0.9	3.9	3.5
		Government	Core	0.4	3.4	3.8
			Short	1.1	3.1	1.2
			Intermediate	0.4	3.4	5.4
			Long	-0.9	3.5	8.5
			Other	0.4	3.4	3.8
		Municipals	Core	0.4	2.8	2.8
			Short	1.0	2.7	0.8
			Intermediate	0.4	2.8	2.8
			Long	-0.9	2.8	4.4
			High Yield	1.3	5.1	7.9
			Other	0.4	2.8	2.8
		Corporate Investment Grade Credit	Core	1.3	4.6	5.3
			Short	1.6	3.2	2.1
			Intermediate	1.7	4.2	4.0
			Long	0.5	5.3	10.1
			Other	1.3	4.6	5.3
		Corporate High Yield	Corporate High Yield	3.6	6.4	9.7
		Puerto Rico Municipals	Puerto Rico Municipals	0.4	2.8	2.8
		Preferred	Preferred	2.1	4.9	7.6
		Convertibles	Convertibles	3.1	5.9	12.0
	Global	Global	Global	2.5	3.9	5.5
	International	International	International	0.0	1.8	7.9
		Developed Markets	Developed Markets	0.0	1.8	7.9
		Emerging Markets	Emerging Markets	4.2	5.2	9.8
Equity	US	US Equity	Core	5.7	7.7	15.8
			Growth	5.2	7.4	15.8
			Value	6.2	7.9	16.1
			Master Limited Partnerships	8.6	8.0	17.8
			Public Real Estate	6.6	9.1	22.3
			Other	5.7	7.7	15.8
		Large Cap	Core	5.7	7.7	15.5
			Growth	5.2	7.4	15.6
			Value	6.2	7.9	15.9
			Master Limited Partnerships	8.6	8.0	17.8
			Public Real Estate	6.6	9.1	22.3
			Other	5.7	7.7	15.5
		Mid Cap	Core	6.2	7.8	17.7
			Growth	5.7	7.5	18.0
			Value	6.7	8.0	17.9
			Master Limited Partnerships	8.6	8.0	17.8
			Public Real Estate	6.6	9.1	22.3
			Other	6.2	7.8	17.7
		SMid Cap	Core	6.2	7.8	18.8
			Growth	5.7	7.5	19.6
			Value	6.7	8.0	18.6
			Master Limited Partnerships	8.6	8.0	17.8
			Public Real Estate	6.6	9.1	22.3
			Other	6.2	7.8	18.8
		Small Cap	Core	6.3	7.9	20.0
			Growth	5.8	7.6	20.5
			Value	6.8	8.1	20.0
			Master Limited Partnerships	8.6	8.0	17.8
			Public Real Estate	6.6	9.1	22.3
			Other	6.3	7.9	20.0
		Preferred	Preferred	2.1	4.9	7.6
		Convertibles	Convertibles	3.1	5.9	12.0

Broad Asset Class	Asset Class	Subclass	Style	Capital Market Assumptions, in % Strategic Return	Equilibrium Return	Risk
Equity	Global	Global	Core	7.0	8.3	14.7
			Growth	6.5	8.0	14.0
			Value	7.5	8.5	14.2
			Public Real Estate	6.4	9.3	20.6
			Other	7.0	8.3	14.7
	International	International	Core	8.4	9.2	16.6
			Growth	7.9	8.9	14.8
			Value	8.9	9.4	15.7
			Public Real Estate	6.0	8.0	21.3
			Other	8.4	9.2	16.6
		Developed Markets	Core	8.2	9.3	15.9
			Growth	7.7	9.0	15.0
			Value	8.7	9.5	16.3
			Other	8.2	9.3	15.9
		Emerging Markets	Core	9.2	9.2	20.7
			Growth	8.7	8.9	22.3
			Value	9.7	9.4	21.1
			Other	9.2	9.2	20.7
Commodities	Commodities	Commodities	Commodities	4.5	4.5	17.2
			Energy	7.9	8.0	25.0
			Agriculture	0.9	0.9	20.1
			Industrial Metals	7.5	7.6	21.6
			Precious Metals	4.0	4.1	19.5
			Other	4.5	4.5	17.2
Non-Traditional	Non-Traditional	Non-Traditional	Non-Traditional	6.4	8.0	8.3
		Hedge Funds	Multi Strategy	4.9	5.7	6.0
			Diversified Fund of Funds	3.5	4.2	5.2
			Global Macro	2.6	3.3	5.1
			Event Driven	2.3	3.2	6.6
			Relative Value	2.7	3.9	7.4
			Managed Futures	1.2	1.9	5.4
			Equity Long/Short	2.9	3.4	7.6
			Other	4.9	5.7	6.0
		Private Equity	Private Equity	8.4	10.2	12.5
		Private Real Estate	Private Real Estate	5.9	8.1	10.3
Other	Other	Other	Other	4.7	6.1	8.9
	Balanced	Balanced	Balanced	4.7	6.1	8.9
	Insured Solutions	Insured Solutions	Insured Solutions	4.3	4.6	6.7
		Annuities	Other	4.3	4.6	6.7
			Fixed	3.4	0.4	3.8
			Variable	4.3	4.6	6.7
			Immediate	3.4	0.4	3.8
			Indexed	4.3	4.6	6.7
		Insurance	Other	3.6	3.5	4.2
			Term Life	2.6	1.6	0.2
			Whole Life	3.4	0.4	3.8
			Survivorship Whole Life	3.4	0.4	3.8
			Universal Life	3.4	0.4	3.8
			Survivorship Universal Life	3.4	0.4	3.8
			Variable Universal Life	4.3	4.6	6.7
			Survivorship Variable Universal Life	4.3	4.6	6.7
			Indexed Universal Life	4.3	4.6	6.7
			Hybrid Universal Life	3.4	0.4	3.8
			Hybrid Whole Life	3.4	0.4	3.8
			LTC	2.6	1.6	0.2
			Disability	2.6	1.6	0.2

These CMAs are not guaranteed and do not represent the return of a particular security or investment.

Source: UBS Wealth Management USA Asset Allocation Committee, as of 27 April 2020.

See Important Information section, Wealth Management USA Asset Allocation Committee and the UBS Capital Market Assumptions and Strategic Asset Allocation Models, for more information.

Appendix 2: Strategic Asset Allocations

	SAA: Institutional investors with non-traditional assets				
	Conservative	**Moderately Conservative**	**Moderate**	**Moderately Aggressive**	**Aggressive**
Cash	**2.0%**	**2.0%**	**2.0%**	**2.0%**	**2.0%**
Fixed Income	**56.0%**	**42.0%**	**30.0%**	**17.0%**	**10.0%**
US Fixed Income	**51.0%**	**40.0%**	**28.0%**	**15.0%**	**10.0%**
US Gov't FI (short)	21.0%	15.0%	5.0%	0.0%	0.0%
US Gov't FI (intermediate)	16.0%	12.0%	10.0%	6.0%	0.0%
US Gov't FI (long)	0.0%	2.0%	4.0%	6.0%	10.0%
US IG Corp FI	9.0%	7.0%	6.0%	0.0%	0.0%
US HY Corp FI	5.0%	4.0%	3.0%	3.0%	0.0%
Int'l Fixed Income	**5.0%**	**2.0%**	**2.0%**	**2.0%**	**0.0%**
EM FI (Hard)	3.0%	1.0%	1.0%	1.0%	0.0%
EM FI (Local)	2.0%	1.0%	1.0%	1.0%	0.0%
Equity	**12.0%**	**26.0%**	**38.0%**	**51.0%**	**58.0%**
US Equity	**8.0%**	**13.0%**	**19.0%**	**25.0%**	**28.0%**
US Large cap growth	3.0%	4.5%	6.5%	8.5%	9.5%
US Large cap value	3.0%	4.5%	6.5%	8.5%	9.5%
US Mid cap	2.0%	3.0%	4.0%	5.0%	6.0%
US Small cap	0.0%	1.0%	2.0%	3.0%	3.0%
International Equity	**4.0%**	**13.0%**	**19.0%**	**26.0%**	**30.0%**
Int'l Developed Markets	4.0%	9.0%	13.0%	18.0%	21.0%
Emerging Markets	0.0%	4.0%	6.0%	8.0%	9.0%
Non-traditional	**30.0%**	**30.0%**	**30.0%**	**30.0%**	**30.0%**
Hedge Funds	13.0%	10.0%	8.0%	5.0%	0.0%
Private Equity	10.0%	14.0%	17.0%	20.0%	25.0%
Private Real Estate	7.0%	6.0%	5.0%	5.0%	5.0%
Estimated return	**3.38%**	**4.36%**	**5.23%**	**6.17%**	**6.66%**
Estimated risk	**5.14%**	**6.99%**	**8.87%**	**10.95%**	**12.01%**

Source: UBS Wealth Management USA Asset Allocation Committee, as of 27 April 2020.
See Important Information and Disclosures section, Wealth Management USA Asset Allocation Committee and the UBS Capital Market Assumptions and Strategic Asset Allocation Models, for more information.

	SAA: Institutional investors with hedge funds				
	Conservative	Moderately Conservative	Moderate	Moderately Aggressive	Aggressive
Cash	**2.0%**	**2.0%**	**2.0%**	**2.0%**	**2.0%**
Fixed Income	**73.0%**	**54.0%**	**36.0%**	**20.0%**	**6.0%**
US Fixed Income	**67.0%**	**48.0%**	**30.0%**	**15.0%**	**6.0%**
US Gov't FI (short)	22.0%	12.0%	4.0%	0.0%	0.0%
US Gov't FI (intermediate)	15.0%	12.0%	10.0%	4.0%	0.0%
US Gov't FI (long)	0.0%	4.0%	3.0%	4.0%	6.0%
US IG Corp FI	24.0%	15.0%	8.0%	2.0%	0.0%
US HY Corp FI	6.0%	5.0%	5.0%	5.0%	0.0%
Int'l Fixed Income	**6.0%**	**6.0%**	**6.0%**	**5.0%**	**0.0%**
EM FI (Hard)	3.5%	3.5%	4.0%	3.5%	0.0%
EM FI (Local)	2.5%	2.5%	2.0%	1.5%	0.0%
Equity	**14.0%**	**29.0%**	**47.0%**	**67.0%**	**87.0%**
US Equity	**9.0%**	**17.0%**	**26.0%**	**36.0%**	**46.0%**
US Large cap growth	3.0%	6.0%	10.0%	13.0%	16.0%
US Large cap value	3.0%	6.0%	10.0%	13.0%	16.0%
US Mid cap	2.0%	3.0%	4.0%	6.0%	8.0%
US Small cap	1.0%	2.0%	2.0%	4.0%	6.0%
International Equity	**5.0%**	**12.0%**	**21.0%**	**31.0%**	**41.0%**
Int'l Developed Markets	5.0%	9.0%	15.0%	22.0%	29.0%
Emerging Markets	0.0%	3.0%	6.0%	9.0%	12.0%
Non-traditional	**11.0%**	**15.0%**	**15.0%**	**11.0%**	**5.0%**
Hedge Funds	11.0%	15.0%	15.0%	11.0%	5.0%
Private Equity	0.0%	0.0%	0.0%	0.0%	0.0%
Private Real Estate	0.0%	0.0%	0.0%	0.0%	0.0%
Estimated return	**2.45%**	**3.52%**	**4.67%**	**5.76%**	**6.48%**
Estimated risk	**4.66%**	**6.37%**	**8.80%**	**11.50%**	**13.58%**

Source: UBS Wealth Management USA Asset Allocation Committee, as of 27 April 2020.
See Important Information and Disclosures section, Wealth Management USA Asset Allocation Committee and the UBS Capital Market Assumptions and Strategic Asset Allocation Models, for more information.

	SAA: Institutional investors without non-traditional assets				
	Conservative	Moderately Conservative	Moderate	Moderately Aggressive	Aggressive
Cash	**2.0%**	**2.0%**	**2.0%**	**2.0%**	**2.0%**
Fixed Income	**81.0%**	**65.0%**	**48.0%**	**28.0%**	**11.0%**
US Fixed Income	**74.0%**	**58.0%**	**42.0%**	**25.0%**	**11.0%**
US Gov›t FI (short)	22.0%	12.0%	5.0%	0.0%	0.0%
US Gov›t FI (intermediate)	16.0%	12.0%	10.0%	4.0%	0.0%
US Gov›t FI (long)	0.0%	4.0%	4.0%	4.0%	6.0%
US IG Corp FI	30.0%	24.0%	17.0%	12.0%	5.0%
US HY Corp FI	6.0%	6.0%	6.0%	5.0%	0.0%
Int›l Fixed Income	**7.0%**	**7.0%**	**6.0%**	**3.0%**	**0.0%**
EM FI (Hard)	4.5%	4.5%	4.0%	1.5%	0.0%
EM FI (Local)	2.5%	2.5%	2.0%	1.5%	0.0%
Equity	**17.0%**	**33.0%**	**50.0%**	**70.0%**	**87.0%**
US Equity	**11.0%**	**19.0%**	**28.0%**	**37.0%**	**46.0%**
US Large cap growth	4.0%	7.0%	10.0%	13.0%	16.0%
US Large cap value	4.0%	7.0%	10.0%	13.0%	16.0%
US Mid cap	2.0%	3.0%	5.0%	7.0%	8.0%
US Small cap	1.0%	2.0%	3.0%	4.0%	6.0%
International Equity	**6.0%**	**14.0%**	**22.0%**	**33.0%**	**41.0%**
Int›l Developed Markets	6.0%	10.0%	16.0%	24.0%	29.0%
Emerging Markets	0.0%	4.0%	6.0%	9.0%	12.0%
Non-traditional	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**
Hedge Funds	0.0%	0.0%	0.0%	0.0%	0.0%
Private Equity	0.0%	0.0%	0.0%	0.0%	0.0%
Private Real Estate	0.0%	0.0%	0.0%	0.0%	0.0%
Estimated return	**2.24%**	**3.28%**	**4.31%**	**5.49%**	**6.30%**
Estimated risk	**4.91%**	**6.65%**	**8.82%**	**11.45%**	**13.41%**

Source: UBS Wealth Management USA Asset Allocation Committee, as of 27 April 2020.
See Important Information and Disclosures section, Wealth Management USA Asset Allocation Committee and the UBS Capital Market Assumptions and Strategic Asset Allocation Models, for more information.

Important Information and Disclosures

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All information and opinions represent our current views on the topics covered which are based, in part, on information and data obtained from third party and/or publicly available sources. While we believe those sources to be reliable, no representation or warranty, express or implied, is made as to its accuracy or completeness (other than disclosures relating to UBS and its affiliates) of that information.

The information presented is not intended to be a complete statement or summary of the securities, markets or developments referred to in the materials. It should not be regarded by recipients as a substitute for the exercise of their own judgment. Any opinions expressed in this material are subject to change without notice and may differ or be contrary to opinions expressed by other business areas or groups of UBS as a result of using different assumptions and criteria. UBS is under no obligation to update or keep current the information contained herein.

Cautionary statement regarding forward-looking statements.
This report contains statements that constitute "forward-looking statements", including but not limited to statements relating to the current and expected state of the securities market and capital market assumptions. While these forward-looking statements represent our judgments and future expectations concerning the matters discussed in this document, a number of risks, uncertainties, changes in the market, and other important factors could cause actual developments and results to differ materially from our expectations. These factors include, but are not limited to (1) the extent and nature of future developments in the US market and in other market segments; (2) other market and macroeconomic developments, including movements in local and international securities markets, credit spreads, currency exchange rates and interest rates, whether or not arising directly or indirectly from the current market crisis; (3) the impact of these developments on other markets and asset classes. UBS is not under any obligation to (and expressly disclaims any such obligation to) update or alter its forward-looking statements whether as a result of new information, future events, or otherwise.

Wealth Management USA Asset Allocation Committee and the UBS Capital Market Assumptions and Strategic Asset Allocation Models
The capital market assumptions and strategic asset allocation models discussed in this publication were vetted and approved by the Wealth Management USA Asset Allocation Committee (WM USA AAC).

The capital market assumptions are estimates of forward-looking average annual returns for a particular asset class. **They are not guaranteed and do not represent the return of a particular security or investment. The actual performance of any particular security, investment or strategy can differ, perhaps significantly, from these CMAs.**

The strategic asset allocation models are intended to provide a general framework to assist our clients in making informed investment decisions. They are provided for illustrative purposes, and were designed by the WM USA AAC for hypothetical U.S. investors with a total return objective under five different investor risk profiles: conservative, moderate conservative, moderate, moderate aggressive and aggressive. Your UBS Financial Services Inc. Financial Advisor can help you determine how a strategic allocation could be applied or modified according to your individual profile and investment goals.

The CMAs and SAAs do not take into consideration the fees, costs or charges associated with any security, investment, or strategy, including those that may be incurred when implementing an asset allocation.

Asset allocation does not assure profits or prevent against losses from an investment portfolio or accounts in a declining market.

Please note that UBS has changed its capital market assumptions and strategic asset allocation models in the past and may do so in the future.

Index performance data
Index information is provided for illustrative purposes only. Indexes are not available for direct investment and represent an unmanaged universe of securities which does not take into account advisory or transaction fees, all of which will reduce overall return.

Investment Risks
Asset Class is a term that broadly defines a category of investments that share common investment characteristics. Typical broad asset classes include equities, fixed income securities, cash and cash alternatives. This section describes some of the asset classes used in this report and some of the general risk considerations. *All investments involve risks which you should carefully consider prior to implementing an investment strategy*.

Cash: Cash and cash alternatives typically include money market securities or three-month T-Bills. These securities have short maturity dates and they typically provide a stable investment value as compared to other investments and current interest income. These investments may be subject to credit risks and inflation risks. Treasuries also carry liquidity risks for sales prior to maturity. Investments in money market funds are neither insured nor guaranteed by the Federal Deposit Insurance Corporation (FDIC), the U.S. government or any other government agency. There can be no assurance that the funds will be able to maintain a stable net asset value at $1.00 per share or unit.

Equities: Equity securities are subject to market risk and will undergo price fluctuations in which downward and upward trends may occur over short or extended periods. Historically, equities have shown greater growth potential than other types of securities, but they have also shown greater volatility. In addition to these risks, securities issued by small-cap companies may be relatively highly volatile because their earnings and business prospects typically fluctuate more than those of larger-cap companies. Securities issued by non-U.S. companies can have risks not typically associated with domestic securities, including risks associated with changes in currency values, economic, political and social conditions, loss of market liquidity, the regulatory environments of the respective countries and difficulties in receiving current or accurate information.

Fixed Income: Fixed Income represents debt issued by private corporations, governments or Federal agencies. Two main risks related to fixed income investing are interest rate risk and credit risk. Typically, when interest rates rise, there is a corresponding decline in the market value of bonds. Credit risk refers to the possibility that the issuer of the bond will not be able to make principal and interest payments. High yield investments are high yielding securities but may also carry more risk. A bond fund's yield and value of its portfolio fluctuate and can be affected by changes in interest rates, general market conditions and other political, social and economic developments.

Corporate Bonds: Fixed income securities are subject to market risk and interest rate risk. If sold in the secondary market prior to maturity, investors may experience a gain or loss depending on interest rates, market conditions and issuer credit quality.

Municipal Securities: Income from municipal bonds may be subject to state and local taxes based on residency of the investor and may be subject to the Alternative Minimum Tax. Call features may exist that can impact yield. If sold prior to maturity, investments in municipal securities are subject to gains/losses based on the level of interest rates, market conditions and credit quality of the issuer.

Foreign Exchange/Currency Risk: Investors in securities of issuers located outside of the United States should be aware that even for securities denominated in U.S. dollars, changes in the exchange rate between the U.S. dollar and the issuer's "home" currency can have unexpected effects on the market value and liquidity of those securities. Those securities may also be affected by other risks (such as political, economic or regulatory changes) that may not be readily known to a U.S. investor.

Emerging Markets: Investing in emerging market securities can pose some risks different from, and greater than, risks of investing in U.S. or developed markets securities. These risks include: a risk of loss due to political instability; exposure to economic structures that are generally less diverse and mature, and to political systems which may have less stability, than those of more developed countries; smaller market capitalization of securities markets, which may suffer periods of relative illiquidity; significant price volatility; restrictions on foreign investment; and possible repatriation of investment income and capital.

Non-Traditional Asset Classes: Non-traditional asset classes are alternative investments that include hedge funds, private equity, and private real estate, (collectively, alternative investments). Interests of alternative investment funds are sold only to qualified investors, and only by means of offering documents that include information about the risks, performance and expenses of alternative investment funds, and which clients are urged to read carefully before subscribing and retain. **An investment in an alternative investment fund is speculative and involves significant risks.** Specifically, these investments (1) are not mutual funds and are not subject to the same regulatory requirements as mutual funds; (2) may have performance that is volatile, and investors may lose all or a substantial amount of their investment; (3) may engage in leverage and other speculative investment practices that may increase the risk of investment loss; (4) are long-term, illiquid investments, there is generally no secondary market for the interests of a fund, and none is expected to develop; (5) interests of alternative investment funds typically will be illiquid and subject to restrictions on transfer; (6) may not be required to provide periodic pricing or valuation information to investors; (7) generally involve complex tax strategies and there may be delays in distributing tax information to investors; (8) are subject to high fees, including management fees and other fees and expenses, all of which will reduce profits.

Interests in alternative investment funds are not deposits or obligations of, or guaranteed or endorsed by, any bank or other insured depository institution, and are not federally insured by the Federal Deposit Insurance Corporation, the Federal Reserve Board, or any other governmental agency. Prospective investors should understand these risks and have the financial ability and willingness to accept them for an extended period of time before making an investment in an alternative investment fund and should consider an alternative investment fund as a supplement to an overall investment program.

In addition to the risks that apply to alternative investments generally, the following are additional risks related to an investment in these strategies:

- **Hedge Fund Risk**: There are risks specifically associated with investing in hedge funds, which may include risks associated with investing in short sales, options, small-cap stocks, "junk bonds," derivatives, distressed securities, non-US securities and illiquid investments.
- **Managed Futures**: There are risks specifically associated with investing in managed futures programs. For example, not all managers focus on all strategies at all times, and managed futures strategies may have material directional elements.
- **Real Estate**: There are risks specifically associated with investing in real estate products and real estate investment trusts. They involve risks associated with debt, adverse changes in general economic or local market conditions, changes in governmental, tax, real estate and zoning laws or regulations, risks associated with capital calls and, for some real estate products, the risks associated with the ability to qualify for favorable treatment under the federal tax laws.
- **Private Equity**: There are risks specifically associated with investing in private equity. Capital calls can be made on short notice, and the failure to meet capital calls can result in significant adverse consequences including, but not limited to, a total loss of investment.

About Our Wealth Management Services
As a firm providing wealth management services to clients, UBS Financial Services Inc. offers investment advisory services in its capacity as an SEC-registered investment adviser and brokerage services in its capacity as an SEC-registered broker-dealer. Investment advisory services and brokerage services are separate and distinct, differ in material ways and are governed by different laws and separate arrangements. It is important that clients understand the ways in which we conduct business, that they carefully read the agreements and disclosures that we provides to them about the products or services we offer. A small number of our financial advisors are not permitted to offer advisory services to you, and can only work with you directly as UBS broker-dealer representatives. Your financial advisor will let you know if this is the case and, if you desire advisory services, will be happy to refer you to another financial advisor who can help you. Our agreements and disclosures will inform you about whether we and our financial advisors are acting in our capacity as an investment adviser or broker-dealer. For more information, please review the PDF document at **ubs.com/relationshipsummary**. In providing financial planning services, we may act as a broker-dealer or investment adviser, depending on whether we charge a fee for the service. The nature and scope of the services are detailed in the documents and reports provided to you as part of the service.

UBS Financial Services Inc., its affiliates, and its employees do not provide tax or legal advice. Clients should speak with their independent legal or tax advisor regarding their particular circumstances.

UBS Asset Allocation Study

IMPORTANT: The projections or other information generated by the Zephyr Asset Allocation Tool regarding the likelihood of various investment outcomes are hypothetical in nature, do not reflect actual investment results and are not guarantees of future results. Results will vary with each use and over time.

Results reflect the reinvestment of income, but not the impact of transaction costs, advisory fees, taxes and inflation (unless otherwise indicated). If these factors were included, the results shown would be lower.

Historic results are provided for illustrative purposes only and are based on the retroactive application of historic index data to the asset allocation(s) analyzed. The Zephyr tool calculates hypothetical portfolio performance results for the period shown using long-term performance of representative indices as proxies for the hypothetical performance of the asset classes included in the portfolio(s) analyzed. The calculation assumes that the portfolio was rebalanced monthly, which does not necessarily reflect how an actual portfolio would have been managed. Allocations were developed with the benefit of hindsight and results do not consider the impact that material economic and market factors might have had on investment decision-making during the time period. Actual results may be lower than the hypothetical returns and will vary depending on market conditions and the specific composition and implementation of the portfolio. Past performance or historic results provide no guarantee of future returns.

Please see Appendix for important information about this report.
The information herein is based on data and computations by Zephyr Associates and is believed to be reliable but UBS does not warrant its completeness or accuracy.

UBS Capital Market Assumptions

The asset class return, risk, and correlation results used and displayed in this report are based on UBS's estimated forward-looking return, riskas measured by standard deviationand correlation assumptions ("capital market assumptions") as vetted and approved by the Wealth Management Americas Asset Allocation Committee ("UBS WMA AAC"), which are based on UBS proprietary research. The development process includes a review of a variety of factors, including the return, risk, correlations and historical performance of various asset classes, inflation and risk premium.

UBS WMA AAC has developed two sets of return assumptions that are designed for different investment time horizons. The "strategic" returns in the UBS capital market assumptions reflect UBS WMA AAC's expectations for the average annual total return for various asset classes over one full business cycle. The "equilibrium" return assumptions reflect our expectations for average annual returns over multiple business cycles based on certain structural assumptions about the economy, including the long-term potential growth rate and the neutral rate of interest.

UBS WMA AAC's risk assumptions and asset class correlation assumptions remain the same when using strategic or equilibrium return assumptions.

This Analysis uses Equilibrium Return Assumptions

The strategic return assumptions are applicable for short- to long-term investment horizons over a full business cycle, such as when constructing strategic asset allocations or performing custom portfolio analysis or risk monitoring. In contrast, equilibrium return assumptions are appropriate for multi-cycle investment horizons that are typical of long-term planning. You have requested that this analysis use"equilibrium" return assumptions which are shown on the following "Scenario Analysis" page. Using equilibrium return assumptions may be appropriate in certain circumstances for multi-cycle investment horizons to help assess the potential success of a long-term financial plan or the funding status of an institutional pension plan; however, equilibrium return assumptions have limitations for portfolio construction because they do not consider cyclical developments or current economic or market conditions. We recommend using strategic return assumptions to construct and evaluate strategic asset allocations because strategic return assumptions reflect our current return expectations for the cycle.

You should review this analysis in conjunction with the analysis you received using UBS WMA AAC's strategic return assumptions. Please contact your UBS Consultant if you have not received a report using strategic return assumptions.

UBS capital market assumptions are not guarantees and are subject to change at any time at our discretion and without notice. UBS has changed its return, risk and correlation assumptions in the past and may do so in the future. Neither UBS nor your UBS Consultant is required to provide you with an updated analysis based upon changes to these or other underlying assumptions.

Capital market assumptions set by the UBS WMA AAC may differ or be contrary to those established by other business areas or divisions of UBS as a result of using different assumptions and/or criteria. In addition, UBS has a variety of analyses and services that provide portfolio review, including asset allocation strategies. The recommendations and types of analysis may vary depending on the asset allocation analysis used.

Since assumptions are subject to uncertainty, including market forces and factors outside of our control, you should also understand that the assumptions used are estimates, are not guarantees or projections of future results. There is no certainty that the assumptions for the model will accurately estimate asset class return rates going forward. Actual long-term results for each asset class may differ from our assumptions, with those for classes with limited histories potentially diverging more. As a result, UBS will not be responsible for omissions in the analysis, regardless of the source of such inaccuracies, errors, or omissions. In addition, capital market assumptions pertain to the asset or sub-asset class in general, not the performance of specific securities or investments. Particular investment products may have higher or lower returns than the range for the corresponding asset class used in this analysis. Your actual results may vary significantly from the results shown in this report.

Important Information About Your Report

The projections and other information contained in this report have been generated by a digital asset allocation analysis tool developed by Zephyr Associates (the "Zephyr Asset Allocation Tool" or "Zephyr tool"). The goal of the tool is to aid and educate our UBS Consultants, clients and prospective clients in understanding the scope of our service offerings, the issues that should be considered before engaging in an investment strategy or transaction, the basic tenants of investing (particularly with a view towards long-term investing), our views of long-term economic trends and projections and, subject to certain assumptions, the potential effects that a particular strategy, investment program or product or series of transactions may have on a portfolio. You and your UBS Consultant can use this tool to analyze the composition and hypothetical growth of an asset allocation or series of several asset allocations (e.g., your current allocation, a UBS strategic asset allocation model, a custom allocation develop by you and your UBS Consultant based on your individual investment policy, etc.).

The information in this report is based on data and computations provided by Zephyr Associates and other third parties. UBS believes this information to be reliable but we have not independently verified and do not guarantee the accuracy or completeness of the data and computations.

IMPORTANT: The projections or other information generated by the Zephyr Asset Allocation Tool regarding the likelihood of various investment outcomes are hypothetical in nature, do not reflect actual investment results and are not guarantees of future results.

Actual results may vary with each use and over time depending on the specific composition of the investor's portfolio, when the portfolio is implemented, and with changing market conditions. All results reflect realized and unrealized gains and losses and the reinvestment of income. Unless otherwise indicated, results do not include the impact of transaction costs (e.g., commissions, mark-ups, mark-downs, fees), advisory fees, or taxes. If these factors were included, the results shown would be lower. Assets are classified based on UBS' proprietary classification methodology (assets held at UBS) or as identified by you (assets held at other financial institutions). Rebalancing to the asset allocation shown is assumed to have occurred at the beginning of each month for the period shown.

Scope of our Services

UBS Financial Services Inc. ("UBS") makes the interactive Zephyr Asset Allocation Tool available to certain UBS Consultants, clients and prospective clients to conduct certain asset allocation analyses. This Zephyr Asset Allocation Tool report is provided for informational purpose only and is not an offer to buy or sell any security or investment strategy, is not meant to be a comprehensive financial plan, and does not create an investment advisory relationship between you and UBS or your UBS Consultant.

This report is intended to aid (and be used by) your UBS Consultant in providing you with actual individualized investment advice. Therefore, the report should only be considered in conjunction with the actual recommendations and advice of your UBS Consultant, our standard account documents, agreements and disclosures and the additional factors that warrant consideration for your particular financial situation, including costs.

Neither UBS Financial Services nor any of its employees provide tax or legal advice. You must consult with your legal or tax advisors regarding your personal circumstances.

You are not required to implement any of the asset allocation strategies modeled in this report. If you would like UBS to assist you in making any changes to your current asset allocation strategy, the capacity in which we act will depend on, and vary by, the nature of the product, service or account that you select for implementation (i.e., brokerage or advisory). Understanding the ways in which we can conduct business under applicable laws and regulations is essential to the relationship between You and Us.

As a firm providing wealth management services to clients in the U.S., UBS Financial Services Inc. is registered with the U.S. Securities and Exchange Commission as an investment adviser and a broker-dealer, offering both investment advisory and brokerage services. At the end of this report you will find a detailed explanation regarding the distinctions between investment advisory programs and brokerage service, including how we charge for these services and our respective responsibilities to you. See Conducting Business with UBS: Investment Advisory and Broker-Dealer Services. **It is important that you review and understand the agreements and disclosures we provide to you about the products or services offered. If at any time you would like clarification on the nature of your accounts or the services you are receiving, please speak with your UBS Consultant or visit our website at [http://www.ubs.com/workingwithus.](http://www.ubs.com/workingwithus)**

Overview

This report is presented for illustrative purposes as a general assessment of the asset allocation strategies displayed. The asset allocations analyzed may include a number of your existing accounts, each with a potentially different investment objective and risk parameter. Where applicable, these accounts have been considered as a whole in helping you develop an overall asset allocation strategy. When considering whether or not to implement any of the asset allocation strategies presented, to buy or sell securities, or to participate in any UBS program, you should carefully review the impact of such changes on each account involved and the impact on the overall portfolio.

Please note that it is your responsibility to determine whether to implement any of the allocation strategies identified in this report and how such implementation would be accomplished. UBS will not track or monitor specific investments you make to determine whether they complement your existing investment objectives, investment policy or any asset allocation strategy you may adopt, unless you have specifically engaged us to provide such monitoring. In addition, this report will not be updated to reflect any changes in your investment strategies, risk tolerances or market conditions.

If your assets are held at UBS Financial Services Inc., your UBS Financial Services Inc. account statements are the only official record of your UBS holdings and account and are not replaced, amended or superseded by any of the information presented in this report.

This report is not intended to provide you with consolidated information or reporting regarding your holdings at other firms. However, at your request, this report may include information regarding assets that you hold at other financial institutions so that we may review your asset allocation and/or investment strategy in the context of your overall holdings. If your assets are held at other financial institutions, this report will be based on information regarding holdings, balances and values of assets you provided to us. We have not verified, and are not responsible for, the accuracy or completeness of this information. **If the information you provided is not current, inclusion of these assets will impact the accuracy of the current asset allocation and other analysis presented. You should review the account statements and other documentation you receive from your third party custodian for their record of the assets and asset values held in your accounts. The account statements you receive from your third party custodian regarding the assets you hold with them are the official record of your holdings and accounts and are not impacted or superseded by the information in this report.**

UBS's SIPC coverage only applies to assets held at UBS. If you maintain assets at other firms that may be SIPC members, you should contact their financial representative or the other entity or refer to the other entity's statement regarding SIPC membership.

Asset Allocation Presented and Analysis Assumptions

The results in this report are based on information regarding your investment objectives (as reflected by your allocation criteria), risk tolerance, cash flow requirements, time horizon and other views and requirements. We rely on the accuracy of the information you provide to us in developing this report. Please review the client inputs described in this report carefully as inaccuracies can materially impact the analysis, and advise your UBS Consultant if any change is necessary.

The asset allocation(s) analyzed can be your current asset allocation, a UBS strategic asset allocation or a customized asset allocation developed by you and your UBS Consultant based on your investment policy and risk profile. All asset allocations analyzed were identified by you and/or your UBS Consultant. You should understand that the asset allocation can be modeled at the asset class (e.g., equities, fixed income, etc.) or the sub-asset class (e.g., large-cap equities, emerging market equities) and that there may be asset or sub-asset classes not presented that have characteristics similar or superior to those analyzed in this report. Your UBS Consultant can provide additional information regarding the allocation model(s) analyzed in this report.

UBS strategic asset allocation models are developed using a proprietary process based on UBS capital market assumptions (see Return, Risk, and Correlation Assumptions). UBS has changed its asset allocation models in the past and may do so in the future as circumstances warrant. If UBS strategic asset allocations are used in this report, neither UBS nor your UBS Consultant is required to provide you with an updated analysis based upon changes to asset allocation or other underlying assumptions.

Asset allocation does not assure a profit or eliminate the risk of a loss.

Efficient Frontier Analysis

Mean-Variance Optimization tools may be used to help determine optimal allocations to different asset classes within a portfolio given a certain level of acceptable risk. The Efficient Frontier analysis is a mean-variance optimization methodology that calculates a series of optimal portfolios that offer the highest expected return for a given level of risk or the lowest risk for a given level of expected return. The Efficient Frontier is determined based on estimated forward-looking risk, return, and correlation of assets assumptions established by UBS (see Return, Risk, and Correlation Assumptions section) and your specific guidelines regarding time horizon and investment objective/ risk tolerance (as reflected in allocation constraints). Each point on the frontier is theoretically efficient based on the given assumptions. An "inefficient portfolio" does not lie on the frontier because alternate portfolios can be found that offers more return for the same amount of risk or the same expected return with a less risk. "Efficient" portfolios on the frontier line are more desirable to investors trying to maximize return and minimize risk. The selection of a proper portfolio depends upon the investor's goals and risk tolerance.

Mean-variance optimization is very sensitive to changes in the forward-looking capital market assumptions and may result in asset allocations and portfolios that are highly concentrated. Your UBS Consultant can provide additional information regarding the Efficient Frontier analysis in this report.

Deterministic Analysis

Except for any probabilistic analysis sections of this report, a deterministic analysis is used to illustrate the hypothetical growth of the asset allocation strategies presented based on an assumed rate of return, risk and correlation for each asset or sub-asset class identified within the strategy. The rate of return, risk and correlations used are based on estimated forward-looking assumptions established by UBS (see Return, Risk, and Correlation Assumptions section below).

In order to create the analysis presented, the rates of return for each asset or sub-asset class are combined in the same proportion as the asset allocation(s) illustrated (e.g., if the asset allocation indicates 40% equities, then 40% of the results shown for the allocation will be based on the estimated forward-looking risk, return, and correlation assumptions for equities based on UBS proprietary research).

Simulated Portfolio Value Probability Analysis

Simulated Portfolio Value Probability Analysis (frequently referred to as "Monte Carlo" simulations), is another tool for evaluating the potential future performance of the asset allocation strategies presented. Monte Carlo analyses incorporate future uncertainty by simulating possible return scenarios for a portfolio under variable market conditions. Monte Carlo analysis generally performs several thousand simulations, each simulating the growth of the modeled asset allocation over a specified period of time and assuming certain client inputs and a variety of returns and scenarios, all of which are subject to change as a result of market volatility, economic factors and world events. Monte Carlo results present the probability of achieving certain targets based on the results of the simulations.

IMPORTANT: The projections or other information in this report regarding the likelihood of various investment outcomes are hypothetical in nature, do not reflect actual investments results and are not guarantees of future results.

Monte Carlo simulations are based on estimated forward-looking return, risk and correlation assumptions established by UBS (see Return, Risk and Correlation Assumptions section).

Unless noted otherwise, the analysis assumes a constant rate of inflation and does not account for variations in inflation rate over time. Monte Carlo simulations also account for certain client inputs and assumptions regarding inflation and cash flows, the accuracy of which will materially impact the results of the analysis. Please review the client inputs described and advise your UBS Consultant if any change is necessary. Unless specifically included as an outflow, the analysis will not account for investment advisory fees, transaction fees or taxes.

Monte Carlo results are intended to represent a spectrum of possible return outcomes for the modeled asset classes based on the established assumptions. The portfolio value at the end of each scenario is recorded and compared against the established portfolio target. The probability of achieving a target is calculated by dividing the number of scenarios where the portfolio value equaled or exceeded the target by the total number of scenarios. Note that the highest likelihood of success is 99% because there is never a guarantee that a particular result will be actualized. Results should only be viewed as reasonable estimates of possible outcomes and not as a guarantee, prediction or projection. The results shown may vary with each use and over time and if any of the underlying assumptions change. Your actual results can vary materially from the results shown in this analysis.

Monte Carlo analysis does not take into account actual market conditions that may severely affect your portfolio results over the long-term. It does not reflect the average periods of bull and bear markets, which can be longer than those modeled.

The analysis also does not consider short-term correlations among asset class returns and does not consider the results that could occur from an extreme market event, either positive or negative, due to the low probability of such an occurrence. A market crises can cause asset classes to perform similarly, lowering the accuracy of our return assumptions and diminishing the benefits of diversification in ways not captured by the analysis. As a result, returns actually experienced by the investor may be more volatile than those used in our analysis.

Your UBS Consultant can provide additional information regarding the Monte Carlo/Simulated Portfolio Value Probability analysis reflected in this report.

Historic Asset Allocation Backtest

If the historical performance of an asset allocation is provided, the historical performance does not reflect your actual performance but, rather, was calculated by the retroactive application of historic index results to the asset allocation(s) analyzed. This performance is based on the long-term performance of certain indexes that have been selected by UBS (or as requested by the Client) as a representative proxy for the asset classes in the asset allocation(s) or portfolio(s) analyzed. See the Scenario Assumptions section for a description of the index proxies used for each asset class in this analysis. UBS selects proxy indices based on our research and understanding of the asset class or the allocation and strategy of the investments in your portfolio, or as requested by the client. Because the asset allocations were structured with the benefit of knowing how each asset class and benchmark performed during the period shown, the hypothetical returns may be higher than the returns of a portfolio that would have been recommended during the time period shown. In addition, backtested performance does not reflect the impact that past economic and market factors might have had on investment decision-making. The results shown reflect realized and unrealized gains and losses and the reinvestment of income, but do not include the impact of transaction costs, advisory fees, taxes and inflation. If these were included, the results shown would be lower. Please note that the historical backtest analysis considers data over the period shown and assumes that the asset allocation was rebalanced at the beginning of each month back to the initial asset allocation. This rebalancing frequency does not necessarily reflect how an actual portfolio would have been managed. There is no guarantee that these backtested results could, or would, have been achieved had this asset allocation been used during the years presented.

Past performance or historic results provide no guarantee of future returns.

Return, Risk and Correlation – Assumptions Forward-Looking Estimates

The asset class risk and return results used and displayed in this report, as well as the asset class correlations, are based on estimated forward-looking return, risk?as measured by standard deviation?and correlation assumptions ("capital market assumptions"), which are based on UBS proprietary research. The development process includes a review of a variety of factors, including the return, risk, correlations and historical performance of various asset classes, inflation and risk premium.

The strategic returns in the UBS capital market assumptions consider returns over a full business cycle. The capital market assumptions are subject to change at any time at our discretion and without notice. UBS has changed its return, risk and correlation assumptions in the past and may do so in the future. Neither UBS nor your UBS Consultant is required to provide you with an updated analysis based upon changes to these or other underlying assumptions.

Since assumptions are subject to uncertainty, including market forces and factors outside of our control, you should also understand that the assumptions used are estimates, are not guarantees or projections of future results. There is no certainty that the assumptions for the model will accurately estimate asset class return rates going forward. Actual long-term results for each asset class may differ from our assumptions, with those for classes with limited histories potentially diverging more. As a result, UBS will not be responsible for omissions in the analysis, regardless of the source of such inaccuracies, errors, or omissions. In addition, capital market assumptions pertain to the asset or sub-asset class in general, not the performance of specific securities or investments. Particular investment products may have higher or lower returns than the range for the corresponding asset class used in this analysis.

Your actual results may vary significantly from the results shown in this report.

Periodic Reviews

This report is based on information you have provided as of the date indicated. Over time, your financial circumstances or the other assumptions and estimates that underlie this report may change. For this reason, you should periodically meet with your UBS Consultant to re-evaluate your financial situation, reassess your asset allocation strategy, and review the assumptions upon which this information is based.

Asset Class Risk Considerations

Some of the general risk considerations associated with the asset classes included in this report are described below. The descriptions are not meant to be a complete list of all investment risks. Individual funds and investments will have specific risks related to their investment programs that will vary from fund to fund. Clients should familiarize themselves with the particular market risks and the other risks associated with the specific investment. All investments contain risk and may lose value.

Alternative Investment Strategies –Alternative investment strategies are investment vehicles that are formed by professional money managers to afford them greater flexibility to manage money in any market environment. These strategies typically have flexibility regarding the types of securities in which they can invest (e.g., options and futures contracts), the types of positions they can take (e.g., long and short positions) and the amount of leverage they are permitted to employ. A professional money manager can use these and other techniques to modify market exposure and create portfolio characteristics that may be desirable for certain clients (e.g., reduced correlation to financial markets, potential lower volatility, and better performance in "down" markets). This flexibility can add value when used skillfully. This flexibility does, however, add additional elements of risk and complexity, including that alternative investments are often long-term, illiquid investments that are subject to restrictions on transfer and not easily valued. Note that due to the nature of alternative investments, the risk and return assumptions used in this analysis may tend to overstate potential benefits but not fully reflect potential risks.

Interests of Non-Traditional Investment Strategies are sold only to qualified investors, and only by means of offering documents that include information about the risks, performance and expenses of the funds, and which Clients are urged to read carefully before subscribing and retain. An investment in a fund is speculative and involves significant risks. The funds' performance may be volatile, and investors may lose all or a substantial amount of their investment in a fund. The funds may engage in leveraging and other speculative investment practices that may increase the risk of investment loss. The funds are subject to high fees, including management fees and other fees and expenses, all of which will reduce profits. Prospective investors should understand these risks and have the financial ability and willingness to accept them for an extended period of time before making an investment in a fund. Investors should consider a fund as a supplement to an overall investment program.

Investing in the fixed income market is subject to risks including market, interest rate, issuer, credit, default and inflation risk. An investment in a portfolio may be worth more or less than its original cost when redeemed. Derivatives may involve certain costs and risks such as liquidity, interest rate, market, credit, management, default risk, and the risk that the position could not be closed when most advantageous. Investing in derivatives could lose more than the amount invested.

Equity investments represent ownership interest in a company. Historically, equities are more risky than fixed income or cash investments as they experience greater volatility risk, which is the risk that the value of your investment may fluctuate over time. The value of investments in equity securities will fluctuate in response to general economic conditions and to changes in the prospects of particular companies and/or sectors in the economy. The risk of equity investments can vary based on the market capitalization (market value) of the company, for example, Large, Mid, and Smid. Investments in small cap and medium company stocks can be more volatile over the short term than investments in large company stocks.

Non-U.S. Equity and Fixed Income represent ownership interests and debt, respectively, of foreign governments and corporations that can be sub-divided into those from countries that have "Developed Markets" or "Emerging Markets." Foreign investing involves risks, including, but not limited to, risks related to foreign currency, limited liquidity, less government regulation and the possibility of substantial volatility due to adverse political, economic or other developments. Investors in securities of issuers located outside of the United States should be aware that even for securities denominated in U.S. dollars, changes in the exchange rate between the U.S. dollar and the issuer's "home" currency can have unexpected effects on the market value and liquidity of those securities. Those securities may also be affected by other risks.

Calculation Definitions

This section includes descriptions for the terms and calculations used within this report. Your UBS Consultant can provide additional information regarding the terms, calculations, and results contained within this report.

Alpha: **Alpha is a measure of risk-adjusted return. It measures the difference between a portfolio's returns and the returns the portfolio might be expected to deliver based on the portfolio's level of risk (beta) and a benchmark index over the date range shown. Unless otherwise described, the Zephyr tool uses the S&P 500 as the market benchmark for calculating alpha. A positive alpha means the portfolio outperformed expectations for the period shown, while a negative alpha indicates that the portfolio underperformed expectations during the period shown. If two portfolios have the same return, but one has a lower beta, that portfolio would have a higher alpha.**

Annualized Returns: **An annualized return is the geometric average return of a portfolio for each year over the time period shown. Annualized returns take into account compounding returns by considering the portfolio's** cumulative return **(the total compounded portfolio return over the time period) and expressing that as a per year figure. Annualized returns only provide a snapshot of investment performance as of a given date and do not indicate volatility over the time period analyzed.**

Average Positive Return/Average Positive Return: **To calculate the average positive return and average negative return for a portfolio over a given date range, the Zephyr Asset Allocation Tool partitions the portfolio's series of returns into two parts, one made up of the positive periods of returns (up periods), the other of the zero and negative periods of returns (down periods). The average positive/up and negative /down returns are the respective averages of these two series.**

Batting Average: **The batting average of a portfolio is the ratio between the number of periods where the portfolio outperforms a benchmark and the total number of periods. Unless otherwise described, the Zephyr tool uses the S&P 500 as the market benchmark for calculating batting average.**

Best Case/Worse Case: **See Range of Returns.**

Best Month Return/Worse Month Return: **The best month return is simply the maximum of the monthly returns inside the given date range. Similarly, the worst month return is the minimum of the monthly returns inside the date range.**

Best Quarter Return/Worse Quarter Return: **The best quarter return is simply the maximum of the quarterly returns inside the given date range. Similarly, the worst month return is the minimum of the quarter returns inside the date range.**

Best Year Return/Worse Year Return: **To calculate the best one-year return for a given portfolio, the Zephyr Asset Allocation moves a one-year time window along the series and calculates the compound return for each of these windows. The best one-year return is the maximum of the returns thus found. Similarly, the worst one-year return is the minimum of the returns thus found. Note that best and worst one-year returns do not refer to calendar years. Rather, they refer to arbitrarily placed one-year periods.**

Beta: **Beta represents the systematic risk of an analyzed portfolio. Beta measures how the analyzed portfolio performed in relation to the performance of a benchmark index during the time period shown. Unless otherwise described, the Zephyr tool uses the S&P 500 as the benchmark index for calculating beta. A portfolio with a beta of one is considered to be as volatile (risky) as the benchmark and would therefore have provided returns equal to those of the market benchmark during both up and down periods over the date range analyzed. A portfolio with a beta of two would have moved approximately twice as much as the benchmark.**

Conditional Value at Risk: **See Value at Risk.**

Constraints, Min and Max: **Portfolio asset class constraints established by the Client to force minimum or maximum allocations to selected asset classes when generating an Efficient Frontier.**

Correlation (R): **Correlation represents the degree to which an investment's return moves in tandem with another and is a critical component of diversified portfolio construction. The Correlation of assets varies between a minimum of -1 (move in opposite direction) and a maximum of 1 (completely correlated). A correlation of 0 indicates no relationship between the investments. When included within a portfolio, assets with lower Correlations to the other assets in the portfolio enhance diversification and result in better risk-adjusted expected returns for the portfolios. An** R **of less than 0.3 is often considered low Correlation. Correlation may also be used to represent the degree to which an portfolio's return moves in tandem with a benchmark or an asset class moves in tandem with another asset class.**

Cumulative Distribution of Return: **See Omega.**

Cumulative Excess Return: **See Excess Return.**

Distribution of Returns: The range of possible outcomes that may be expected for a portfolio compounded over the time period(s) shown based on the asset class return, risk (standard deviation), and correlation assumptions set by UBS (and accounting for any Constraints imposed by the Client). The distribution of returns presents the annualized returns after the period(s) shown and displays various percentiles which represent the percentage of possible return outcomes that may be expected to be equal to or lower than the stated return. The percentiles displayed include the 5th percentile, 25th percentile, 50th percentile (which is a median return), 75th percentile, and 95th percentile.

Down Capture: See Up Capture/Down Capture.

Drawdown: Any sub-period of time during the date range analyzed where the portfolio had a negative loss percentage starting from the date of the loss began (drawdown start date) and ending on the date of the lowest value before the portfolio recovered to its value before the loss began (drawdown end date). Conceptually, this is the "peak to trough" of the drawdown when displayed on a graph. Drawdown measures the loss percentage (compounded, not annualized) that a portfolio incurred during any sub-period of the date range analyzed. See Maximum Drawdown.

Drawdown Average: The arithmetic average of all returns during all drawdowns over the date range analyzed. The drawdown average is based on drawdowns that begin with a drawdown start date and end with a drawdown end date. Compare to Average Negative Return which is the arithmetic return of all periods (e.g., calendar months) that had a negative return during that period.

Efficient Frontier: Nobel Laureate Harry Markowitz developed mean-variance optimization as a way to create optimal portfolios based on risk-return trade-offs. The optimization, which results in an Efficient Frontier, uses three inputs – returns, standard deviations (risk), and correlations – to combine assets into portfolios that maximize return for any given level of risk.

Excess Return: Excess return represents the difference between the return of the analyzed portfolio and the return of a benchmark. Unless otherwise described, the Zephyr tool uses the S&P 500 as the market benchmark for calculating excess return. A positive excess return implies that the portfolio outperformed the benchmark. Cumulative excess returns represent the difference between the total returns in the portfolio and the total returns for the benchmark during a given date range and annualized excess returns represent the difference between the annualized returns of the portfolio series and the annualized returns of the benchmark during a given date range.

Expected Return:See Range of Returns.

Expected Risk: See Range of Returns.

Information Ratio: Information Ratio measures the consistency of excess returns of a portfolio compared to a benchmark. The information ratio is the portfolio's annualized excess return over a benchmark divided by the portfolio's annualized standard deviation of excess return over the benchmark (i.e. tracking error). Unless otherwise described, the Zephyr tool uses the S&P 500 as the market benchmark for calculating the information ratio.

Inflation: The Monte Carlo simulation projections can include an inflation rate that would be applied to each year being simulated.

Interpolate: The Monte Carlo Simulation allows Clients to use multiple expected return distributions using the interpolate option. Clients can enter supplementary mean and standard deviation values in addition to the mean and standard deviation values established by the UBS capital market assumptions. The mean and standard deviation define a distribution that represents possible future returns. Clients can also choose the distribution type as either normal or log-normal. Log-normal distribution intends to account for observations that returns are never less than -100% and that over longer time periods (such as a year) returns are positively skewed. Please speak with your UBS Consultant for more information regarding additional mean and standard deviation values and log-normal distribution.

Kurtosis: Kurtosis characterizes the relative peakedness or flatness of a distribution of returns compared with a normal distribution. Positive kurtosis indicates a relatively peaked distribution. Negative kurtosis indicates a relatively flat distribution.

MAR (minimal acceptable return): A minimal return figure established to assess a portfolio's ability to achieve a certain target. See Sortino Ratio and Omega.

Maximum Drawdown: Maximum drawdown is the maximum loss percentage (compounded, not annualized) that a portfolio incurred during any sub-period of the date range analyzed. Conceptually, this is the biggest "peak to trough" loss, beginning with the maximum drawdown start date (the date the maximum loss percentage started) and ending with the maximum drawdown end date (the date that the portfolio hit its lowest point before recovering to the peak level reached before the maximum drawdown). The calculation looks at all sub-periods of the entire time period analyzed and calculates the compounded return of the portfolio or index over that period. The maximum drawdown loss value is the largest negative value of all these compounded return periods (or zero if there were no drawdowns during the period analyzed). The maximum drawdown length is the number of periods (days, months, or quarters depending on the periodicity of the data) between the maximum drawdown start date and the maximum drawdown end date. The maximum drawdown recovery date is the date that the portfolio returns to the drawdown start date (the date at which the compounded returns regain the peak level that was reached before the maximum drawdown began). The maximum drawdown recovery length is the number of periods it takes to reach the recovery level from maximum drawdown end date.

Monte Carlo Percentiles: Probability distributions of asset value outcomes generated from the Monte Carlo Simulations.

Monte Carlo Probabilities: The probability of the wealth goal (or target) is the number of simulation trials that meet or exceed the wealth goal (or target) divided by the total number of trials.

Omega: Omega relative to a given minimal acceptable return (MAR) is the ratio between the price of a European call option written against the investment and the price of a European put option written against the investment, with the strike price being equal to the MAR in both cases. Omega is represented graphically as a cumulative distribution of returns function where the x-axis (horizontal axis) of the graph displays returns and the y-axis (vertical axis) of the graph displays the probability that a given portfolio will achieve or exceed that return figure. Upside Omega is the area on a cumulative distribution between the vertical minimum acceptable return (MAR) line and the distribution above the MAR. This is highlighted in green on the Cumulative Distribution of Returns slide(s). It is the numerator in the omega calculation. Downside Omega is the area on a cumulative distribution between the vertical minimum acceptable return line (MAR) and the distribution below the MAR. This is highlighted in red on the Cumulative Distribution of Returns slide(s). It is the numerator in the omega calculation.

Pain Index: The Pain Index is a statistic developed by Zephyr exclusively for use within the Zephyr Asset Allocation tool. It represents the frequency, the depth, and the width of the portfolio's drawdowns by calculating the area enclosed by the downward drawdown graph and the zero drawdown line, divided by the length of the time interval. The pain index is an attempt to capture in one single number as much of the information that is contained in the drawdown graph as possible, rather than just the maximum drawdown number. This number increases as the spikes grow more frequent, deeper, or wider during the same time period.

Pain Ratio: The Pain Ratio indicates the excess return per unit of total risk as measured by the pain index of the portfolio. It is a ratio of the portfolio's annualized excess returns over the risk-free rate to the portfolio's pain index. The pain ratio is a measure of the premium earned for the risk incurred by the portfolio.

Range of Returns: A Range of Returns indicates the range of possible outcomes calculated by the cumulative returns compounded over the period(s) shown for a given portfolio based on UBS return, risk, and correlation assumptions (and Client Constraints). The expected return is the annualized return after the period(s) shown under a base case scenario. The best/worst case return is the annualized return after the period(s) shown under a best/worst case scenario, and the expected risk is the standard deviation of the expected return. As the time horizon increases, the expected risk moves towards zero. For any given portfolio, the expected return for a time period is represented by the 50th percentile (which is a mean return) and the expected best case scenario by the 95th percentile and the expected worst case scenario by the 5th percentile. The likelihood of obtaining a total portfolio value that is more extreme than the best/worst case cumulative value (given the capital market assumptions and Constraints) is approximately 2.5%.

R-Squared: The R-Squared (R2) of a portfolio measures the variance of the portfolio's returns compared to the variance of a benchmark's returns in order to determine how closely the portfolio tracks the benchmark. R2 ranges between zero and 100%. An R2 of 100% indicates perfect tracking, while an R2 of zero indicates no tracking at all. Unless otherwise described, the Zephyr tool uses the S&P 500 as the benchmark for calculating R2.

Relative Constraints: These are portfolio asset allocation constraints established by the Client indicating the allocation to an asset class or asset class group has to be less than, greater than or equal to another asset class or asset class group.

Return, Risk, and Correlation assumptions: Mean-Variance optimization uses three inputs to generate the Efficient Frontier: Returns, Standard Deviations (Risk) and Correlations. These are commonly referred to as the Capital Market Assumptions for generating the Efficient Frontier. These values are based on UBS estimated forward-looking assumptions based on UBS proprietary research (see the Return, Risk, and Correlation Assumptions – Forward-looking Estimates section for more information).

Sharpe Ratio: The Sharpe Ratio indicates the excess return per unit of total risk as measured by standard deviation. It is a ratio of the portfolio's arithmetic average of excess returns over the risk-free rate to the portfolio's standard deviation. The Sharpe Ratio is a measure of the premium earned for the risk incurred by the portfolio. The Sharpe Ratio – Internal is similar to the Sharpe Ratio, but the denominator is the standard deviation of the portfolio's excess returns over the risk-free rate (i.e. tracking error). This captures the risk associated with the excess returns instead of the risk solely associated with the portfolio.

Skewness: Skewness characterizes the degree of asymmetry of a distribution around its mean. Positive skewness indicates a distribution with an asymmetric tail extending toward more positive values. Negative skewness indicates a distribution with an asymmetric tail extending toward more negative values.

Sortino Ratio: The Sortino Ratio indicates the excess return per unit of total risk as measured by downside deviation. It is a ratio of the portfolio's arithmetic average of excess returns over a minimum acceptable return (MAR) to the portfolio's downside deviation. The Sortino ratio uses the downside deviation with a constant MAR indicated. Downside deviation measures the deviation between returns that are less than the MAR and the MAR.

Standard Deviation: A measure of the extent to which observations in a series vary from the mean of the series. The standard deviation of a series of asset returns is a measure of volatility or risk of the asset. A large standard deviation implies that there have been large swing in the return series. The standard deviation calculation assumes that the return series is a sample of possible returns, while the population standard deviation assumes that the series has all of the returns in the population.

Tracking Error: Tracking Error measures the difference between the returns of the analyzed portfolio and those of a benchmark. Tracking error is calculated as the annualized standard deviation of the excess return of the portfolio compared to the benchmark return. The lower the tracking error, the more closely the portfolio's returns tracked those of the benchmark. Unless otherwise described, the Zephyr tool uses the S&P 500 as the market benchmark for calculating tracking error.

Trailing Year Returns: Returns trailing from the date analyzed. All returns over one year are annualized.

Treynor Ratio: The Treynor Ratio is a risk-adjusted measure of return which uses beta to represent risk. It is the portfolio's excess return over the risk-free rate divided by the portfolio's beta to the selected benchmark. The Treynor Ratio differs from the Sharpe Ratio insofar as the beta to the market benchmark is used as the measure of risk rather than the standard deviation of the portfolio series.

Up Capture/Down Capture: The up and down capture measure how well the portfolio was able to replicate or improve on phases of positive benchmark returns and how badly the portfolio was affected by phases of negative benchmark returns. To calculate the up capture, we first form a new return series from the portfolio and benchmark return series by dropping all time periods where the benchmark return is zero or negative. The up capture is then the ratio of the annualized return of the resulting portfolio series to the annualized return of the resulting benchmark series. The down capture is calculated analogously. Unless otherwise described, the Zephyr tool uses the S&P 500 as the benchmark for calculating the up capture and down capture.

Upside/Downside Deviation: Downside deviation measures the deviation between returns that are less than a target return and the target return. Upside deviation measures the deviation between returns that are more than a target return and the target return. Target returns may be referred to as a minimal acceptable return (MAR).

Value at Risk: Nonparametric Value at Risk (VaR) attempts to evaluate risk by applying historical returns for a portfolio and determining a VaR value where a certain percentage (called the confidence level) of the rest of the portfolio's returns exceeded that VaR value. For example, if the confidence level is 95%, that means that 95% of the portfolio's historical returns over the given date range were more than the VaR and analogously that 5% of the portfolio's historical returns over the given time frame were less than the VaR. If the confidence level is 99%, that means that 99% of the portfolio's historical returns exceeded the VaR and 1% of the portfolio's returns were less than the VaR. Conditional Value at Risk (CVaR) quantifies the amount of tail risk for an investment portfolio by calculating the average return of the portion of the portfolio's historical returns that exceeded a given confidence level. For example, if the confidence level is 95%, the CVaR calculates the average return of the worst 5% of historical returns over the given time frame. CVaR provides an average historical loss whereas VaR provides a range of the historical losses.

Worst Month Return/Worst Quarter Return: See Upside/Downside.

Conducting Business with UBS: Investment Advisory and Broker Dealer Services

As a wealth management firm providing services to clients in the United States, UBS Financial Services Inc. is registered with the U.S. Securities and Exchange Commission (SEC) as a broker-dealer and an investment adviser, offering both brokerage and investment advisory services.

Our clients work with their UBS Consultants to determine the services that are most appropriate given their financial goals and circumstances. Based on the services you request, we can fulfill your wealth management needs in our capacity as a broker-dealer, as an investment adviser, or as both. Most of our UBS Consultants are qualified and licensed to provide both brokerage and investment advisory services depending on the services requested by their clients.

In addition, some of our UBS Consultants hold educational or professional credentials, such as the Certified Financial Planner™ (CFP®) designation (Certified Financial Planner Board of Standards Inc. owns these certification marks in the U.S., which it awards to individuals who successfully complete CFP Board's initial and ongoing certification requirements). Holding a professional designation typically indicates that the UBS Consultant has completed certain courses or continuing education. However, a UBS Consultant's professional designation does not change the obligation of UBS or the UBS Consultant to you in providing investment advisory or brokerage services to you.

It is important to understand that brokerage and investment advisory services are separate and distinct and each is governed by different laws and separate arrangements that we may have with you. While there are similarities between the brokerage and investment advisory services we provide, depending on the capacity in which we act, our relationship and legal duties to you are subject to a number of important differences as described in our applicable contracts with you.

This document is intended to inform you about the key distinctions between brokerage and investment advisory services and our respective duties and obligations. We encourage you to review this document carefully and discuss it with your UBS Consultant.

Our Services as a Broker-Dealer and Relationship with You

As a full-service broker-dealer, our services are not limited to taking customer orders and executing securities transactions. In our capacity as broker-dealer, we may provide a variety of services relating to investments in securities, including investment research, trade execution and custody services. In a brokerage account, you pay us commissions and applicable fees each time we execute a transaction in your account.

We also may make recommendations to our brokerage clients about whether to buy, sell or hold securities. We consider this to be part of our brokerage services and do not charge a separate fee for this advice. Our recommendations must be suitable for you in light of your particular financial circumstances, goals and tolerance for risk. When we provide recommendations with respect to a retirement account such as an IRA, we do so pursuant to the laws, regulations and exemptions that apply to these accounts.

When we work with you in our capacity as broker-dealer, we do not make investment decisions for you or manage your accounts on a discretionary basis. We will only buy or sell securities for brokerage clients based on specific directions from you.

Our Responsibilities to You as a Broker-Dealer

When we act as your broker, we are subject to the Securities Exchange Act of 1934, the Securities Act of1933, the rules of self-regulatory organizations such as the Financial Industry Regulatory Authority (FINRA), the rules of the New York Stock Exchange and applicable state laws.

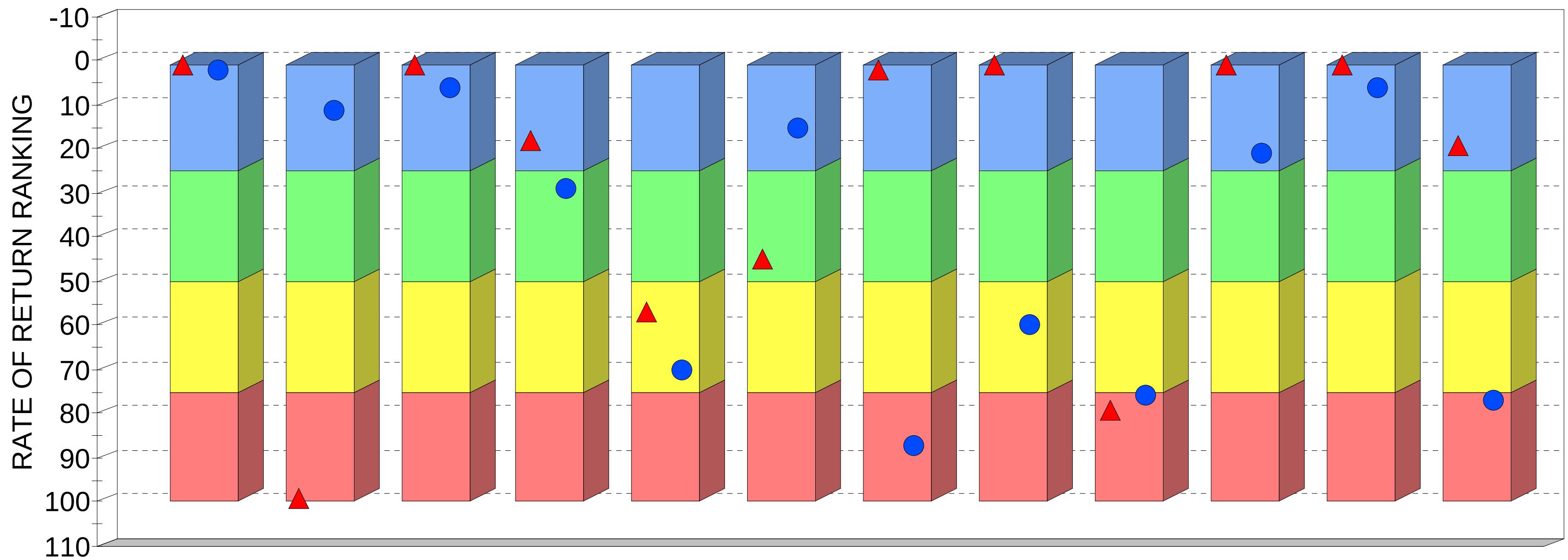
The standards for broker-dealers under these rules and regulations include the following:

- As your broker-dealer, we have a duty to deal fairly with you. Consistent with our duty of fairness, we are obligated to make sure that the prices you receive when we execute transactions for you are reasonable and fair in light of prevailing market conditions and that the commissions and other fees we charge you are not excessive.
- We must have a reasonable basis for believing that any securities recommendations we make to you are suitable and appropriate for you, given your individual financial circumstances, needs and goals.
- We are permitted to trade with you for our own account ("principal trading") or for an affiliate or another client and may earn a profit on those trades. When we engage in these trades, we disclose the capacity in which we acted on your confirmation, though we are not required to communicate this or obtain your consent in advance or to inform you of the profit earned on the trades.
- When we act as your broker-dealer, we do not generally enter into a fiduciary relationship with you; however, special rules apply to our activities, obligations and fiduciary status when we provide recommendations with respect to a retirement account. Absent special circumstances (which would include the special rules applicable to recommendations with respect to retirement accounts) we are not held to the same legal standards that apply when providing investment advisory services to you. Our legal obligations to disclose detailed information to you about the nature and scope of our business, personnel, fees, conflicts between our interests and your interests and other matters are more limited than when we are providing investment advisory services to you. Nevertheless, when we provide recommendations with respect to a retirement account, we do so pursuant to the laws, regulations and exemptions applicable to those retirement accounts.

UBS Institutional Consulting program is an investment advisory program. Details regarding the program including fees, services, features and suitability are provided in the Form ADV Disclosure, available from your UBS Consultant.

UBS

QUARTILE RANKING ANALYSIS
FOREIGN LARGE VALUE UNIVERSE
CALENDAR PERIODS ENDING DECEMBER 31, 2019

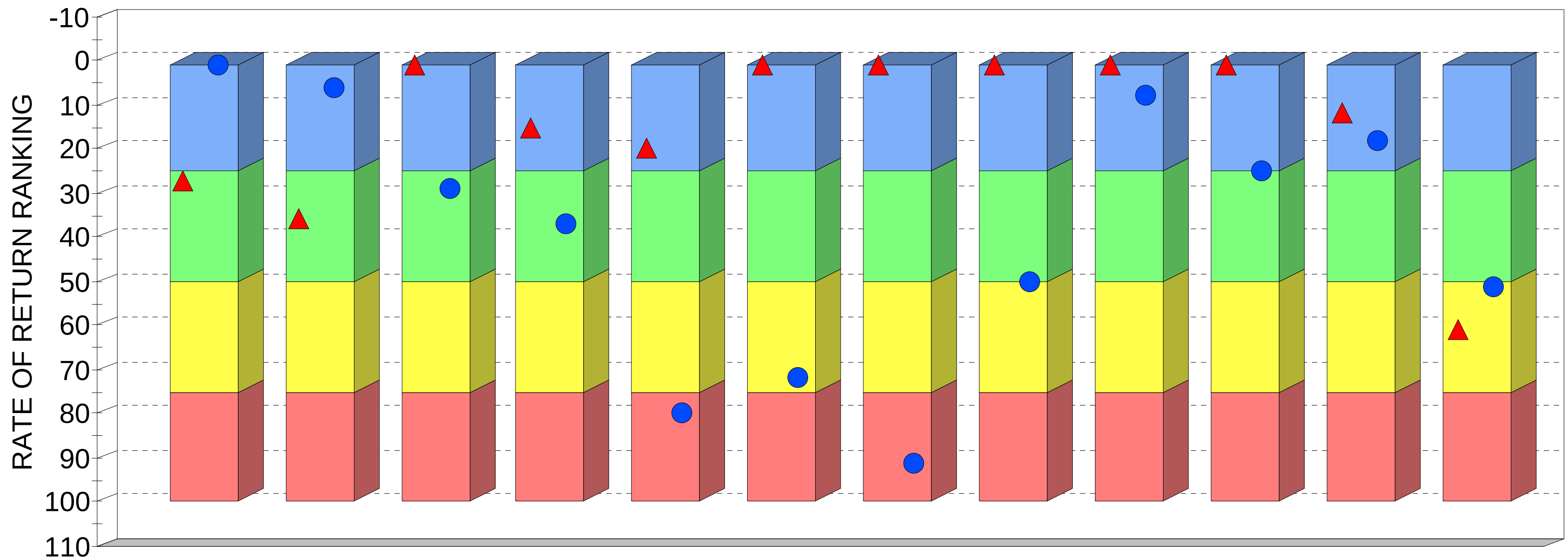


	12019	2018	2017	2016	2015	2014	2013	2012	2011	2010	2009	2008
HIGH (0.05)	22.08	-12.11	28.47	12.82	3.42	-2.84	29.85	23.16	-2.28	15.66	50.18	-32.75
FIRST QUARTILE	19.20	-15.63	24.83	5.06	0.51	-4.50	24.25	19.80	-10.90	10.93	35.66	-41.39
MEDIAN	17.61	-16.62	22.92	2.00	-3.13	-5.72	21.86	17.73	-12.21	8.10	29.71	-43.70
THIRD QUARTILE	15.95	-17.97	21.08	0.56	-6.44	-7.24	19.62	15.59	-13.53	6.49	26.76	-45.06
LOW (0.95)	12.90	-22.68	15.35	-2.36	-13.07	-10.80	9.49	11.09	-17.88	3.13	18.95	-49.50
MEAN	17.64	-16.65	22.76	3.36	-3.45	-6.07	21.31	17.69	-12.27	8.53	31.24	-43.01
VALID COUNT	274	264	263	255	245	237	225	225	215	203	199	170

	12019		2018		2017		2016		2015		2014		2013		2012		2011		2010		2009		2008	
	VALUE	RANK	VALUE	RANK	VALUE	RANK	VALUE	RANK	VALUE	RANK	VALUE	RANK	VALUE	RANK	VALUE	RANK	VALUE	RANK	VALUE	RANK	VALUE	RANK	VALUE	RANK
Oakmark International Investor**	24.21	1	-23.43	99	29.75	1	7.91	18	-3.83	57	-5.41	45	29.34	2	29.22	1	-14.07	79	16.22	1	56.30	1	-41.06	19
MSCI AC World Index ex US Net	21.51	2	-14.20	11	27.19	6	4.50	29	-5.66	70	-3.87	15	15.29	87	16.83	60	-13.71	76	11.15	21	41.45	6	-45.53	77

** THIS INVESTMENT OR STRATEGY IS REVIEWED BY UBS. SEE "IMPORTANT INFORMATION" SECTION FOR ADDITIONAL INFORMATION.

QUARTILE RANKING BAR
THREE YEARS ROLLING PERIOD
FOREIGN LARGE VALUE UNIVERSE
PERIODS ENDING DECEMBER 31, 2019

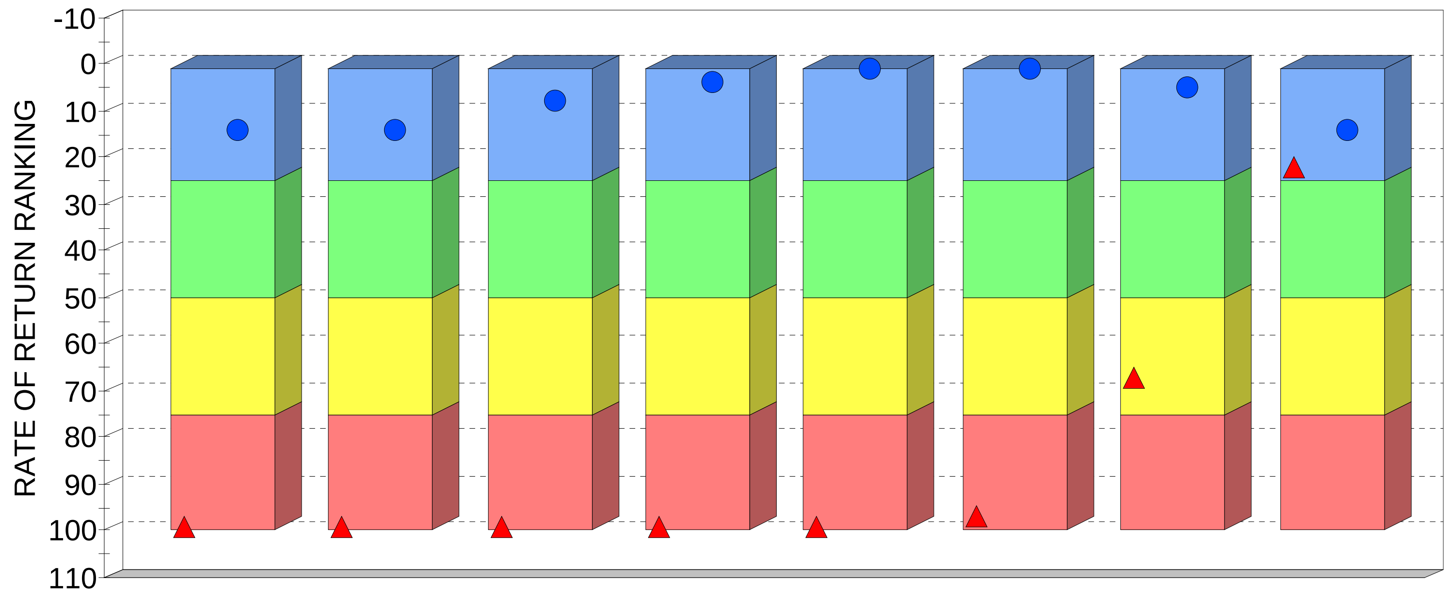


	12/2016-12/2019	12/2015-12/2018	12/2014-12/2017	12/2013-12/2016	12/2012-12/2015	12/2011-12/2014	12/2010-12/2013	12/2009-12/2012	12/2008-12/2011	12/2007-12/2010	12/2006-12/2009	12/2005-12/2008
HIGH (0.05)	8.88	5.44	11.10	0.78	7.41	14.35	11.29	7.68	14.58	-0.83	-1.82	-2.80
FIRST QUARTILE	7.33	3.09	8.10	-1.19	4.86	11.43	9.38	5.29	8.88	-5.03	-4.24	-5.65
MEDIAN	6.50	1.71	7.07	-2.58	2.81	10.19	7.82	3.87	7.37	-6.47	-6.05	-6.75
THIRD QUARTILE	5.55	0.56	5.96	-3.27	1.81	8.88	6.41	2.94	6.13	-8.12	-7.71	-9.41
LOW (0.95)	3.21	-1.46	1.80	-6.25	-3.21	4.83	1.70	-0.88	3.94	-10.76	-11.06	-12.86
MEAN	6.35	1.84	6.87	-2.28	3.07	10.15	7.79	3.95	7.63	-6.50	-6.02	-7.40
VALID COUNT	263	255	245	237	225	225	215	203	199	170	164	132

	12/2016-12/2019		12/2015-12/2018		12/2014-12/2017		12/2013-12/2016		12/2012-12/2015		12/2011-12/2014		12/2010-12/2013		12/2009-12/2012		12/2008-12/2011		12/2007-12/2010		12/2006-12/2009		12/2005-12/2008	
	VALUE	RANK	VALUE	RANK	VALUE	RANK	VALUE	RANK	VALUE	RANK	VALUE	RANK	VALUE	RANK	VALUE	RANK	VALUE	RANK	VALUE	RANK	VALUE	RANK	VALUE	RANK
▲ Oakmark International Investor**	7.26	27	2.35	36	10.43	1	-0.61	15	5.57	20	16.50	1	12.83	1	8.87	1	16.00	1	2.30	1	-2.86	12	-8.51	61
● MSCI AC World Index ex US Net	9.87	1	4.48	6	7.83	29	-1.78	37	1.50	80	8.99	72	5.14	91	3.87	50	10.70	8	-5.03	25	-3.49	18	-6.98	51

** THIS INVESTMENT OR STRATEGY IS REVIEWED BY UBS. SEE "IMPORTANT INFORMATION" SECTION FOR ADDITIONAL INFORMATION.

QUARTILE RANKING ANALYSIS
FOREIGN LARGE VALUE UNIVERSE
TRAILING PERIODS ENDING MARCH 31, 2020



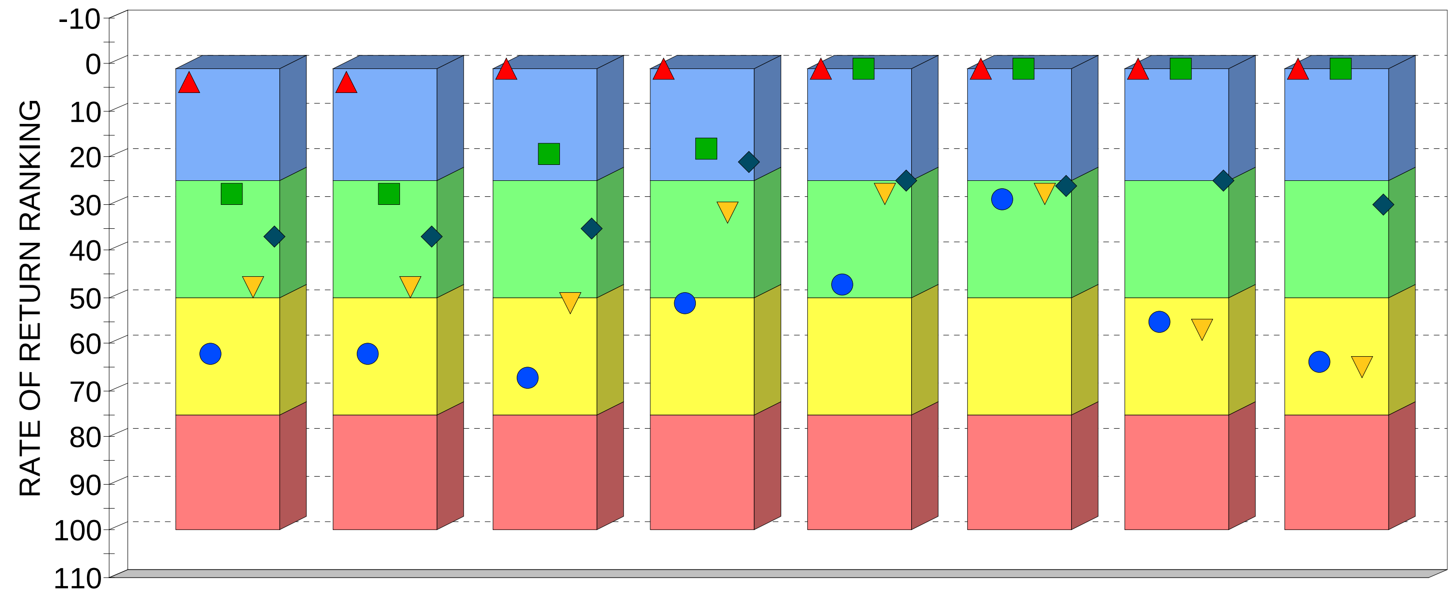
	Latest Quarter	Year To Date	1 Year	2 Years	3 Years	5 Years	7 Years	10 Years
HIGH (0.05)	-20.49	-20.49	-12.46	-9.30	-3.15	-1.43	1.42	3.09
FIRST QUARTILE	-24.66	-24.66	-18.18	-13.27	-4.70	-2.46	0.22	1.61
MEDIAN	-27.76	-27.76	-21.40	-15.18	-6.42	-3.56	-0.64	0.80
THIRD QUARTILE	-30.05	-30.05	-24.29	-16.42	-7.81	-4.47	-1.39	-0.07
LOW (0.95)	-34.50	-34.50	-28.44	-20.15	-10.41	-6.00	-3.54	-1.58
MEAN	-27.38	-27.38	-21.32	-14.88	-6.43	-3.54	-0.70	0.77
VALID COUNT	277	277	274	264	263	248	232	203

	Latest Quarter		Year To Date		1 Year		2 Years		3 Years		5 Years		7 Years		10 Years	
	VALUE	RANK	VALUE	RANK	VALUE	RANK	VALUE	RANK	VALUE	RANK	VALUE	RANK	VALUE	RANK	VALUE	RANK
▲ Oakmark International Investor**	-38.12	99	-38.12	99	-29.51	99	-22.20	99	-11.30	99	-5.74	97	-1.18	67	1.70	22
● MSCI AC World Index ex US Net	-23.36	14	-23.36	14	-15.57	8	-10.07	4	-1.96	1	-0.64	1	1.06	5	2.05	14

** THIS INVESTMENT OR STRATEGY IS REVIEWED BY UBS. SEE "IMPORTANT INFORMATION" SECTION FOR ADDITIONAL INFORMATION.

UBS

QUARTILE RANKING ANALYSIS
FOREIGN LARGE BLEND UNIVERSE
TRAILING PERIODS ENDING MARCH 31, 2020



	Latest Quarter	Year To Date	1 Year	2 Years	3 Years	5 Years	7 Years	10 Years
HIGH (0.05)	-18.95	-18.95	-9.25	-5.83	1.01	1.02	3.08	3.95
FIRST QUARTILE	-22.20	-22.20	-13.43	-9.59	-1.82	-0.55	1.76	2.83
MEDIAN	-23.39	-23.39	-15.46	-11.01	-2.62	-1.21	1.20	2.34
THIRD QUARTILE	-24.91	-24.91	-17.26	-12.26	-3.68	-1.94	0.60	1.83
LOW (0.95)	-28.16	-28.16	-20.71	-15.22	-5.95	-3.26	-1.03	0.27
MEAN	-23.50	-23.50	-15.22	-10.75	-2.73	-1.21	1.15	2.30
VALID COUNT	649	649	626	608	592	529	505	456

	Latest Quarter		Year To Date		1 Year		2 Years		3 Years		5 Years		7 Years		10 Years	
	VALUE	RANK	VALUE	RANK	VALUE	RANK	VALUE	RANK	VALUE	RANK	VALUE	RANK	VALUE	RANK	VALUE	RANK
MFS Intl Diversification R6**	-19.74	4	-19.74	4	-9.66	1	-4.99	1	2.82	1	2.79	1	3.78	1	5.02	1
Vanguard Total Intl Stock Index Admiral*	-24.30	62	-24.30	62	-16.57	67	-11.08	51	-2.55	47	-0.68	29	1.09	55	2.06	64
American Funds Europacific Growth R6**	-22.43	28	-22.43	28	-12.70	19	-8.77	18	0.28	1	0.91	1	3.46	1	3.97	1
MSCI AC World Index ex US Net	-23.36	48	-23.36	48	-15.57	51	-10.07	32	-1.96	28	-0.64	28	1.06	57	2.05	65
MSCI EAFE Net	-22.83	37	-22.83	37	-14.38	35	-9.20	21	-1.82	25	-0.62	26	1.75	25	2.72	30

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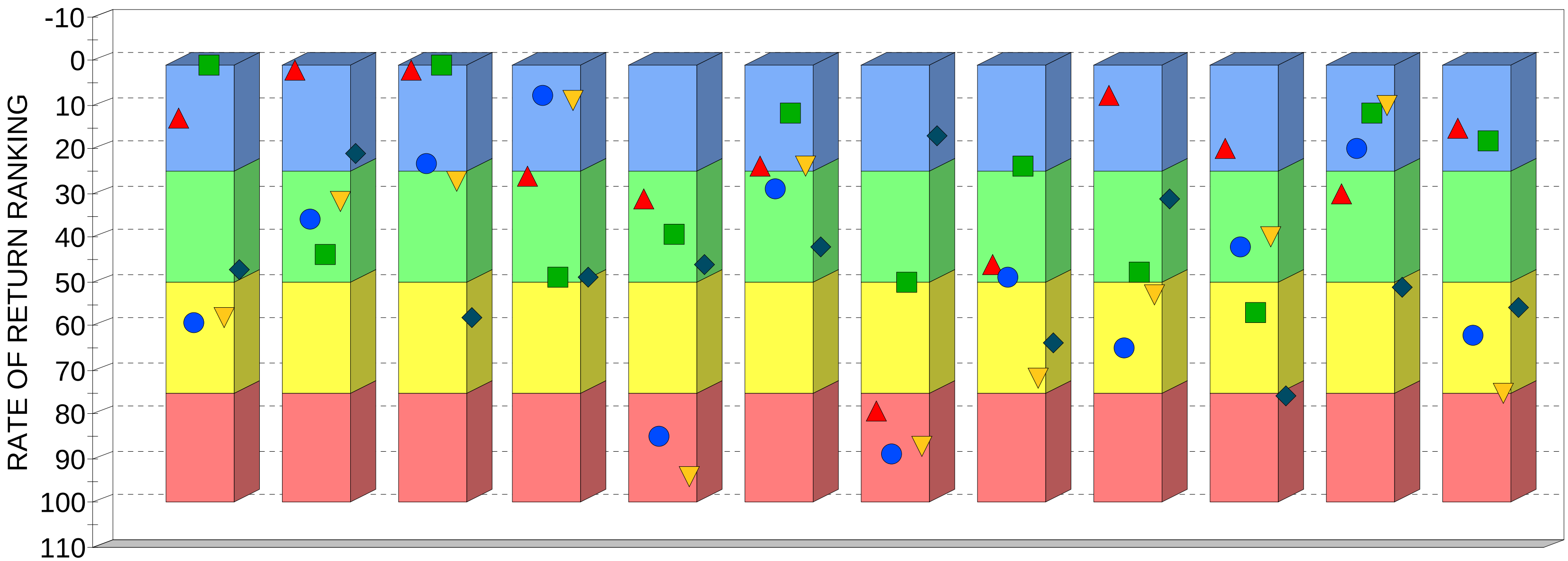
UBS

QUARTILE RANKING ANALYSIS
FOREIGN LARGE BLEND UNIVERSE
CALENDAR PERIODS ENDING DECEMBER 31, 2019



	12019	2018	2017	2016	2015	2014	2013	2012	2011	2010	2009	2008
HIGH (0.05)	27.58	-10.32	31.01	6.55	5.28	0.75	28.03	27.90	-7.17	18.59	48.46	-37.73
FIRST QUARTILE	24.43	-13.92	27.45	2.54	0.58	-3.98	22.20	19.60	-11.54	13.09	35.65	-41.27
MEDIAN	21.87	-15.17	25.32	0.98	-0.91	-5.41	20.63	18.19	-13.36	10.42	32.00	-43.01
THIRD QUARTILE	20.62	-16.96	24.23	-0.86	-2.73	-6.40	17.85	16.61	-15.06	7.91	27.84	-45.48
LOW (0.95)	17.22	-21.01	18.33	-3.85	-8.51	-10.04	12.10	12.56	-22.88	4.84	20.86	-49.65
MEAN	22.33	-15.45	25.62	0.96	-1.21	-5.04	20.15	18.15	-13.31	10.54	32.52	-43.33
VALID COUNT	623	600	591	573	523	504	502	487	466	452	443	398

	12019		2018		2017		2016		2015		2014		2013		2012		2011		2010		2009		2008	
	VALUE	RANK	VALUE	RANK	VALUE	RANK	VALUE	RANK	VALUE	RANK	VALUE	RANK	VALUE	RANK	VALUE	RANK	VALUE	RANK	VALUE	RANK	VALUE	RANK	VALUE	RANK
MFS Intl Diversification R6**	26.09	13	-10.92	2	30.25	2	2.47	26	0.11	31	-3.86	24	17.26	79	18.39	46	-9.17	8	13.57	20	34.66	30	-40.07	15
Vanguard Total Intl Stock Index Admiral*	21.51	59	-14.43	36	27.55	23	4.67	8	-4.26	85	-4.17	29	15.14	89	18.21	49	-14.52	65	11.04	42	36.73	20	-44.10	62
American Funds Europacific Growth R6**	27.40	1	-14.91	44	31.17	1	1.01	49	-0.48	39	-2.29	12	20.58	50	19.64	24	-13.31	48	9.76	57	39.35	12	-40.53	18
MSCI AC World Index ex US Net	21.51	58	-14.20	32	27.19	27	4.50	9	-5.66	94	-3.87	24	15.29	87	16.83	72	-13.71	53	11.15	40	41.45	10	-45.53	75
MSCI EAFE Net	22.01	47	-13.79	21	25.03	58	1.00	49	-0.81	46	-4.90	42	22.78	17	17.32	64	-12.14	31	7.75	76	31.78	51	-43.38	56

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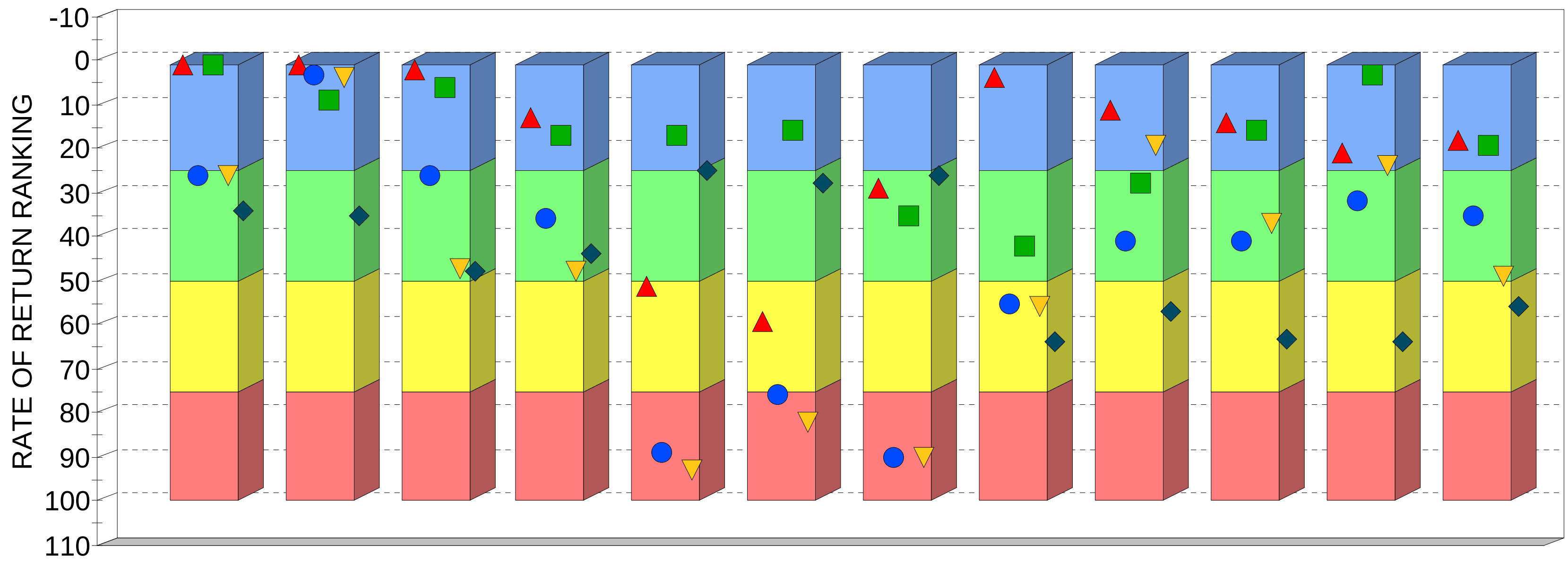
QUARTILE RANKING BAR
THREE YEARS ROLLING PERIOD
FOREIGN LARGE BLEND UNIVERSE
PERIODS ENDING DECEMBER 31, 2019



	12/2016-12/2019	12/2015-12/2018	12/2014-12/2017	12/2013-12/2016	12/2012-12/2015	12/2011-12/2014	12/2010-12/2013	12/2009-12/2012	12/2008-12/2011	12/2007-12/2010	12/2006-12/2009	12/2005-12/2008
HIGH (0.05)	12.14	4.82	10.49	1.12	7.81	14.85	11.58	8.55	13.59	0.63	0.15	-2.87
FIRST QUARTILE	9.90	3.24	8.54	-0.90	5.06	11.31	8.23	5.39	10.25	-4.11	-3.52	-5.42
MEDIAN	9.00	2.44	7.74	-1.80	4.15	10.39	7.30	4.11	8.32	-6.01	-5.03	-7.03
THIRD QUARTILE	8.16	1.30	6.83	-2.86	3.09	9.40	6.28	3.16	6.33	-7.93	-6.92	-8.51
LOW (0.95)	6.08	-0.71	5.09	-4.69	0.55	7.23	2.73	0.33	4.06	-11.56	-10.95	-12.07
MEAN	9.02	2.27	7.71	-1.86	4.08	10.48	7.30	4.20	8.34	-5.85	-5.09	-7.01
VALID COUNT	591	573	523	504	502	487	466	452	443	398	366	348

	12/2016-12/2019		12/2015-12/2018		12/2014-12/2017		12/2013-12/2016		12/2012-12/2015		12/2011-12/2014		12/2010-12/2013		12/2009-12/2012		12/2008-12/2011		12/2007-12/2010		12/2006-12/2009		12/2005-12/2008	
	VALUE	RANK	VALUE	RANK	VALUE	RANK	VALUE	RANK	VALUE	RANK	VALUE	RANK	VALUE	RANK	VALUE	RANK	VALUE	RANK	VALUE	RANK	VALUE	RANK	VALUE	RANK
MFS Intl Diversification R6**	13.52	1	5.93	1	10.14	2	-0.46	13	4.11	51	10.10	59	8.03	29	6.89	4	11.58	11	-2.86	14	-2.97	21	-4.72	18
Vanguard Total Intl Stock Index Admiral*	9.87	26	4.54	3	8.53	26	-1.34	36	1.84	89	9.26	76	5.17	90	3.91	55	9.07	41	-5.32	41	-4.07	32	-6.49	35
American Funds Europacific Growth R6**	12.45	1	4.08	9	9.66	6	-0.60	17	5.45	17	12.12	16	7.74	35	4.42	42	9.86	28	-3.11	16	-0.47	3	-4.82	19
MSCI AC World Index ex US Net	9.87	26	4.48	4	7.83	47	-1.78	48	1.50	93	8.99	82	5.14	90	3.87	56	10.70	19	-5.03	37	-3.49	24	-6.98	49
MSCI EAFE Net	9.56	34	2.87	35	7.80	48	-1.60	44	5.01	25	11.06	28	8.17	26	3.56	64	7.65	57	-7.02	63	-6.04	64	-7.35	56

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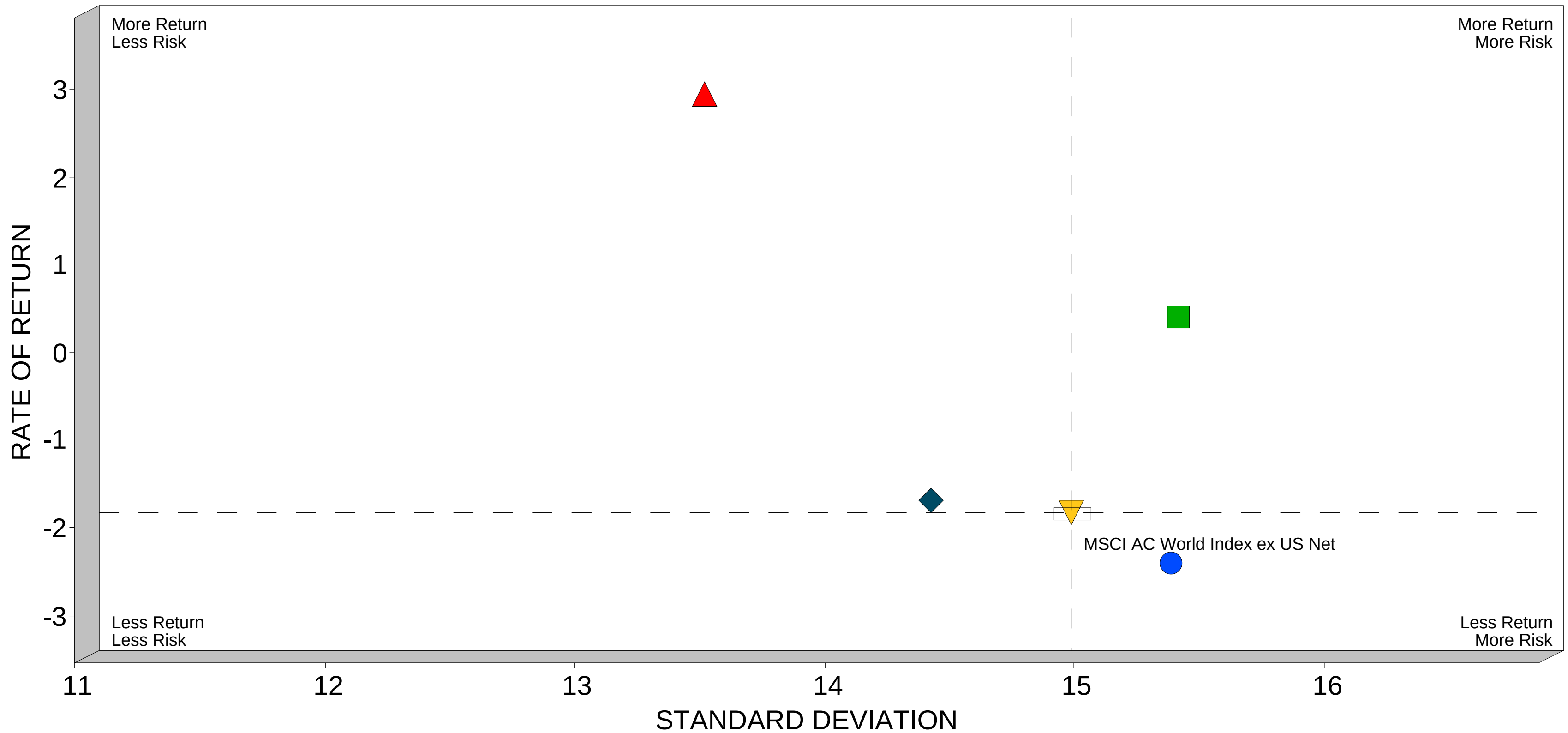
TOTAL RISK REWARD

MARCH 31, 2017 TO MARCH 31, 2020



	ROR	Std Dev Pop	Alpha	Beta	R-Squared
MFS Intl Diversification R6**	2.82	13.47	4.32	0.88	0.95
Vanguard Total Intl Stock Index Admiral* **	-2.55	15.33	-0.47	1.02	0.99
American Funds Europacific Growth R6**	0.28	15.36	2.38	1.01	0.97
MSCI AC World Index ex US Net	-1.96	14.94	0.00	1.00	1.00
MSCI EAFE Net	-1.82	14.38	-0.06	0.95	0.98

RISK BENCHMARK USED FOR THIS ANALYSIS: MSCI AC WORLD INDEX EX US NET

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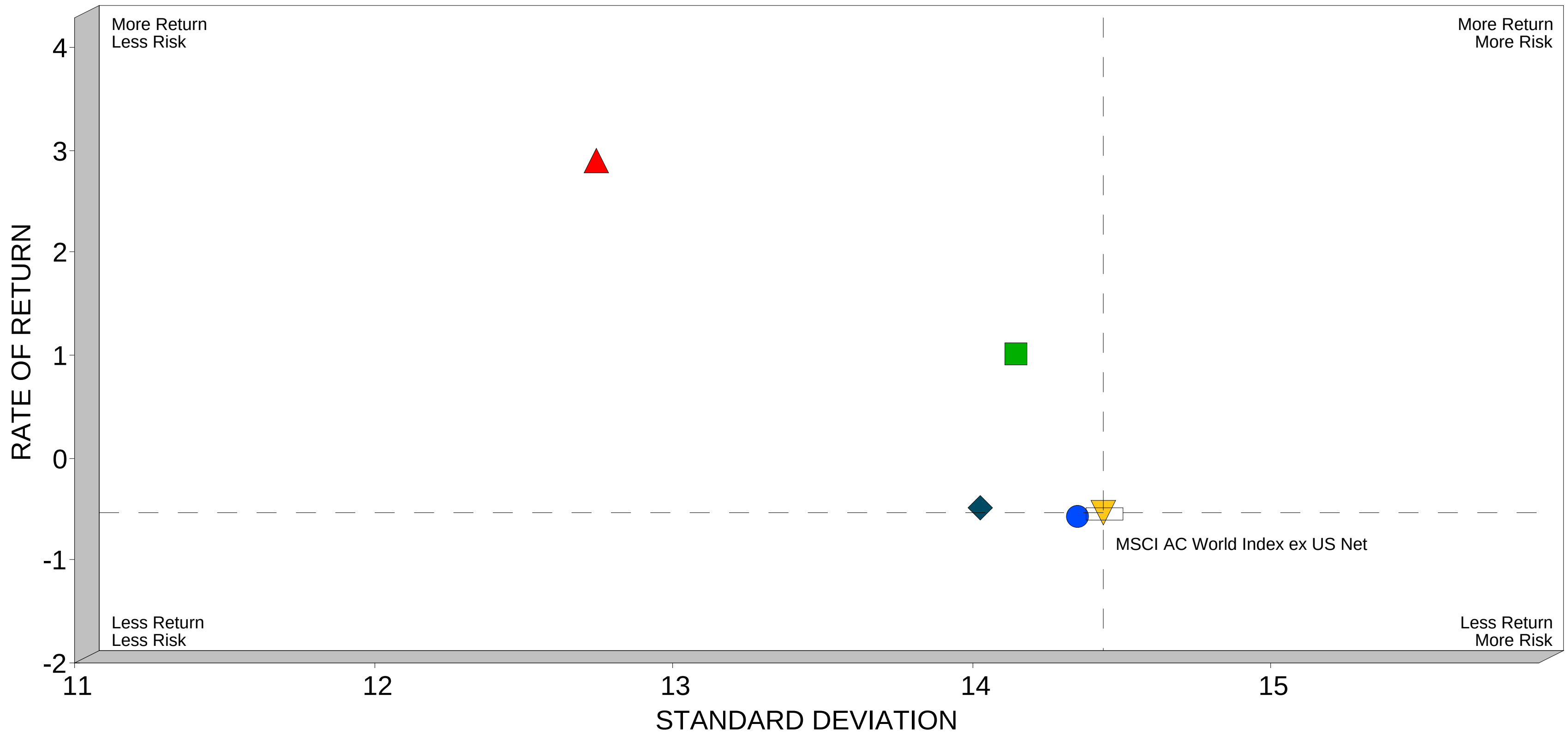
UBS

TOTAL RISK REWARD

MARCH 31, 2015 TO MARCH 31, 2020



	ROR	Std Dev Pop	Alpha	Beta	R-Squared
MFS Intl Diversification R6**	2.79	12.70	3.10	0.85	0.94
Vanguard Total Intl Stock Index Admiral* **	-0.68	14.31	-0.05	0.99	0.98
American Funds Europacific Growth R6**	0.91	14.10	1.49	0.95	0.94
MSCI AC World Index ex US Net	-0.64	14.39	0.00	1.00	1.00
MSCI EAFE Net	-0.62	13.99	-0.06	0.96	0.97

RISK BENCHMARK USED FOR THIS ANALYSIS: MSCI AC WORLD INDEX EX US NET

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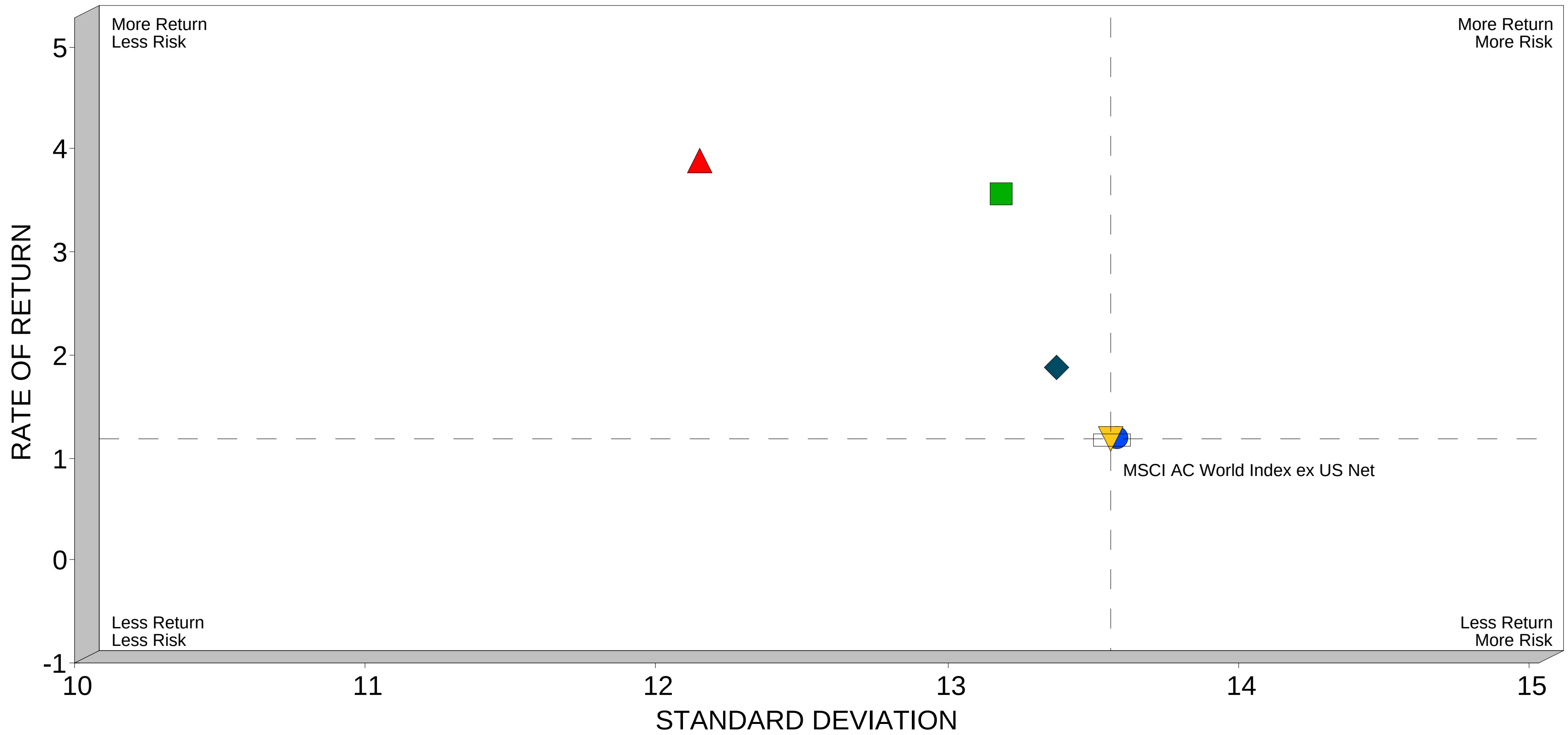
UBS

TOTAL RISK REWARD

MARCH 31, 2013 TO MARCH 31, 2020



	ROR	Std Dev Pop	Alpha	Beta	R-Squared
MFS Intl Diversification R6**	3.78	12.11	2.67	0.87	0.94
Vanguard Total Intl Stock Index Admiral* **	1.09	13.53	0.05	0.99	0.98
American Funds Europacific Growth R6**	3.46	13.14	2.40	0.94	0.94
MSCI AC World Index ex US Net	1.06	13.52	0.00	1.00	1.00
MSCI EAFE Net	1.75	13.33	0.70	0.97	0.97

RISK BENCHMARK USED FOR THIS ANALYSIS: MSCI AC WORLD INDEX EX US NET

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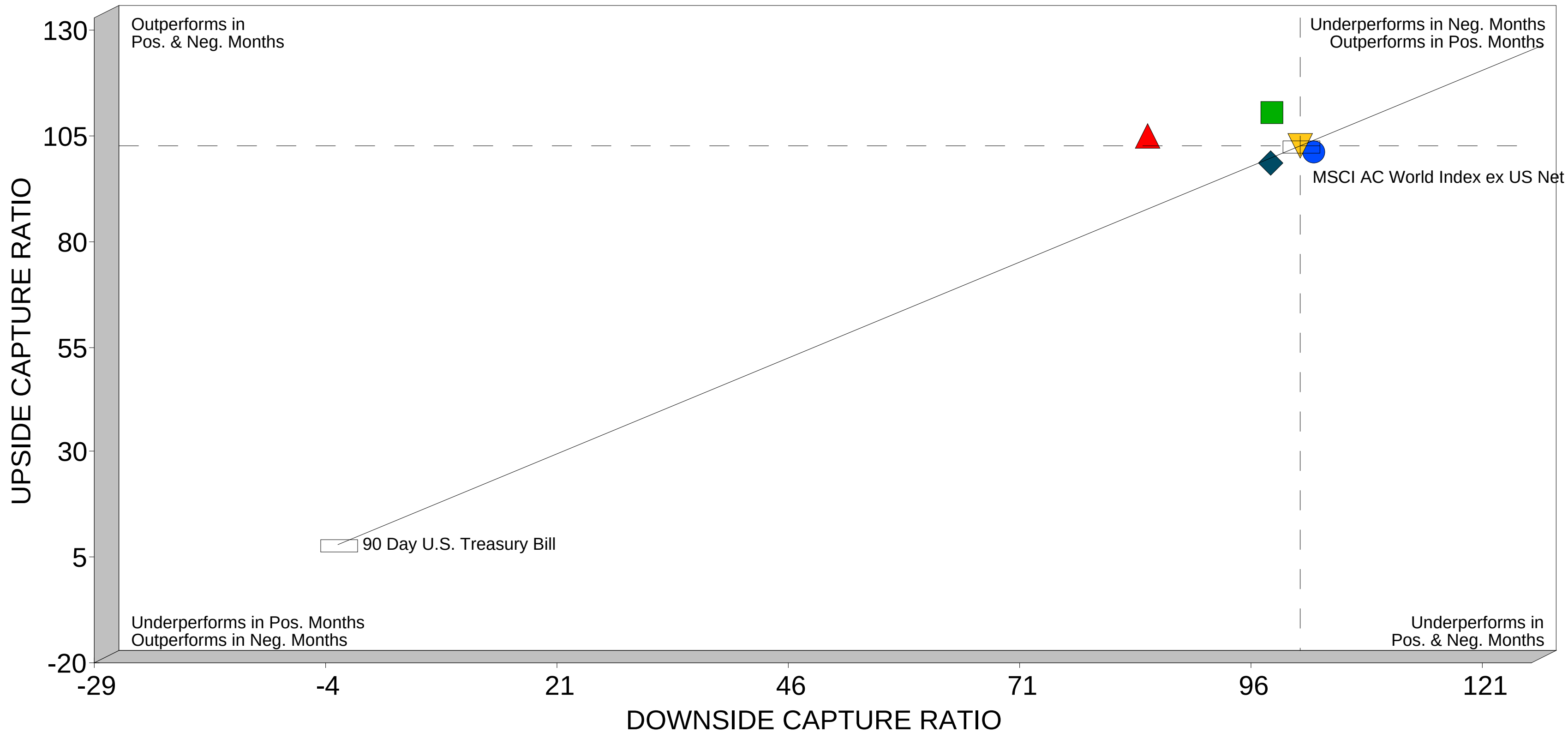
UPSIDE VS. DOWNSIDE MARKET CAPTURE ANALYSIS
3 YEAR PERIOD ENDING MARCH 31, 2020



	Up Mkt Capt Retrn	Up Cap Ratio	Dnside Cap Return	Dnside Cap Ratio	R-Squared
MFS Intl Diversification R6**	35.10	102.15	-36.56	83.36	0.95
Vanguard Total Intl Stock Index Admiral* **	33.84	98.49	-44.41	101.25	0.99
American Funds Europacific Growth R6**	37.18	108.20	-42.38	96.63	0.97
MSCI AC World Index ex US Net	34.36	100.00	-43.86	100.00	1.00
MSCI EAFE Net	32.81	95.50	-42.47	96.83	0.98

RISK BENCHMARK USED FOR THIS ANALYSIS: MSCI AC WORLD INDEX EX US NET

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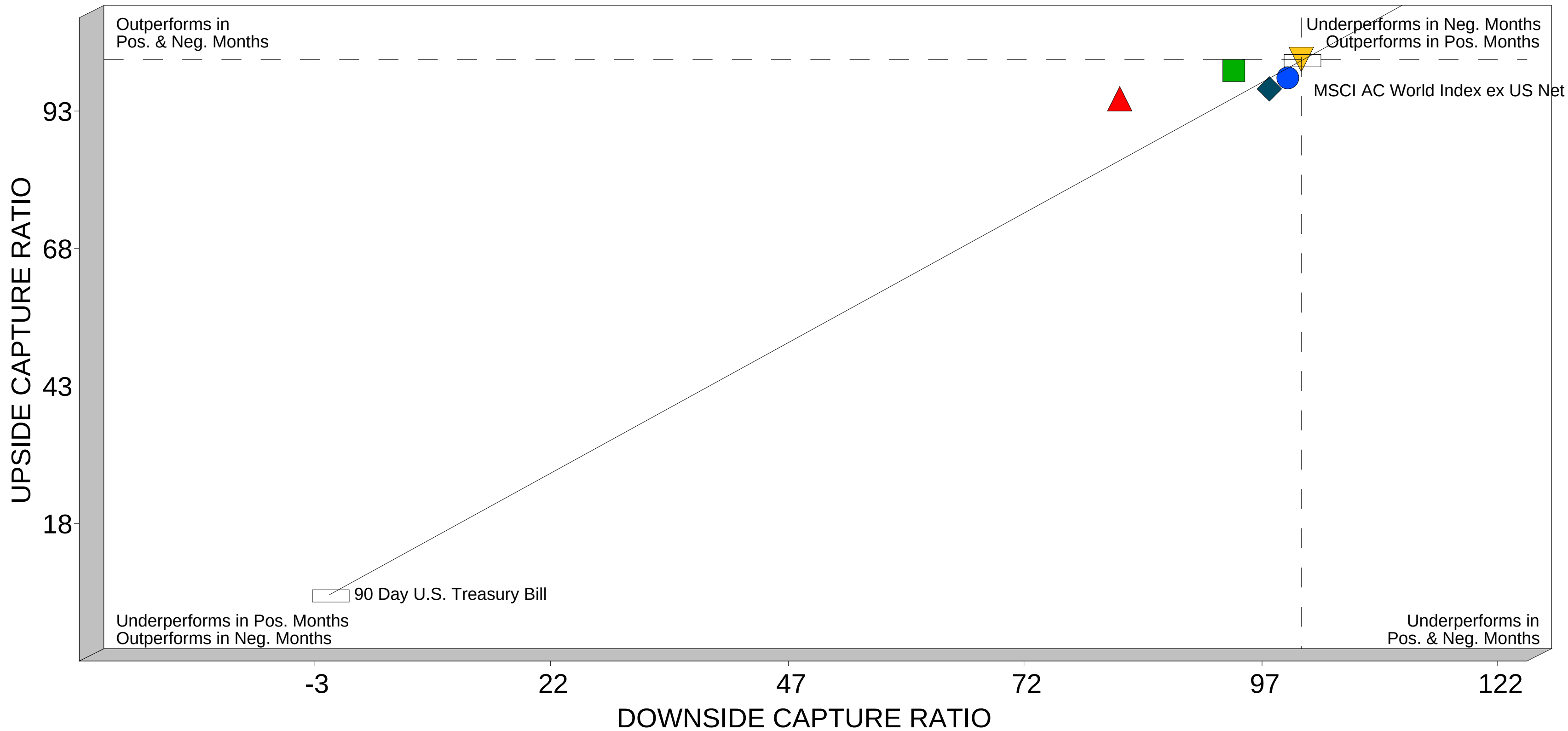
UPSIDE VS. DOWNSIDE MARKET CAPTURE ANALYSIS

5 YEAR PERIOD ENDING MARCH 31, 2020



	Up Mkt Capt Retrn	Up Cap Ratio	Dnside Cap Return	Dnside Cap Ratio	R-Squared
MFS Intl Diversification R6**	37.40	92.84	-29.67	80.82	0.94
Vanguard Total Intl Stock Index Admiral* **	39.11	97.10	-36.07	98.24	0.98
American Funds Europacific Growth R6**	39.58	98.26	-33.98	92.53	0.94
MSCI AC World Index ex US Net	40.28	100.00	-36.72	100.00	1.00
MSCI EAFE Net	38.20	94.83	-35.43	96.48	0.97

RISK BENCHMARK USED FOR THIS ANALYSIS: MSCI AC WORLD INDEX EX US NET

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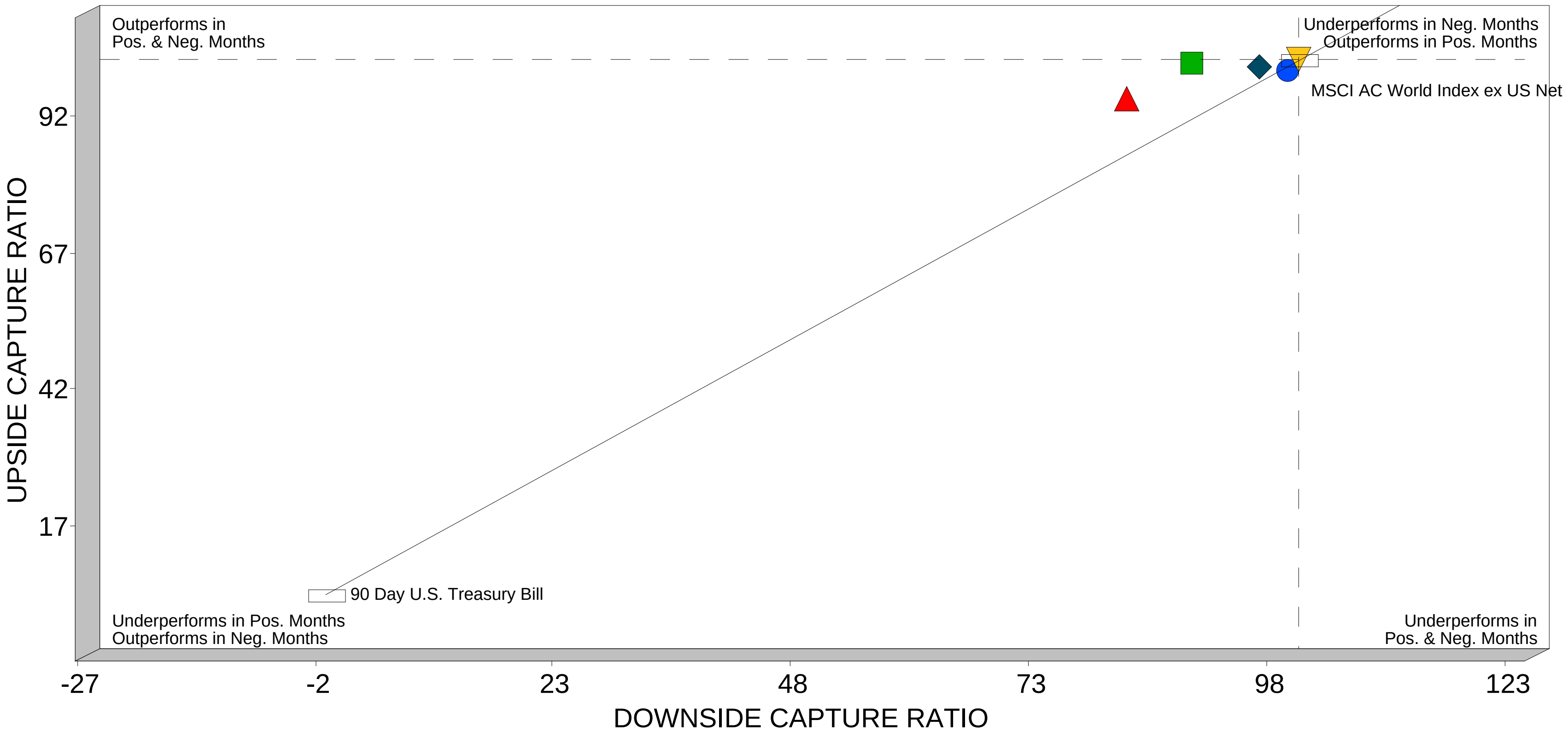
UPSIDE VS. DOWNSIDE MARKET CAPTURE ANALYSIS

7 YEAR PERIOD ENDING MARCH 31, 2020



	Up Mkt Capt Retrn	Up Cap Ratio	Dnside Cap Return	Dnside Cap Ratio	R-Squared
MFS Intl Diversification R6**	36.31	93.10	-27.85	82.06	0.94
Vanguard Total Intl Stock Index Admiral* **	38.39	98.43	-33.50	98.71	0.98
American Funds Europacific Growth R6**	38.82	99.54	-30.09	88.66	0.94
MSCI AC World Index ex US Net	39.00	100.00	-33.94	100.00	1.00
MSCI EAFE Net	38.53	98.79	-32.56	95.96	0.97

RISK BENCHMARK USED FOR THIS ANALYSIS: MSCI AC WORLD INDEX EX US NET

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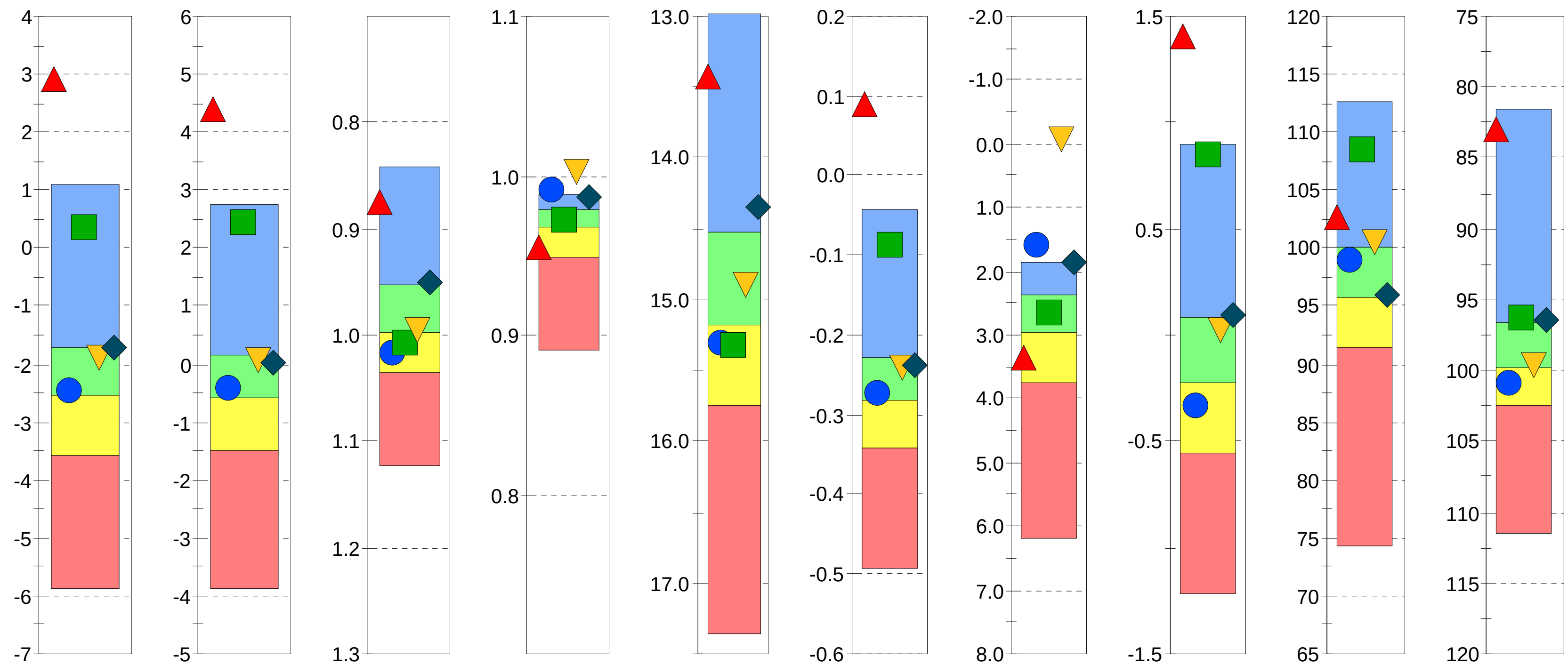
UBS

MULTI-STATISTIC QUARTILE RANKING BAR
FOREIGN LARGE BLEND UNIVERSE
MARCH 31, 2017 TO MARCH 31, 2020



	ROR	Alpha	Beta	R-Squared	Std Dev Pop	Sharpe Ratio Pop	Tracking Error Pop	Info Ratio Pop	Upside Cap Ratio	Dnside Cap Ratio
HIGH (0.95)	1.01	2.67	0.85	0.98	13.02	-0.05	1.92	0.87	112.26	81.96
FIRST QUART	-1.82	0.07	0.96	0.98	14.57	-0.23	2.46	0.06	99.57	96.94
MEDIAN	-2.62	-0.65	1.00	0.96	15.21	-0.29	3.04	-0.25	95.29	100.09
THIRD QUART	-3.68	-1.56	1.04	0.95	15.79	-0.35	3.83	-0.58	91.01	102.87
LOW (0.05)	-5.95	-3.98	1.13	0.89	17.39	-0.50	6.28	-1.24	73.81	111.87
MEAN	-2.73	-0.76	1.00	0.96	15.24	-0.29	3.23	-0.27	95.12	99.66
VALID COUNT	592	592	592	592	592	592	592	592	592	592

	VALUE	RANK	VALUE	RANK	VALUE	RANK	VALUE	RANK	VALUE	RANK	VALUE	RANK	VALUE	RANK	VALUE	RANK	VALUE	RANK	VALUE	RANK
▲ MFS Intl Diversification R6**	2.82	1	4.32	1	0.88	3	0.95	65	13.47	2	0.08	1	3.45	61	1.39	1	102.15	13	83.36	1
● Vanguard Total Intl Stock Ind	-2.55	47	-0.47	43	1.02	65	0.99	1	15.33	56	-0.28	44	1.67	1	-0.35	60	98.49	31	101.25	63
■ American Funds Europacific	0.28	1	2.38	1	1.01	58	0.97	39	15.36	57	-0.09	1	2.71	36	0.83	1	108.20	5	96.63	23
▼ MSCI AC World Index ex US	-1.96	28	0.00	26	1.00	49	1.00	1	14.94	37	-0.25	27	0.00	1	0.00	28	100.00	22	100.00	50
◆ MSCI EAFE Net	-1.82	25	-0.06	27	0.95	22	0.98	3	14.38	18	-0.25	27	1.95	4	0.07	23	95.50	48	96.83	24

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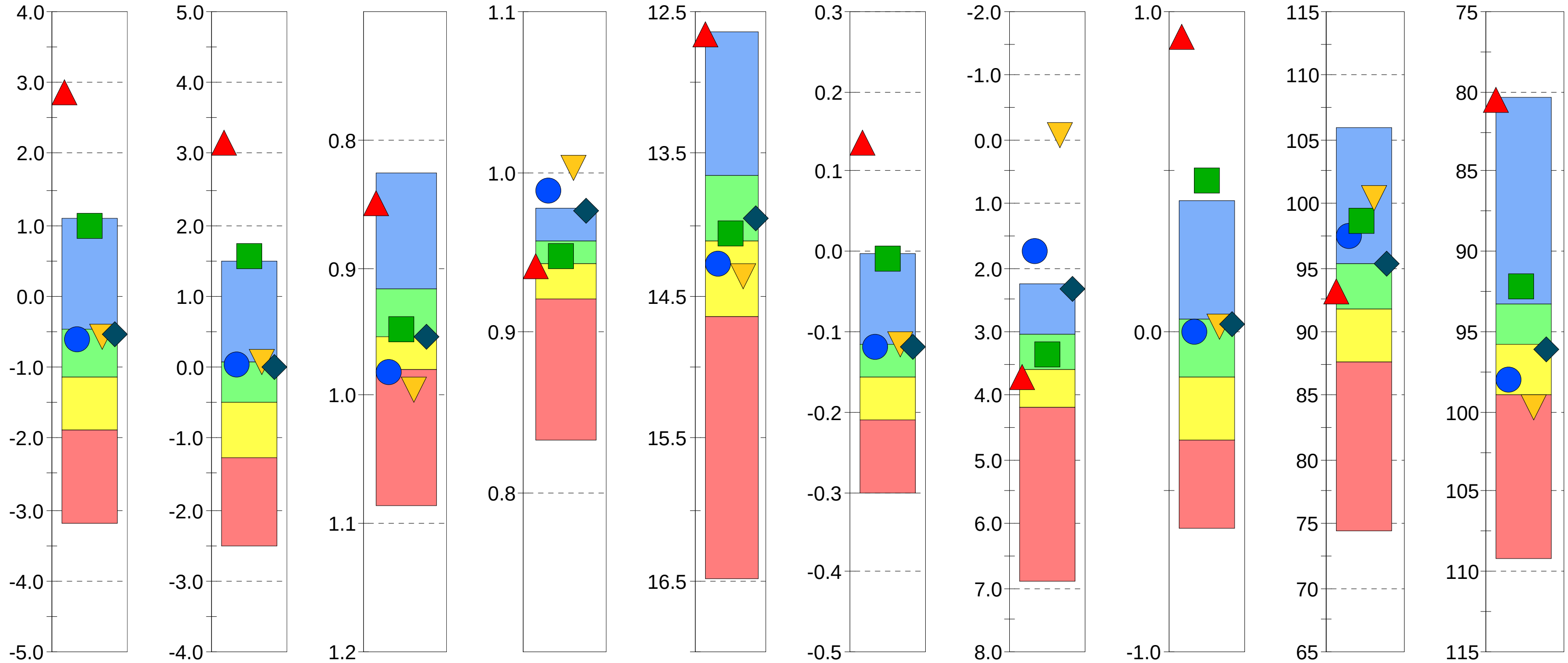
UBS

MULTI-STATISTIC QUARTILE RANKING BAR
FOREIGN LARGE BLEND UNIVERSE
MARCH 31, 2015 TO MARCH 31, 2020



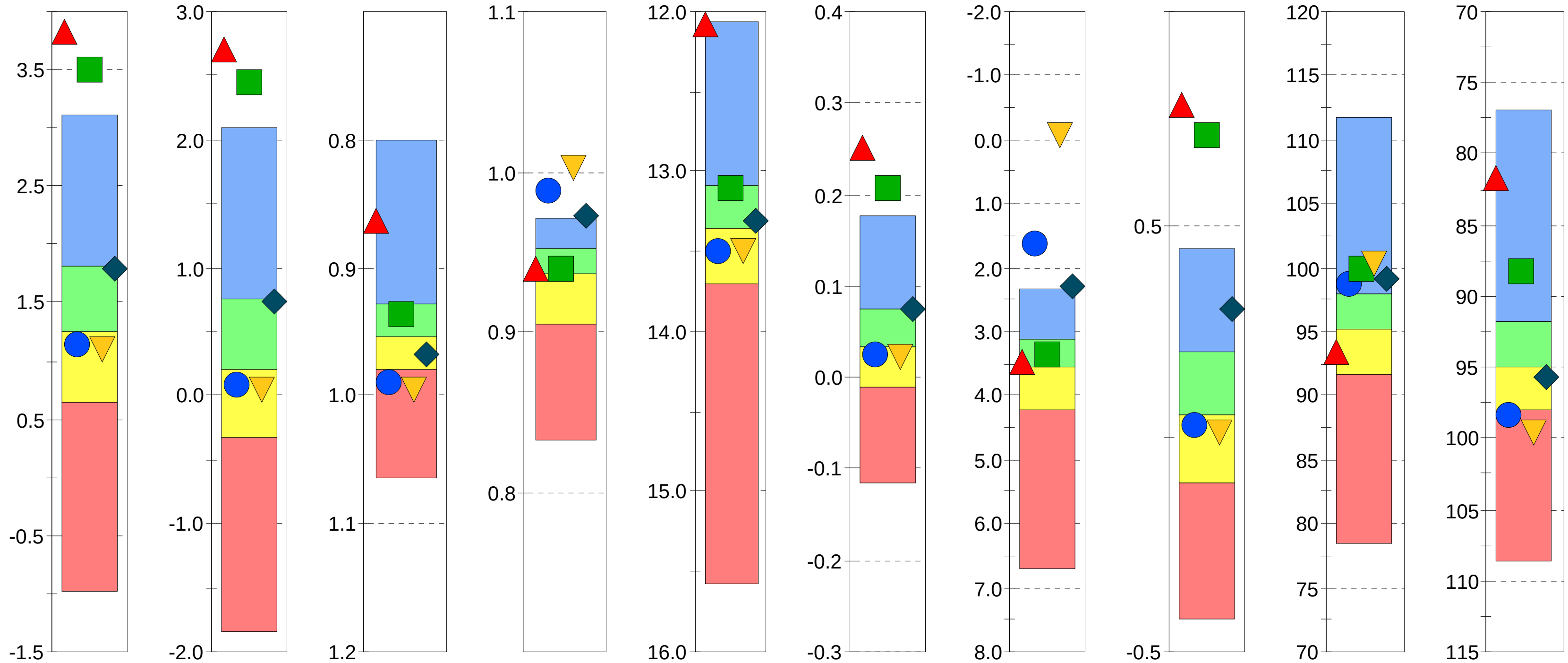
	ROR	Alpha	Beta	R-Squared	Std Dev Pop	Sharpe Ratio Pop	Tracking Error Pop	Info Ratio Pop	Upside Cap Ratio	Dnside Cap Ratio
HIGH (0.95)	1.02	1.42	0.83	0.97	12.67	-0.01	2.34	0.39	105.55	80.64
FIRST QUART	-0.55	-0.01	0.92	0.95	13.68	-0.12	3.13	0.02	94.85	93.55
MEDIAN	-1.21	-0.58	0.96	0.94	14.15	-0.16	3.65	-0.16	91.31	96.09
THIRD QUART	-1.94	-1.33	0.98	0.92	14.67	-0.22	4.24	-0.35	87.17	99.26
LOW (0.05)	-3.26	-2.60	1.09	0.83	16.52	-0.31	7.00	-0.63	73.96	109.46
MEAN	-1.21	-0.62	0.95	0.93	14.21	-0.16	3.82	-0.16	90.90	96.10
VALID COUNT	529	529	529	529	529	529	529	529	529	529

	VALUE	RANK	VALUE	RANK	VALUE	RANK	VALUE	RANK	VALUE	RANK	VALUE	RANK	VALUE	RANK	VALUE	RANK	VALUE	RANK	VALUE	RANK
MFS Intl Diversification R6**	2.79	1	3.10	1	0.85	4	0.94	51	12.70	2	0.13	1	3.80	63	0.90	1	92.84	34	80.82	1
Vanguard Total Intl Stock Ind	-0.68	29	-0.05	26	0.99	76	0.98	1	14.31	59	-0.13	27	1.81	1	-0.02	30	97.10	17	98.24	69
American Funds Europacific	0.91	1	1.49	1	0.95	48	0.94	41	14.10	47	-0.02	1	3.42	38	0.46	1	98.26	11	92.53	21
MSCI AC World Index ex US	-0.64	28	0.00	24	1.00	85	1.00	1	14.39	63	-0.12	26	0.00	1	0.00	28	100.00	10	100.00	79
MSCI EAFE Net	-0.62	26	-0.06	27	0.96	51	0.97	1	13.99	40	-0.12	27	2.42	1	0.01	26	94.83	24	96.48	54

* MANAGER STYLE OR INVESTMENT STRATEGY REVIEWED BY UBS FS. PLEASE READ “IMPORTANT INFORMATION” SECTION. ** THIS INVESTMENT OR STRATEGY IS REVIEWED BY UBS. SEE "IMPORTANT INFORMATION" SECTION FOR ADDITIONAL INFORMATION.

UBS

MULTI-STATISTIC QUARTILE RANKING BAR
FOREIGN LARGE BLEND UNIVERSE
MARCH 31, 2013 TO MARCH 31, 2020



	ROR	Alpha	Beta	R-Squared	Std Dev Pop	Sharpe Ratio Pop	Tracking Error Pop	Info Ratio Pop	Upside Cap Ratio	Dnside Cap Ratio
HIGH (0.95)	3.08	2.05	0.80	0.97	12.10	0.17	2.42	0.43	111.33	77.28
FIRST QUART	1.76	0.71	0.93	0.95	13.11	0.07	3.20	0.19	97.64	92.11
MEDIAN	1.20	0.18	0.96	0.93	13.39	0.03	3.62	0.04	94.83	95.38
THIRD QUART	0.60	-0.36	0.98	0.90	13.73	-0.02	4.28	-0.12	91.36	98.33
LOW (0.05)	-1.03	-1.88	1.07	0.83	15.61	-0.12	6.78	-0.43	78.03	108.99
MEAN	1.15	0.14	0.96	0.92	13.44	0.03	3.81	0.03	94.39	95.13
VALID COUNT	505	505	505	505	505	505	505	505	505	505

	VALUE	RANK	VALUE	RANK	VALUE	RANK	VALUE	RANK	VALUE	RANK	VALUE	RANK	VALUE	RANK	VALUE	RANK	VALUE	RANK	VALUE	RANK
MFS Intl Diversification R6**	3.78	1	2.67	1	0.87	4	0.94	41	12.11	2	0.24	1	3.54	45	0.77	1	93.10	62	82.06	1
Vanguard Total Intl Stock Ind	1.09	55	0.05	56	0.99	82	0.98	1	13.53	61	0.02	55	1.69	1	0.02	53	98.43	19	98.71	80
American Funds Europacific	3.46	1	2.40	1	0.94	28	0.94	44	13.14	29	0.20	1	3.43	39	0.70	1	99.54	11	88.66	10
MSCI AC World Index ex US	1.06	57	0.00	58	1.00	86	1.00	1	13.52	60	0.02	57	0.00	1	0.00	57	100.00	10	100.00	86
MSCI EAFE Net	1.75	25	0.70	25	0.97	64	0.97	1	13.33	50	0.07	24	2.38	1	0.29	8	98.79	16	95.96	57

* MANAGER STYLE OR INVESTMENT STRATEGY REVIEWED BY UBS FS. PLEASE READ “IMPORTANT INFORMATION” SECTION. ** THIS INVESTMENT OR STRATEGY IS REVIEWED BY UBS. SEE "IMPORTANT INFORMATION" SECTION FOR ADDITIONAL INFORMATION.

MFS
MFS INTL DIVERSIFICATION R6

OVERALL RANKING:	μ μ μ μ μ
Product Type:	Open Ended Mutual Fund
Mgmt. Co. Name:	MFS
Mgmt. Co. Address:	MFS SERIES TRUST X 111 HUNTINGTON AVENUE 24TH FLOOR BOSTON MA 02199 USA
Phone:	800-225-2606
Website:	http://www.mfs.com
Inception Date:	10/2017
CUSIP:	552743544
Ticker:	MDIZX
Share Class Type:	Retirement
Total Net Assets (4/2020):	$6,492,115,669
NAV (4/2020):	18.19
Yield:	1.72
Equity Style:	Large Blend
Fix Income Style:	--
Morningstar Category:	Foreign Large Blend
Fund Objective:	Growth
Portfolio Turnover:	1.00
Open to New Investors:	Yes
Init. Min. Purchase ($):	0.00
Subsequent Purchase ($):	--
Init. IRA Min. Purchase ($):	--
Portfolio Managers:	Camille Lee
Tenure (yrs):	1.66

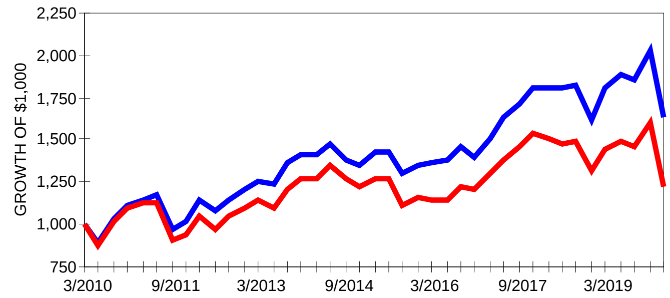
	MRQ	2019	2018	2017	2016	2015	2014	2013	2012	2011	2010	Incept
Manager	-19.7	26.09	-10.92	30.25	2.47	0.11	-3.86	17.26	18.39	-9.17	13.57	6.30
Bnchmrk	-23.3	21.51	-14.20	27.19	4.50	-5.66	-3.87	15.29	16.83	-13.71	11.15	4.25
Excess	3.61	4.57	3.28	3.06	-2.03	5.77	0.00	1.97	1.56	4.54	2.42	2.05
90 TBill	0.24	2.08	2.00	0.96	0.33	0.06	0.03	0.05	0.08	0.06	0.14	1.32

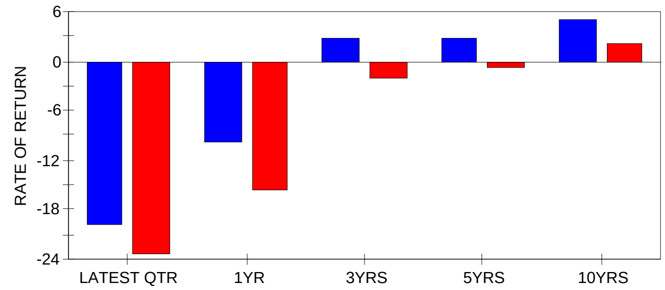
PERIOD	ROR	STDEV	ALPHA	BETA	RSQR	TRCKERR	SHARPE	INFORATIO
3 Yrs	2.82	17.31	4.55	0.95	0.98	2.63	0.06	1.82
4 Yrs	4.66	15.83	2.96	0.94	0.96	3.32	0.21	0.92
5 Yrs	2.79	14.88	3.22	0.92	0.96	3.24	0.11	1.06
6 Yrs	2.52	14.08	3.05	0.92	0.96	3.07	0.11	1.05
7 Yrs	3.78	13.45	2.65	0.91	0.96	3.09	0.22	0.88
8 Yrs	4.60	13.09	2.66	0.90	0.96	3.02	0.30	0.88
9 Yrs	4.02	14.38	3.05	0.91	0.97	2.97	0.23	1.06
10 Yrs	5.02	15.06	2.96	0.92	0.97	2.93	0.29	1.01
Inception	6.30	17.48	2.11	0.91	0.98	3.01	0.29	0.68

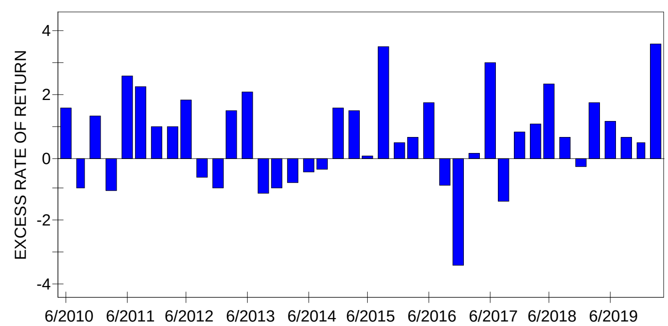
FEES AND EXPENSES		COMPOSITION OF ASSETS	
Deferred Load (%):	--	Cash (%)	2.10
Front Load (%):	--	Convertible (%)	0.00
Actual 12B-1 (%):	--	Non-US Bonds (%)	0.00
Expense Ratio (%):	0.00	Non-US Stocks (%)	91.68
Management Fee (%):	0.00	Preferred (%)	0.00
Redemption Fee (%):	--	US Bonds (%)	0.00
Admin Fee (%):	--	US Stocks (%)	6.22
		Other (%)	0.00

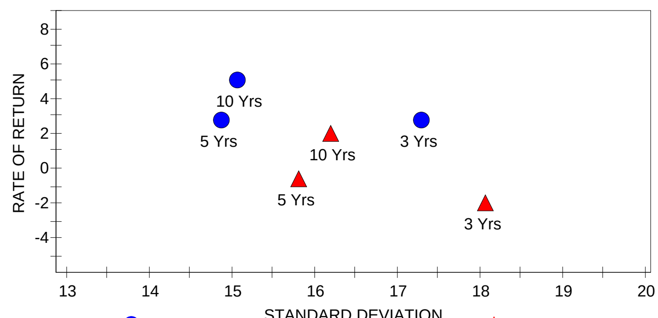
STYLE BREAKDOWN		MARKET CAP BREAKDOWN	
Equity Large Value (%):	13.85	Cap Giant (%)	35.71
Equity Large Blend (%):	34.97	Cap Large (%)	37.25
Equity Large Growth (%):	24.31	Cap Medium (%)	23.62
Equity Mid Value (%):	4.87	Cap Small (%)	3.02
Equity Mid Blend (%):	7.61	Cap Micro (%)	0.39
Equity Mid Growth (%):	11.01		
Equity Small Value (%):	0.70		
Equity Small Blend (%):	1.48		
Equity Small Growth (%):	1.21		

FIXED-INCOME STATISTICS		EQUITY STATISTICS	
Avg Eff/Mat/Duration (yrs):	--	Price/Earning Ratio (%)	17.38
Avg Weighted Coupon (%):	--	Price/Book Ratio (%)	1.89
Avg Credit Quality:		Price/Sales Ratio (%)	1.71
		Price/Cash Ratio (%)	11.24









	RATE OF RETURN			GROWTH OF $1,000		
PERIOD	MANAGER	BENCHMARK	EXCESS	MANAGER	BENCHMARK	PREMIUM
1 Yr	-9.66	-15.57	5.91	$903	$844	$59
2 Yrs	-4.99	-10.07	5.09	$903	$809	$94
3 Yrs	2.82	-1.96	4.78	$1,087	$942	$145
4 Yrs	4.66	1.61	3.05	$1,200	$1,066	$134
5 Yrs	2.79	-0.64	3.43	$1,147	$968	$179
6 Yrs	2.52	-0.71	3.23	$1,161	$958	$203
7 Yrs	3.78	1.06	2.73	$1,297	$1,076	$220
8 Yrs	4.60	1.94	2.65	$1,433	$1,166	$266
9 Yrs	4.02	0.89	3.14	$1,426	$1,083	$344
10 Yrs	5.02	2.05	2.97	$1,632	$1,225	$407
Inception	6.30	4.25	2.05	$2,578	$1,906	$672

PERIODS ENDING: March 31, 2020
SINCE INCEPTION: September 30, 2004
BENCHMARK: MSCI ACWI x US Net

VANGUARD
VANGUARD TOTAL INTL STOCK INDEX ADMIRAL

OVERALL RANKING:	μ μ μ
Product Type:	Open Ended Mutual Fund
Mgmt. Co. Name:	Vanguard
Mgmt. Co. Address:	Vanguard Star Funds Po Box 2600 V26 Valley Forge PA 19482 USA
Phone:	800-662-7447
Website:	www.vanguard.com
Inception Date:	11/2010
CUSIP:	921909818
Ticker:	VTIAX
Share Class Type:	Inst
Total Net Assets (3/2020):	$59,016,567,290
NAV (4/2020):	24.36
Yield:	3.59
Equity Style:	Large Blend
Fix Income Style:	--
Morningstar Category:	Foreign Large Blend
Fund Objective:	Foreign Stock
Portfolio Turnover:	4.00
Open to New Investors:	Yes
Init. Min. Purchase ($):	3000.00
Subsequent Purchase ($):	1.00
Init. IRA Min. Purchase ($):	--
Portfolio Managers:	Michael Perre
Tenure (yrs):	11.74

	MRQ	2019	2018	2017	2016	2015	2014	2013	2012	2011	2010	Incept
Manager	-24.3	21.51	-14.43	27.55	4.67	-4.26	-4.17	15.14	18.21	-14.52	11.04	3.67
Bnchmrk	-23.3	21.51	-14.20	27.19	4.50	-5.66	-3.87	15.29	16.83	-13.71	11.15	--
Excess	-0.95	-0.01	-0.24	0.36	0.18	1.40	-0.31	-0.15	1.38	-0.82	-0.11	--
90 TBill	0.24	2.08	2.00	0.96	0.33	0.06	0.03	0.05	0.08	0.06	0.14	2.12

PERIOD	ROR	STDEV	ALPHA	BETA	RSQR	TRCKERR	SHARPE	INFORATIO
3 Yrs	-2.55	18.50	-0.45	1.02	1.00	0.77	-0.23	-0.76
4 Yrs	1.29	16.87	-0.27	1.02	1.00	0.95	-0.01	-0.34
5 Yrs	-0.68	16.06	0.03	1.01	1.00	0.99	-0.11	-0.03
6 Yrs	-0.74	15.17	0.03	1.02	1.00	0.95	-0.11	-0.04
7 Yrs	1.09	14.70	0.06	1.02	1.00	0.89	0.02	0.04
8 Yrs	2.00	14.40	0.06	1.02	1.00	0.91	0.09	0.06
9 Yrs	0.95	15.87	0.10	1.03	1.00	0.98	0.02	0.06
10 Yrs	2.06	16.74	0.02	1.03	1.00	1.06	0.09	0.01
Inception	3.67	19.38	--	--	--	--	0.08	--

FEES AND EXPENSES

Deferred Load (%):	--
Front Load (%):	--
Actual 12B-1 (%):	--
Expense Ratio (%):	0.11
Management Fee (%):	0.10
Redemption Fee (%):	--
Admin Fee (%):	--

COMPOSITION OF ASSETS

Cash (%)	1.89
Convertible (%)	0.00
Non-US Bonds (%)	0.02
Non-US Stocks (%)	97.25
Preferred (%)	0.04
US Bonds (%)	0.13
US Stocks (%)	0.62
Other (%)	0.06

STYLE BREAKDOWN

Equity Large Value (%):	27.60
Equity Large Blend (%):	26.62
Equity Large Growth (%):	19.32
Equity Mid Value (%):	7.72
Equity Mid Blend (%):	6.11
Equity Mid Growth (%):	6.20
Equity Small Value (%):	2.79
Equity Small Blend (%):	1.96
Equity Small Growth (%):	1.67

MARKET CAP BREAKDOWN

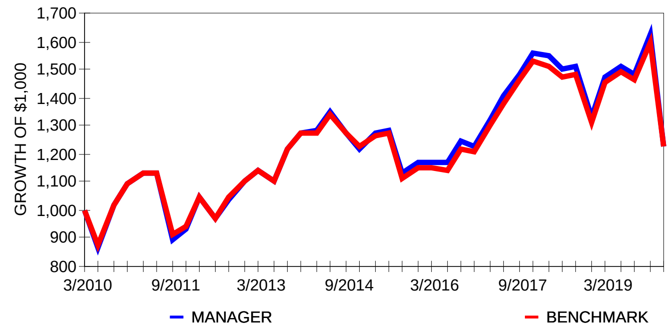
Cap Giant (%)	39.78
Cap Large (%)	33.70
Cap Medium (%)	20.03
Cap Small (%)	5.68
Cap Micro (%)	0.81

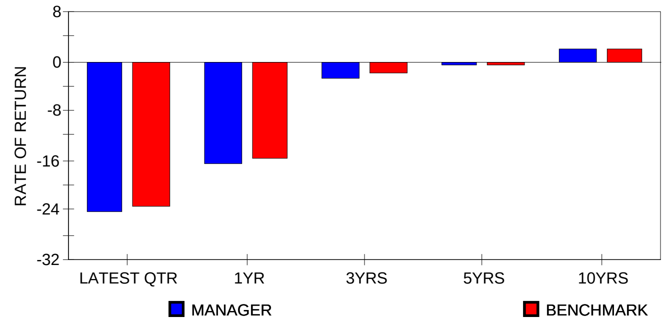
FIXED-INCOME STATISTICS

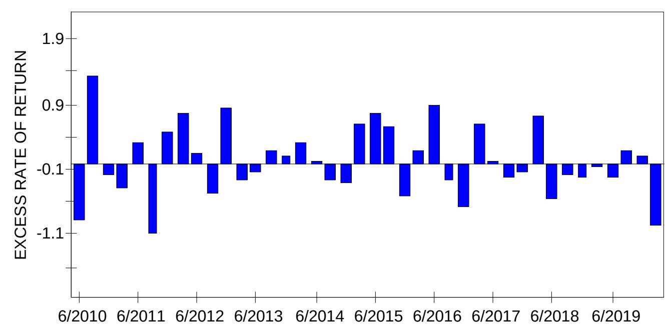
Avg Eff/Mat/Duration (yrs):	--
Avg Weighted Coupon (%):	--
Avg Credit Quality:	

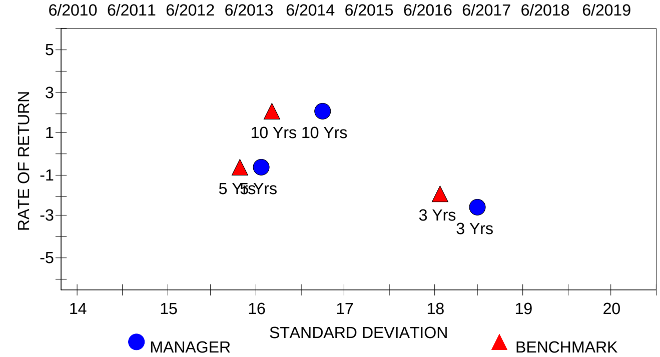
EQUITY STATISTICS

Price/Earning Ratio (%)	12.73
Price/Book Ratio (%)	1.25
Price/Sales Ratio (%)	0.94
Price/Cash Ratio (%)	7.48









	RATE OF RETURN			GROWTH OF $1,000		
PERIOD	MANAGER	BENCHMARK	EXCESS	MANAGER	BENCHMARK	PREMIUM
1 Yr	-16.57	-15.57	-0.99	$834	$844	-$10
2 Yrs	-11.08	-10.07	-1.01	$791	$809	-$18
3 Yrs	-2.55	-1.96	-0.59	$925	$942	-$17
4 Yrs	1.29	1.61	-0.32	$1,053	$1,066	-$13
5 Yrs	-0.68	-0.64	-0.03	$967	$968	-$2
6 Yrs	-0.74	-0.71	-0.03	$956	$958	-$2
7 Yrs	1.09	1.06	0.03	$1,079	$1,076	$2
8 Yrs	2.00	1.94	0.06	$1,172	$1,166	$5
9 Yrs	0.95	0.89	0.06	$1,089	$1,083	$6
10 Yrs	2.06	2.05	0.01	$1,227	$1,225	$2
Inception	3.67	--	--	$2,354	--	--

PERIODS ENDING: March 31, 2020
SINCE INCEPTION: June 30, 1996
BENCHMARK: MSCI ACWI x US Net

AMERICAN FUNDS
AMERICAN FUNDS EUROPACIFIC GROWTH R6

OVERALL RANKING:	μ μ μ
Product Type:	Open Ended Mutual Fund
Mgmt. Co. Name:	American Funds
Mgmt. Co. Address:	Europacific Growth Fund 333 South Hope Street Los Angeles, CA 90071-1406 USA
Phone:	800-421-4225
Website:	www.americanfunds.com
Inception Date:	5/2009
CUSIP:	298706821
Ticker:	RERGX
Share Class Type:	Retirement
Total Net Assets (4/2020):	$65,402,367,473
NAV (4/2020):	46.98
Yield:	1.61
Equity Style:	Large Growth
Fix Income Style:	--
Morningstar Category:	Foreign Large Growth
Fund Objective:	Foreign Stock
Portfolio Turnover:	35.00
Open to New Investors:	Yes
Init. Min. Purchase ($):	250.00
Subsequent Purchase ($):	50.00
Init. IRA Min. Purchase ($):	--
Portfolio Managers:	Carl Kawaja
Tenure (yrs):	18.93

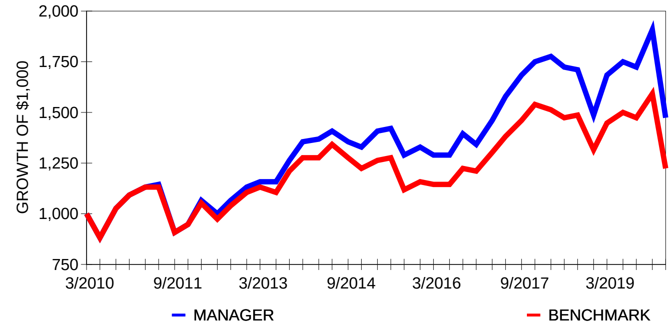
	MRQ	2019	2018	2017	2016	2015	2014	2013	2012	2011	2010	Incept
Manager	-22.4	27.40	-14.91	31.17	1.01	-0.48	-2.29	20.58	19.64	-13.31	9.76	9.98
Bnchmrk	-23.3	21.51	-14.20	27.19	4.50	-5.66	-3.87	15.29	16.83	-13.71	11.15	--
Excess	0.93	5.88	-0.71	3.98	-3.48	5.18	1.57	5.29	2.81	0.40	-1.39	--
90 TBill	0.24	2.08	2.00	0.96	0.33	0.06	0.03	0.05	0.08	0.06	0.14	3.41

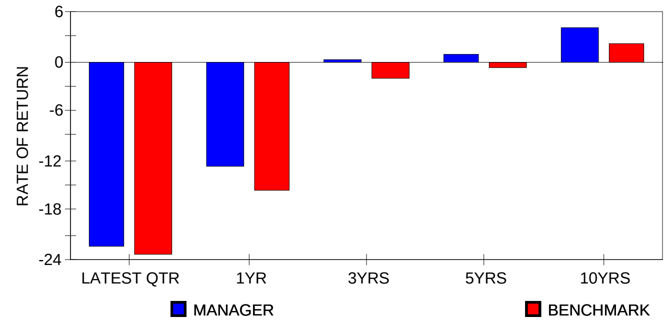
PERIOD	ROR	STDEV	ALPHA	BETA	RSQR	TRCKERR	SHARPE	INFORATIO
3 Yrs	0.28	19.02	2.52	1.04	0.98	2.61	-0.07	0.86
4 Yrs	3.34	17.59	1.79	1.06	0.98	2.90	0.11	0.60
5 Yrs	0.91	16.53	1.67	1.03	0.97	2.95	-0.01	0.53
6 Yrs	1.22	15.43	2.01	1.02	0.96	3.10	0.02	0.62
7 Yrs	3.46	14.90	2.43	1.01	0.96	3.12	0.18	0.77
8 Yrs	4.21	14.44	2.26	1.00	0.96	2.97	0.24	0.76
9 Yrs	3.03	15.94	2.18	1.02	0.97	2.85	0.15	0.75
10 Yrs	3.97	16.54	1.92	1.01	0.97	2.78	0.20	0.69
Inception	9.98	17.21	--	--	--	--	0.38	--

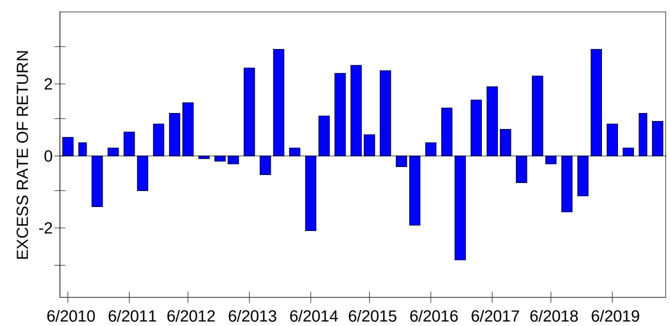
FEES AND EXPENSES		COMPOSITION OF ASSETS	
Deferred Load (%):	--	Cash (%)	9.23
Front Load (%):	--	Convertible (%)	0.00
Actual 12B-1 (%):	--	Non-US Bonds (%)	0.01
Expense Ratio (%):	0.49	Non-US Stocks (%)	89.74
Management Fee (%):	0.69	Preferred (%)	0.00
Redemption Fee (%):	--	US Bonds (%)	0.08
Admin Fee (%):	0.05	US Stocks (%)	0.93
		Other (%)	0.01

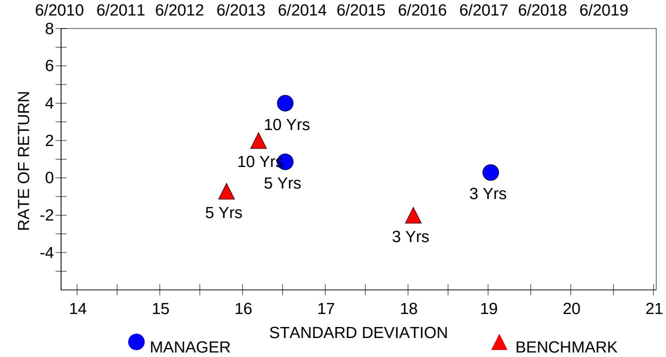
STYLE BREAKDOWN		MARKET CAP BREAKDOWN	
Equity Large Value (%):	9.81	Cap Giant (%)	58.61
Equity Large Blend (%):	30.72	Cap Large (%)	29.41
Equity Large Growth (%):	47.83	Cap Medium (%)	11.55
Equity Mid Value (%):	1.93	Cap Small (%)	0.40
Equity Mid Blend (%):	2.70	Cap Micro (%)	0.04
Equity Mid Growth (%):	6.57		
Equity Small Value (%):	0.12		
Equity Small Blend (%):	0.24		
Equity Small Growth (%):	0.08		

FIXED-INCOME STATISTICS		EQUITY STATISTICS	
Avg Eff/Mat/Duration (yrs):	--	Price/Earning Ratio (%)	17.72
Avg Weighted Coupon (%):	2.38	Price/Book Ratio (%)	2.01
Avg Credit Quality:		Price/Sales Ratio (%)	1.78
		Price/Cash Ratio (%)	10.81









	RATE OF RETURN			GROWTH OF $1,000		
PERIOD	MANAGER	BENCHMARK	EXCESS	MANAGER	BENCHMARK	PREMIUM
1 Yr	-12.70	-15.57	2.87	$873	$844	$29
2 Yrs	-8.77	-10.07	1.30	$832	$809	$24
3 Yrs	0.28	-1.96	2.25	$1,009	$942	$66
4 Yrs	3.34	1.61	1.73	$1,141	$1,066	$75
5 Yrs	0.91	-0.64	1.56	$1,046	$968	$78
6 Yrs	1.22	-0.71	1.93	$1,076	$958	$117
7 Yrs	3.46	1.06	2.41	$1,269	$1,076	$193
8 Yrs	4.21	1.94	2.27	$1,391	$1,166	$224
9 Yrs	3.03	0.89	2.14	$1,308	$1,083	$225
10 Yrs	3.97	2.05	1.92	$1,475	$1,225	$250
Inception	9.98	--	--	$30,026	--	--

PERIODS ENDING: March 31, 2020
SINCE INCEPTION: June 30, 1984
BENCHMARK: MSCI ACWI x US Net

Important Information about this Report

This report includes presentations of managers' performance on a gross fee basis. Since the effects of management fees reduce performance, this report is intended only for one-on-one presentations to institutional and high net worth individuals who understand how the payment of fees, compounded over time, will reduce performance results and have indicated such accreditation in the MEPS questionnaire.

This report is intended as a general guide for your investment plans and is for your use only. This report provides, among other things, a preliminary comparison to various market indexes of the hypothetical investment performance that might have been achieved if the investment managers identified had managed an investor's account in accordance with the asset allocations and investment styles specified. It is not intended to provide and should not be construed as providing tax or legal advice.

The information contained in this report reflects a collaborative process between you and your Financial Advisor. Any recommendations are based upon our understanding of your responses to the profile questions and are current only as of the date printed on the front cover. Unless you make a specific request for an update, this report will not be updated to reflect any changes in any of the accounts covered, your investment objectives, risk tolerances or market conditions.

You should note that UBS Financial Services ("the Firm") has a variety of products and services that provide portfolio review and analysis. The recommendations and types of analyses provided (including recommended asset allocation strategies) may vary depending on the asset allocation model and program used.

This report may cover a number of your existing portfolio, each with potentially different investment objectives and risk parameters. As you instructed, the assets in these accounts have been considered as a whole in developing an overall asset allocation strategy that addresses your specific investment goal.

Investment Manager Performance

Performance results for investment managers that are included in our ACCESS program, which are indicated throughout the report, are based upon the ACCESS manager's time weighted rates of return of fully discretionary ACCESS accounts managed for at least one full calendar quarter. Performance results for non-ACCESS participating investment managers are obtained from Informa Investment Solutions' Plan Sponsor Network (PSN) as reported by each investment manager and do not reflect actual UBS Financial Services account performance. Your returns may vary from these results shown due to timing and other individual account factors. These results are generally net of commissions on securities transactions but do not reflect the deduction of the investment manager's fee or UBS Financial Services' fee. The payment of these fees and expenses will reduce your return. The net effect of the deduction of fees on annualized performance, including the compounded effect over time, is determined by the relative size of the fee and the account's investment performance. For example, for an account with a 2.8% annual fee deducted quarterly, if the gross performance is 10% on an annual basis, the quarterly compounding effect of the fees will result in a final performance of approximately 7.1% per year, a reduction of 2.9% per year. Compounding will similarly affect the account's performance on a cumulative basis. It should also be noted that where your gross returns are compared to an index, the index performance also does not reflect any transaction costs or management fees.

Some investment managers presented in the strategies may have individual performance track records that are longer than the period shown in the report. Individual investment managers' performance records for longer time periods, if applicable, are available through your Financial Advisor. For complete information regarding these investment managers, their fees and performance, contact your UBSIC Consultant and see the manager's Form ADV, Part II.

Important Information Regarding Simulated Performance

The strategy is a new strategy and does not have a track record. The performance information presented is simulated, backtested and was created by applying the same investment perspectives and quantitative analysis of valuation, quality and sentiment that are employed in existing strategies managed by the investment manager, though differences exist in portfolio construction. Any improvements that were incorporated into the current investment process and quantitative models were assumed to exist for the entire simulation period. Implementation of the live strategy versus the simulated strategy will be virtually identical with the exception of intramonth trading. The hypothetical performance results for the model shown reflect the investment returns that an investor might have achieved by investing in the strategy for the entire period indicated. It assumes that, since inception, no cash was added to or assets withdrawn from the account and that all dividends, gains and other earnings in the account were reinvested. The simulation assumed once a month trading but trading for the live strategy will likely occur more frequently. Returns are simulated for the entire period and assume 1.0% transaction costs. The testing methodology used both internally and Factset provided data and applications to generate simulated historical portfolios. The results shown do not represent the results of actual trading using client assets, but were achieved by means of the retroactive application of a model that was designed with the benefit of hindsight. The simulated performance was compiled after the end of the period depicted and does not represent the actual investment decisions of the advisor. These results do not reflect the effect of material economic and market factors on decision-making. As a result, there is no reason to believe that your portfolio will perform in a similar manner or that the investment manager would have made the same investment recommendations or achieved the same level of performance if it had been managing the strategy for the entire period for actual clients and charging fees for the advice, with the knowledge that clients would rely on the advice and in light of then-current market conditions. The strategy did not exist during the period presented. In addition, if investors had actually invested based on the strategy, their results would have differed from those shown because of differences in the timing and amounts of their investments. Past performance is never an indicator of future results.

Index Information

An actual investment in the securities included in the index would require an investor to incur transaction costs, which would lower the performance results. Please keep in mind that index information is for illustrative purposes and relates to historical performance of market indexes and not the performance of actual strategies or managers presented. The past performance of the indexes is not a guarantee of future results because each index reflects an unmanaged universe of securities and does not include any deduction for advisory fees or other expenses that would reduce actual returns. The performance shown should not be considered indicative of the performance of an actively managed portfolio for the same time period. Most managers are not restricted to investment in the same securities or security weightings as the corresponding indexes, so performance will vary. Finally, the performance of the indexes reflects the reinvestment of all income and dividends. A description of each index can be found in the Definitions section at the end of this report.

Recommended Strategies

The Manager Recommendations included in this Report are limited to those managers and strategies in our ACCESS, MAC Researched, and UBSIC Reviewed programs. While the due diligence process encompasses managers in each program, the frequency and depth of our due diligence reviews varies depending on which program the manager participates in. The level of due diligence encompasses a quantitative review of composite and actual performance data and portfolio analytics (including responses to a detailed questionnaire) and may also include on-site visits by one or more of our Investment Manager Research Analysts to each manager. For ACCESS managers, on-site visits occur on average at least once every 12 months. On-site visits to MAC Researched managers occur on average at least every 2 years. UBSIC Reviewed managers are subject to in-depth review on average at least every 2 years, but no on-site visits are conducted. The evaluation criteria covered in on-site visits are the same for managers in both programs. In addition, for ACCESS managers, a detailed review of portfolio performance and attribution is performed on a quarterly basis to ensure that portfolios continue to be invested consistent with the manager's stated investment style. Portfolio attribution analysis is performed prior to on-site visits and may be done during periods of poor relative performance, but is not systematically performed on a quarterly basis. T

he strategies presented are hypothetical portfolios, and have not been tracked by UBS Financial Services. They were created as of the date of this report with the benefit of hindsight. The past performance of each recommended investment manager was known to UBS Financial Services when it developed the strategies and was a key factor in the Firm's decision to include each investment manager in a recommended strategy. There is no reason to believe that UBS Financial Services would have been able to develop this same strategy without knowing in advance how the recommended investment managers and the markets would perform, and these results are not an indicator that UBS Financial Services will be able to do so in the future.

The past performance results for the recommended strategy are hypothetical. They reflect the theoretical investment returns that an investor might have achieved by investing the amount and on the dates indicated on the investment profile section of this report, and by following the recommendation for initially allocating, and then reallocating from time to time, the account's assets among the different recommended investment managers. It assumes that, after establishing the account, the investor would not have added any cash to or withdrawn assets from the account and that all dividends, gains and other earnings in the account would have been reinvested in accordance with the Firm's recommendations. The recommended strategy in this format may not have existed as of the dates for which performance is shown. In addition, some of the investment managers recommended may not have been part of any UBS Financial Services sponsored program at that time. Actual assets of actual clients may not have been invested in accordance with these strategies during the time periods shown.

Past performance can never guarantee future results.

Assets Held at Other Financial Institutions

At your direction, we may also have considered assets that you hold at other financial institutions. Information about these assets is based solely on the information you have provided to us. We have not verified, and are not responsible for, the accuracy or completeness of this information.

You have provided the names of investment managers managing your assets at other financial institutions. This report provides performance information derived from a third party database, which is believed to be reliable, but which UBS Financial Services has not verified. The managers listed are in comparative portfolios and are for illustrative purposes. You may not have received the performance returns presented here because they are gross of any management fees and other charges that have been assessed to your account. Therefore, any evaluation or analysis provided in this report regarding separate account managers, which includes assets

Please note that any discrepancies between the information you provided and the actual value of those assets at the time you choose to implement the strategy may also affect the outcome of the asset allocation strategy we discuss with you. As such, the results may differ from any illustrations shown on this report.

Taxes Implementing any strategy presented, including changing any strategy may result in incurring gains or losses for income tax purposes. UBS Financial Services does not provide tax advice. We recommend that you evaluate this report with your legal and/or tax advisor before taking any action because of the significance and complexity of tax considerations.

Periodic Reviews Since this report is based on information provided as of the date indicated on the cover, assumptions and estimates may change. For this reason, with your Financial Advisor, you should periodically revisit your current financial situation, your current strategy, and the assumptions it contains.

Definitions

General Definitions

Alpha – A measure of the difference between a fund's actual returns and its expected performance, given its level of risk as measured by beta. A positive alpha figure indicates the fund has performed better than its beta would predict. In contrast, a negative alpha indicates the fund's underperformance, given the expectations established by the fund's beta. All MPT statistics (alpha, beta, and R-squared) are based on a least-squared regression of the fund's return over Treasury bills.

Beta – A measure of a fund's sensitivity to market movements. The beta of the market is 1.00 by definition. Morningstar calculates beta by comparing a fund's excess return over T-bills to the market's excess return over T-bills, so a beta of 1.10 shows that the fund has performed 10% better than its benchmark index in up markets and 10% worse in down markets, assuming all other factors remain constant. Conversely, a beta of 0.85 indicates that the fund's excess return is expected to perform 15% worse than the market's excess return during up markets and 15% better during down markets.

Blend – A Blend is several managers allocated to percentages of a whole. The performance of the managers is weighted to create the blended performance.

Downside Risk – Downside Risk, or Semi-variance is the standard deviation (see Standard Deviation) of the portfolio's negative returns. Many consultants find the statistic extremely useful since it measures volatility in undesirable situations. The higher the value, the greater the historical Downside Risk.

Down Market Capture Ratio – A measure of managers' performance in down markets relative to the market itself. A down market is one in which the market's quarterly return is less than zero. The lower the manager's down-market capture ratio, the better the manager protected capital during a market decline. A value of 90 suggests that a manager's losses were 90% of the market loss when the market was down.

Information Ratio – The ratio of annualized expected residual return to residual risk. To calculate the IR the active return and tracking error must be annualized.

R-Squared – Reflects the percentage of a strategy's movements that can be explained by movements in its benchmark index. An R-squared of 100 indicates that all movements of a fund can be explained by movements in the index. Thus, portfolios invested in S&P 500 stocks will typically have an R-squared close to 100. Conversely, a low R-squared indicates that very few of the fund's movements can be explained by movements in its benchmark index. An R-squared measure of 35, for example, means that movements in the benchmark index can explain only 35% of the portfolio's movements.

Sharpe-Ratio – A risk-adjusted measure developed by Nobel Laureate William Sharpe. It is calculated by using standard deviation and excess return to determine reward per unit of risk. The higher the Sharpe Ratio, the better the portfolio's historical risk-adjusted performance is. The Sharpe Ratio is calculated for the past 36-month period by dividing a portfolio's annualized excess returns by its annualized standard deviation. Since this ratio uses standard deviation as its risk measure, it is most appropriately applied when analyzing a portfolio that is an investor's sole holding. The Sharpe Ratio can be used to compare two portfolios directly on how much risk a fund has to bear to earn excess return over the risk-free rate.

Standard Deviation – A measure of risk. A statistical measurement of dispersion about an average, which, for a portfolio, depicts how widely the returns varied over a certain period of time. Investors use the standard deviation of historical performance to try to predict the range of returns that are most likely for a given portfolio. When a portfolio has a high standard deviation, the predicted range of performance is wide, implying greater risk and volatility.

Tracking Error – Measures the divergence between the price behavior of a portfolio to the price behavior of a benchmark.

Up Market Capture Ratio – Up-market capture ratio is a measure of managers' performance in up markets relative to the market itself. An up market is one in which the market's quarterly return is greater than or equal to zero. The higher the manager's up-market capture ratio, the better the manager capitalized on a rising market. For example, a value of 110 suggests that the manager captured 110% of the up market (performed ten percent better than the market) when the market was up.

Index Definitions

First Boston Convertible Securities (FBCB) This is a performance benchmark for convertible accounts. This index generally includes 250 to 300 issues. To be included, convertible bonds and preferreds must be rated B- or better by Standard & Poor's (quality-related adjustments are made at the end of each calendar year), convertibles must have a minimum issue size of $50 million (new issues are added in the month following their issuance), and preferreds must have a minimum of 500,000 shares outstanding. Eurobonds are also included if they are issued by US-domiciled companies, rated B- or higher by Standard & Poor's, and have an issue size greater than $100 million.

Barclays Capital Aggregate Bond Index (BCAG) Composed of securities from Barclays Capital Brothers government/corporate bond index, mortgage-backed securities index, and the asset-backed securities index. Total return comprises price appreciation/depreciation and income as a percentage of the original investment. Indexes are rebalanced monthly by market capitalization.

Barclays Capital Corporate Int (BCIC) A subset of the Barclays Capital Corporate Bond Index covering all corporate, publicly issued, fixed-rate, nonconvertible US debt issues rated at least Baa with at least $50 million principal outstanding and maturity less than 10 years.

Barclays Capital Corporate Long Term (BCLTC) A subset of the Barclays Capital Corporate Bond Index covering all corporate, publicly issued, fixed-rate, nonconvertible US debt issues rated at least Baa with at least $50 million principal outstanding and maturity greater than 10 years.

Barclays Capital Government Corporate Bond Index (BCGC) Composed of all bonds that are investment grade (rated Baa or higher by Moody's or BBB or highest by S&P, if unrated by Moody's). Issues must have at least one year to maturity. Total return comprises price appreciation/depreciation and income as a percentage of the original investment. Indexes are rebalanced monthly by market capitalization.

Barclays Capital Government/Corporate Int (BCIGC) Composed of all bonds covered by the Barclays Capital Government/Corporate Bond Index with maturities between one and 9.99 years. Total return comprises price appreciation/depreciation and income as a percentage of the original investment. Indexes are rebalanced monthly by market capitalization.

Barclays Capital Government/Corporate Long Term (BCLTGC) Composed of all bonds covered by the Barclays Capital Government/Corporate Bond Index with maturities of 10 years or greater. Total return comprises price appreciation/depreciation and income as a percentage of the original investment. Indexes are rebalanced monthly by market capitalization.

Barclays Capital Mortgage Backed (BCMBS) Composed of all fixed-rate, securitized mortgage pools by GNMA, FNMA, and FHLMC, including GNMA graduated payment mortgages. The minimum principal amount required for inclusion is $50 million. Total return comprises price appreciation/depreciation and income as a percentage of the original investment. Indexes are rebalanced monthly by market capitalization.

Barclays Capital Municipal Bond (BCM) Computed twice monthly from prices on approximately 1,100 bonds. Prices are supplied by Kenny Information Systems, Inc. The index is composed of approximately 60% revenue bonds and 40% state government obligations.

Barclays Capital Municipal 5 Year (BCMB) A subset of the Barclays Capital Municipal Bond Index where the average maturity of the bonds are five years.

MSCI (EAFE) An arithmetic, market value-weighted average of the performance of over 900 securities listed on the stock exchanges of the following countries in Europe, Australia and the Far East: Australia, Hong Kong, Norway, Austria, Ireland, Singapore, Belgium, Italy, Spain, Denmark, Japan, Sweden, Finland, Malaysia, Switzerland, France, Netherlands, United Kingdom, Germany, New Zealand.

MSCI Emerging Markets (EMF) The MSCI Emerging Markets (EMF) is a free float-adjusted market capitalization index that is designed to measure equity market performance in the global emerging markets. As of April 2002 the MSCI EMF Index consisted of the following 26 emerging market country indexes: Argentina, Brazil, Chile, China, Colombia, Czech Republic, Egypt, Hungary, India, Indonesia, Israel, Jordan, Korea, Malaysia, Mexico, Morocco, Pakistan, Peru, Philippines, Poland, Russia, South Africa, Taiwan, Thailand, Turkey and Venezuela.

MSCI World S/B Net (MSCIW) The MSCI World Index is a free float-adjusted market capitalization index that is designed to measure global developed market equity performance. As of April 2002 the MSCI World Index consisted of the following 23 developed market country indexes: Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Hong Kong, Ireland, Italy, Japan, Netherlands, New Zealand, Norway, Portugal, Singapore, Spain, Sweden, Switzerland, the United Kingdom and the United States.

S&P 500 (SWPI) Covers 500 industrial, utility, transportation, and financial companies of the US markets (mostly NYSE issues). The index represents about 75% of NYSE market capitalization and 30% of NYSE issues. It is a capitalization-weighted index calculated on a total return basis with dividends reinvested.

Russell 1000 (R1000) Consists of the 1,000 largest securities in the Russell 3000 index. This large cap (market-oriented) index represents the universe of stocks from which most active money managers typically select. The Russell 1000 is highly correlated with the S&P 500 index.

Russell 1000 Growth (R1000G) Contains those Russell 1000 securities with a greater-than-average growth orientation. Securities in this index tend to exhibit higher price-to-book and price-earnings ratios, lower dividend yields and higher forecasted growth values than the value universe.

Russell 1000 Value (R1000V) Contains those Russell 1000 securities with a less-than-average growth orientation. It represents the universe of stocks from which value managers typically select. Securities in this index tend to exhibit low price-to-book and price-earnings ratios, higher dividend yields and lower forecasted growth values than the growth universe.

Russell 2000 (R2000) Consists of the smallest 2,000 securities in the Russell 3000 index, representing approximately 11% of the Russell 3000 total market capitalization. This index is widely regarded in the industry as the premier measure of small cap stocks.

Russell 2000 Growth (R2000G) Contains those Russell 2000 securities with a greater-than-average growth orientation. Securities in this index tend to exhibit higher price-to-book and price-earnings ratios, lower dividend yields and higher forecasted growth values than the value universe.

Russell 2000 Value (R2000V) Contains those Russell 2000 securities with a less-than-average growth orientation. Securities in this index tend to exhibit lower price-to-book and price-earnings ratios, higher dividend yields and lower forecasted growth values than the growth universe.

Russell 2500 (R2500) Consists of the bottom 500 securities in the Russell 1000 index and all 2,000 securities in the Russell 2000 index, representing approximately 23% of the Russell 3000 total market capitalization. This index is a good measure of small to medium-small stock performance.

Russell 2500 Growth (R2500G) Measures the performance of those Russell 2500 companies with higher price-to-book ratios and higher forecasted growth values.

Russell 2500 Value (R2500V) Measures the performance of those Russell 2500 companies with lower price-to-book ratios and lower forecasted growth values.

Russell 3000 (R3000) Measures the performance of the 3,000 largest US companies based on total market capitalization, which represents approximately 98% of the investable US equity market.

Russell 3000 Growth (R3000G) Measures the performance of those Russell 3000® Index companies with higher price-to-book ratios and higher forecasted growth values. The stocks in this index are also members of either the Russell 1000® Growth or the Russell 2000® Growth indexes.

Russell 3000 Value (R3000V) Measures the performance of those Russell 3000® Index companies with lower price-to-book ratios and lower forecasted growth values. The stocks in this index are also members of either the Russell 1000® Value or the Russell 2000® Value indexes.

Russell Midcap (RMID) Consists of the smallest 800 securities in the Russell 1000 index, as ranked by total market capitalization. This index accurately captures the medium-sized universe of securities and represents approximately 35% of the Russell 1000 total market capitalization.

Russell Midcap Growth (RMIDG) Contains those Russell Midcap securities with a greater-than-average growth orientation. Securities in this index tend to exhibit higher price-to-book and price-earnings ratios, lower dividend yields and higher forecasted growth values than the value universe. The stocks are also members of the Russell 1000 Growth Index.

Russell Midcap Value (RMIDV) Contains those Russell Midcap securities with a less-than-average growth orientation. Securities in this index tend to exhibit low price-to-book and price-earnings ratios, higher dividend yields and lower forecasted growth values than the growth universe. The stocks are also members of the Russell 1000 Value Index.

Salomon Brothers World Government Bond (SWGB) A market capitalization-weighted index consisting of government bond markets of the following countries: Australia, Austria, Belgium, Canada, Denmark, France, Germany, Italy, Japan, Netherlands, Spain, Sweden, United Kingdom, United States.

U.S. Treasury Bill (USTB): Represents 90-day return for Treasury Bills issued by the United States government.

Wilshire RE Securities Index (WRESI) A broad measure of the performance of publicly traded real estate securities, such as Real Estate Investment Trusts (REITs) and Real Estate Operating Companies (REOCs). The index is capitalization-weighted. The beginning date, January 1, 1978, was selected because it coincides with the Russell/NCREIF Property Index start date. The Index is rebalanced monthly, and returns are calculated on a buy and hold basis.

UBS

Cobb County Government Employees' Pension Plan

Asset Class Summary

Style Analysis As of May 31, 2020 Manager/Accounts	Account #:	% Assets	Large Cap Growth	Large Cap Blend	Large Cap Value	Mid Cap Blend	Small Cap Growth	Small Cap Value	Global	International	Fixed Income	Cash	Total Portfolio
TCW	**XXXXX76**	7.2%	$50,838,224										$ 50,838,224
Westfield Capital Management	**XXXXX32**	8.4%	$59,143,669										$ 59,143,669
Vanguard S&P 500 (VINIX)	**XXXXX66**	10.8%		$75,952,627									$ 75,952,627
Eagle Capital	**XXXXX85**	10.5%			$74,184,748								$ 74,184,748
Vanguard Mid Cap (VMCIX)	**XXXXX66**	6.3%				$44,432,174							$ 44,432,174
Eagle Asset Management	**XXXXX85**	3.1%					$21,477,373						$ 21,477,373
Vaughan Nelson	**XXXXX49**	2.8%						$19,424,560					$ 19,424,560
BlackRock Global Allocation (MALOX)	**XXXXX66**	2.8%							$19,847,256				$ 19,847,256
First Eagle Global (SGIIX)	**XXXXX66**	3.1%							$21,995,532				$ 21,995,532
Loomis Sayles Global Equity & Income(LSWWX)	**XXXXX66**	3.4%							$23,764,668				$ 23,764,668
Vanguard Total Int'l Stock (VTSNX)	**XXXXX66**	5.0%								$35,454,429			$ 35,454,429
Vanguard International Growth (VWILX)	**XXXXX66**	6.0%								$42,361,051			$ 42,361,051
Tweedy Browne Global Value (TBGVX)	**XXXXX66**	4.5%								$31,544,964			$ 31,544,964
Richmond	**XXXXX37**	12.1%									$85,293,832		$ 85,293,832
BlackRock Strategic Income Opps (BSIIX)	**XXXXX66**	6.7%									$47,383,405		$ 47,383,405
Delaware Diversified Income (CIT)	**XXXXX84**	7.2%									$50,545,127		$ 50,545,127
Total		**100%**	**$ 109,981,893**	**$ 75,952,627**	**$ 74,184,748**	**$ 44,432,174**	**$ 21,477,373**	**$ 19,424,560**	**$ 65,607,457**	**$ 109,360,444**	**$ 183,222,364**	**$ -**	**$ 703,643,639**
Current Allocation			**15.63%**	**10.79%**	**10.54%**	**6.31%**	**3.05%**	**2.76%**	**9.32%**	**15.54%**	**26.04%**	**0.00%**	**100%**
Target Allocation			**11.00%**	**11.00%**	**11.00%**	**6.00%**	**3.00%**	**3.00%**	**10.00%**	**20.00%**	**25.00%**		**100%**
Difference in %			**4.63%**	**-0.21%**	**-0.46%**	**0.31%**	**0.05%**	**-0.24%**	**-0.68%**	**-4.46%**	**1.04%**		

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Dollar values above are rounded to the nearest dollar.

Cobb County Government Employees' Pension Plan
Asset Class Summary
Market Value As of: May 31, 2020

Disclosures:

This report is provided for informational purposes only at your request. This report does not constitute an offer to sell or a solicitation or an offer to buy any securities. Any reference to a specific security included in this report does not constitute a recommendation to buy, sell or hold that security.

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Past performance does not guarantee future results and current performance may be lower or higher than past performance data presented. Past performance for periods greater than one year are presented on an annualized basis. The investment return and principal value of an investment will fluctuate so that your investment, when redeemed, may be worth more or less than your original cost of investing.

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Values for investments held at SunTrust and other information are provided as a courtesy and come solely from the information you have made available to us. UBSFS does not provide advice with respect to assets you hold at other financial institutions. UBSFS has not independently evaluated the accuracy of the information, including any valuations, which has been included solely for your convenience, and makes no representation or warranty about the accuracy or completeness of such information. UBSFS' SIPC coverage would only apply to those assets held at UBSFS, and to the extent some of the other reported entities may be SIPC members, customers should contact their financial representative or the other entity or refer to the other entity's statement regarding SIPC membership.

The target allocation is based on the client's most recent IPS that UBSFS has on file.

This report does not constitute an offer to sell or a solicitation or an offer to buy any securities. Any reference to a specific security included in this report does not constitute a recommendation to buy, sell or hold that security.

The investment return and principal value of an investment will fluctuate so that your investment, when redeemed, may be worth more or less than your original cost of investing.

If you believe any information included in this report is incomplete or inaccurate in any way, please contact your UBSFS representative.

Sources: Custodial Statement; IPS; Client Request or Advisor Recommendation

Review code: IS1602740

UBS

Cobb County OPEB

Asset Class Summary

Style Analysis

As of May 31, 2020 Manager/Accounts	Account #:	% Assets	Large Cap Growth	Large Cap Blend	Large Cap Value	Mid Cap Blend	Small Cap Growth	Small Cap Value	Global	International	Fixed Income	Cash	Total Portfolio
TCW	XXXXX93	7.1%	$ 9,919,633										$ 9,919,633
Westfield Capital Management	XXXXX91	7.5%	$ 10,503,413										$ 10,503,413
Vanguard S&P 500 (VINIX)	XXXXX57	11.2%		$ 15,593,836									$ 15,593,836
Eagle Capital	XXXXX00	9.9%			$ 13,816,750								$ 13,816,750
Vanguard Mid Cap (VIMAX)	XXXXX57	5.8%				$ 8,110,512							$ 8,110,512
Eagle Asset Management (HSRUX)	XXXXX57	3.0%					$ 4,258,284						$ 4,258,284
Vaughan Nelson	XXXXX94	2.7%						$ 3,718,684					$ 3,718,684
BlackRock Global Allocation (MALOX)	XXXXX57	3.4%							$ 4,786,773				$ 4,786,773
First Eagle Global (SGIIX)	XXXXX57	3.3%							$ 4,646,031				$ 4,646,031
Loomis Sayles Global Equity & Income(LSWWX)	XXXXX57	3.9%							$ 5,488,853				$ 5,488,853
Vanguard Total Int'l Stock (VTSNX)	XXXXX57	5.5%								$ 7,731,008			$ 7,731,008
Vanguard International Growth (VWILX)	XXXXX57	6.3%								$ 8,845,762			$ 8,845,762
Tweedy Browne Global Value (TGBVX)	XXXXX57	4.3%								$ 5,968,089			$ 5,968,089
Richmond	XXXXX92	12.3%									$ 17,198,124		$ 17,198,124
BlackRock Strategic Income Opps (BSIIX)	XXXXX57	6.3%									$ 8,753,959		$ 8,753,959
Delaware Diversified Income (DPFFX)	XXXXX57	7.5%									$ 10,506,848		$ 10,506,848
Total		**100%**	**$ 20,423,046**	**$ 15,593,836**	**$ 13,816,750**	**$ 8,110,512**	**$ 4,258,284**	**$ 3,718,684**	**$ 14,921,657**	**$ 22,544,859**	**$ 36,458,930**	**$ -**	**$ 139,846,559**
Current Allocation			**14.60%**	**11.15%**	**9.88%**	**5.80%**	**3.04%**	**2.66%**	**10.67%**	**16.12%**	**26.07%**	**0.00%**	**100%**
Target Allocation			**11.00%**	**11.00%**	**11.00%**	**6.00%**	**3.00%**	**3.00%**	**10.00%**	**20.00%**	**25.00%**		**100%**
Difference in %			**3.60%**	**0.15%**	**-1.12%**	**-0.20%**	**0.04%**	**-0.34%**	**0.67%**	**-3.88%**	**1.07%**		

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Dollar values above are rounded to the nearest dollar.

Cobb County OPEB
Asset Class Summary
Market Value As of: May 31, 2020

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Sources: Custodial Statement; IPS; Client Request or Advisor Recommendation

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