# ALASKA RETIREMENT MANAGEMENT BOARD

MAY 1, 2020

BOARD OF TRUSTEES MEETING

# FRIDAY, MAY 1, 2020

**I.** **9:00 am** **Call to Order**

**II.** **Roll Call**

**III.** **Public Meeting Notice**

**IV.** **Approval of Agenda**

**V.** **Public/Member Participation, Communications, and Appearances**
(Three Minute Limit)

**VI.** **9:10** **Chair Report**
*Robert Johnson, ARMB Chair*

**VII.** **9:20** **Committee and Legal Reports**

1. Audit Committee, *Robert Johnson, Chair*
2. Operations Committee, *Tom Brice, Chair*
3. Defined Contrib. Plan Committee, *Bob Williams, Chair*
4. Actuarial Committee, *Norm West, Chair*
5. Retiree Health Plan Advisory Board, *Gayle Harbo*
6. Legal Report, *Stuart Goering, Asst. Attorney General*

**VIII.** **9:50** **Minutes, Calendar/Disclosures, and Staff Reports**

7. Approval of Minutes – March 19, 2020

8. Calendar Update
*Stephanie Alexander, Liaison Officer*

**IX.** **9:55** **Existing Business**

9:55-10:25 9. Portfolio Update
*Bob Mitchell, Chief Investment Officer*

## 10:25AM – 15 MINUTE BREAK

10:40-11:15 10. Securities Lending Update
*Henry Disano, State Street Global Advisors*
*Michelle Prebula, Manager of Public Equities*

11:15–11:45 11. Executive Session

## LUNCH – 11:45AM - 1:00PM

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| 1:00-1:30 | 12. | Reflections<br>*Dr. William Jennings, Investment Advisory Council Member* |
| 1:30–2:00 | 13. | Performance Audit Recommendations<br>Action: Recommendations<br>*Bob Mitchell, Chief Investment Officer* |
| 2:00–2:45 | 14a. | Part 1: An Introduction to Factor-Based Investing<br>*Eric Shirbini, Scientific Beta*<br>*Marc Zieger, Scientific Beta* |

**2:45PM – 15 MINUTE BREAK**

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| 3:00–3:45 | 14b. | Part 2: An Introduction to Factor-Based Investing<br>*Eric Shirbini, Scientific Beta*<br>*Marc Zieger, Scientific Beta* |
| 3:45-4:15 | 15. | Risk Reporting (truView+)<br>*Zach Hanna, Deputy Chief Investment Officer*<br>*Shane Carson, State Investment Officer* |
| 4:15–4:30 | 16. | Investment Actions<br>A. Repeal Investment Guidelines<br>B. Clarifying Language for Policy & Procedures Manual<br>C. Create Investment Committee<br>D. Consent Agenda Policy<br>E. Secure Foundation Option<br>F. Review Actuary – First Annual Renewal Option<br>*Bob Mitchell, Chief Investment Officer* |

**X. Unfinished Business**

**XI. New Business**

**XII. Other Matters to Properly Come Before the Board**

**XIII. Public/Member Comments**

**XIV. Investment Advisory Council Comments**

**XV. Trustee Comments**

**XVI. Future Agenda Items**

**XVII. Adjournment**

*NOTE: Times are approximate and every attempt will be made to stay on schedule; however, adjustments may be made.*

**State of Alaska**
**ALASKA RETIREMENT MANAGEMENT BOARD**
**MEETING**

**Teleconference**

**MINUTES OF**
**March 19, 2020**

**Thursday, March 19, 2020**

## CALL TO ORDER

CHAIR ROBERT JOHNSON called the teleconference of the Alaska Retirement Management Board (ARMB) to order at 9:00 a.m., noting that a shorter teleconference was being held instead of a full meeting because of the current coronavirus pandemic. He thanked BOB MITCHELL and STEPHANIE ALEXANDER for their work in reassembling the meeting materials to accommodate the changes, and he welcomed COMMISSIONER MAHONEY to the Board.

## ROLL CALL

Nine ARMB trustees were present at roll call to form a quorum.

**Board Members Present**
Robert Johnson, *Chair*
Tom Brice, *Vice-Chair*
Gayle Harbo, *Secretary*
Lorne Bretz
Allen Hippler
Commissioner Lucinda Mahoney
Commissioner Kelly Tshibaka
Norman West
Bob Williams

**Board Members Absent**
None

**Investment Advisory Council Members Present**
Dr. William Jennings
Dr. Jerry Mitchell
Ruth Ryerson

**Department of Revenue Staff Present**
Bob Mitchell, Chief Investment Officer
Kayla Wisner, State Comptroller
Zachary Hanna, Deputy Chief Investment Officer
Pamela Leary, Director, Treasury Division
Scott Jones, State Investment Officer
Stephanie Alexander, Board Liaison
Steve Sikes
Sean Howard
Mark Moon
Ryan Kauzlarich

**Department of Administration Staff Present**
Kevin Worley, Chief Financial Officer, Division of Retirement & Benefits
Ajay Desai, Director, Division of Retirement & Benefits

**Consultants, Invited Participants, and Others Present**
Stuart Goering, Department of Law, Assistant Attorney General
Paul Erlendson, Callan Associates, Inc.
Steve Center, Callan Associates, Inc.
David Kershner, Buck
Scott Young, Buck
Tonya Manning, Buck
Ric Ford, Buck
Paul Wood, Gabriel Roeder Smith
Bill Detweiler, Gabriel Roeder Smith
Elaine Schroeder
Robert Schroeder
Katie McKenna
Michael Tobin
Doug Woodby

## PUBLIC MEETING NOTICE

Board Liaison STEPHANIE ALEXANDER confirmed that public meeting notice requirements had been met.

## APPROVAL OF AGENDA

MS. HARBO moved to approve the agenda. MR. WILLIAMS seconded the motion.

With no objections, the agenda was approved.

## INTRODUCTORY COMMENTS FROM CIO

CIO BOB MITCHELL thanked the Trustees for their patience as the meeting was retooled, explaining that they were strongly advised by the Commissioner of Health and Human Services on Monday the 16th to curtail in-person meetings, and they were not prepared to shift the entire two and a half days to an online format on such short notice. Thus it was decided to hold an abbreviated meeting in March and try to follow up around late April or the 1st of May, by which time they can be better prepared for teleconferencing.

## PUBLIC/MEMBER PARTICIPATION, COMMUNICATIONS AND APPEARANCES

ELAINE SCHROEDER said that she has lived in Alaska for almost 40 years. She has worked in private practice as a psychotherapist, and her husband's career has been with ADF&G. They both depend on his pension in retirement. Directing her question to Chair Rob Johnson, she asked what the ARM Board's plans are to respond to the worldwide trend among pension funds and investment institutions to divest from fossil fuels, which she said are rapidly losing value and are among the riskiest of investments. She asked whether the ARM Board has a climate risk assessment process in place, and if they would say what that assessment is.

CHAIR JOHNSON responded that he comments on this issue in the forthcoming Chair Report.

KATIE MCKENNA, a high school senior from Juneau, stated that she is from a family of educators who have spent their entire careers in Alaska; her father, who relies on TRS benefits, supports her testimony, she said. She encouraged the Board to divest from fossil fuels. She stated that she understands that Alaska's economy is highly dependent on oil, but in Standard & Poor's 2018 assessment of 500 different sectors, fossil fuel energy finished dead last. MS. MCKENNA said that fossil fuel companies are misguided and unsustainable long-term investments. She said that her generation wants to come back to Alaska as adults and join a system that supports them, but with an unrelenting focus on fossil fuels, and repeated failures to diversify the economy, their fates seem to be ignored. She thanked the Board for their work supporting her dad and other educators, and urged them to move forward with transparency about their fossil fuel investments. She said investments in fossil fuels ignore the fiscal and environmental realities that her generation is saddled with, and she hopes that inspired by recent events, people will shift toward a long-term perspective for the benefit of all, especially the more vulnerable.

DOUG WOODBY yielded his time to MIKE TOBIN.

MICHAEL TOBIN, a retired emergency room physician from Juneau, commented on the changing meaning of fiduciary responsibility in this era of climate instability. He said that the Board's fiduciary duty demands prudence, no self-dealing, and treating all of the beneficiaries equally, including beneficiaries decades from now whose world will be experiencing the ravages of climate change destabilization if the fossil fuel industry continues to be propped up by investment. He pointed out that big institutional investors are pulling back rapidly from the fossil fuel sector, because it does not best serve a careful investor. He concluded that investments in the fossil fuel sector, which produces the $CO_2$ that drives global heating and climate instability, discriminate against the younger beneficiaries who will survive deeper into the crisis than Board members, and he asked as fiduciaries, how they will adjust portfolios to protect younger beneficiaries.

## CHAIR REPORT

CHAIR JOHNSON said his report would be truncated because some issues which he would have discussed at length are postponed, particularly discussions about creating an Investment Committee. Also, he was going to discuss the idea of using a consent agenda to streamline meetings, which will be taken up by the Operations Committee so the Board can consider it.

As to the fossil fuel investment issues that were raised by the three public testimony presenters, CHAIR JOHNSON noted that the Board has received public comments at the December meeting and written communications from concerned citizens advocating for the exclusion of oil- and gas-related investments from the plan's overall portfolio, and it is obviously of importance to beneficiaries. CHAIR JOHNSON cited the statutory mandate that the Board is to concentrate on diversifying investments as the fiduciary considers appropriate to increase the probable total rate of return or to decrease the overall exposure to potentially adverse market value risks. He said that to have a sole exclusion on a particular social or environmental issue would probably be inappropriate, but they do need to take into account the issues raised by today's speakers. The discussion would have been taken up at greater length today, but the Board will explore it in the future.

CHAIR JOHNSON said that the question is how to go about doing it while seeking to broadly diversify investments and not limit their ability to invest. He said they have considered the issue and are exploring in depth the delivery of an ESG (environmental and social governance) component of overlay in how they make investment decisions. As ESG considerations are before a number of other public trusts, they are looking at those for precedent, and the Board has directed staff to address the issue of whether and how to incorporate these into the structure of the decision-making process while advancing the portfolio for the benefit of beneficiaries.

CHAIR JOHNSON noted that the following items 1 – 6 are things that in the future could be under a consent agenda.

## MINUTES, CALENDAR/DISCLOSURES, AND STAFF REPORTS

### 1. APPROVAL OF MINUTES: December 12 - 13, 2019

<u>MS. HARBO moved to approve the minutes of the December 12 - 13, 2019 meeting of the ARM Board. MR. WEST seconded the motion.</u>

With no objections, the minutes were approved.

### 2. CALENDAR/DISCLOSURES

MS. ALEXANDER stated that the disclosure attachment and calendar for this year are in the packet, though the calendar would be discussed and may be modified near the end of the meeting.

## 3. FUND FINANCIAL PRESENTATION AND CASH FLOW UPDATE

KAYLA WISNER, Comptroller at DOR, stated that as of March 18, 2020, total nonparticipant-directed assets were $23.6 billion, year-to-date losses were $2.6 billion, and the plans experienced net withdrawals of $563.7 million. Year-to-date assets were down about 11.71 percent fiscal year-to-date, with 9.71 percent due to investment loss.

KEVIN WORLEY, CFO, said that his report as of the end of January doesn't show any impacts from the last month, but any questions could probably be answered in the attachment at the end with the explanations.

MR. WILLIAMS commented that considering what the markets have been doing, to have only a 9.7 percent loss as of March 18th seems outstanding. MS. WISNER noted that that was just nonparticipant-directed assets.

## 4. INVESTMENT TRANSACTION SUMMARY

CIO BOB MITCHELL said that if the Board goes to a consent agenda, he expects that he would present the information on investment transactions in the packet and then report on any salient features in his CIO Report. Highlights of this report from November 2019 through February 2020 include two transitions that were completed, from the intermediate treasury mandate within fixed income to the broader-based investment grade mandate that is benchmarked against the Bloomberg Barclays aggregate index, and the transition of manager structure with the international equity program to streamline the number of mandates and simplify the structure. Also, they liquidated $292 million in domestic equities versus fixed income to rebalance the asset allocation to target, then an additional $250 million in March in global equities versus cash, which he will expand on in a later presentation. CIO MITCHELL also stated that they committed $30 million to a private equity mandate, a limited partner Clearlake Capital Partners VI.

## 5. RETIREMENT & BENEFITS DIVISION REPORT

### A. Membership Statistics

MR. WORLEY reported that the decrease in the defined benefit membership continues, with a loss of 93 in PERS and 6 in TRS, and defined contribution membership is increasing, with 127 additional retirees for PERS but a decrease of 19 for TRS.

### B. Buck Invoices

MR. WORLEY said that the summary of monthly billings for the six months through December 31 is attached.

MR. WORLEY added that the Division recently issued RFPs for actuarial services, and they are starting to process questions from respondents. The new contract will start July 1.

## 6. TREASURY DIVISION REPORT

DIRECTOR PAM LEARY said that the Continuity of Operations Plan, or COOP, which has been discussed with the Board in the past, is up to date and is working. Treasury staff has conducted remote testing in small groups over the past couple of weeks, and now the entire team is deployed at home for a group test. Staff are using laptops that are docked at their desks, and they are communicating very well using various formats including e-mail, calls, Skype, a Microsoft product called Teams, and other means. MS. LEARY thanked SCOTT JONES and GRANT FICEK for their efforts in making sure the Treasury team is functioning, and thanked MS. ALEXANDER for keeping up with all the last-minute changes for this meeting.

CHAIR JOHNSON asked whether they are confident in the cybersecurity; MS. LEARY replied that everyone is channeling directly into the state system, using state access and a protocol called VPN, so it is as if they were working at their desks. They are working on confidentiality protocols to make sure people are working in secure areas that are free from others' views, not using printers, and so on.

## 7. INFORMATION REPORT – RESPONSE TO TRUSTEE INQUIRY

CIO MITCHELL said that at the December meeting, during a presentation by Legal & General, JASON SHOUP, one of the presenters, commented that in a low and falling rate environment, low vol equities would tend to have stronger performance, and someone asked if the experience in Japan confirms that. The presenters followed up with additional information, which is included in a memo in the meeting packet. MR. MITCHELL said the response looked at periods of relatively low interest rates in Japan, and they point out a couple of years where a low vol, factor-based portfolio outperformed the market cap benchmark, but he noted there were also a couple of years where it underperformed. He apologized that the information may be hard to see because he tried to get it all on one page, and summarized that over the five-year period ending at the end of December, the Low Vol strategy within Japan outperformed the market-cap-based index by about 1.77 percent, and over 10 years outperformed by about 2.04 percent.

## 8. PERFORMANCE MEASUREMENT 4$^{TH}$ QUARTER

MR. ERLENDSON acknowledged that things have changed since the end of the 4$^{th}$ quarter, and said he would include market updates as of March 18$^{th}$.

MR. ERLENDSON said that quarterly GDP growth had been consistent, if not unusually strong, since the global financial crisis, and with relatively little inflation. He mentioned the financial stimulus that is being planned in response to the coronavirus, which dwarfs what was done during the global financial crisis, and said inflation could pick up as a result. He explained that the lower yields from Treasury bonds means future payments are getting more expensive, and that people going into retirement with a focus on preserving capital will get lower returns on their investments. He said that global growth will be affected by the interruption of economic activity due to the virus.

MR. ERLENDSON reviewed performance through the end of 2019, when the capital markets had been performing well, noting that the U.S. stock market has been the best performer over five and ten years, though emerging markets was the best over the last three months of 2019. He briefly reviewed the most recent data. MR. WILLIAMS asked if he was accurate in feeling that with the S&P 500 down 25 percent but the nonparticipant funds down less than 10 percent, that's very good; MR. CENTER replied that it's important to remember that PERS and TRS have a public equity allocation of about 45 percent and about 24 percent fixed income, which makes CIO MITCHELL look like a genius and helps the relative performance.

MR. CENTER said that this year's first quarter performance of Alaska's funds should look good compared to peers, because of the lower allocation to public equities. He noted also that the private investments held by the plans are not valued frequently, so the impact of their performance may not be seen right away; those are about 20 percent of the portfolio.

MR. CENTER reviewed performance for the 4th quarter of 2019, using the PERS portfolio to illustrate. He showed performance versus the actuarial expected return and the total fund target, noting that next quarter's chart will not look good. However, both PERS and TRS have outperformed their targets over the last 2- and 3-year periods. MR. CENTER reviewed the performance of various asset classes.

MR. CENTER then discussed the participant-directed plans. The PERS DC plan ended the year with about 60 percent of its assets invested in the target date funds, with the remaining split between active core options and passive core options. The PERS plan is net cash flow positive, and grew in assets by about $130 million. TRS is also net cash flow positive, with about $50 million coming in during the quarter, and also about 60 percent invested in target date funds. The Deferred Compensation Plan is cash flow negative with about $11 million coming in during the quarter about $17 million going out. SBS was also cash flow negative, with about $40 million coming in and about $60 million going out. MR. CENTER reviewed the performance of the investment options within the participant-directed plans, with fairly strong performance from the target date funds and the balanced funds.

CHAIR JOHNSON asked about the performance of these in the current quarter; MR. CENTER replied that T. Rowe Price's glide path for their target date funds tends to have a higher allocation to public equity than their peers, which led to high rankings as of December 31st, but does not bode well for relative performance in the first quarter of 2020. CIO MITCHELL added that he had been informed by MICHELLE PREBULA, who oversees the participant-directed investments, that the market value of all of them has declined from about $6.9 billion at the end of December to about $5.9 billion. MR. WILLIAMS inquired about the size of the peer group; MR. ERLENDSON replied that Morningstar data uses peer groups of more than 50, so it is robust.

MR. CENTER briefly went over the passive options, other active options, Stable Value, and the money market fund, noting no concerns.

CHAIR JOHNSON recessed the meeting from 10:24 a.m. to 10:35 a.m.

## 9. MARKET AND PORTFOLIO UPDATE

CIO BOB MITCHELL explained that he would discuss issues, impacts, and policy responses relating to the coronavirus pandemic, then review the current portfolio positioning. He cited the most recent data of 220,000 people diagnosed and 9,100 deaths worldwide, numbers which had risen significantly since the previous day. He said that the steps various countries are taking to contain and mitigate the impact of the virus will have significant economic and market implications for businesses and individuals. He showed graphs of the progression of the virus in various countries, and the effects of more or less aggressive containment measures. MR. MITCHELL reviewed some data coming out of China showing that industrial output fell by 13.5 percent there in January and February, and retail sales dropped by over 20 percent compared to the previous year; yet, it appears to be bouncing back, with consumption now back to 75 percent, and blast furnaces operating at about 65 percent. There were some disruptions in supply chains as container ship volume declined precipitously, but that now appears to be normalizing, he said, though there will be more disruptions in other parts of the world.

MR. MITCHELL said that U.S. growth is expected to undergo a rapid deceleration, but forecasts at this time are guesses, and markets don't like uncertainty. The interruption of manufacturing and decline in consumption will have significant impacts, and the magnitude will not be known until the crisis has passed. MR. MITCHELL discussed the impacts on markets, with some of the worst trading days ever over the past couple of weeks, and liquidity becoming more dear. He noted that unlike the global financial crisis, when the market makers had no capital and were close to being insolvent, there are now more regulations and more capital. However, risk management systems combined with regulations lead market makers to be less willing to participate. That is a difference that can be addressed through policy, and he said he hopes to see some normalization soon.

MR. MITCHELL said there are big moves in the bond market, and there has been a significant sell-off in a short time period; also, a couple of weeks ago a large private equity firm advised the firms that it owns to draw on their lines of credit. It is clear that there are needs for liquidity as companies face cash flow issues as a result of supply chain disruption and the drop in economic activity.

MR. MITCHELL discussed what can be done in response. Two key issues are liquidity, which the Fed can help by buying corporate bonds and encouraging banks to lend to small businesses and individuals, and fiscal relief, such as direct payments to people, paid sick leave, foreclosure moratoriums, and so on. He said the markets will continue to struggle until there is a sufficient policy response and we won't know what is sufficient until we find out in real time; however, it is clear that governments around the world are going to do whatever it takes to provide the resources necessary to combat both the virus and the economic and market impacts.

MR. MITCHELL repeated that they have liquidated about $250 million in equities to bolster their cash position from about 1 to 2 percent. They now have about $450 million to $500 million in cash, and they estimate cash flows from the portfolio at about half a billion dollars per year. Combined with the fact that they've gone from a 10 percent cash allocation to a 24 percent cash allocation, their ability to sell fixed income is significantly higher than it was last year. He said they are mindful of their liquidity issues, and at the end of each quarter a decision has to be made how to reset the strategic asset allocation; starting April 1st they will be significantly underweight on equities and overweight on fixed income. Believing that this will pass, their view is that it makes sense to continue to manage the portfolio against the strategic asset allocation. He explained that his intent is to harvest the gains they've had as liquidity allows in fixed income and reinvest assets into the equity market.

MR. HIPPLER asked whether they are still in the process of increasing the fixed income allocation; MR. MITCHELL replied that they substantially achieved the 24 percent target at the end of 2019, but they are still underweight fixed income because they are overweight real assets. He expressed that as an underweight to fixed income relative to the long-term allocation, but they are still slightly underweight the 24 percent target. He explained that the benchmark weight resets to the strategic target on a quarterly basis, and in between those resets, it drifts. If they did nothing, it would be crystallized on the 1st of April, so they are increasing equity allocation through the rest of March.

## 10. USE OF EQUITY FUTURES IN INTERNALLY MANAGED PORTFOLIOS

MARK MOON, Director of Internal Public Equity, said that staff anticipates utilizing indexed futures as portfolio management tools in the near future in some of the internal equity portfolios, which is allowed within the existing guidelines. MR. MOON explained that they use tracking error as a primary indicator of how close portfolios are to their benchmarks. Tracking errors are usually in the range of zero to 10 basis points, generally close to zero since most of these portfolios are passive. Cash building up in a portfolio adds to tracking error, because the benchmarks assume there is zero cash, but in the real world there are dividends from companies and cash generated from corporate actions, increasing tracking error and making them want to trade to bring the underlying portfolios closer in line with their benchmarks. However, they cannot always trade when they want to, and there are a lot of questions related to timing and cash to consider first. MR. MOON stated that index futures offers a solution to many of these temporal frictions.

MR. MOON explained how index futures work, and pointed out that futures contracts have expiration dates, typically quarterly. Also, he said that in some markets, like U.S. equities, futures are extremely liquid, with billions of dollars' worth traded each day, and the daily marked-to-market clearinghouse structure helps mitigate some party risk issues.

MR. MOON showed three equity futures contracts in which they have the most interest, and said he would expect the most trading would be in the first one, the S&P 500 E-mini, which is by far the most liquid. He explained the anticipated uses of index futures within the internal equity portfolios, saying that maintaining a small exposure to a futures contract would allow them to maintain a larger cash position than would otherwise be possible without creating cash drag and higher tracking error. Also, it would reduce some of the delayed trading frictions, and they think it will facilitate increased use of market-on-close trading, which is potentially important because all of the index portfolio benchmarks assume that is happening. Additionally, they think it can be an efficient way to reinvest dividend cash, and could help with reallocation actions because it allows for efficient changes in broad market exposures to be made quickly and cheaply.

MR. MOON pointed out that although equity futures have not been used within internal equities, other areas of the portfolio have been using them for a number of years, so staff is familiar with it. He reviewed what they see as the costs and benefits of implementing index futures: it offers them greater flexibility in time and in trades; it allows them to effectively run lower cash positions in the portfolios; it allows for quicker and more precise transitions of economic exposures; it should help them run a lower tracking error; and it will facilitate an increased use of market-on-close trading. As for cost, the only cost they see is needing personnel who understand it, which they believe they have, and some minor operational requirements around the daily marked-to-market cash flows, which they have dealt with successfully in the past.

MR. MITCHELL clarified that they are not seeking specific action, but just to notify the Board that they have the ability in their investment guidelines to engage in derivatives, including futures, and although they have not done so before, they now intend to.

MR. WILLIAMS asked what the downside is, commenting that he tends to want to run for the exit when he hears the word “derivatives”; he asked what is the worst that could possibly happen if things go bad. MR. MOON replied that if someone didn’t understand, it could lead to exposures that are higher or lower than they intended, but if people know what they are doing, these can be effective, useful tools.

## 11. BUCK UPDATES

DAVID KERSHNER said that SCOTT YOUNG and TONYA MANNING were with him, as well as RIC FORD, who has not yet met the Board. MR. FORD introduced himself as the leader of the Atlanta Wealth Practice in Atlanta; he joined Buck last April, and covers the southeastern part of the U.S. along with MR. KERSHNER.

MR. KERSHNER said he would focus mostly on the new information; he showed the June 30, 2019 actuarial valuations which will be used to set the FY 22 contribution rates. Asset returns were slightly less than expected, creating losses, but the liability side was favorable, mostly due to medical and prescription drugs claims experience, and those gains were larger than the losses, resulting in a higher funded status as of June 30, 2019 than the previous year.

SCOTT YOUNG discussed the repeal of the Cadillac tax, which reduced the liability for the total plans by about $52 million. However, he said that given the size of the plans, those impacts were relatively immaterial. He explained that since this change occurred right after the December meeting and before the contribution rates were finalized, they have updated the results to reflect the repeal of this tax.

MR. HIPPLER asked if something had gone wrong with the estimates; MR. KERSHNER explained that the state had negotiated a new contract which resulted in significantly higher discounts which are reflected for the first time this year, and they had a bigger gain than expected. MR. WILLIAMS asked, with close to a billion dollars’ change in liability, which would have caused a lot of heartburn if it had changed in the other direction, is there something they don’t know that keeps changing, or are they just really bad at knowing what the liability is? MR. KERSHNER responded that there have been some significant changes in the last couple of years of external factors that they don’t anticipate in projections of future benefits. They don’t typically expect to see such significant increases, but they try to reflect the recent experience by using an average of two years of actual claims to set projected claims expenditures.

MR. WEST commented that in his experience as an executive of the Teamsters health plan and as CFO of a self-funded health plan for about 10,000 participants, he got to the point where he disbelieved medical actuarial assumptions, because every year it was better than projected because medical markets change. However, nobody gets it exactly right. It's a mathematical guess at best, he said. MS. MANNING concurred, saying that they base assumptions on the market that they know, not the market that has evolved in the meantime. MR. HIPPLER requested to see the projected expenses for 2019 and actual expenses, and the net present value calculation through the Actuarial Committee.

MR. KERSHNER went over the 20-year projections, which they ran with two different scenarios, one with the 7.38 return assumption every year, and an alternative scenario which was prepared before these recent events began, so may look unrealistically rosy. For the alternative scenario they assumed a 5.75 percent return for the five years starting in FY 21 and then 7.38 percent after that. He showed three sets of projections, including the projected additional state contributions for FY 22 through FY 39. He said the actual FY 22 additional state contributions will be calculated in September of this year, and will reflect the actual return for the year ending 6-30-20. Given recent events, unless markets rebound over the next three months, these projected numbers will ultimately be much higher because actual asset returns for the year ending 6-30-21 are expected to be much lower than the 7.38 that was included in these projections. MS. HARBO pointed out that even including the declines in 2003 and 2008, the average annual return since 1992 for PERS has been 7.79 percent, and for TRS, 7.83 percent. MR. KERSHNER explained that the 5.75 was the nominal return, before subtracting inflation, not the real return.

MR. KERSHNER said they have considered how they might be able to access the overfunding in the healthcare trust to help offset some of the additional state contributions. It appears that a change in the statutes would be required, but they may have further discussions with DRB and DOR, and will keep the Board updated.

TONYA MANNING attended the meeting to follow up on the discussion of ASOP (Actuarial Standard of Practice) No. 51 from December. She said they've given some additional information for the Board, not just to meet the standard requirements but to give the Board some thoughts about the different risks inherent in the plans that they might want to explore in future presentations. MS. MANNING said they hope to go into it more in a future presentation, at the discretion of the Chair.

MR. FORD discussed a recent development related to ASOP No. 4, which is going to require actuaries to disclose to clients a market-value-type liability number. That means they will continue to state liability for Alaska's 7.38 percent discount rate, but they will also have to state what the liability would be at a much lower interest rate, like the 3-point-something of right now. As it stands, this requirement is effective in 2021, and they will bring more details as it unfolds. MR. KERSHNER added that the additional measure of liability has no impact on how the plans are funded or reported on the financial statements; it is just a matter of disclosing in the valuation report an additional informational liability, which does not affect any decisions the Board has to make.

MR. KERSHNER added that they also included some survey information relating to other state and local government pension funds, and some information related to the funding of healthcare liabilities. He noted that everything is on schedule for the Board to adopt the final reports at the June meeting.

## 12. GRS REPORT

PAUL WOOD said that as the review actuary, their job is to perform a test life review of the valuation results every year. They sift through Buck's information and put a lot of work into it. He said that the test lives that they received this year were slightly different than some of those received in the past, which allowed them to dig deeper into some of the benefit features that are part of the plans offered by the State of Alaska. They came up with four findings:

1. There was a slight inconsistency in the way the mortality assumption was being applied.
2. The second finding related to PRPA for disability, which should be applied immediately and not at conversion to normal retirement.
3. There is a question on the time conversion from a disability benefit to a normal retirement benefit, but the administration of the benefit is consistent with the valuation, so it was dropped.
4. The fourth finding related to the participation rate for retiree medical. Their particular test life for this year had different values for credited service versus eligibility service, and the valuation was using the improper service. This doesn't happen much, but for this member it had a large impact.

He said that as part of their monthly calls with Buck, they discussed these issues. Buck reran their valuation applying these changes, and the impact was very minor. He said that if the Board or the Actuarial Committee were looking for a recommendation, he would be comfortable taking up these changes in valuation in future years.

MR. WOOD added that on the healthcare issue with the large gain, they know that a majority of that massive claims gain came from a new contract. So is there a risk that the company in a sense purchased the work and will go back to higher claims in the future? He suggested they could look at the risks associated with that. MR. WILLIAMS expressed that he would appreciate that, as the Actuarial Committee did question whether that gain was real.

## 13. INVESTMENT ACTIONS

CIO BOB MITCHELL said that he had three action items for the Board's attention.

The first item MR. MITCHELL raised was the expiring term of DR. WILLIAM JENNINGS, the IAC member who fills the position of academic experience. His term expires in June, and he is willing to serve another term. MR. MITCHELL recommended that the Board reappoint DR. JENNINGS to a three-year term on the Investment Advisory Council beginning July 1, 2020, and ending June 30, 2023.

<u>MS. HARBO so moved.</u> <u>MR. BRICE seconded the motion.</u>

A roll call vote was taken, and the motion to reappoint DR. JENNINGS carried. MR. MITCHELL said congratulations to DR. JENNINGS.

Resolution 2020-01 required a bit of explanation. MR. MITCHELL explained that Resolution 2020-01 requests that the Board adopt a new asset allocation for the existing fiscal year, in order to address an inadvertent change in the underlying benchmark for the real assets component. He said that in June they passed an asset allocation, then in September staff recommended a revised set of benchmarks for the real assets portfolio, which were adopted and implemented last October 1st. Then in December, MR. HANNA and MR. CARSON gave a risk presentation to the Board, in which it was observed that the bands surrounding the fixed income asset class appeared to be low. A resolution to expand those bands that was brought before the Board inadvertently reused the language from June, and this resolution intends to correct that oversight. He said that it should not impact the integrity of the benchmark because it would apply starting in January, and this quarter hasn't been completed yet so Callan hasn't begun calculating the performance.

MR. MITCHELL said that staff recommends the ARM Board adopt Resolution 2020-01, incorporating the real assets policy benchmark changes into the approved asset allocation effective January 1st of 2020.

MS. HARBO so moved. MR. WILLIAMS seconded the motion.

A roll call vote was taken, and Resolution 2020-01 passed unanimously.

MR. MITCHELL then discussed an action memo relating to a recommendation to terminate the J.P. Morgan Systematic Alpha strategy, one of two alternative beta strategies that were implemented in 2017, funded in December of that year. The fund invests in a combination of risk factors and strategies that are intended to provide diversification from traditional market betas. MR. MITCHELL said it has been their experience since investing that this particular implementation has not satisfied that. Many of the risk factors have had negative returns, and the various strategies haven't provided expected diversification, both within the fund and to the ARM Board's broader portfolio. Performance since inception has been negative 11.7 percent annualized through February and has fallen further in March, which has prompted MR. MITCHELL to instruct J.P. Morgan to liquidate the entire balance at the end of March, which is within his authority. Therefore, he requested the Board to adopt the recommendation to direct staff to terminate J.P. Morgan Systematic Alpha.

MS. HARBO so moved. MR. WEST seconded the motion.

MR. WILLIAMS asked what is the main criteria that made him think he wanted to get rid of this; MR. MITCHELL answered that the decision is centered around forward-looking return expectations, and they think they are likely to have better risk-adjusted performance in traditional assets and equities and fixed income, and this portfolio is not satisfying the objectives that it behave differently than other market betas that they already have exposure to. DR. JERRY MITCHELL said he would agree with staff.

A roll call vote was taken, and the motion to terminate J.P. Morgan Systematic Alpha was approved unanimously.

**UNFINISHED BUSINESS**

CHAIR JOHNSON said that there is a lot of unfinished business that was originally on the agenda for this meeting and will have to be taken up in the future, such as discussions of the Anodos recommendations pursuant to inquiries from MR. BRETZ, discussion of committee sizes, and consideration of consent agendas and an Investment Committee. Other Trustees had no items to add.

**NEW BUSINESS**

None.

**OTHER MATTERS TO PROPERLY COME BEFORE THE BOARD**

Legal Counsel STUART GOERING said there is nothing new to report in the status of the court cases pending, and the wait will now be longer than expected.

MR. HIPPLER asked about a FOIA request that was addressed to Board members; MS. ALEXANDER replied that those go through her, and she would answer any questions by e-mail.

**PUBLIC/MEMBER COMMENTS**

DOUG WOODBY said he hopes Trustees will read his written testimony submitted two days prior. CHAIR JOHNSON said that MR. SCHROEDER also has sent an e-mail which will be part of the record, which will be sent to Trustees for their consideration.

MS. HARBO said she wanted to read for the record some important statistics regarding the amount of money in pension funds that comes from interest earnings, which came up in the last meeting. She contacted NASRA, the National Association of State Retirement Administrators, and NCTR (National Council on Teacher Retirement), and they confirmed that for the last 30 years, since 1989 to 2018, 63 percent of the funds to pay pension benefits come from investment earnings, 11 percent from employee contributions, and the remaining 26 percent comes from employer contributions.

**INVESTMENT ADVISORY COUNCIL COMMENTS**

DR. JERRY MITCHELL said that he was heartened by the tenor of the investment discussion today, being fact-based and unemotional, as one hopes to see at a time of crisis.

MS. RYERSON commented that she appreciated participating today, and she looks forward to meeting everybody in June.

**TRUSTEE COMMENTS**

MS. HARBO thanked the DOR and DOA staff for their extraordinary work at this time.

**FUTURE AGENDA ITEMS**

CHAIR JOHNSON said that the Actuarial Committee needs to meet soon to take up some critical issues, including relating to cost changes on the healthcare side, and other things that were on the agenda for this meeting. He said he will work with MS. ALEXANDER to schedule that.

MR. WILLIAMS said he gets a constant stream of questions about the HR interest, when it will be calculated, and how members can access that information, and he thought they would address it in the DC Committee, but since they didn't meet, he wondered about how they could remedy that soon.

MR. MITCHELL said that they had an as-needed meeting on the calendar for May 1st, and he would like to schedule a meeting around the end of April or May 1st, which will give staff time to improve their ability to do videoconferencing. MS. ALEXANDER added that they do have a meeting tentatively scheduled for April 30 and May 1, and she will be in touch with Trustees to finalize plans.

**ADJOURNMENT**

There being no objection and no further business to come before the board, the meeting was adjourned at 12:24 p.m. on March 19, 2020, on a motion made by MS. HARBO and seconded by MR. WILLIAMS.

Chair of the Board of Trustees
Alaska Retirement Management Board

**ATTEST:**

__________________________________________

Corporate Secretary

Note: An outside contractor recorded the meeting and prepared the summary minutes. For in-depth discussion and more presentation details, please refer to the recording of the meeting and presentation materials on file at the ARMB office.

**RETIREE HEALTH PLAN ADVISORY BOARD MEETING – FEB 6, 2020**

THE BOARD MET IN ANCHORAGE IN THE ATWOOD BLDG AND TELECONFERENCED WITH THE HEALTH TEAM IN JUNEAU AND DALLAS HARGRAVE, OUR ONE MEMBER IN JUNEAU.

MOST MEMBERS ALSO ATTENDED THE MEETING THE PREVIOUS DAY WITH HEALTH CARE VENDORS FOR LTC, DELTA DENTAL, OPTUM RX AND AETNA.

THE DIVISION UPDATE INCLUDED INFO ON THE RECENTLY COMPLETED ENROLLMENT IN THE DENTAL PLANS, EITHER LEGACY (THE OLD PLAN) OR STANDARD, THE PLAN IN PLACE SINCE JANUARY 2020. THERE ARE 37K PLUS PEOPLE IN THE DENTAL PLAN.

THE DIVISION HAS ALSO BEEN PROCESSING THE OPTUM RX FORMS FOR THE PEOPLE WHO PAY MORE FOR MEDICARE AND THEREFORE PAY FOR RX DRUGS. THE AMOUNT PAID IS REPAID TO THE RETIREE. THERE ABOUT 3000 PEOPLE IN THIS CATEGORY AND THE CLAIMS ARE PROCESSED MANUALLY.

20 DRAFT PROPOSALS FOR THE MODERNIZATION PLAN WERE DISCUSSED FOR CONSENSUS AND NARROWING THE FOCUS. THE INFORMATION REGARDING THE PROPOSALS IS ON THE WEBSITE AND I WOULD REFER YOU TO THAT FOR MORE COMPLETE INFO. THE NEXT MEETING IN MAY 27.

- GAYLE HARBO -

# ALASKA RETIREMENT MANAGEMENT BOARD
## 2020 Meeting Calendar

| DATE | LOCATION | DESCRIPTION |
|---|---|---|
| April 30<br>Thursday | Telephonic | Actuarial Committee<br>DC Plan Committee<br>Audit Committee<br>Operations Committe |
| **May 1<br>Friday** | **Telephonic** | **Board of Trustees Meeting** |
| June 17<br>Wednesday | Juneau, AK | Actuarial Committee<br>Audit Committee<br>Operations Committee<br>Defined Contribution Plan Committee |
| **June 18-19<br>Thursday - Friday** | **Juneau, AK** | **Board of Trustees Meeting:**<br>**Final Actuary Reports/Adopt Valuation*<br>**Adopt Asset Allocation*<br>**Performance Measurement - 1st Quarter*<br>**Manager Presentations* |
| September 16<br>Wednesday | Juneau, AK | Actuarial Committee<br>Audit Committee<br>Operations Committee<br>Defined Contribution Plan Committee |
| **September 17-18<br>Thursday - Friday** | **Juneau, AK** | **Board of Trustees Meeting:**<br>**Set Contribution Rates*<br>**Audit Results/Assets – Auditor*<br>**Approve Budget*<br>**Performance Measurement – 2nd Quarter*<br>**Real Estate Annual Plan*<br>**Real Assets Evaluation – Callan LLC*<br>**Manager Presentations* |
| October 16<br>Friday (placeholder) | Telephonic | Audit Committee |
| December 2<br>Wednesday | Juneau, AK | Actuarial Committee<br>Audit Committee<br>Operations Committee<br>Defined Contribution Plan Committee |
| **December 3-4<br>Thursday-Friday** | **Juneau, AK** | **Board of Trustees Meeting:**<br>**Audit Report - DRB Auditor*<br>**Performance Measurement – 3rd Quarter*<br>**Manager Review (Questionnaire)*<br>**Private Equity Evaluation - Callan LLC*<br>**Review Private Equity Annual Plan*<br>**Manager Presentations* |

ALASKA RETIREMENT MANAGEMENT BOARD

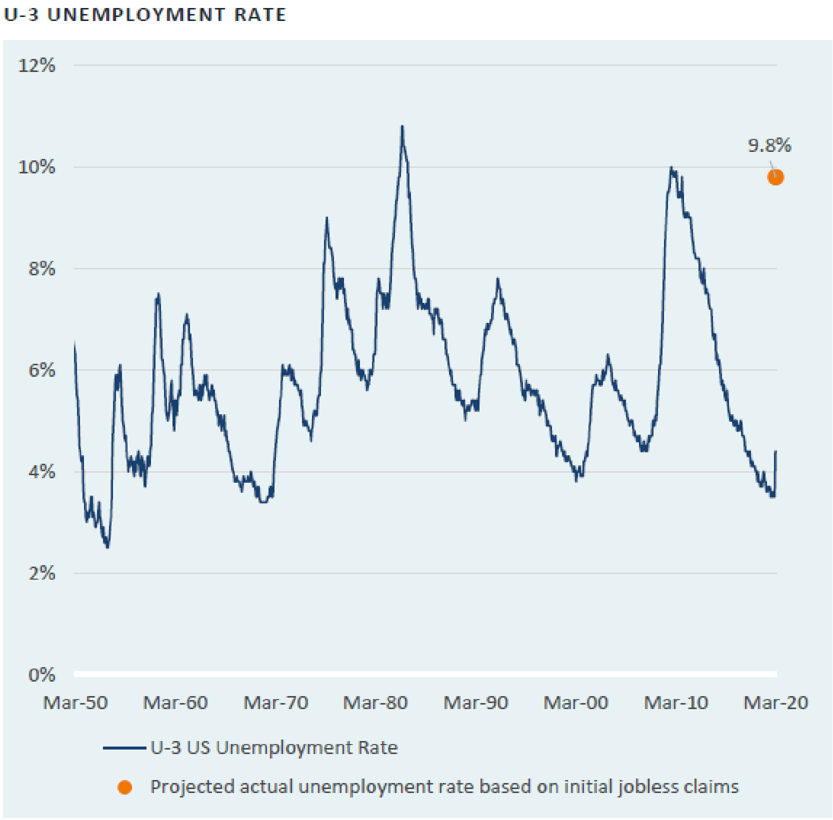
# Portfolio Update

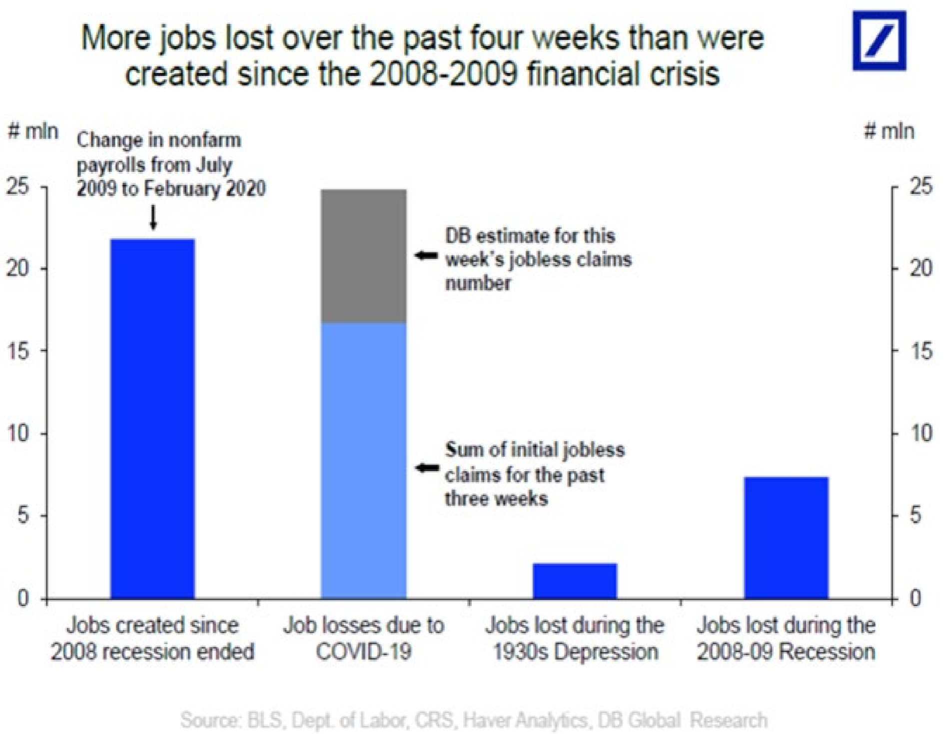
Bob Mitchell, CFA
Chief Investment Officer
May 1, 2020

# Overview

- Economic & Policy Update
- Recent Market Developments
- Portfolio Management Challenges & Actions
- Asset Allocation
- Current Initiatives

# Economic & Policy Update




Source: Verus, Deutsche Bank

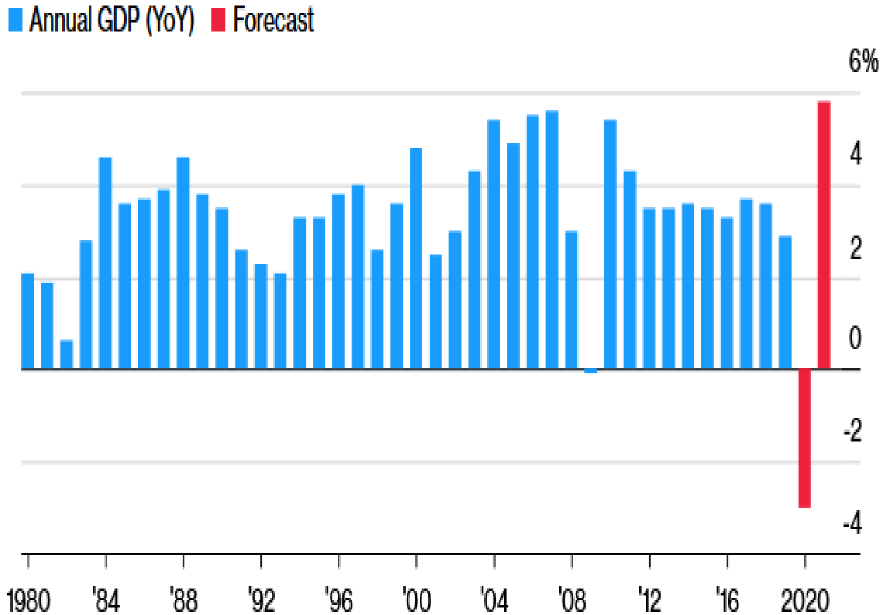
# Economic & Policy Update

**World GDP by Region**
2020 Impact

| | % Impact | % Growth 2020 | | % Growth 2009 |
|---|---|---|---|---|
| | | Pre-COVID | Current | |
| **Advanced Economies** | | | | |
| U.S. | -5.0 | 2.1 | -2.9 | -2.5 |
| Europe | -6.5 | 1.6 | -4.9 | -4.2 |
| Japan | -2.5 | 0.5 | -2.0 | -5.4 |
| UK | -4.0 | 1.4 | -2.6 | -4.2 |
| Canada | -5.0 | 1.8 | -3.2 | -2.9 |
| Other | -2.5 | 2.0 | -0.5 | -0.8 |
| **Subtotal** | **-5.0** | **1.7** | **-3.3** | **-3.3** |
| **Emerging Markets** | | | | |
| China | -7.1 | 4.7 | -2.4 | 9.4 |
| EM Ex-China | -3.0 | 3.9 | 0.9 | 0.6 |
| **Subtotal** | **-4.3** | **4.2** | **-0.1** | **2.8** |
| **World Total** | **-4.6** | **3.2** | **-1.4** | **-0.1** |

**Deep Global Recession**

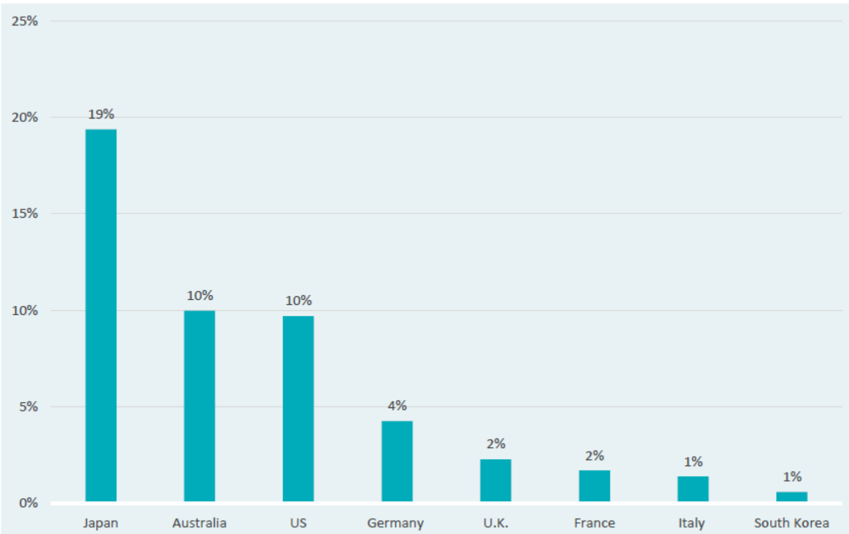
The IMF is predicting a 2020 global contraction of 3%



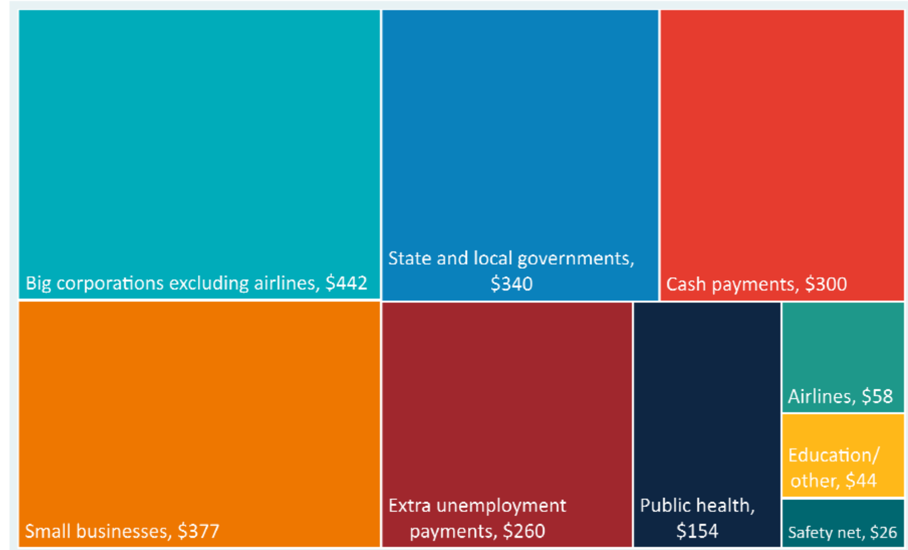

Source: International Monetary Fund

# Economic & Policy Update

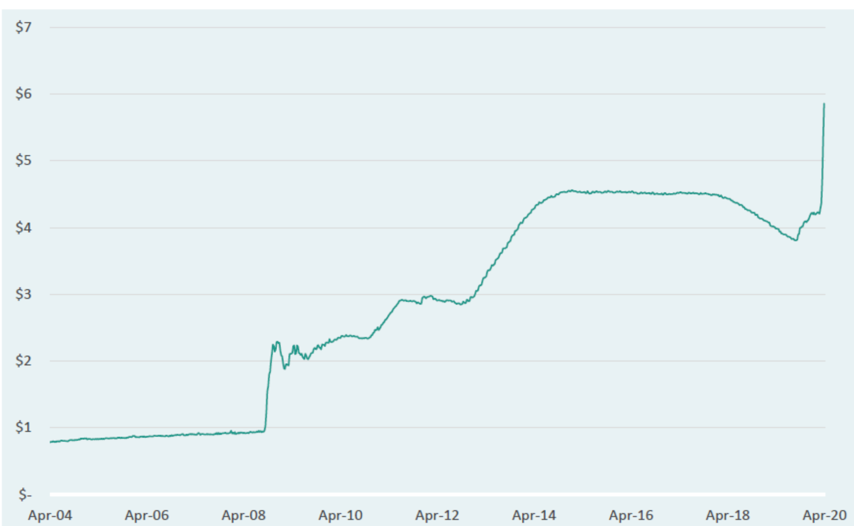
PLEDGED FISCAL SUPPORT (% OF GDP)




*Source: Bloomberg, as of 4/7/20*



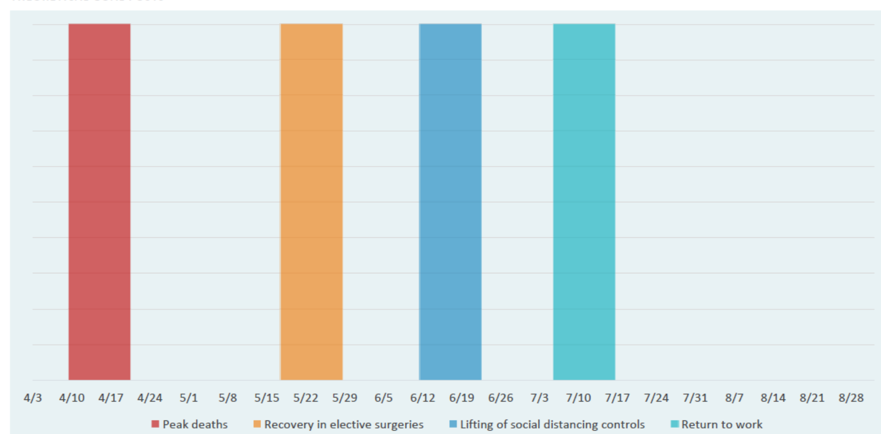

FEDERAL RESERVE BALANCE SHEET (USD TRILLIONS)




*Source: Federal Reserve, as of 4/1/20*

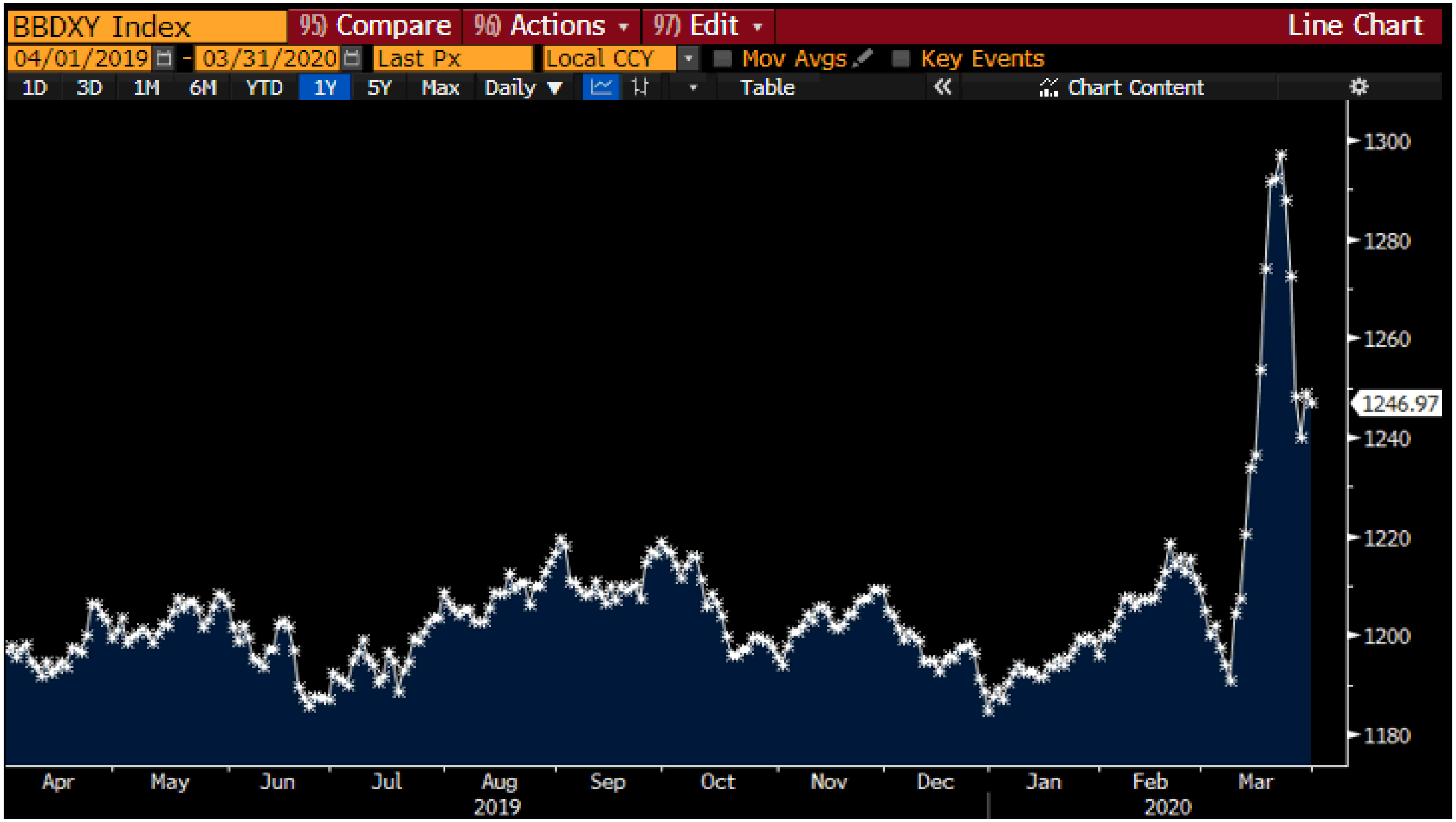
## Framework for recovery

THEORETICAL GOAL POSTS




Source: Verus

# Recent Market Developments – US Dollar




Source: Bloomberg

# Recent Market Developments – 10 Yr. Treasuries


Source: Bloomberg

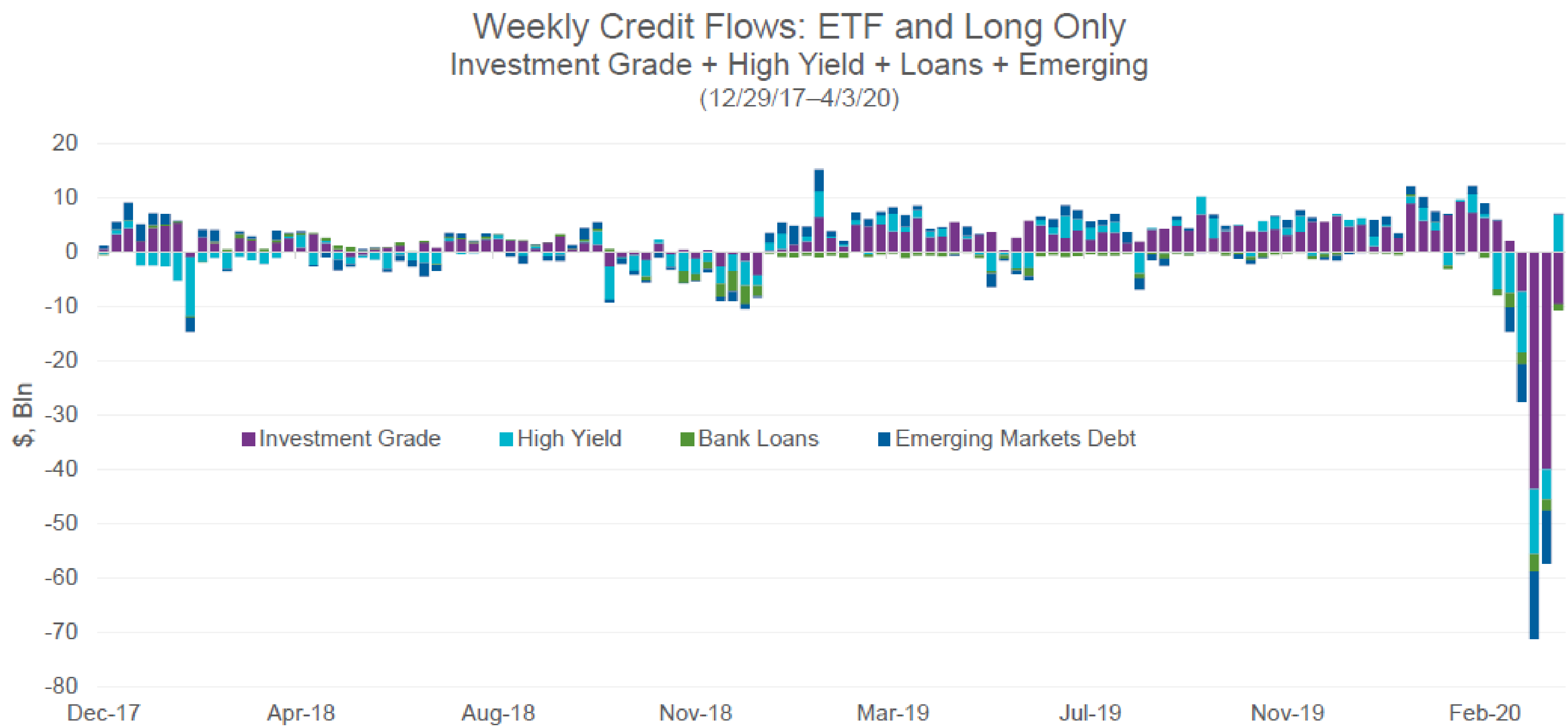
# Recent Market Developments – Yield Curve


| | Curve Id | 3M | 1Y | 2Y | 3Y | 5Y | 10Y | 30Y |
|---|---|---|---|---|---|---|---|---|
| 11) | I25 03/31/20 | 0.061 | 0.155 | 0.246 | 0.293 | 0.380 | 0.669 | 1.321 |
| 12) | I25 12/31/19 | 1.544 | 1.566 | 1.569 | 1.609 | 1.691 | 1.917 | 2.390 |
| 13) | I25 (03/31/20-12/3... | -148.3 | -141.1 | -132.4 | -131.6 | -131.1 | -124.8 | -106.8 |

Source: Bloomberg

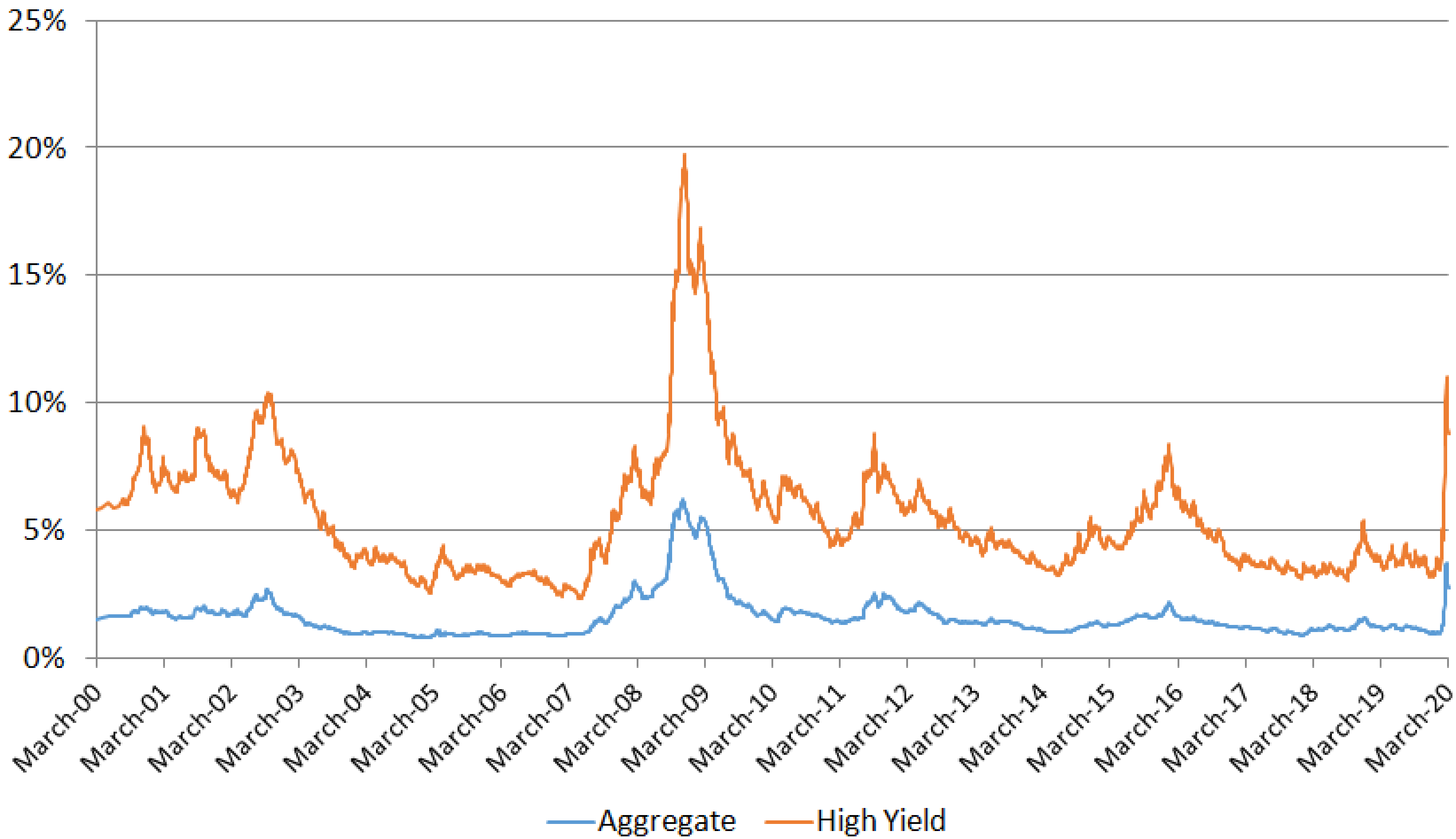
# Recent Market Developments – Credit Flows

## Credit Outflows Suggest Capitulation



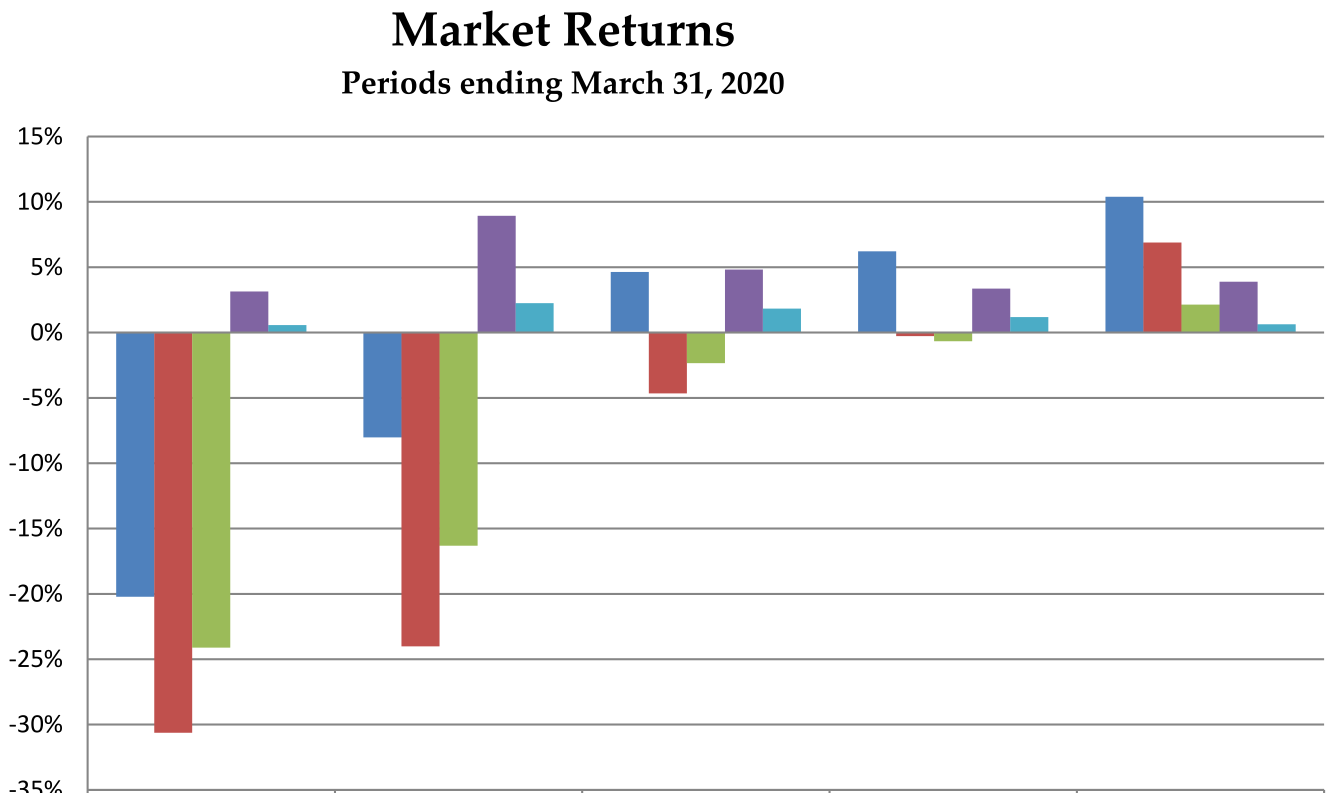

Source: Natixis

# Recent Market Developments – Bond Yields




Source: Bloomberg

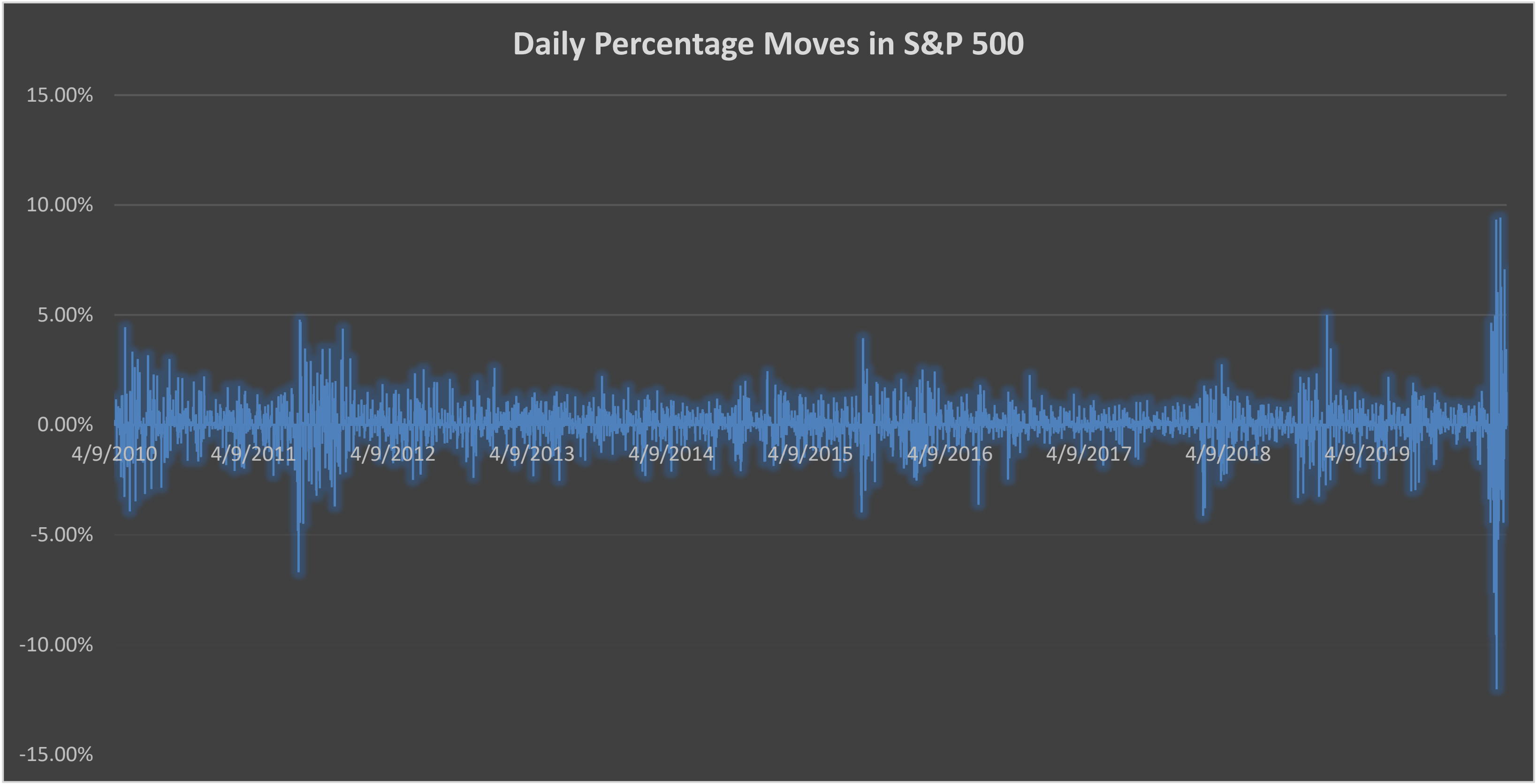
# Recent Market Developments




| | 3 Months | 1 Year | 3 Years | 5 Years | 10 Years |
|---|---|---|---|---|---|
| Russell 1000 | -20.22% | -8.03% | 4.64% | 6.22% | 10.39% |
| Russell 2000 | -30.62% | -24.01% | -4.66% | -0.27% | 6.90% |
| MSCI ACWI Ex-US IMI | -24.11% | -16.32% | -2.34% | -0.66% | 2.14% |
| BB Aggregate | 3.15% | 8.93% | 4.82% | 3.36% | 3.88% |
| 90 Day Treasury Bill | 0.57% | 2.25% | 1.83% | 1.19% | 0.64% |

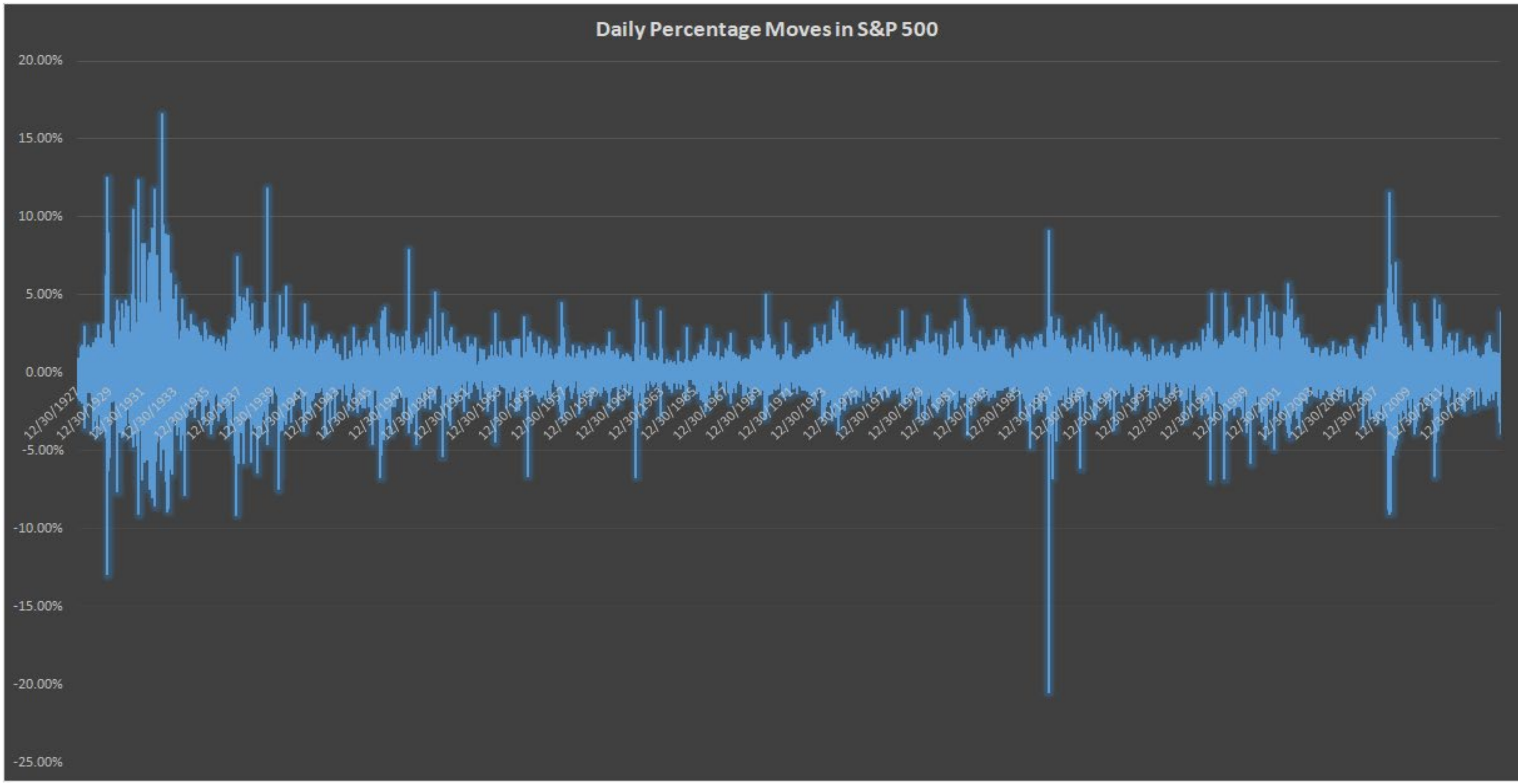
Source: Bloomberg

# Portfolio Management Challenges & Actions




Source: Bloomberg

# Portfolio Management Challenges & Actions

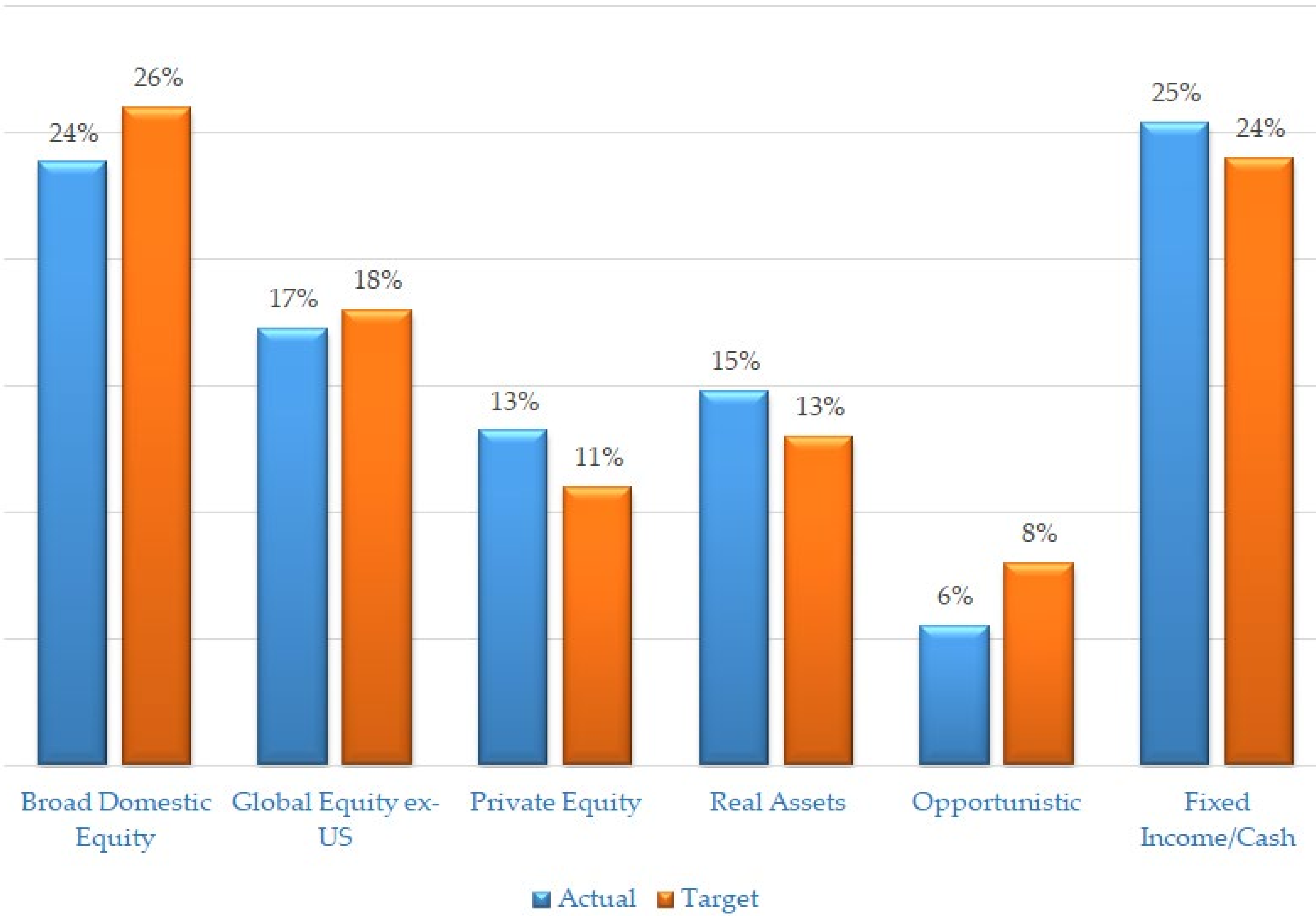



Source: Bloomberg

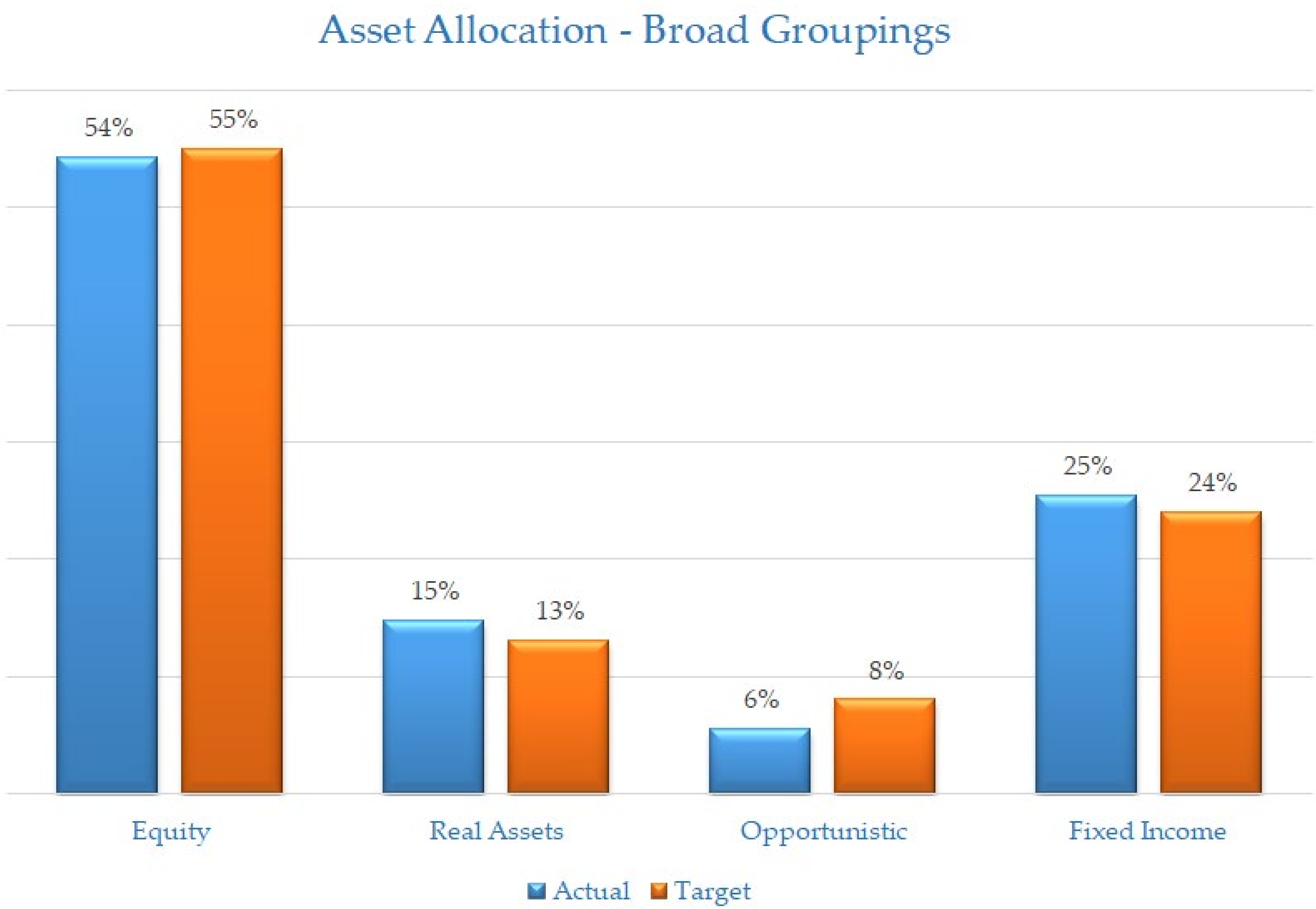
# Portfolio Management Challenges & Actions

- Markets have become more volatile.
- Liquidity has diminished.
- Illiquid assets are slower to reflect large changes in value.
- Our Approach
  - Be mindful of both portfolio liquidity requirements and market liquidity conditions to rebalance toward the estimated risk posture of the strategic asset allocation.
  - Try not to time the equity market.
  - Apply a longer-term perspective to the fixed income dislocations – which are more easily reduced to math.
  - We are leaning into private credit and unconstrained public bonds.

# Asset Allocation



# Asset Allocation



# Current Initiatives

- FY21 Asset Allocation
  - Slight reduction in fixed income
  - Military Plan considering private equity and real assets
- Real Assets Review
- Opportunistic Review
- Currency Hedging
- Risk Parity
- Equity Factor Implementation

May 2020

# Securities Finance Agency Lending Program Update

## The Alaska Retirement Management Board

STATE STREET

# Securities Finance

## Why participate in securities lending?

- Generate ***additional alpha*** on unutilised assets that are laying dormant in custody accounts
- Offset ***custody costs***, management fees, and other operational expenses
- The additional returns can help to ***outperform peers*** over a long term horizon
- Gain access to valuable ***short interest data*** to help assess if a long strategy is justified
- Facilitate better global ***market liquidity*** and help to reduce market execution costs
- Improve ***price transparency*** and help prevent artificial price bubbles in securities

*"There are two key benefits to securities lending. Firstly it provides a low risk incremental income for investors, and secondly it provides liquidity to the broader global markets."*

**A Guide for Policymakers, Aug 2015**
**International Securities Lending Association**

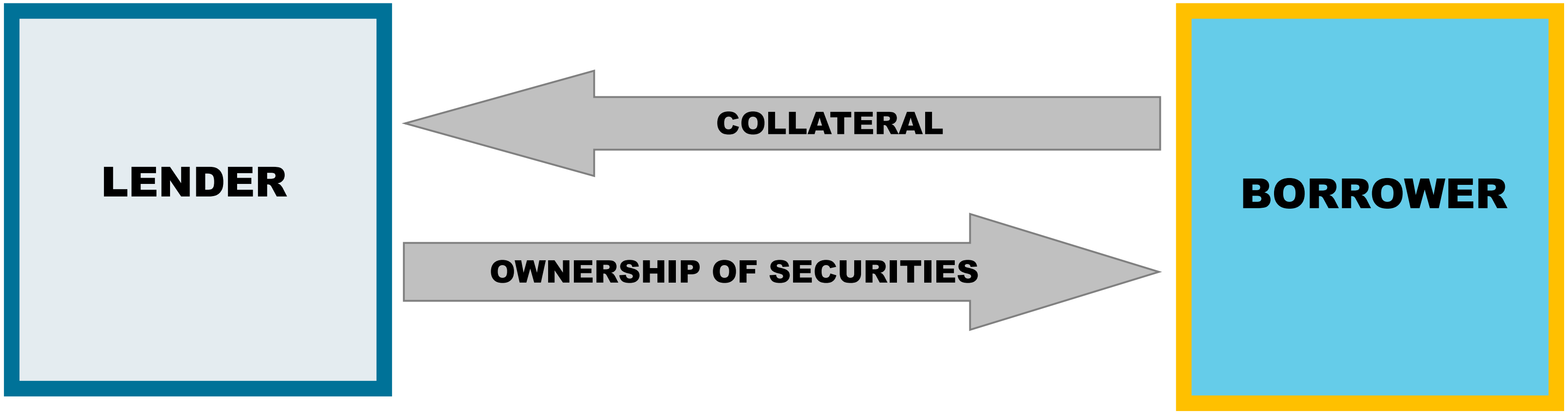
*"Supply constraints in the lending market…can be a serious impediment to pricing efficiency in the stock market."*

**In Short Supply: Short-Sellers and Stock Returns**
**M.D. Beneish, C.M.C. Lee, C. Nichols – Stanford University, Feb 2015**

STATE STREET

# Securities Finance Summarized

An investment management product where participants generate revenue by temporarily transferring idle securities, in a collateralized transaction, to a borrower.




- Lender transfers legal ownership of securities while retaining rights of beneficial ownership (i.e. entitlements on all dividend distributions and corporate actions)
- Borrower is contractually obligated to return the securities upon recall by the lender


STATE STREET

# Transaction Overview

**Initiating transaction**

1. Terms are negotiated
2. Loan is initiated

**Transaction in progress**

3. Borrower delivers collateral to lending agent
4. Securities are delivered through clearing agent
5. Cash collateral is invested
6. Collateral is adjusted daily via marks-to-market

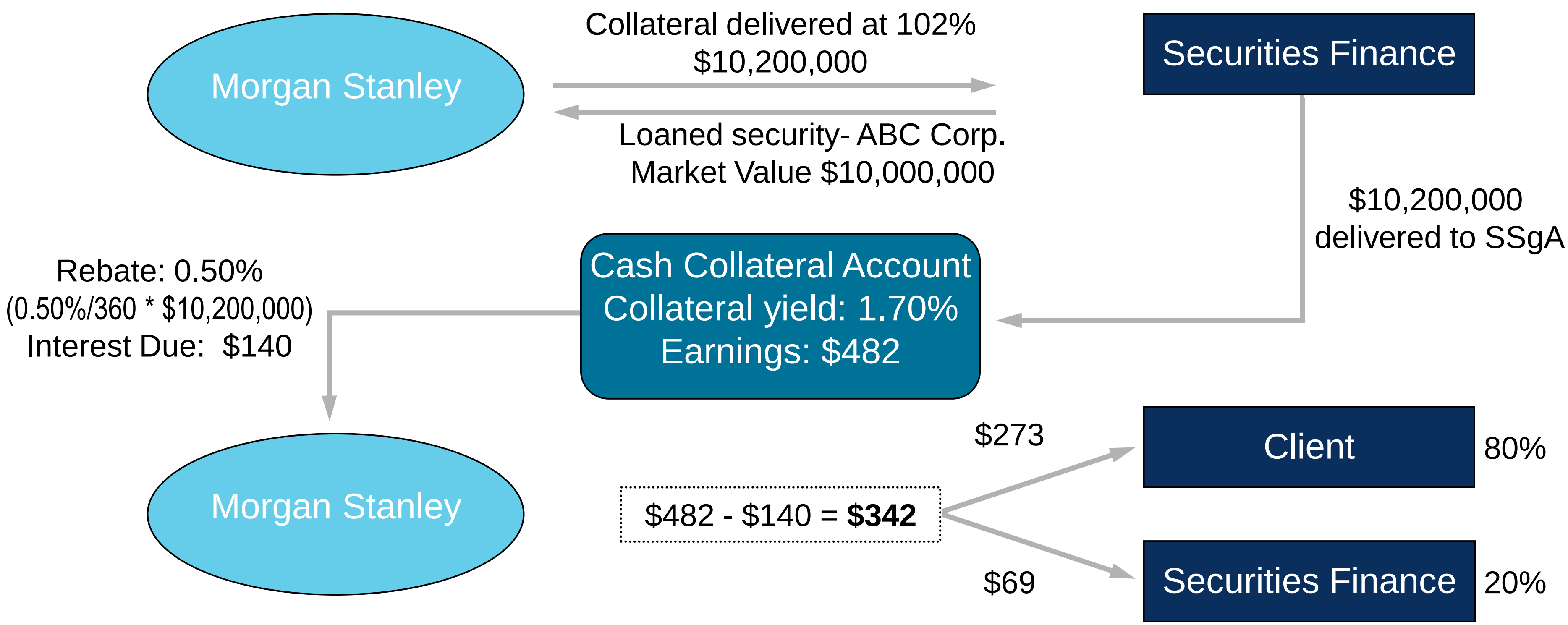
**Closing transaction**

7. Securities returned by borrower, collateral returned by agent
8. Loan is closed



STATE STREET

# Sample Transaction- One Day




Yield – Rebate = **Total Spread**

1.70% - 0.5% = 1.20% (120bps)

** Collateral Yield and Rebate Rate are annualized using a 360 day basis*.

STATE STREET.

# State Street Agency Lending

## Program Overview

State Street's securities finance program launched in ***1974*** and is one of the largest agency lending programs in the world today.

Leveraging our experienced global trading teams, State Street provides follow-the-sun **access to demand** within a **customized** framework that fits each client's requirements.

*45* years of experience in securities lending

*$4.49 trillion* of lendable assets

*$380.7 billion* of active loans

*34* security markets for equities and fixed income

*251* active clients, *47* approved jurisdictions

*157* borrowers, *16* approved jurisdictions

*US* (BTC) and *German* (GmbH) legal entities

Cash collateral is managed by *State Street Global Advisors* (SSGA), one of the world's largest cash managers

*8* regional offices with *5* trading desks

*405** dedicated employees

*AA-* rating from Standard & Poor's (Dec 2018)

*"State Street provides us with regular updates on industry events and new opportunities. We've mandated State Street as our securities lending agent for many years. We are very satisfied with the service they offer. Their service is very reliable and high quality."*

*#1* in the 2018 ISF Borrower Survey[1] global isf

*#1* in the 2019 Global Investor/ ISF Beneficial Owners Survey[2] global isf

*#1* in the 2019 Global Investors Award dinner[3]

*#1* in the 2019 Asia Asset Management awards[4]

1 #1 global weighted lender, Asia-Pacific weighted lender, Asia-Pacific unweighted lender
2 #1 lender overall, weighted by importance
3 #1 in the Americas unweighted category by the Equity Lending Survey Group 1
4 #1 securities financing house
* Headcount data as of 31 December 2019. This headcount figure does not include contractors

# Securities Lending Performance

# Securities Lending Program Summary

**Structure**

- Securities lending program commenced in February 2017
- Cash collateral only
- Collateral invested in SEC Rule 2a-7 Navigator Government Fund
- Fee split - 80% Alaska; 20% State Street for < $2m in revenue, then 85% /15%
- Demand-based program requiring 50 bps minimum demand spread
- Approved to lend to all non-GMSLA borrowers (Global Master Securities Lending Agreement)
- Indemnified against counterparty default

**Performance**

- $6.5 million in revenue since inception
- $1.3 million in client earnings for 2019
- $10.8b in lendable assets and $22.8m on loan as of March 31, 2020
- 220 bps return to securities on loan
- 50 funds currently authorized to participate in the program (9 with active loan balances as of March 2020)

*Performance data shown represents past performance and is no guarantee of future results*
*Source: Securities Finance Business Intelligence by Cognos*

# Performance Summary

## Year over Year Comparison

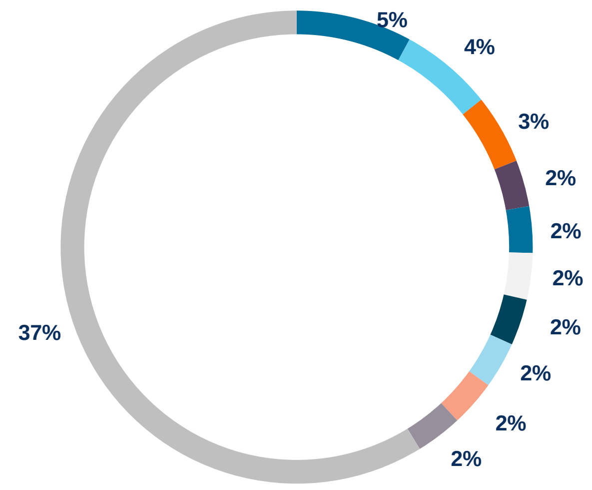
| | 2017* | 2018 | 2019 | Q1 2020 |
|---|---|---|---|---|
| **Average Lendables** | 13,224,433,991 | 13,731,170,342 | 11,189,314,088 | 6,929,266,863 |
| NON-US CORP BOND & EQUITY | 3,093,440,911 | 3,167,882,026 | 2,054,650,196 | 553,859,079 |
| US CORP BOND & EQUITY | 7,901,123,590 | 8,268,543,617 | 6,708,521,628 | 4,577,899,340 |
| US GOVERNMENT | 2,145,694,631 | 2,250,211,369 | 2,398,985,227 | 1,791,330,330 |
| NON-US FIXED INCOME | 84,174,859 | 44,533,330 | 27,157,037 | 6,178,113 |
| **Average On Loan** | 145,788,222 | 105,635,901 | 69,980,286 | 27,678,315 |
| NON-US CORP BOND & EQUITY | 39,800,354 | 45,974,977 | 18,135,321 | 150,681 |
| US CORP BOND & EQUITY | 101,363,934 | 56,288,836 | 24,827,564 | 18,255,796 |
| US GOVERNMENT | 5,086,326 | 4,496,117 | 29,473,529 | 9,271,839 |
| **Utilization (%)** | 1.1% | 0.8% | 0.6% | 0.4% |
| | | | | |
| **Client Earnings** | 2,636,203 | 2,481,182 | 1,382,639 | 128,778 |
| NON-US CORP BOND & EQUITY | 1,086,825 | 1,267,466 | 584,464 | 743 |
| US CORP BOND & EQUITY | 1,520,095 | 1,193,762 | 633,107 | 99,641 |
| US GOVERNMENT | 29,284 | 19,953 | 165,068 | 28,394 |
| | | | | |
| **Net Spread 360 (bps)** | 231 | 258 | 254 | 223 |
| Funding Spread 360 (bps) | 252 | 262 | 245 | 208 |
| Collateral Spread 360 (bps) | (22) | (3) | 9 | 15 |
| | | | | |
| **Annualized Return (bps)** | 2 | 2 | 1 | 1 |

**2017 Data is February 2017 – December 2017*
*Performance data shown represents past performance and is no guarantee of future results*
*Source: Securities Finance Business Intelligence by Cognos*

# Top Securities

## January 1, 2019 – December 31, 2019

| Security Name | Asset Class / Country Name | Net Spread (bps) | Alaska Earnings | % of Earnings |
|---|---|---|---|---|
| US TREASURY N/BINTR: 1.625 MATD: 08/15/29 | US TREASURY | 66 | 101,840 | 5% |
| ELI LILLY + CO | US EQUITY | 2,404 | 92,179 | 4% |
| YETI HOLDINGS INC | US EQUITY | 847 | 60,170 | 3% |
| ENGIE | NON-US EQUITY | 811 | 49,987 | 2% |
| SANOFI | NON-US EQUITY | 346 | 47,346 | 2% |
| PUBLICIS GROUPE | NON-US EQUITY | 12,907 | 47,205 | 2% |
| CARREFOUR | NON-US EQUITY | 18,362 | 46,906 | 2% |
| TRUPANION INC | US EQUITY | 740 | 44,987 | 2% |
| ACCELERATE DIAGNOSTICS | US EQUITY | 2,301 | 41,217 | 2% |
| COMPAGNIE DE SAINT GOBAIN | NON-US EQUITY | 649 | 40,329 | 2% |
| All Others | | | 809,493 | 37% |
| **Summary** | | **220** | **1,381,659** | **100%** |




*Performance data shown represents past performance and is no guarantee of future results.*
*Source: Securities Finance Business Intelligence by Cognos*

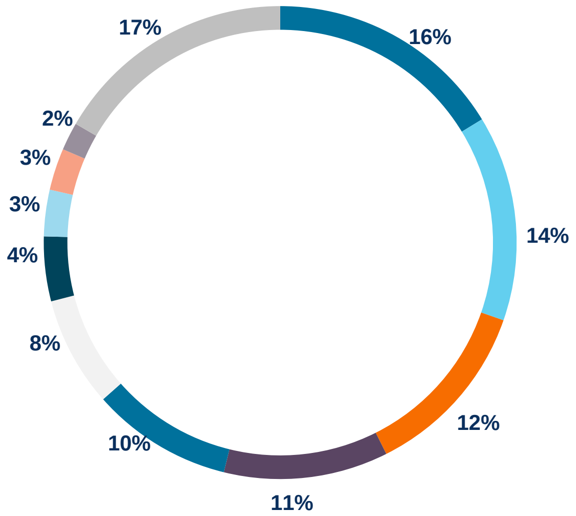


STATE STREET

# Top Borrowers

## January 1, 2019 – December 31, 2019

| Borrower Name | Average Loan Balance | % of Loan Balance |
|---|---|---|
| MORGAN STANLEY & CO. LLC | 11,355,434 | 16% |
| CITIGROUP GLOBAL MARKETS INC. | 9,808,587 | 14% |
| BOFA SECURITIES, INC. | 8,556,131 | 12% |
| ING FINANCIAL MARKETS LLC | 7,843,385 | 11% |
| JP MORGAN SECURITIES LLC | 6,725,829 | 10% |
| SOCIETE GENERALE SA (NY BRANCH) | 5,254,395 | 8% |
| BMO CAPITAL MARKETS CORP. | 3,081,400 | 4% |
| CREDIT SUISSE SECURITIES (USA) LLC | 2,219,336 | 3% |
| STATE STREET BANK & TRUST COMPANY | 1,995,419 | 3% |
| SG AMERICAS SECURITIES, LLC | 1,334,274 | 2% |
| All Others | 11,604,067 | 17% |
| **Summary** | **69,778,255** | **100%** |

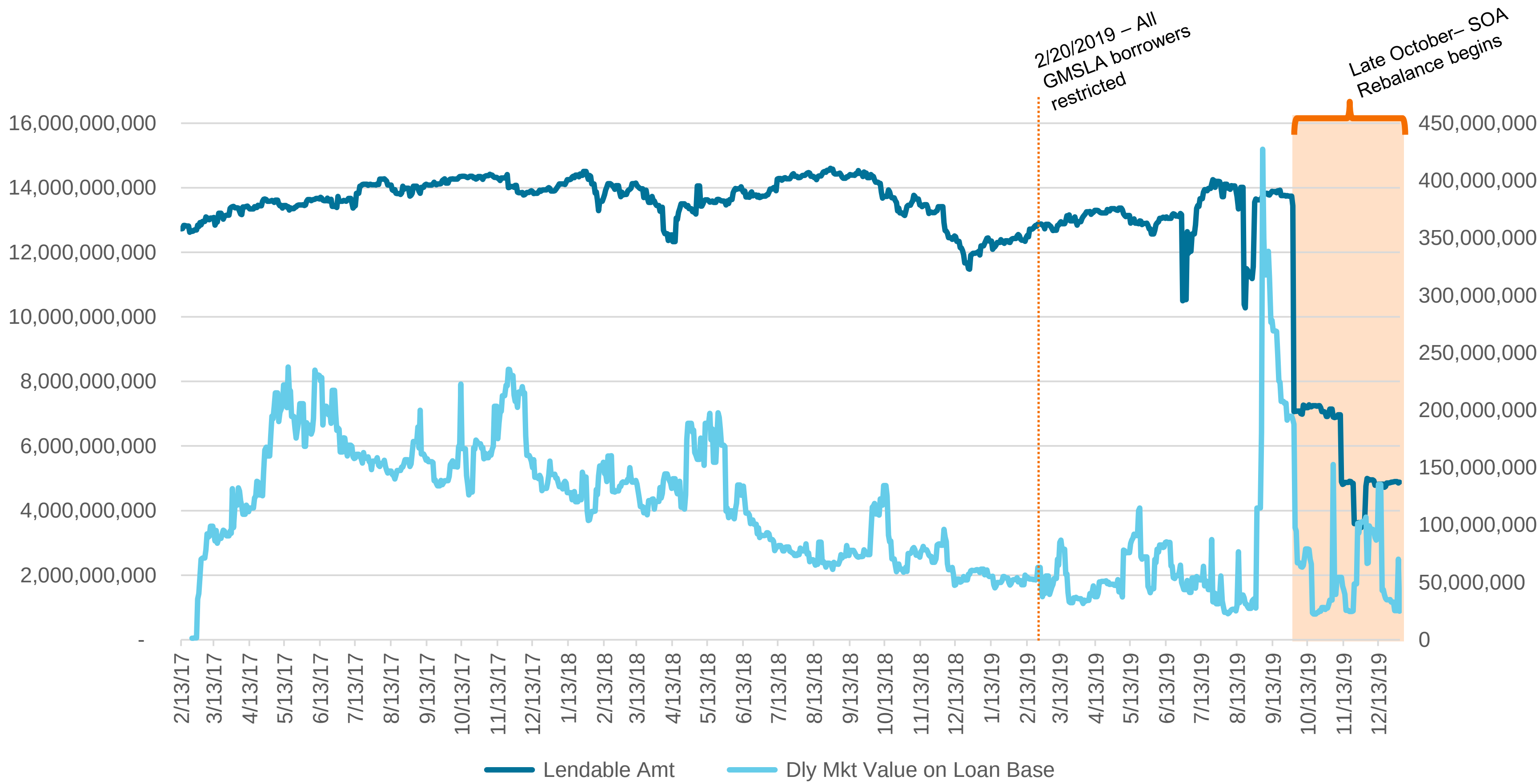



*Performance data shown represents past performance and is no guarantee of future results.*
*Source: Securities Finance Business Intelligence by Cognos*

# Lendable and On Loan

## Inception – December 31, 2019

- 2019 rebalance had significant impact on lendable and on loan assets; YoY lendables decreased by 19%. YoY on loan balances decreased by 34%.
- Terminated funds accounted for 32% of 2018 annual revenue




*Performance data shown represents past performance and is no guarantee of future results.*
*Source: Securities Finance Business Intelligence by Cognos*

# Risk Management

# Securities Finance

## What are the major risks and mitigating factors?

### Credit Risk

State Street controls the quality of its **approved borrower list** and monitors all borrowers daily against credit limits approved by Enterprise Risk.

The borrower default **indemnity** transfers credit risk to State Street Bank & Trust Co which is rated AA- by S&P (as of June 2019).

### Market Risk

State Street **marks to market** all loans and collateral daily, takes a positive margin on collateral, and monitors Value at Risk (VaR).

The **indemnity** transfers market risk to State Street, who will cover the shortfall in collateral value in the event of a borrower default.

### Ops Risk

State Street has **dedicated operations teams** to monitor daily processes and industry standard systems such as Pirum to reconcile positions with borrowers.

Security-level **buffers** are imposed to ensure that most sales can be facilitated through reallocations with other clients, removing the need for a loan recall.

### Legal Risk

Clients sign a single **Securities Lending Authorization Agreement** (SLAA) defining all terms and parameters for their program.

The SLAA should be regularly reviewed and updated to ensure that it properly reflects the client's **risk/reward appetite.**

### Reinvest Risk

Cash collateral is managed by **State Street Global Advisors**, one of the world's largest cash managers with over $357.45 billion under management.*

State Street's borrower default indemnity **does not cover cash collateral** and clients should ensure that their reinvestment policy is appropriate.

No reinvestment risk associated with non-cash collateral.

** Source: State Street Global Advisors, June 28, 2019*



STATE STREET.

# Securities Finance Risk Management

**Front Office Risk is comprised of 15 full-time analysts with deep subject matter expertise and years of Securities Lending industry experience.**

## Three Primary Functions of Front Office Risk:

- Credit Risk: Monitor the credit quality of our existing borrower base as well as review prospective financial institutions for inclusion in the Lending program
- Collateral/Market Risk: Establish eligible collateral types and applicable margins. Monitor program and entity level exposures and market trends.
- Business Analytics: Create models and analytical solutions to assist various teams across the Securities Lending program in risk management, trading decisions and revenue optimization

## Enterprise Risk Management ("ERM"): A Checks and Balances Approach

- ERM sets the framework, SF Front Office Risk manages the business risk
- New borrowers are vetted and analyzed by two independent teams
- ERM team of specialists is located with the Front Office Risk team on the trading floor

## Tested in times of crisis

- Proven ability to quickly liquidate and repurchase large portfolios of collateral and loans if necessary
- Partnership with Transition Management

*As of 12/31/2019*

# Credit Risk Management

## Borrower Approval and Due Diligence

- The Front Office Risk team performs due diligence and credit write-ups on all borrowers
- Independent approval of all borrowers and credit limits conducted by ERM Credit team
- Ongoing due diligence includes onsite visits to borrowers on a quarterly basis
- Detailed default plan that governs the management of borrower defaults is thoroughly reviewed and tested on an annual basis

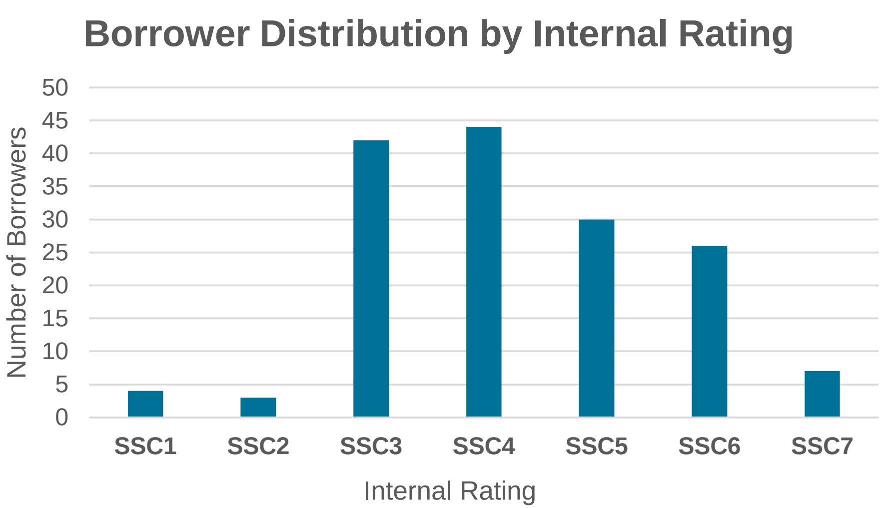
## Internal Credit Ratings

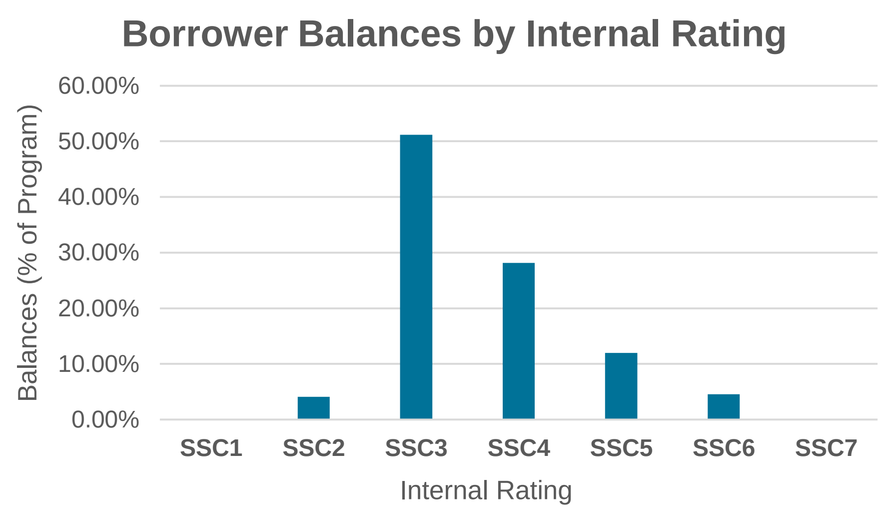
- All borrowers carry internal credit ratings assigned by ERM
- Annual renewals of credit approvals and ongoing review of internal ratings are standard procedure
- Certain collateral types, including ABS/MBS and Convertibles, are restricted to the most highly rated borrowers
- State Street's borrower population displays very high average credit quality

# Credit Risk Management

## Borrower Credit Analysis

- Borrower base consists of 130+ financial institutions world-wide (some 100 are active)
- Borrower base comprised of over 50 groups
- Loan Balances are concentrated amongst the high quality borrower base




*As of 12/31/2019*

# Cash Collateral Reinvestment



STATE STREET

# State Street Navigator Securities Lending Government Money Market Portfolio

## FC1B — State Street Navigator Securities Lending Government Money Market Portfolio

As of December 31, 2019

| Summary Characteristics | |
|---|---|
| 1-Day Yield[1] | 1.56% |
| 7-Day Yield | 1.59 |
| Par Position + Uninvested Cash (in millions) | 8861.13 |
| Floating Rate % | 46.54 |
| Foreign Issuers %[2] | 8.7 |
| Weighted Average Maturity (WAM)[3] | 26.14 |
| WAM to Call | 22.62 |
| Call v. Mat Spread | 3.52 |
| % Callables | 2.62 |
| Weighted Average Life (WAL)[4] | 95.17 |
| Fund Price as of 12/31/19 | 100.01 |
| Number of Holdings | 84 |

**Credit Quality BreakDown**

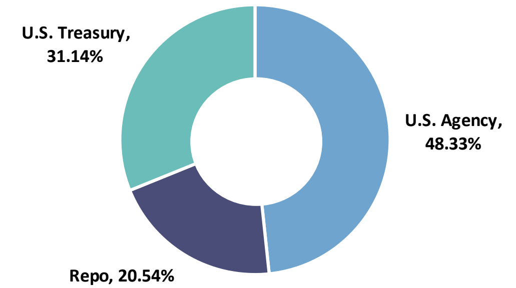
| Long-term Ratings | % of Fund |
|---|---|
| AAA | -- |
| AA | 32.06 |
| A | -- |
| BBB+ | -- |
| BBB | -- |
| BBB- | -- |
| BB+ | -- |
| BB | -- |
| BB- | -- |

| Short-term Ratings | % of Fund |
|---|---|
| A-1+/P-1 | 47.4 |
| A-1/P-1 | 20.54 |
| A-2 | -- |
| Other | -- |

| Liquidity Schedule | % of Fund |
|---|---|
| Next Business Day | 53.7 |
| **1 WEEK LIQUIDITY[5]** | **64.18** |
| 2-30 Days Liquidity | 6.03 |
| 31-60 Days Liquidity | 15.18 |
| 61-90 Days Liquidity | 8.79 |
| **90 DAY LIQUIDITY** | **83.69** |
| 91-120 Days Liquidity | 2.14 |
| 121-150 Days Liquidity | 3.14 |
| 151-180 Days Liquidity | 0.79 |
| 181-270 Days Liquidity | 5.3 |
| 271-360 Days Liquidity | 4.93 |
| 12-15 Month Liquidity | -- |
| 15-18 Month Liquidity | -- |
| 18-21 Month Liquidity | -- |
| 21-24 month Liquidity | -- |
| Greater than 2 Year Liquidity | -- |
| YE 2019 Liquidity | 5.94 |

| Floating Rate Index Breakdown | % of Fund |
|---|---|
| FED FUNDS | -- |
| 1MO LIBOR | 5.76 |
| 3 MOS LIBOR | 0.07 |
| 3 MO TBILL | 19.81 |
| FCPR | -- |
| OBFR | -- |
| SOFR | 20.9 |

| Floating Rate Reset Buckets | % of Fund |
|---|---|
| Next Business Day | 39.3 |
| 2-7 Days | 1.52 |
| 8-31 Days | 5.65 |
| 1-2 Months | -- |
| 2-3 Months | 0.07 |




| Repo Collateral | % of Fund |
|---|---|
| Treasuries | 16.43 |
| Agencies | -- |
| Agency MBS | 4.1 |
| Money Markets | -- |
| Corporates | -- |
| Asset-Backed | -- |
| Equities | -- |

Source: SSGA, Bloomberg. Ratings are from Bloomberg and are S&P. Performance quoted represents past performance, which is no guarantee of future results. Investment return and principal value will fluctuate, so you may have a gain or loss when shares are sold. Current performance may be higher or lower than that quoted. Visit my.statestreet.com for most recent month-end performance.

[1] 1 Day Yield is the Net Yield (income minus expenses). The fund is in USD and the benchmark is the Overnight Bank Funding Rate (OBFR).

[2] All YCD's are being reported as Domestic and thus not included in the % Foreign Issuers. % Foreign issuers is the % of the fund held in foreign issues (domicile of issuer which represents the issuer's country of incorporation, for repo it's where the counterparty is incorporated).

[3] Weighted Average Maturity (WAM): aggregation of WAM of underlying securities in fund defined as (1) Floating rate securities: Next Reset Date – Current Date; (2) Fixed Rate: Maturity Date – Current Date (defined in days)

[4] Weighted Average Life (WAL): aggregation of WAL of underlying securities in fund defined as (1) Floating rate securities: Expected Maturity Date – Current Date; (2) Fixed Rate: Expected Maturity Date – Current Date (defined in days)

State Street Global Advisors investment management fee is 1.75 bps per annum

Any S&P ratings below BB- or below A-1 as well as Unrated securities are included in the "Other" category

Floating rate % is the % of floating rate securities held in the fund.

Liquidity schedule is the maturity profile of the cash investment.

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You could lose money by investing in the Fund. Although the Fund seeks to preserve the value of your investment at $1.00 per share, it cannot guarantee it will do so. An investment in the Fund is not insured or guaranteed by the Federal Deposit Insurance Corporation or any other government agency. The Fund's sponsor has no legal obligation to provide financial support to the Fund, and you should not expect that the sponsor will provide financial support to the Fund at any time.

# Appendix

# Fund Performance – Top 10

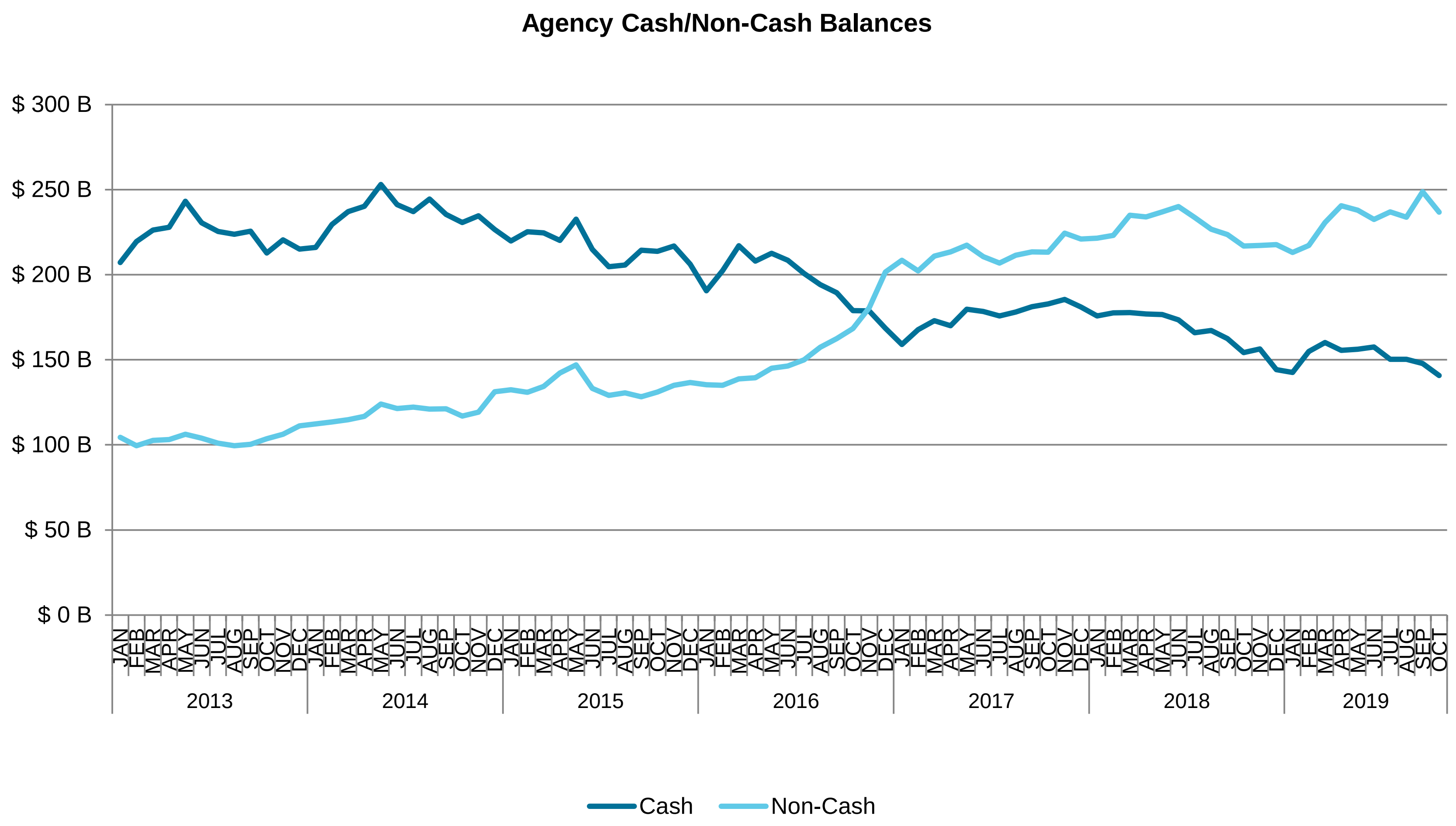
## January 1, 2019 – December 31, 2019

| Fund Name | Avg Lendable Assets | Avg Utilization | Avg Loan Balance | Fund Earnings | Return to Lendable (bps) |
|---|---|---|---|---|---|
| BRANDES | 632,002,798 | 0.70% | 4,429,656 | 280,990 | 5.48 |
| S&P 600 FOF | 393,532,381 | 1.58% | 6,231,459 | 147,998 | 4.64 |
| ARMB US AGGREGATE FIXED INCOME | 822,545,793 | 2.82% | 23,223,598 | 142,709 | 2.14 |
| LORD, ABBETT & CO - MICRO CAP | 47,010,070 | 8.01% | 3,767,512 | 137,638 | 36.10 |
| SCHRODER INVESTMENT MANAGEMENT | 130,484,148 | 2.70% | 3,517,066 | 101,261 | 9.57 |
| ARROWSTREET CAPITAL, LIMITED PARTNERSHIP | 265,893,093 | 1.42% | 3,777,258 | 69,447 | 3.22 |
| ARROWMARK FOF | 42,205,919 | 3.43% | 1,446,352 | 67,222 | 19.64 |
| ARMB S&P 900 | 1,874,531,452 | 0.07% | 1,297,111 | 65,001 | 0.43 |
| MONDRAIN INVESTMENT PARTNERS | 137,743,826 | 2.64% | 3,636,519 | 48,043 | 4.30 |
| LAZARD FRERES | 198,442,129 | 0.60% | 1,182,959 | 39,173 | 2.43 |

*Performance data shown represents past performance and is no guarantee of future results*
*Source: Securities Finance Business Intelligence by Cognos*

# Shift In What Prime Brokers Are Pledging

## 7 year trend




*As of 10/31/2019*
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# Reflections

# Agency Issues

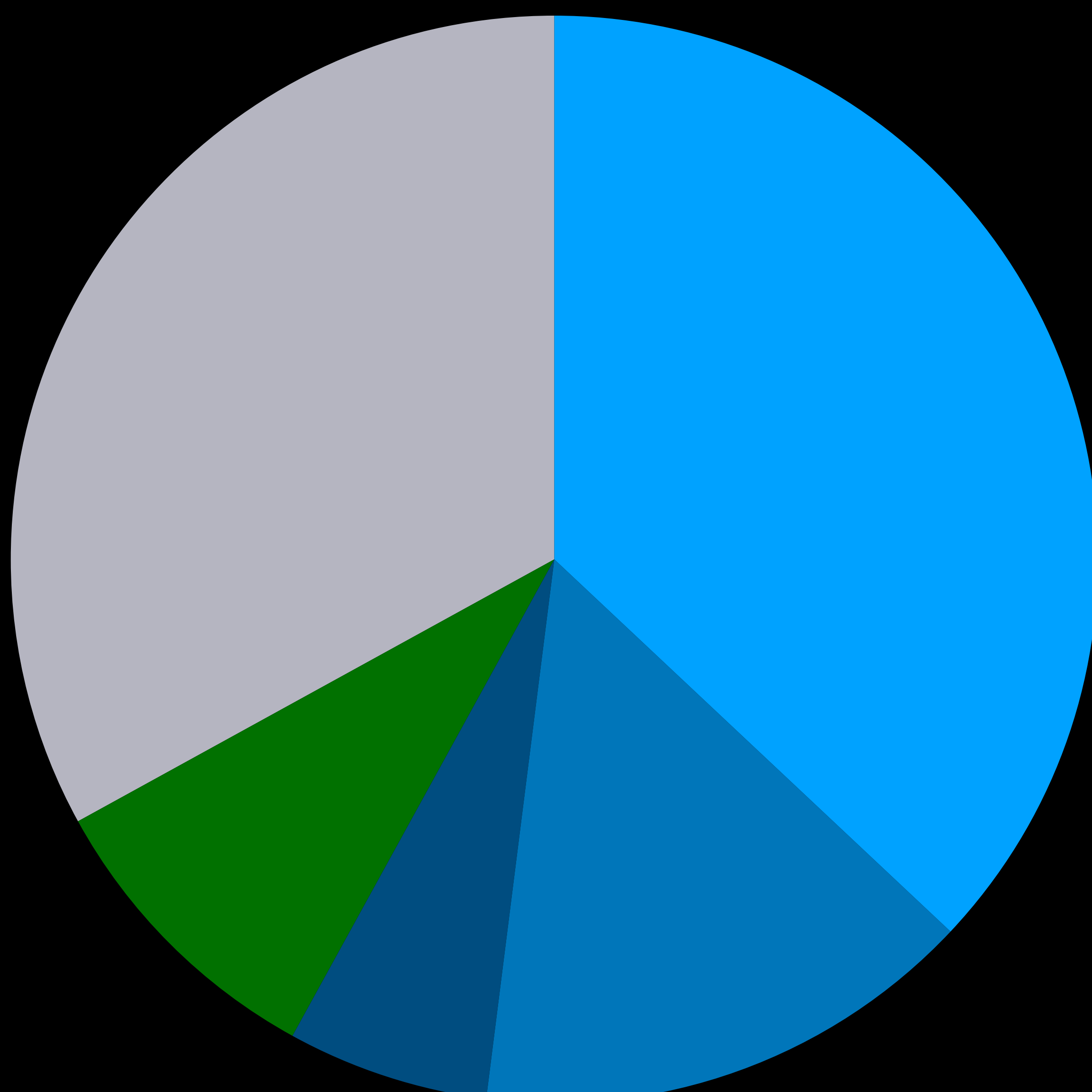
“Nearly every aspect of funds management suffers from decisions made in the self-interest of the agents, at the expense…of the principals.”
—David Swensen, Yale CIO

# Advising philosophy

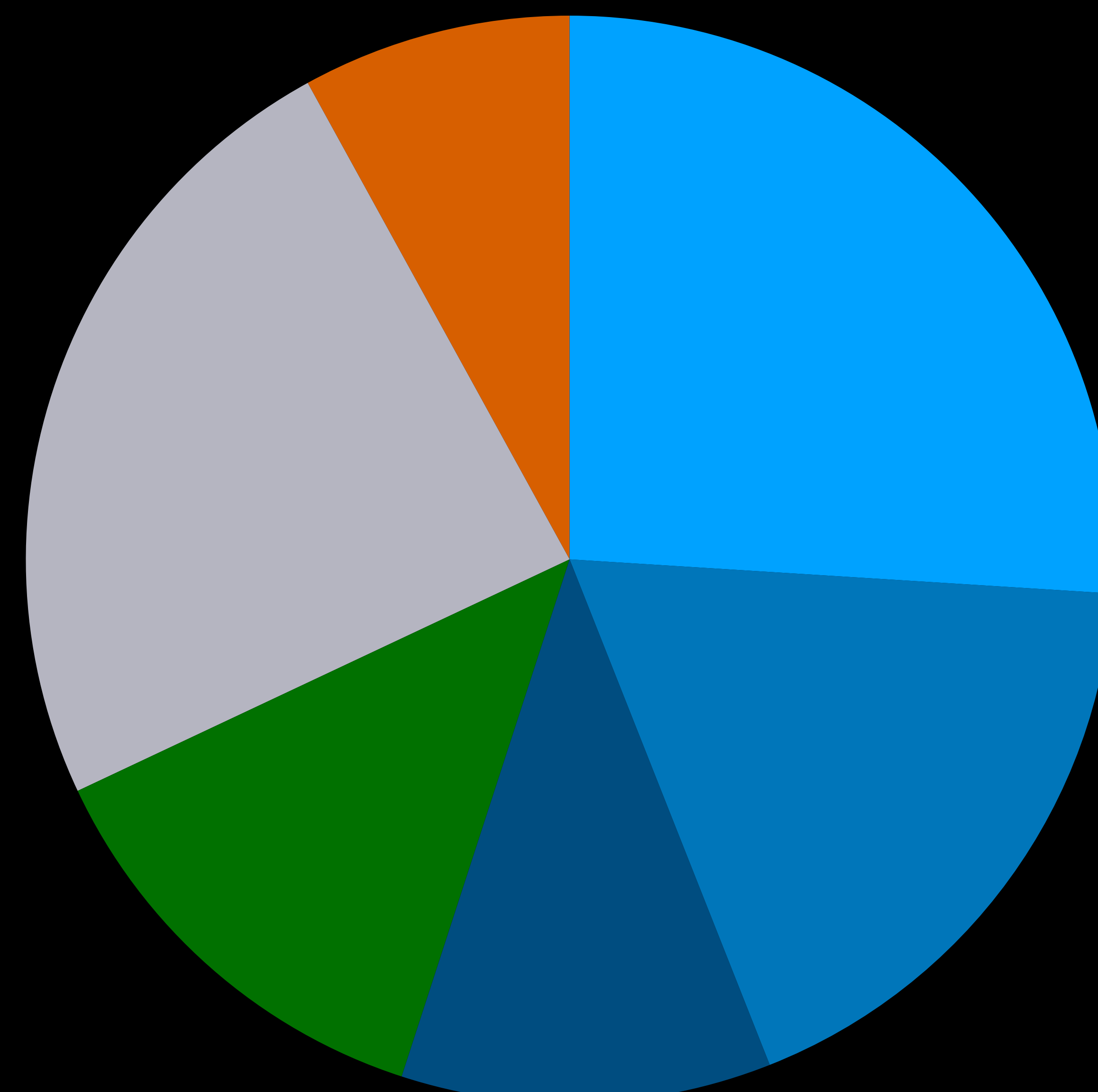
- Duty of loyalty
- Act as a catalyst
- A time to speak up
- Investment committee expertise differs from investment expertise

# Diversification

2003



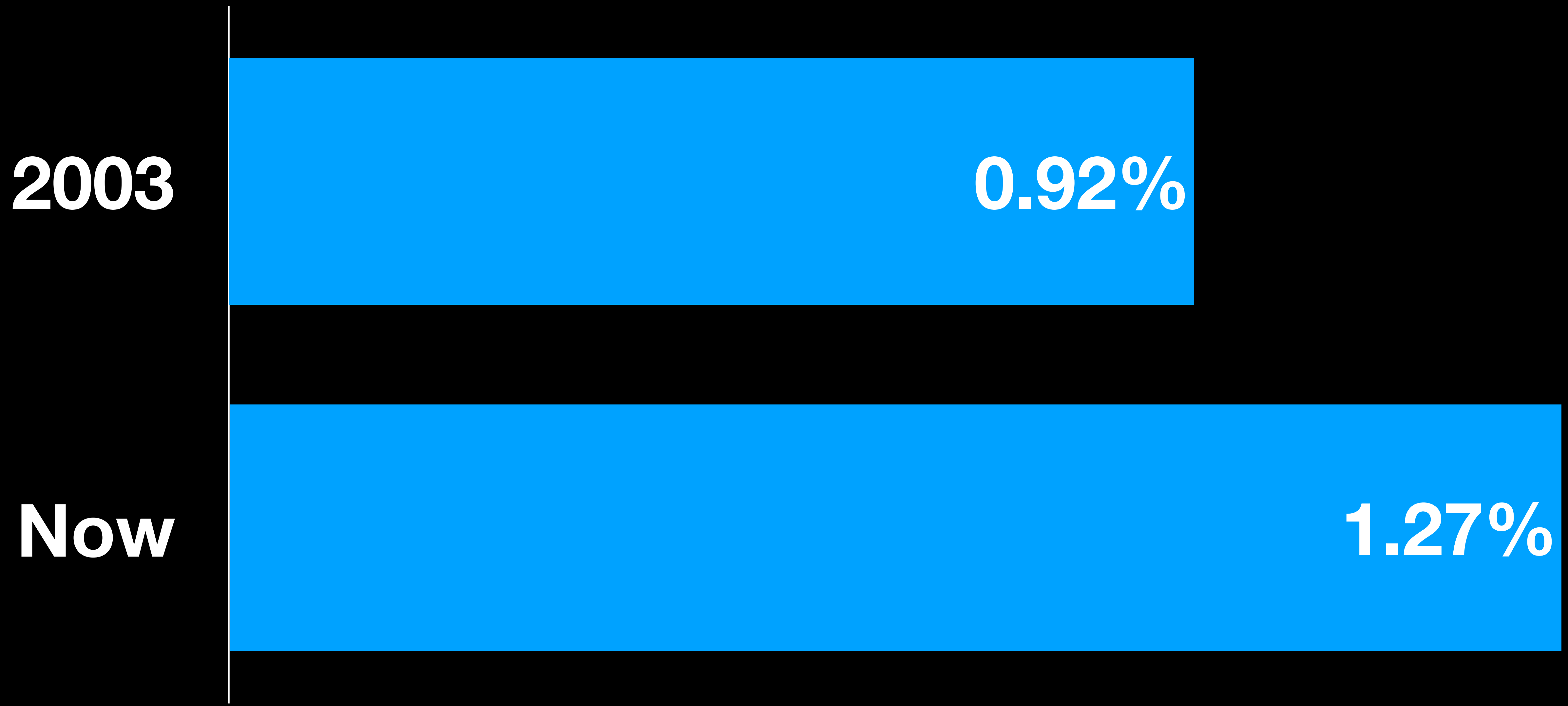
Now



# Five Trends

- More international
- More alternatives
- More managers
- More private
- More exotic

# Diversification Benefits



# Defined Contribution

- SB 141
- Target-date upgrades
- Better & cheaper default
- Harmonization across plans
  - consistent menu
  - clearer menu

# Perspective

- Fewer, bigger manager allocations
- Decide who decides
- Ask the “fourth question” as you govern
- More indexing
- More CFAs
- Strategic time allocation

# Six Questions on New Investments

- What is it?
- What is the reward?
- What is the risk?
- Is the risk-reward tradeoff worthwhile?
- Is a disaster too painful?
- Is it worth our time?

# For the future

- Where can we cut costs?
- Where can we simplify?
- Risk conversations
- Better benchmarks
- Oversight of internal management
- Liquidity end-game

# Review of Performance Audit Recommendations

Bob Mitchell, CFA
Chief Investment Officer
March 19-20, 2020

# Consolidated Recommendations

1. We suggest that Callan create an easy to digest "performance dashboard" (limited to a few pages) which reports to the Board the return and risk elements of performance at the Fund and Asset Class levels to "spot check" if the risk experienced is consistent with expectations.

2. We recommend that the Board direct Callan to produce on an annual basis a "Fee Dashboard" which notes (1) what the manager's agreed upon fee is and (2) how the agreed upon fee compares to other managers within a peer group.

3. We recommend that for the Fixed Income managers Callan include each manager's (a) credit quality, (b) duration, (c) issuer type and (d) geographic allocation.

4. We recommend ARMB and Callan reconsider the frequency of valuations (daily vs. monthly) for public assets.

5. We recommend ARMB and Callan reconsider the return intervals (monthly vs. quarterly) used to calculate standard deviation, noting that using monthly returns allows for a more precise risk measurement.

# Recommendation #1: Performance Dashboard

Recommendation

We suggest that Callan create an easy to digest “performance dashboard” (limited to a few pages) which reports to the Board the return and risk elements of performance at the Fund and Asset Class levels to “spot check” if the risk experienced is consistent with expectations.

Summary of Callan Response

Callan agrees and is willing to work with staff to select a set of exhibits to analyze the performance and risk of each Fund relative to its asset allocation target.

Staff Recommendation

Implement a performance dashboard in the performance reports and performance presentations Callan makes to the Board starting with the period ending no later than March 31, 2020.

# Recommendation #2: Fee Dashboard

Recommendation

We recommend that the Board direct Callan to produce on an annual basis a "Fee Dashboard" which notes (1) what the manager's agreed upon fee is and (2) how the agreed upon fee compares to other managers within a peer group.

Summary of Callan Response

Callan agrees and is confident that a responsive and useful format can be created to display managers' fees to an appropriate peer group. This report will be prepared and presented to the ARM Board on an annual basis.

Staff Recommendation

Annually, include a fee dashboard exhibit in the Staff and Board reports starting with the period ending June 30, 2020.

# Recommendation #3: Disclose Fixed Income Stats.

Recommendation

We recommend that for the Fixed Income managers Callan include each manager's (a) credit quality, (b) duration, (c) issuer type and (d) geographic allocation.

Summary of Callan Response

Staff has agreed to provide this information for the internally-managed fixed income accounts. With the exception of Crestline's strategies that reside in ARMB's fixed-income allocation and for which these characteristics do not apply. The cited characteristics will be listed for the two external fixed-income strategies -- Fidelity's Tactical Bond Pool and the Fidelity Real Estate High Income Fund – and the fixed-income pools can also be included in quarterly Staff and Board reports for periods ending on and after December 31, 2019.

Staff Recommendation

Incorporate this information in the Staff and Board reports starting with the period ending no later than March 31, 2020.

# Recommendation #4: Daily Valuation

Recommendation

Re Performance Calculations: We recommend ARMB and Callan reconsider the frequency of valuations (daily vs. monthly) for public assets.

Summary of Callan Response

Callan respectfully disagrees. Callan notes that if it received daily information from the custodian, it could calculate returns based upon daily chain-linked returns. If no intra-period cash flows were to occur, Callan's performance would be similar using either method. Callan currently employs a method of chain-linking returns intra-period when a significant cash flow (defined as >10%) occurs. Callan is willing to lower the threshold to 5%.

Staff Recommendation

Do not employ daily chain-linked performance for public assets. Lower the cash flow threshold to 5% for chain-linking intra-period returns.

# Recommendation #5: Employ Monthly Intervals

Recommendation

We recommend ARMB and Callan reconsider the return intervals (monthly vs. quarterly) used to calculate standard deviation, noting that using monthly returns allows for a more precise risk measurement.

Summary of Callan Response

Callan respectfully disagrees. The monthly valuation cycle cannot be applied to the illiquid portions of ARMB's asset base. It is therefore not possible to apply a monthly valuation cycle to the entire portfolio. Callan is unable to calculate peer return and risk statistics based upon a monthly cycle. If ARMB were to convert, it would make peer comparisons less meaningful.

Staff Recommendation

Maintain the existing frequency employed by Callan.

Callan

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www.callan.com

February 21, 2020

Mr. Bob Mitchell
Chief Investment Officer
Alaska Retirement Management Board
333 Willoughby
11th Floor
Juneau, AK 99801

Dear Bob,

Callan LLC ("Callan") has reviewed the "Report on State Performance Consultants" presented by Anodos Advisors ("Anodos") to the Alaska Retirement Management Board ("ARMB") at its December 13, 2019 meeting in Juneau. This letter contains Callan's responses to the various recommendations outlined within the report.

Callan believes that performance reports should be prepared so that they address the specific informational requirements of each client. The Anodos report is a very useful contribution to defining ARMB's information preferences as relates to the quarterly performance reports prepared for the Board, for you and your staff, and for the summary report that Steve Center and I present to the Board.

As noted below, the overwhelming majority of the recommendations made by Anodos can be incorporated into the Callan performance report. We suggest that after evaluating Callan's response, ARMB staff and Callan discuss the Board and staff's objectives to determine which of the Anodos recommendations are consistent with ARMB's information needs. Callan will begin incorporating those recommendations into quarterly Staff and Board reports for periods on and after December 31, 2019.

**Recommendation #1:**
**Duty re Risk Measurement: We suggest that Callan create an easy to digest "performance dashboard" (limited to a few pages) which reports to the Board the return and risk elements of performance at the Fund and Asset Class levels to "spot check" if the risk experienced is consistent with expectations.**

We agree. Callan will work with Department of Revenue staff to select a set of exhibits to analyze the performance and risk of each Fund relative to its asset allocation target. A Fund's relative performance can be compared to a peer group of funds. Various performance characteristics can be evaluated for each Fund on a relative basis including but not limited excess return, tracking error, and standard deviation. Comparisons can be made to peer groups and relative to the Fund's policy target.

Callan will work with Department of Revenue staff to identify the specific exhibits and reporting cycles to address Anodos' "performance dashboard" recommendation with exhibit(s) acceptable to ARMB.

**Recommendation #2:**
**Duty re Investment Expenses: We recommend that the Board direct Callan to produce on an annual basis a "Fee Dashboard" which notes (1) what the manager's agreed upon fee is and (2) how the agreed upon fee compares to other managers within a peer group.**

We agree. Callan has submitted a "fee dashboard" template to Department of Revenue staff for consideration. Based on DOR feedback, we are confident that a responsive and useful format can be created to display managers' fees to an appropriate peer group. This report will be prepared and presented to the ARM Board on an annual basis.

**Recommendation #3:**
**Duty re Monitoring / Benchmarking: We recommend that for the Fixed Income managers Callan include each manager's (a) credit quality, (b) duration, (c) issuer type and (d) geographic allocation.**

We agree. DOR agreed to provide this information on the internally-managed fixed income accounts via Callan's standard manager questionnaire. With the exception of Crestline's strategies that reside in ARMB's fixed-income allocation and for which these characteristics do not apply, the cited characteristics will be listed for the two external fixed-income strategies -- Fidelity's Tactical Bond Pool and the Fidelity RE High Income Fund – and the fixed-income pools can also be included in quarterly Staff and Board reports for periods ending on and after December 31, 2019.

**Recommendation #4:**
**Re Performance Calculations: We recommend ARMB and Callan reconsider the frequency of valuations (daily vs. monthly) for public assets.**

We take a differing view on this issue. While we agree that daily valuation is a laudable goal *in theory*, there are practical considerations that lead us to respectfully disagree with the recommendation.

It is our experience that time-weighted return differences based on a portfolio's daily valuation versus its monthly valuation do not rise to the level of significance ***unless*** there are material cash flows (e.g. -- contributions or disbursements greater than 10% of the account's market value) during the period of the performance calculation.

Both Callan and GIPS require revaluation only when there are material cash flows. Callan's performance measurement analysts use custodial valuations whenever there are significant flows so our time-weighted returns are both accurate and GIPS-compliant.[1]

Callan is willing to lower the significance threshold on cash flows to 5% of account value versus 10% which is the GIPS and Callan standard. We are also willing to discuss with DOR the objectives, methods and implications of shifting to a daily valuation feed on all public assets in the future.

**<u>Recommendation #5</u>:**
**Re Performance Calculations: We recommend ARMB and Callan reconsider the return intervals (monthly vs. quarterly) used to calculate standard deviation, noting that using monthly returns allows for a more precise risk measurement.**

Callan agrees that more frequent return intervals can create greater precision. We respectfully disagree, however, that monthly returns are practical for two primary reasons: *<u>applicability</u>* and *<u>significance</u>.*

Regarding applicability, we note that nearly one-fourth of ARMB's assets are invested in strategies which cannot be valued monthly – timber, farmland, real estate, private equity. Since a monthly valuation cycle cannot be applied to a significant portion of ARMB's asset base, it is not possible to apply a monthly valuation cycle on the totality of ARMB's assets thereby negating the ability to accurately calculate monthly values on the Total Fund.

From the perspective of significance, the marginal value of greater precision is worth consideration. It is our experience that standard deviation calculated using monthly returns will result in a slightly higher calculated risk value compared to the same calculation based on quarterly returns. It is Callan's considered opinion that absolute values are neither as relevant nor as useful as is the ability to meaningfully compare those numbers to a benchmark or a relevant peer group whose values are determined using the same frequency. It is presently not possible for Callan to calculate historical risk for peer groups using monthly returns as those data sets are based on quarterly reporting cycles.

While investors may gain precision using more frequent valuations, investors' ability to compare their risk levels to peers would be lost. We believe the comparisons of quarterly values to peer groups and indices provide reasonable and actionable information to investors. The observation that losing the ability to make peer comparisons applies not only to returns, but to all other return-based risk statistics.

[1] The October 7, 2019 Anodos report to the ARMB appears to validate the Callan valuation and return calculation methodologies. Note #3 under "Findings" on page 27 that document states: "We find our recalculations of return for a sample of managers to be within 0.05% of those reported by Callan, which is an acceptable margin of difference."

We note that the 2020 GIPS for Asset Owners states that asset owners must present in each GIPS ASSET OWNER REPORT: "For TOTAL FUNDS or COMPOSITES for which monthly TOTAL FUND or COMPOSITE returns are available, the three-year annualized EX POST STANDARD DEVIATION (using monthly returns) of the TOTAL FUND or COMPOSITE and the BENCHMARK as of each annual period end."[2] This standard applies for periods ending on or after 1 January 2011.

Callan interprets the standard above to mean that monthly standard deviation is a requirement only if monthly returns are available across an asset owner's total asset class structure. ARMB's strategic allocation policy targets approximately one-fourth of its assets in private market assets, valuations of which are done quarterly meaning that any Total Fund measurements done more frequently than quarterly would be statistically flawed and any resulting measurement would be inherently inaccurate.

Callan appreciates the suggestions proffered by Anodos and we hope that our responses above are useful to ARMB. We look forward to your feedback and direction.

Respectfully,

Paul Erlendson

Steve Center, CFA

[2] CFA Institute, "2020 Global Investment Performance Standards (GIPS®) for Asset Owners," section 24.A Presentation and Reporting – Requirements, paragraph j, pages 13-14. https://www.cfainstitute.org/-/media/documents/code/gips/2020-gips-standards-asset-owners.ashx

# ALASKA RETIREMENT MANAGEMENT BOARD

| | | | |
|---|---|---|---|
| SUBJECT: | Performance Audit Recommendations | ACTION: | **X** |
| DATE: | March 19-20, 2020 | INFORMATION: | |

BACKGROUND:

AS 37.10.220(a)(11) directs the Board to "...contract for an independent audit of the state's performance consultant not less than once every four years."

Callan LLC (Callan) was contracted as the state's consultant during this audit period.

Following an RFP selection process, the Alaska Retirement Management Board (ARMB) selected Anodos Advisors in June 2019 to conduct the evaluation of Callan's performance services.

In December 2019, Anodos presented its findings to the Board, including five recommendations.

STATUS:

Callan reviewed Anodos' recommendations and issued a response letter to staff. Staff considered the Anodos recommendations and Callan's response and provided a set of staff recommendations in a presentation at the March 2020 meeting of the ARMB.

RECOMMENDATION:

The Alaska Retirement Management Board approve staff's recommendations from its presentation entitled, "Review of Performance Audit Recommendations" delivered to the Board at its March 2020 meeting.

Scientific Beta
An SGX and EDHEC Venture

# An Introduction to Factor-Based Investing

**Eric Shirbini, PhD**
Global Research and Investment Solution Director, Scientific Beta

*ARMB Trustees, Juneau, Alaska*
*March 19, 2020*

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# Introduction to Factor Based Investing

- Academic studies that show the bulk and more reliable element of active management can be captured by exposure to a small set of systematic risk factors.
- The remaining contribution of idiosyncratic security selection is negative and non-persistent for most investors.
- It follows that instead of seeking outperformance to expensive active managers investors would be better off investing in equity portfolios exposed to these systematic factors.
- Such smart beta portfolios have become increasingly available as low cost and transparent systematic strategies which goes a along to explain the newfound popularity of factor investing.
- However, it is important to understand the source of outperformance and risks associated with these smart beta investments

# Explanatory Power of Equity Factors

- Factors explain differences in long-term returns across assets (***cross-sectional perspective***) and short-term variability of asset returns (***time-series perspective***)
  - Fama-French (2018) show that a 6-factor model explains 81% of differences in return levels across equity portfolios, and 91% of variability over time
  - Barallis and Shanken (2018) compare several models and settle on a six-factor model (market, size, momentum, investment, profitability and value factors)
- ***Few common factors*** explain return differences for a host of strategies
  - Hou, Xue and Zhang (2015) show that a four-factor model explains returns to 80 strategies, such as strategies based on accruals or dividend yield
  - Seemingly unrelated strategies are driven by implicit exposures to common factors

# Why Do Factor Risk Premia Exist?

- In academia the importance of factors has been long recognized
  - Securities earn their performance through exposure to **multiple priced risk factors**; any remaining risk exposure is by definition unrewarded and can be diversified away
  - The **economic intuition** for the existence of a risk factor is that exposure to such a factor is undesirable for the average investor because it leads to losses in bad times (when marginal utility of consumption is high)
  - For example**, Value** stocks with high fixed assets are more sensitive to economic shocks and will suffer greater short term losses in bad times; investors need to be compensated over the long-term for bearing this short-term risk
  - **Asset owners with long-term liabilities** are well placed to bear short-term risk and are therefore ideally suited to harvest these factor risk premia

# Blending the Advantages of Active and Passive

"rules based strategies that do not use market cap weights"
(Financial Times)

Access to "risk premia previously only available through expensive active strategies in a cheaper way"
(Towers Watson)

**Passive Strategies** | **Smart Beta** | **Active Strategies**

- **Low cost** (low turnover and fees)
- **Transparent** ground rules and data
- **Potential for outperformance**

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# A Consensual Choice of Factors

- A choice based on long-term data documented by empirical academic evidence.

| Factor | Factor Definition | Period | Annual Premium | t-stat | Source |
|---|---|---|---|---|---|
| **Value** | Stocks with high versus low book-to-market | 1963-2013 | 4.53% | 3.20 | Fama-French (2015) |
| **Momentum** | Stocks with high vs. low returns over past 12 months (omitting last month) | 1926-2008 | 9.34% | 5.71 | Ang *et al.* (2009) |
| **Low Risk** | Stocks with low versus high risk (beta, volatility or idiosyncratic volatility) | 1926-2012 | 8.73% | 7.12 | Frazzini-Pedersen (2013) |
| **Size** | Stocks with low versus high market cap | 1963-2013 | 3.54% | 2.31 | Fama-French (2015) |
| **Profitability** | Stocks with high vs. low profitability (e.g. return on equity or gross profitability) | 1963-2013 | 3.04% | 2.92 | Fama-French (2015) |
| **Investment** | Stocks low vs. high investment (change in total assets) | 1963-2013 | 4.03% | 4.07 | Fama-French (2015) |

# Generalising the US Evidence

- Academic research has made considerable progress in generalizing the findings in the US long-run data through surprisingly strong confirmation in international equity markets and in some cases in different asset classes.

| Factor | US Equities | International Equities | Fixed Income, Currency, Commodity |
|---|---|---|---|
| **Value** | Basu (1977); Rosenberg, Reid, Lahnstein (1985); Fama and French (1993) | Fama and French (2012) | Asness, Moskowitz, Pedersen (2013) |
| **Momentum** | Jegadeesh and Titman (1993); Carhart (1997) | Rouwenhorst (1998) | Asness, Moskowitz, Pedersen (2013) |
| **Low Risk** | Ang, Hodrick, Xing, Zhang (2006); Frazzini and Pedersen (2014) | Ang, Hodrick, Xing, Zhang (2009); Frazzini and Pedersen (2014) | Frazzini and Pedersen (2014) |
| **Size** | Banz (1981); Fama and French (1993) | Heston, Rouwenhorst, Wessels (1999); Fama and French (2012) | na |
| **Profitability** | Novy-Marx (2013); Hou, Zhang, Xue (2014); Fama and French (2014) | Ammann, Odoni, Oesch (2012) | na |
| **Investment** | Cooper, Gulen, Schill (2008); Hou, Zhang, Xue (2014); Fama and French (2014) | Watanabe, Xu, Yao, Yu (2013) | na |

# Justified by an Economic Rationale

**A choice justified by economic research**:

- Risk-based explanation: higher return means higher extreme marginal risk.
- Behavioural explanation: if there are persistent limits to arbitrage.

| Factor | Risk-based explanation | Behavioural explanation |
|---|---|---|
| **Value** | Costly reversibility of assets in place: high sensitivity to economic shocks in bad times | Overreaction to bad news and extrapolation of the recent past leads to under-pricing |
| **Momentum** | High expected growth firms are more sensitive to shocks to expected growth | Investor overconfidence and self-attribution bias leads to returns continuation in the short term |
| **Low Risk** | Liquidity-constrained investors have to sell leveraged positions in low risk assets in bad times when liquidity constraints become binding | Disagreement of investors about high risk stocks leads to overpricing due to short sales constraints |
| **Size** | Low liquidity, high distress and downside risk is compensated by higher returns | Limited investor attention to smaller cap stocks |
| **Profitability** | Firms facing high cost of capital will invest only in the most profitable projects | Investors do not discern high and low profitability in growth firms |
| **Investment** | Low investment reflects firms' limited scope for projects given high cost of capital | Investors under-price low investment firms due to expectation errors |

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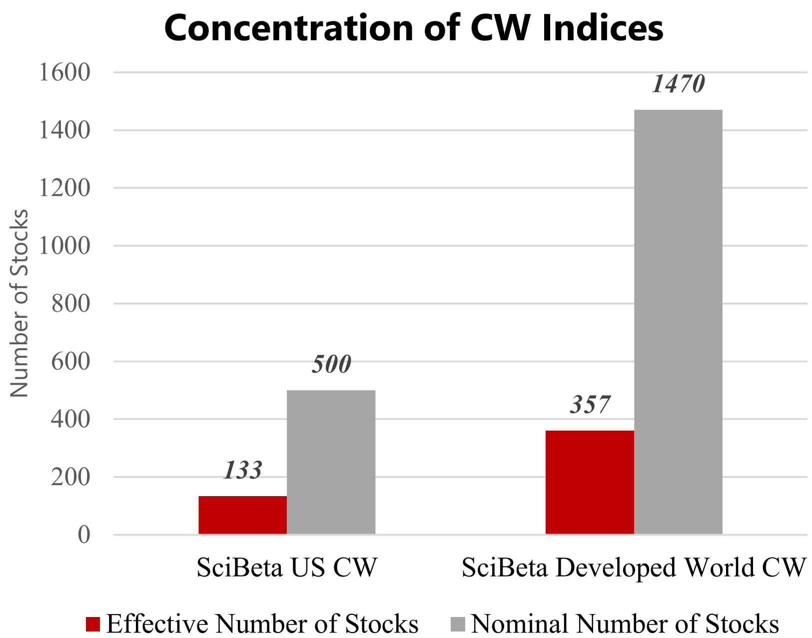
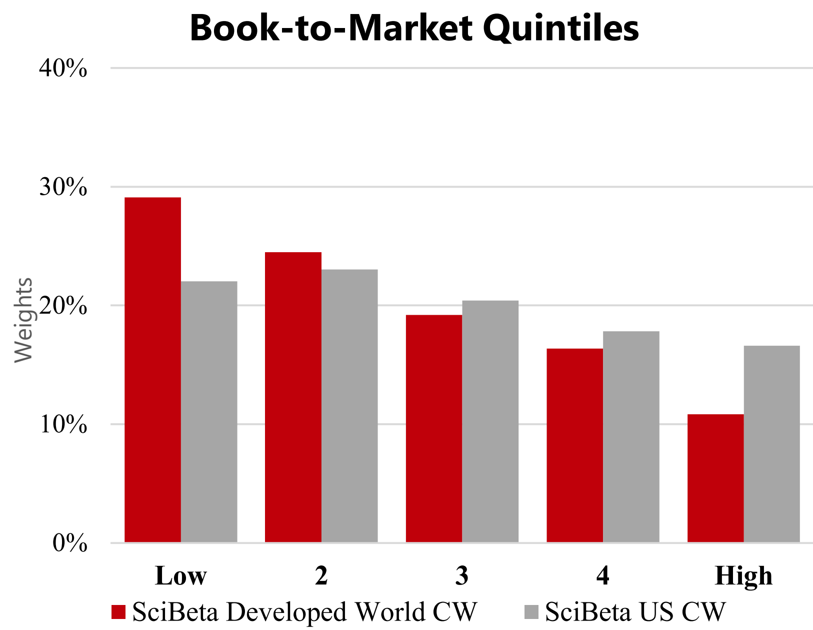
# A Response to the Limitations of Cap-Weighted

*Concentration in few stocks leads to poor risk-adjusted reward for a given factor exposure*




*Dominance of large cap growth stocks lead to "wrong" exposures to systematic factors*



# Key Principles of Investment Philosophy

- Our investment philosophy in the context of multi-factor indices is motivated by a search for robustness at all stages of the index design process and is guided by the following three key principles

Offering exposure to long-term rewarded factors

→

Ensuring a good reward for these factors through diversification of unrewarded (specific) risk

→

Sound risk management through risk control options and factor allocation

# A Consensual Choice of Factor Tilts

- Scientific Beta has constructed long-only indices that tilt towards six main factors, which are rewarded in the long-term.

| Size | Momentum | Volatility | Valuation | Investment | Profitability |
|---|---|---|---|---|---|
| Large-Cap | High Momentum | High Volatility | Value | High Investment | High Profitability |
| Mid-Cap | Low Momentum | Low Volatility | Growth | Low Investment | Low Profitability |
| Free-float adjusted market cap | Cumulative return over the past year omitting the most recent month | Volatility of weekly returns over the past two years | Book-to-market ratio | Growth of total assets over past two years | Past year gross profit/total assets |

# Diversifying Stock and Strategy Specific Risk

Combination of weighting schemes[1]

**Diversified Multi-Strategy**

- **Diversify model-specific risk[2]**
  - Exploit low correlation of parameter estimation errors
  - Diversify across different optimality conditions[3]

Single Diversification Strategies

- Maximum Deconcentration
- Diversified Risk Weighted
- Maximum Decorrelation
- Efficient Max. Sharpe Ratio

- **Diversify stock-specific risk**

1. *Diversified Multi-Strategy indices equal-weight each of the four diversification strategies.*
2. *See Timmermann (2006), Kan and Zhou (2007), Tu and Zhou (2010), Amenc, Goltz, Lodh, Martellini (2012) on benefits of combining portfolio strategies.*
3. *Martellini, Milhau and Tarelli (2013) provide a quantitative analysis of the trade-off between optimality risk and estimation risk.*

# Diversification Matters

- The diversification of specific and unrewarded risks is a core part of the design of all of Scientific Beta's offerings.
- Not only does it reduce their specific volatility but it also improves their long-term risk-adjusted performance in comparison with traditional cap-weighted or non-diversified factor indices.

| **US LTTR (31/12/1974 to 31/12/2019)** | **Broad CW** | **Average of 6 Factor-Tilted CW Indices** | **Average of 6 Factor-Tilted Score-Weighted Indices** | **Average of 6 HFI Diversified Multi-Strategy (4-Strategy) Indices** |
|---|---|---|---|---|
| Annualised Returns | 11.89% | 12.67% | 12.86% | 14.91% |
| Annualised Volatility | 16.75% | 16.54% | 16.38% | 14.77% |
| **Sharpe Ratio** | **0.43** | **0.48** | **0.50** | **0.69** |
| Annualised Relative Returns | - | 0.78% | 0.97% | 3.02% |
| Annualised Tracking Error | - | 3.50% | 3.96% | 5.01% |
| Information Ratio | - | 0.21 | 0.24 | 0.61 |
| Eff. Number of Constituents | 122 | 65 | 65 | 115 |
| **Change in Specific Volatility** | **-** | **-0.46%** | **-0.69%** | **-3.39%** |

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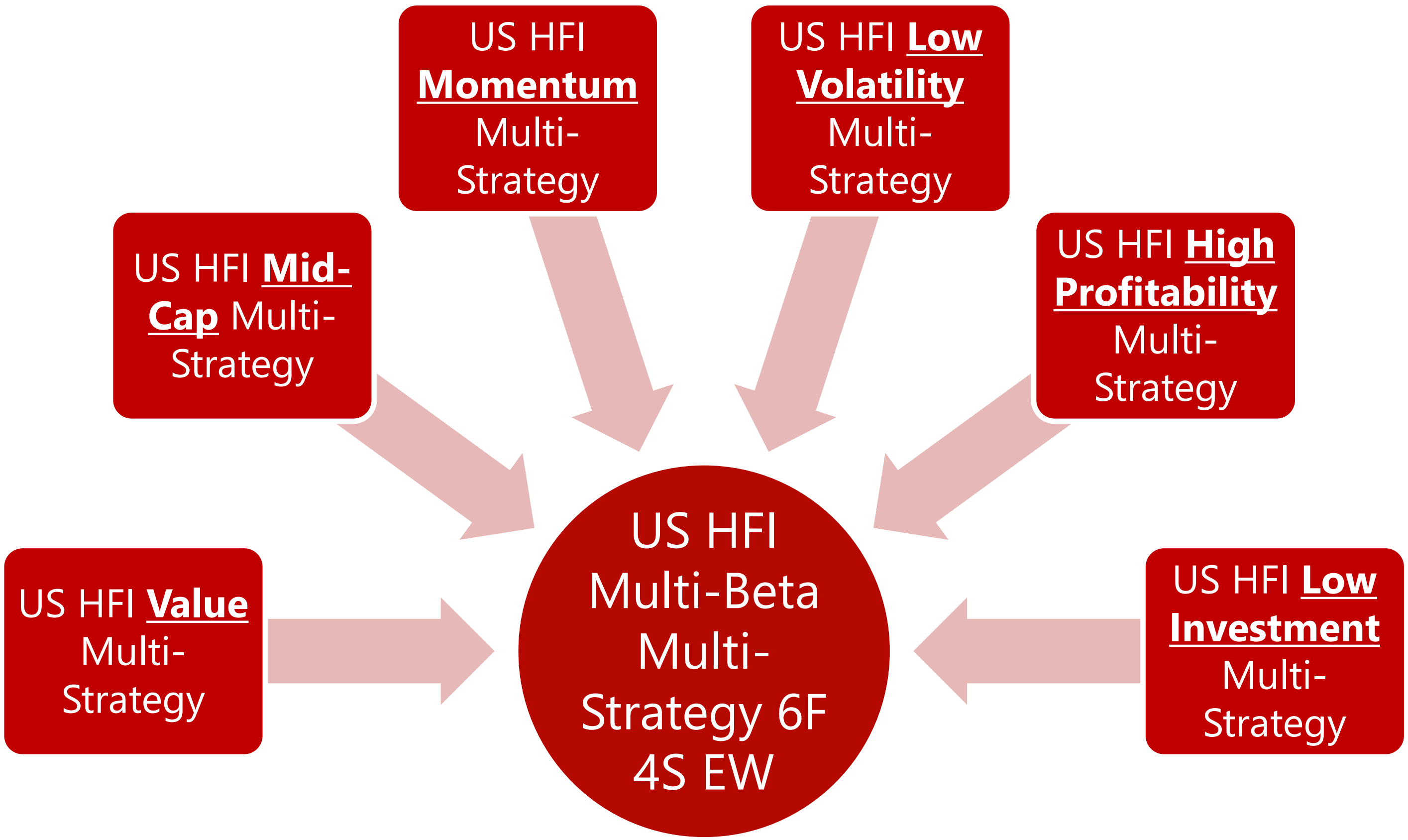
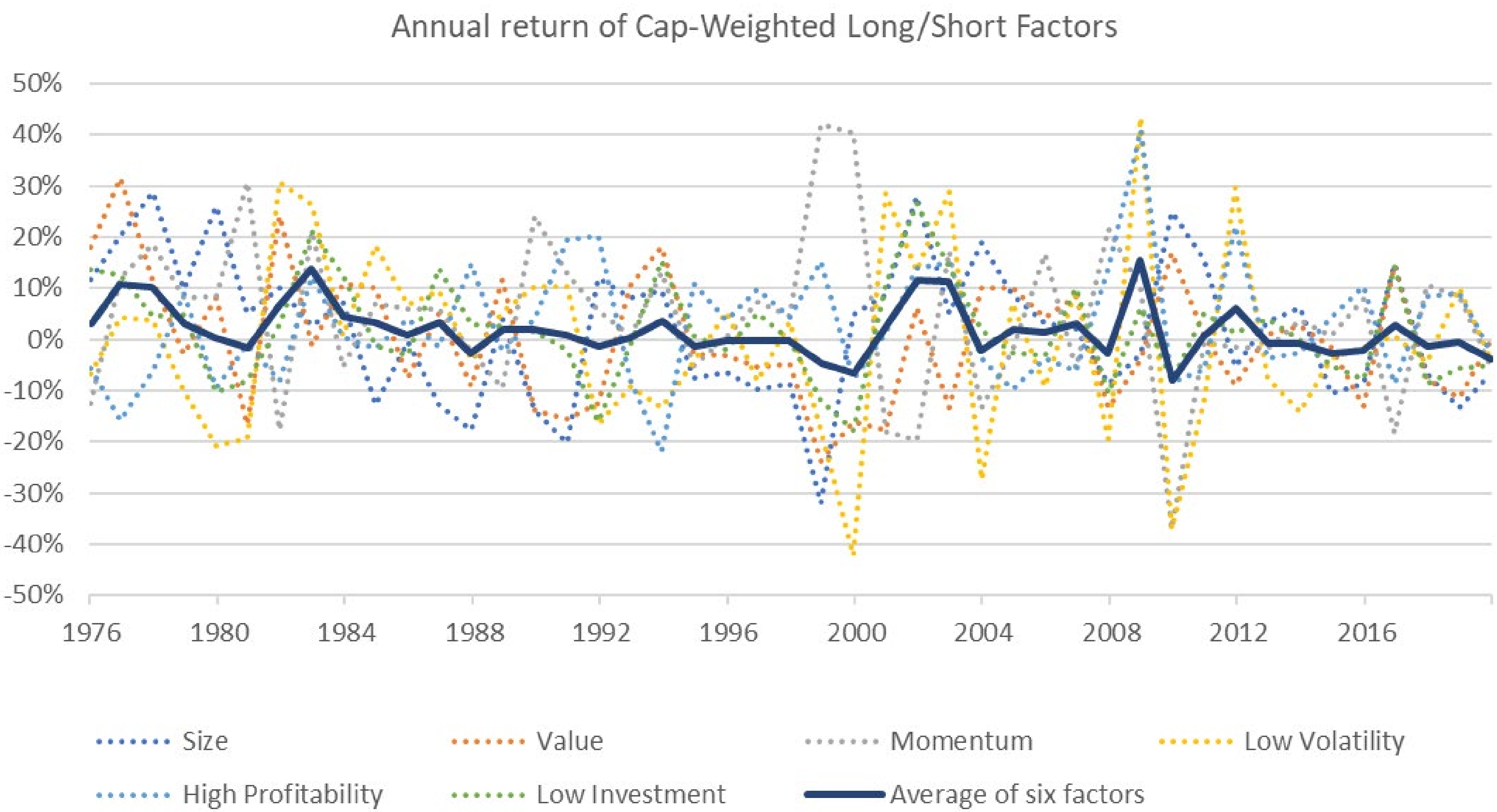
# Multi-Factor Allocation

- Making an equal allocation to the individual smart factor indices is a simple and robust allocation which improves risk-adjusted performance.



# Sound Risk Management

- Using an equally-weighted allocation across risk factors is robust since it avoids estimation error and allows to benefit from their decorrelation.



# Taking the Interaction between Factors into Account

- One of the undesired consequences of decorrelation between factors is interactions between smart factor indices that may be negative. These interactions can impact the factor intensity of the solution.
- Scientific Beta proposes to implement a High Factor Intensity (HFI) filter enabling the factor intensity of the multi-factor assemblies to be conserved.

**HFI** Multi-Factor Filter which reduces the 50%* stock selection to 30%*


*Percentages with respect to the broad index universe.

# Benefits of High Factor Intensity Filter

- The Scientific Beta flagship multi-factor index benefits from the HFI filter and, compared to competitors, exhibits much better factor intensity, factor deconcentration, and factor exposure quality.

| SciBeta USA Last 5 Years (31-Dec-2014 to 31-Dec-2019) | SciBeta USA HFI Divers. MBMS 6F 4S EW | Average of Competitors | Russell 1000 Compre-hensive Factor | JPMorgan Diversified Factor US Equity | MSCI USA Diversified Multi-Factor | MSCI USA Factor Mix | S&P GIVI US | RAFI Multi-Factor U.S. Index | AQR Large Cap Multi-Style Fund | DFA US Core Equity | Robeco US Multi-Factor Equities |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Factor Intensity | 0.73 | 0.47 | 0.76 | 0.44 | 0.57 | 0.22 | 0.35 | 0.55 | 0.42 | 0.41 | 0.47 |
| Factor Deconcentration | 5.14 | 3.31 | 4.22 | 3.00 | 4.03 | 2.70 | 2.97 | 3.70 | 2.74 | 2.64 | 3.80 |
| Factor Exposure Quality | 3.76 | 1.61 | 3.19 | 1.32 | 2.28 | 0.60 | 1.05 | 2.03 | 1.16 | 1.09 | 1.79 |

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# Implicit Risks of Multi-Factor Investing

- Although gaining explicit exposure to priced risk factors is expected to provide good long-term risk-adjusted performance, investing in these very factors also exposes investors to a number of hidden or implicit risks that could be important drivers of short-term performance.
- The three main kinds of implicit risks are:
  – Geographical (and country) Risks
  – Sector Risks
  – Market Beta Bias
- Scientific Beta offers investors an option to control for these implicit risks.
- The choice on managing these risks is a key fiduciary decision that needs to be taken by the investor

# Managing Geographical Risks

- Geographical risks correspond to strong deviations from the weights of economic regions expressed by their market capitalisation.
- Factor investing has been documented to **work best when performed within economically-integrated regions** (Griffin [2002])
- In-line with this academic research Scientific Beta suggests managing these risks on the basis of **respecting the relative market-cap weight of each region**
- This regional approach reconciles smart beta and factor investing and **controls unrewarded geographical risks.**
- In Emerging Market regions where countries are less economically-integrated Scientific Beta offers country-neutral versions of its multi-factor indices which also result in improved conditional performance

# Managing Sector Risks

- Another implicit factor investment risk is the risk of **sector deviation**, which is generally accompanied by fairly **high tracking error with respect to the cap-weighted index** and greater exposure to macroeconomic factors or economic cycles.

- **Scientific Beta offers a sector-neutral risk-control option** for all of its indices.

- This option allows the negative consequences of certain factors' under or overexposure to some sectors to be limited.

- Naturally, this **hedging of the sector risk has an opportunity cost** because the sector and factor dimensions have a fair degree of correlation. This cost translates into lower factor intensity and less of an improvement in the Sharpe ratio.

# Market Beta Bias I

- Most smart beta offerings have a market beta that is uncontrolled and often lower than 1 due to the defensive bias of some factors and weighting schemes.
- This market beta, if left uncontrolled, can lead to significant biases in performance.

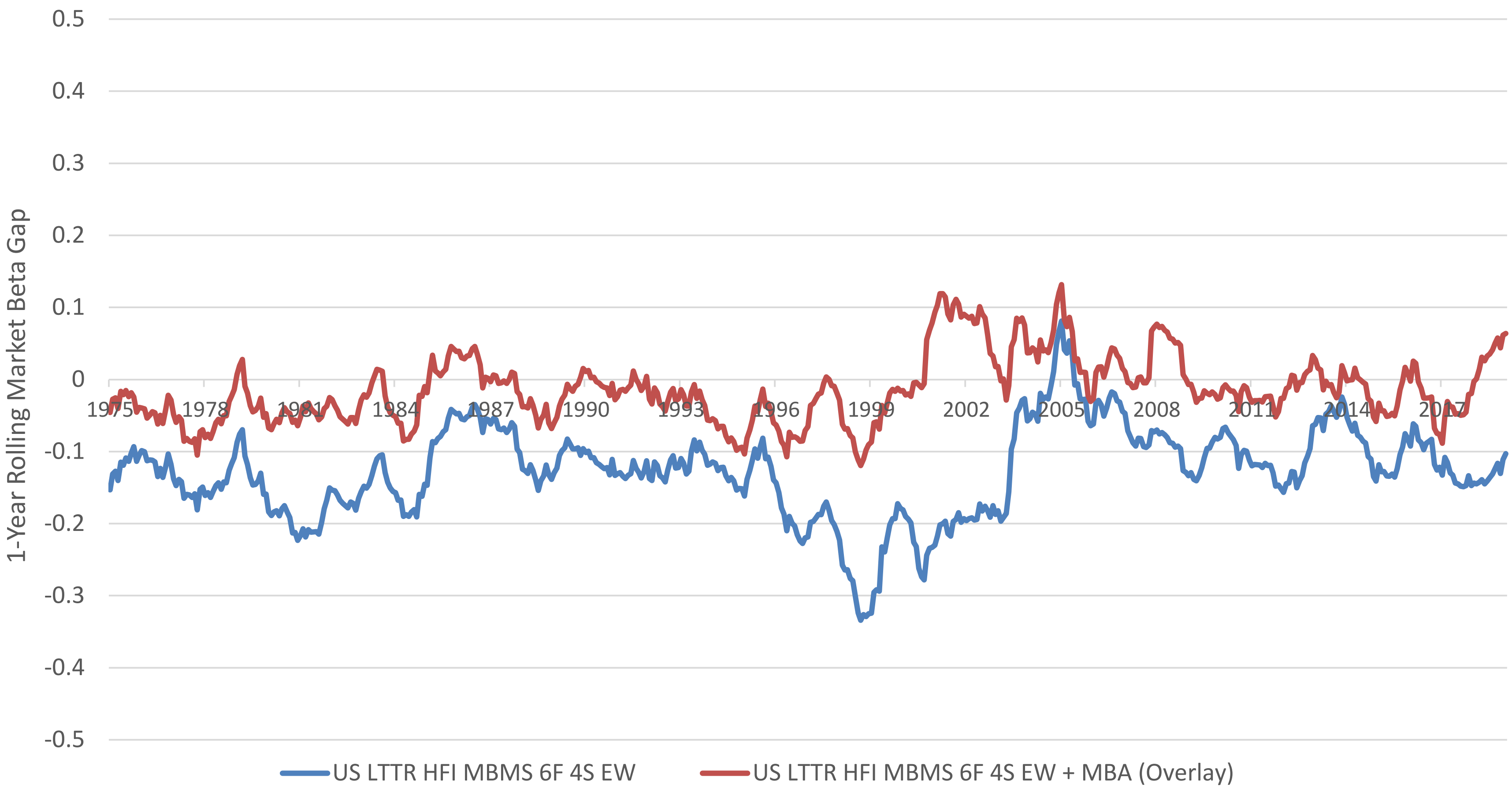
| EDHEC Risk US Long-Term HFI Multi-Beta Multi-Strategy 6F 4S EW Index | | | | | |
|---|---|---|---|---|---|
| **Factor Exposure** | | **Performance Attribution** | | **Volatility Attribution** | |
| Ann. Unexplained | 0.00% | Ann. Unexplained | 0.95% | Idiosyncratic Component | 0.52% |
| **Market Beta** | **0.87** | **Market Factor** | **6.00%** | **Market Factor** | **13.08%** |
| SMB Beta | **0.10** | SMB Factor | 1.37% | SMB Factor | 0.12% |
| HML Beta | **0.13** | HML Factor | 0.12% | HML Factor | 0.12% |
| MOM Beta | **0.07** | MOM Factor | 0.20% | MOM Factor | 0.05% |
| Low Vol Beta | **0.09** | Low Vol Factor | 1.04% | Low Vol Factor | 0.14% |
| High Prof. Beta | **0.10** | High Prof. Factor | 0.06% | High Prof. Factor | 0.04% |
| Low Inv. Beta | **0.09** | Low Inv. Factor | 0.47% | Low Inv. Factor | 0.03% |
| R-squared | 96% | Total Factor | 3.26% | Interaction | 0.32% |
| Factor Intensity | 0.57 | | | | |

# Managing the Market Beta Bias II

- Given the considerable variability in the market beta of factors, Scientific Beta offers a dynamic (quarterly) market beta adjustment option using a robust estimation of the market beta of the Multi-Beta Multi-Strategy 6F EW index.
- This adjustment can be done in two ways:
  - An adjustment that leads to the Scientific Beta MBMS 6F EW index being leveraged to obtain a beta of 1.
  - An adjustment using an overlay made up of a cap-weighted index, with it being possible to replicate this overlay with listed futures. This adjustment is preferred by our clients for its simplicity and security of implementation.
- This adjustment provides full access not only to returns but also to the volatility of the market.

# Managing the Market Beta Bias III

- The MBA option significantly reduces the market beta gap.



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# Summary of Evolution

- There have been three main evolutions since the launch of the Scientific Beta Multi-Beta Multi-Strategy Four-Factor EW indices

- The addition of the two academically consensual Quality factors (March 2016)
  - High Profitability and Low Investment

- The introduction of a Factor Intensity filter to reduce cross-factor interaction effects
  - Standard Factor Intensity filter that removes 20% of the stocks after the primary stock selection (default option)
  - High Factor Intensity filter that removes 40% of the stocks after the primary stock selection

- Risk Control
  - An option to adjust the market beta of the multi-factor offering to one
  - Sector and country risk controls were available as risk control options since inception

# Benefit of Moving from Four to Six Factors

## Lower Probability of Simultaneous Underperformance

- Probabilities of underperformance decrease with longer horizons and more factors
- The probability of 3 out of 4 factors underperforming is the same as 4 out of 6 factors underperforming (15%) over 6 months
- The probability that half the factors underperform simultaneously is 26% for the four-factor strategy compared to 17% for the six-factor strategy.
- Six factors are better than four factors from a factor diversification perspective.

**US Long-Term Track Record L/S Factors (Absolute)**

(31-Dec-1970 to 31-Dec-2017)

| (SMB,HML, MOM, VOL) | Number of underperforming factors is >= | | | |
|---|---|---|---|---|
| | 1 | 2 | 3 | 4 |
| 6 months | 88% | 55% | 15% | 2% |
| 1 year | 84% | 47% | 8% | 1% |
| 3 years | 65% | 26% | 3% | 0% |

| (SMB,HML, MOM, VOL, PRO, INV) | Number of underperforming factors is >= | | | | | |
|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 |
| 6 months | 97% | 78% | 47% | 15% | 4% | 1% |
| 1 year | 97% | 72% | 33% | 10% | 2% | 0% |
| 3 years | 85% | 49% | 17% | 2% | 0% | 0% |

# Benefit of HFI Filter and Quality Factors
## United States (Risk Factor Exposure)

- Explicitly targeting two Quality factors and implementing the HFI filter increases factor intensity significantly (from 0.33 to 0.65).
- Effective number of factors (diversification) increases from 2.38 to over 5.

| 31-Dec-2004 to 31-Dec-2019 (15 years) | Scientific Beta USA Multi-Beta Multi-Strategy (Risk Factor Exposure) | | | | |
|---|---|---|---|---|---|
| | 4-factor EW | HFI 6-factor EW | HFI 6-factor EW (sector-neutral) | HFI 6-factor EW MBA overlay | HFI 6-factor (sector-neutral) MBA overlay |
| Unexplained | 0.80% | 1.18% | 1.72% | 1.29% | 1.49% |
| Market | 0.95 | 0.89 | 0.93 | 1.03 | 1.05 |
| Size | 0.16 | 0.11 | 0.10 | 0.12 | 0.12 |
| Value | 0.03 | 0.11 | 0.14 | 0.10 | 0.12 |
| Momentum | 0.10 | 0.11 | 0.11 | 0.11 | 0.10 |
| Volatility | 0.09 | 0.11 | 0.03 | 0.11 | 0.02 |
| Profitability | -0.04 | 0.11 | 0.13 | 0.12 | 0.13 |
| Investment | 0.00 | 0.09 | 0.08 | 0.09 | 0.08 |
| **Factor Intensity** | **0.33** | **0.65** | **0.57** | **0.64** | **0.56** |
| **Factor De-concentration** | 2.38 | 5.98 | 5.24 | 5.95 | 5.12 |
| Factor Exposure Quality | 0.78 | 3.89 | 3.01 | 3.84 | 2.89 |

# Benefit of HFI Filter and Quality Factors

## United States (Factor Attribution)

- Explicitly targeting two Quality factors and implementing the HFI filter improves return attributable to factors (from 0.22% to 1.18%).
- Imposing sector constraints reduces returns attributable to factors.

| 31-Dec-2004 to 31-Dec-2019 (15 years) | Scientific Beta Multi-Beta Multi-Strategy (Factor Attribution) | | | | |
|---|---|---|---|---|---|
| | 4-factor EW | HFI 6-factor EW | HFI 6-factor EW (sector-neutral) | HFI 6-factor EW MBA overlay | HFI 6-factor (sector-neutral) MBA overlay |
| Unexplained | 1.12% | 1.74% | 2.20% | 1.72% | 1.81% |
| Market | 7.29% | 6.88% | 7.17% | 7.94% | 8.09% |
| Size | -0.27% | -0.19% | -0.17% | -0.20% | -0.20% |
| Value | -0.03% | -0.11% | -0.15% | -0.11% | -0.13% |
| Momentum | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% |
| Volatility | 0.70% | 0.91% | 0.21% | 0.85% | 0.14% |
| Profitability | -0.18% | 0.46% | 0.51% | 0.49% | 0.53% |
| Investment | 0.00% | 0.12% | 0.10% | 0.11% | 0.10% |
| **Factor Contribution** | **0.22%** | **1.18%** | **0.49%** | **1.14%** | **0.43%** |

# Comparison of Absolute and Relative Performance
## United States

- Moving from the 4-factor index to the HFI 6-factor index increases Sharpe ratio (from 0.50 to 0.61) and information ratio (from 0.27 to 0.50)
- Market Beta Adjusted indices have the highest return but also higher risk resulting in a lower Sharpe ratio (compared to no adjustment) but higher information ratio
- The strategy with sector control and market beta adjustment has the lowest tracking error

| 31-Dec-2004 to 31-Dec-2019 (USD) | Scientific Beta USA CW | Scientific Beta USA Multi-Beta Multi-Strategy | | | | |
|---|---|---|---|---|---|---|
| | | Four-Factor EW | HFI Six-Factor 4S EW | HFI (Sector Neutral) Six-Factor 4S EW | HFI Six-Factor 4S EW Market Beta Adjusted (Overlay) | HFI (Sector Neutral) Six-Factor 4S EW Market Beta Adjusted (Overlay) |
| Annual Return | 9.12% | 9.95% | 11.11% | 11.19% | 12.12% | 11.66% |
| Volatility | 18.25% | 17.24% | 16.18% | 16.84% | 18.78% | 19.19% |
| Sharpe Ratio | 0.43 | 0.50 | 0.61 | 0.59 | 0.58 | 0.54 |
| Max Drawdown | 54.63% | 51.93% | 47.30% | 48.44% | 53.05% | 54.12% |
| **Relative Return** | **-** | **0.83%** | **1.99%** | **2.06%** | **3.00%** | **2.53%** |
| Tracking-Error | - | 3.13% | 4.01% | 3.37% | 3.32% | 3.12% |
| Information Ratio | - | 0.27 | 0.50 | 0.61 | 0.90 | 0.81 |

# Conditional Return and Robustness
## United States

- The Market Beta Adjusted option reduces the conditional relative spread and increases the probabilities of outperformance over short-time horizons
- Sector-neutrality reduces underperformance in bull market while maintaining positive return in bear markets.
- Sector-neutral option is a good compromise for investors looking to reduce defensive bias without taking on full market exposure

| 31-Dec-2004 to 31-Dec-2019 (USD) | Scientific Beta USA Multi-Beta Multi-Strategy | | | | |
|---|---|---|---|---|---|
| | Four-Factor EW | HFI Six-Factor 4S EW | HFI (Sector Neutral) Six-Factor 4S EW | HFI Six-Factor 4S EW Market Beta Adjusted (Overlay) | HFI (Sector Neutral) Six-Factor 4S EW Market Beta Adjusted (Overlay) |
| Bull Rel. Return | -1.44% | -1.83% | -0.02% | 3.94% | 4.27% |
| Bear Rel. Return | 3.03% | 5.72% | 3.92% | 1.66% | 0.48% |
| **Ab. Rel. Spread** | **4.47%** | **7.55%** | **3.94%** | **2.28%** | **3.79%** |
| 1-year | 54.86% | 65.80% | 71.41% | 81.26% | 85.23% |
| 3-year | 74.64% | 83.25% | 92.98% | 94.90% | 99.84% |
| 5-year | 78.20% | 98.09% | 99.81% | 100.00% | 100.00% |

# Tracking Error Attribution Analysis
## United States

- The sector-neutral option reduces tracking error attributable to market by half compared to the strategy without sector control
- The Market Beta Adjusted option reduces tracking error attributable to the market significantly.

| Tracking Error Attribution | | | | | |
|---|---|---|---|---|---|
| 31-Dec-2004 to 31-Dec-2019 (USD) | Scientific Beta USA Multi-Beta Multi-Strategy | | | | |
| | Four-Factor EW | High-Factor-Intensity 6-Factor 4-Strategy EW | High-Factor-Intensity (Sector Neutral) 6-Factor 4-Strategy EW | High-Factor-Intensity 6-Factor 4-Strategy EW Market Beta Adjusted (Overlay) | High-Factor-Intensity (Sector Neutral) 6-Factor 4-Strategy EW Market Beta Adjusted (Overlay) |
| Idiosyncratic Component | 2.13% | 1.92% | 2.10% | 2.36% | 2.36% |
| **Market** | **0.26%** | **0.88%** | **0.44%** | **0.08%** | **0.24%** |
| Size | 0.49% | 0.20% | 0.20% | 0.26% | 0.26% |
| Value | 0.01% | 0.13% | 0.26% | 0.12% | 0.21% |
| Momentum | 0.32% | 0.38% | 0.40% | 0.38% | 0.32% |
| Volatility | 0.26% | 0.36% | 0.02% | 0.36% | 0.01% |
| Profitability | 0.03% | 0.15% | 0.22% | 0.19% | 0.23% |
| Investment | 0.00% | 0.06% | 0.05% | 0.07% | 0.05% |
| Interaction Component | -0.47% | -0.49% | -0.75% | -0.61% | -0.62% |

# Implementation and Turnover
## United States

- The table below reports the one-off turnover required to transition from the 4-factor index to the 6-factor index with and without risk controls

| 20-Dec-2019 | Scientific Beta US CW | Scientific Beta USA Multi-Beta Multi-Strategy | | | | |
|---|---|---|---|---|---|---|
| | | Four-Factor EW | HFI Six-Factor 4S EW | HFI (Sector Neutral) Six-Factor 4S EW | HFI Six-Factor 4S EW Market Beta Adjusted (Overlay) | HFI (Sector Neutral) Six-Factor 4S EW Market Beta Adjusted (Overlay) |
| Number of Constituents | 500 | 385 | 317 | 328 | 317 | 328 |
| Turnover (transition) | - | - | 24.46% | 32.81% | 24.46% | 32.81% |

# Market Beta Control by Allocation to S&P 600

- High market beta of S&P 600 offsets low market beta of Scientific Beta HFI (Sector-Neutral) Six-Factor EW index

| 31-Dec-2004 to 31-Dec-2019 (USD) | CAPM Market Beta | Allocation | Market Beta Contribution |
|---|---|---|---|
| Russell 3000 | 1.00 | | |
| US Four-Factor EW | 0.92 | | |
| US Six-Factor EW | 0.92 | | |
| US HFI Six-Factor EW | 0.86 | | |
| US HFI (Sector Neutral) Six-Factor EW | 0.91 | 27.60% | 0.2499 |
| US HFI Six-Factor EW Market Beta Adjusted (Overlay) | 1.00 | | |
| US HFI (Sector Neutral) Six-Factor EW Market Beta Adjusted (Overlay) | 1.02 | | |
| S&P 600 | 1.14 | 8.00% | 0.0915 |
| S&P 900 | 0.98 | 64.40% | 0.6316 |
| Total | | 100.00% | 0.9729 |

# Benefit of HFI Filter and Quality Factors
## Developed ex-USA (Risk Factor Exposure)

- Explicitly targeting two Quality factors and implementing the HFI filter increases factor intensity significantly (from 0.53 to 0.89).
- Effective number of factors (diversification) increases from below 5 to over 5.

| 31-Dec-2004 to 31-Dec-2019 (15 years) | Scientific Beta Developed ex-USA Multi-Beta Multi-Strategy (Risk Factor Exposure) | | | | |
|---|---|---|---|---|---|
| | 4-factor EW | HFI 6-factor EW | HFI 6-factor EW (sector-neutral) | HFI 6-factor EW MBA overlay | HFI 6-factor (sector-neutral) MBA overlay |
| Unexplained | -0.13% | 0.49% | 0.41% | 0.64% | 0.57% |
| Market | 0.87 | 0.84 | 0.86 | 0.99 | 0.99 |
| Size | 0.20 | 0.17 | 0.15 | 0.17 | 0.15 |
| Value | 0.02 | 0.11 | 0.10 | 0.10 | 0.09 |
| Momentum | 0.08 | 0.12 | 0.12 | 0.11 | 0.11 |
| Volatility | 0.11 | 0.14 | 0.13 | 0.14 | 0.12 |
| Profitability | 0.05 | 0.20 | 0.13 | 0.21 | 0.14 |
| Investment | 0.07 | 0.15 | 0.10 | 0.16 | 0.10 |
| **Factor Intensity** | **0.53** | **0.89** | **0.74** | **0.87** | **0.72** |
| **Factor De-concentration** | **4.25** | **5.76** | **5.85** | **5.64** | **5.80** |
| Factor Exposure Quality | 2.24 | 5.11 | 4.30 | 4.91 | 4.19 |

# Benefit of HFI Filter and Quality Factors

## Developed ex-USA (Factor Attribution)

- Explicitly targeting two Quality factors and implementing the HFI filter improves returns attributable to factors (from 2.11% to 2.83%).
- Imposing sector-neutrality reduces returns attributable to factors from 2.83% to 2.49%

| 31-Dec-2004 to 31-Dec-2019 (15 years) | Scientific Beta Developed ex-USA Multi-Beta Multi-Strategy (Factor Attribution) | | | | |
|---|---|---|---|---|---|
| | 4-factor EW | HFI 6-factor EW | HFI 6-factor EW (sector-neutral) | HFI 6-factor EW MBA overlay | HFI 6-factor (sector-neutral) MBA overlay |
| Unexplained | 0.24% | 1.05% | 0.90% | 1.02% | 0.91% |
| Market | 3.76% | 3.64% | 3.71% | 4.27% | 4.30% |
| Size | 0.90% | 0.76% | 0.69% | 0.76% | 0.68% |
| Value | -0.01% | -0.04% | -0.04% | -0.04% | -0.03% |
| Momentum | 0.37% | 0.53% | 0.56% | 0.49% | 0.53% |
| Volatility | 0.64% | 0.82% | 0.76% | 0.79% | 0.73% |
| Profitability | 0.16% | 0.68% | 0.46% | 0.71% | 0.49% |
| Investment | 0.04% | 0.09% | 0.06% | 0.09% | 0.06% |
| **Factor Contribution** | **2.11%** | **2.83%** | **2.49%** | **2.80%** | **2.45%** |

# Comparison of Absolute and Relative Performance
## Developed ex-USA

- Moving from the 4-factor index to the HFI 6-factor index increases Sharpe ratio (from 0.41 to 0.52) and information ratio (from 0.54 to 0.85).
- Market Beta Adjusted indices have the highest return but also higher risk resulting in a lower Sharpe ratio (compared to no adjustment)
- The strategy with sector control and market beta adjustment has the lowest tracking error

| 31-Dec-2004 to 31-Dec-2019 (USD) | Scientific Beta US CW | Scientific Beta Developed ex-USA Multi-Beta Multi-Strategy | | | | |
|---|---|---|---|---|---|---|
| | | Four-Factor EW | HFI Six-Factor 4S EW | HFI (Sector Neutral) Six-Factor 4S EW | HFI Six-Factor 4S EW Market Beta Adjusted (Overlay) | HFI (Sector Neutral) Six-Factor 4S EW Market Beta Adjusted (Overlay) |
| Annual Return | 5.69% | 7.42% | 8.85% | 8.43% | 9.41% | 8.98% |
| Volatility | 16.87% | 15.00% | 14.56% | 14.72% | 16.97% | 16.97% |
| Sharpe Ratio | 0.26 | 0.41 | 0.52 | 0.48 | 0.48 | 0.45 |
| Max Drawdown | 59.23% | 55.79% | 52.36% | 52.35% | 58.84% | 58.47% |
| **Relative Return** | **-** | **1.73%** | **3.15%** | **2.74%** | **3.72%** | **3.28%** |
| Tracking-Error | - | 3.17% | 3.71% | 3.41% | 2.63% | 2.39% |
| Information Ratio | - | 0.54 | 0.85 | 0.80 | 1.42 | 1.37 |

# Conditional Return and Robustness
## Developed ex-USA

- The Market Beta Adjusted option reduces the conditional relative spread and increases the probabilities of outperformance over short-time horizons
- Sector-neutrality reduces underperformance in bull market while maintaining positive return in bear markets.
- Sector-neutral option is a good compromise for investors looking to reduce defensive bias without taking on full market exposure

| 31-Dec-2004 to 31-Dec-2019 (USD) | Scientific Beta Developed ex-USA Multi-Beta Multi-Strategy | | | | |
|---|---|---|---|---|---|
| | Four-Factor EW | HFI Six-Factor 4S EW | HFI (Sector Neutral) Six-Factor 4S EW | HFI Six-Factor 4S EW Market Beta Adjusted (Overlay) | HFI (Sector Neutral) Six-Factor 4S EW Market Beta Adjusted (Overlay) |
| Bull Rel. Return | -3.11% | -2.94% | -2.76% | 4.87% | 4.66% |
| Bear Rel. Return | 4.49% | 6.58% | 5.82% | 2.53% | 2.02% |
| **Abs. Rel. Spread** | **7.60%** | **9.51%** | **8.58%** | **2.34%** | **2.64%** |
| 1-year | 72.50% | 78.66% | 74.69% | 83.17% | 82.76% |
| 3-year | 87.24% | 95.85% | 95.37% | 100.00% | 99.84% |
| 5-year | 100.00% | 100.00% | 100.00% | 100.00% | 100.00% |

# Tracking Error Attribution Analysis
## Developed ex-USA

- The sector-neutral option reduces tracking error attributable to market by half compared to the strategy without sector control
- The Market Beta Adjusted option reduces tracking error attributable to the market significantly.

| Tracking Error Attribution | | | | | |
|---|---|---|---|---|---|
| 31-Dec-2004 to 31-Dec-2019 (USD) | Scientific Beta Developed ex-USA Multi-Beta Multi-Strategy | | | | |
| | Four-Factor EW | HFI 6-Factor 4-Strategy EW | HFI (Sector Neutral) 6-Factor 4-Strategy EW | HFI 6-Factor 4-Strategy EW Market Beta Adjusted (Overlay) | HFI (Sector Neutral) 6-Factor 4-Strategy EW Market Beta Adjusted (Overlay) |
| Idiosyncratic Component | 1.15% | 1.08% | 1.05% | 1.32% | 1.26% |
| **Market** | **1.58%** | **1.95%** | **1.72%** | **0.01%** | **0.00%** |
| Size | 0.56% | 0.35% | 0.31% | 0.50% | 0.44% |
| Value | 0.00% | 0.10% | 0.08% | 0.11% | 0.09% |
| Momentum | 0.13% | 0.22% | 0.27% | 0.28% | 0.35% |
| Volatility | 0.22% | 0.31% | 0.30% | 0.42% | 0.39% |
| Profitability | 0.01% | 0.13% | 0.07% | 0.21% | 0.11% |
| Investment | 0.02% | 0.09% | 0.04% | 0.13% | 0.06% |
| Interaction Component | -0.24% | -0.24% | -0.20% | -0.24% | -0.20% |

# Implementation and Turnover

## Developed ex-USA

- The table below reports the one-off turnover required to transition from the 4-factor index to the 6-factor index with and without risk controls

| 20-Dec-2019 | Scientific Beta US CW | Scientific Beta Developed ex-USA Multi-Beta Multi-Strategy | | | | |
|---|---|---|---|---|---|---|
| | | Four-Factor EW | HFI Six-Factor 4S EW | HFI (Sector Neutral) Six-Factor 4S EW | HFI Six-Factor 4S EW Market Beta Adjusted (Overlay) | HFI (Sector Neutral) Six-Factor 4S EW Market Beta Adjusted (Overlay) |
| Number of Constituents | 970 | 776 | 638 | 676 | 638 | 676 |
| Turnover (transition) | - | - | 24.72% | 32.08% | 24.72% | 32.08% |

# Benefit of HFI Filter and Quality Factors
## Emerging Markets (Risk Factor Exposure)

- Explicitly targeting two Quality factors and implementing the HFI filter
  - increases factor intensity significantly (from 0.41 to 0.66)
  - Increase effective number of factors (diversification) from below 2 to 4.
- Imposing country or sector constraints reduces factor intensity

| 31-Dec-2004 to 31-Dec-2019 (15 years) | Scientific Beta Emerging Multi-Beta Multi-Strategy (Risk Factor Exposure) | | | | | |
|---|---|---|---|---|---|---|
| | 4-factor EW | HFI 6-factor EW | HFI 6-factor EW (country-neutral) | HFI 6-factor EW (sector-neutral) | HFI 6-factor EW MBA overlay | HFI 6-factor (sector-neutral) MBA overlay |
| Unexplained | -1.84% | -1.76% | -1.44% | -1.18% | -1.49% | -1.00% |
| Market | 0.79 | 0.79 | 0.84 | 0.81 | 0.95 | 0.97 |
| Size | 0.22 | 0.19 | 0.14 | 0.17 | 0.19 | 0.17 |
| Value | -0.05 | -0.01 | 0.03 | 0.02 | 0.00 | 0.02 |
| Momentum | 0.07 | 0.09 | 0.10 | 0.08 | 0.09 | 0.08 |
| Volatility | 0.15 | 0.17 | 0.08 | 0.14 | 0.17 | 0.14 |
| Profitability | -0.09 | 0.03 | 0.06 | -0.01 | 0.03 | -0.01 |
| Investment | 0.10 | 0.17 | 0.15 | 0.17 | 0.17 | 0.17 |
| **Factor Intensity** | **0.41** | **0.66** | **0.55** | **0.57** | **0.65** | **0.56** |
| **Factor De-concentration** | **1.71** | **4.01** | **4.89** | **3.78** | **4.11** | **3.84** |
| Factor Exposure Quality | 0.70 | 2.63 | 2.71 | 2.14 | 2.68 | 2.16 |

# Benefit of HFI Filter and Quality Factors

## Emerging Markets (Factor Attribution)

- Explicitly targeting two Quality factors and implementing the HFI filter improves returns attributable to factors from 4.08% to 5.10%.
- Imposing country or sector constraints reduces returns

| 31-Dec-2004 to 31-Dec-2019 (15 years) | Scientific Beta Emerging Multi-Beta Multi-Strategy (Factor Attribution) | | | | | |
|---|---|---|---|---|---|---|
| | 4-factor EW | HFI 6-factor EW | HFI 6-factor EW (country-neutral) | HFI 6-factor EW (sector-neutral) | HFI 6-factor EW MBA overlay | HFI 6-factor (sector-neutral) MBA overlay |
| Unexplained | -1.43% | -1.18% | -0.95% | -0.63% | -1.13% | -0.70% |
| Market | 5.05% | 5.03% | 5.36% | 5.20% | 6.09% | 6.23% |
| Size | 2.48% | 2.15% | 1.57% | 1.90% | 2.10% | 1.85% |
| Value | 0.02% | 0.00% | -0.01% | -0.01% | 0.00% | -0.01% |
| Momentum | 0.56% | 0.68% | 0.79% | 0.59% | 0.68% | 0.61% |
| Volatility | 1.04% | 1.22% | 0.54% | 1.00% | 1.21% | 0.98% |
| Profitability | -0.53% | 0.19% | 0.34% | -0.06% | 0.19% | -0.07% |
| Investment | 0.51% | 0.86% | 0.73% | 0.84% | 0.84% | 0.83% |
| **Factor Contribution** | **4.08%** | **5.10%** | **3.97%** | **4.27%** | **5.02%** | **4.19%** |

# Comparison of Absolute and Relative Performance
## Emerging Markets

- Moving from the 4-factor index to the HFI 6-factor index increases Sharpe ratio (from 0.50 to 0.58) and information ratio (from 0.22 to 0.45).
- Market Beta Adjusted indices have the highest return but also higher risk resulting in a lower Sharpe ratio (compared to no adjustment)
- Country neutrality reduces tracking error more than sector-neutrality
- Sector control and market beta adjustment has the lowest tracking error

| 31-Dec-2004 to 31-Dec-2019 (USD) | Scientific Beta Emerging CW | Scientific Beta Emerging Multi-Beta Multi-Strategy | | | | | |
|---|---|---|---|---|---|---|---|
| | | 4-Factor EW | HFI 6-Factor 4S EW | HFI (Country Neutral) 6-Factor 4S EW | HFI (Sector Neutral) 6-Factor 4S EW | HFI 6-Factor 4S EW Market Beta Adjusted (Overlay) | HFI (Sector Neutral) 6-Factor 4S EW Market Beta Adjusted (Overlay) |
| Annual Return | 7.79% | 9.02% | 10.28% | 9.70% | 10.16% | 11.30% | 11.04% |
| Volatility | 19.02% | 15.36% | 15.33% | 16.31% | 15.75% | 18.37% | 18.71% |
| Sharpe Ratio | 0.34 | 0.50 | 0.58 | 0.51 | 0.56 | 0.54 | 0.52 |
| Max Drawdown | 64.28% | 57.80% | 56.32% | 59.51% | 58.40% | 62.87% | 64.75% |
| **Relative Return** | **-** | **1.23%** | **2.49%** | **1.91%** | **2.37%** | **3.52%** | **3.25%** |
| Tracking-Error | - | 5.51% | 5.48% | 4.28% | 5.08% | 3.74% | 3.56% |
| Information Ratio | - | 0.22 | 0.45 | 0.45 | 0.47 | 0.94 | 0.91 |

# Conditional Return and Robustness
## Emerging Markets

- The Market Beta Adjusted option reduces the conditional relative spread and increases the probabilities of outperformance over short-time horizons
- Country-neutrality and sector-neutrality reduce underperformance in bull market while maintaining positive return in bear markets.
- Country-neutral option is a good compromise for investors looking to reduce defensive bias without taking on full market exposure

| 31-Dec-2004 to 31-Dec-2019 (USD) | Scientific Beta Emerging Markets | | | | | |
|---|---|---|---|---|---|---|
| | 4-Factor EW | HFI Six-Factor 4S EW | HFI (Country-Neutral) Six-Factor 4S EW | HFI (Sector Neutral) Six-Factor 4S EW | HFI Six-Factor 4S EW Market Beta Adjusted (Overlay) | HFI (Sector Neutral) Six-Factor 4S EW Market Beta Adjusted (Overlay) |
| Bull Rel. Return | -8.83% | -8.22% | -6.37% | -6.53% | 5.72% | 6.62% |
| Bear Rel. Return | 5.91% | 7.32% | 5.56% | 6.26% | 1.80% | 1.07% |
| **Abs. Rel. Spread** | **14.74%** | **15.54%** | **11.93%** | **12.79%** | **3.92%** | **5.55%** |
| 1-year | 59.10% | 62.52% | 65.66% | 62.38% | 71.41% | 66.62% |
| 3-year | 68.58% | 73.68% | 74.00% | 70.97% | 72.89% | 70.02% |
| 5-year | 73.61% | 77.44% | 76.67% | 78.97% | 80.31% | 80.69% |

# Tracking Error Attribution Analysis
## Emerging Markets

- The country-neutral and sector-neutral options reduce tracking error attributable to market.
- The Market Beta Adjusted option reduces tracking error attributable to the market significantly.

| Tracking Error Attribution | | | | | | |
|---|---|---|---|---|---|---|
| 31-Dec-2004 to 31-Dec-2019 (USD) | Scientific Beta Emerging Markets | | | | | |
| | Four-Factor EW | HFI 6-Factor 4-Strategy EW | HFI (Country-Neutral) 6-Factor 4-Strategy EW | HFI (Sector Neutral) 6-Factor 4-Strategy EW | HFI 6-Factor 4-Strategy EW Market Beta Adjusted (Overlay) | HFI (Sector Neutral) 6-Factor 4-Strategy EW Market Beta Adjusted (Overlay) |
| Idiosyncratic Component | 1.37% | 1.33% | 1.66% | 1.41% | 1.82% | 1.92% |
| **Market** | **3.60%** | **3.56%** | **2.51%** | **3.05%** | **0.25%** | **0.08%** |
| Size | 0.93% | 0.68% | 0.45% | 0.59% | 0.96% | 0.81% |
| Value | 0.02% | 0.00% | 0.01% | 0.00% | 0.00% | 0.01% |
| Momentum | 0.06% | 0.09% | 0.15% | 0.08% | 0.14% | 0.12% |
| Volatility | 0.27% | 0.36% | 0.09% | 0.27% | 0.53% | 0.37% |
| Profitability | 0.06% | 0.01% | 0.03% | 0.00% | 0.01% | 0.00% |
| Investment | 0.07% | 0.19% | 0.17% | 0.20% | 0.27% | 0.28% |
| Interaction Component | -0.79% | -0.45% | -0.36% | -0.38% | -0.10% | 0.01% |

# Implementation and Turnover

## Emerging Markets

- The table below reports the one-off turnover required to transition from the 4-factor index to the 6-factor index with and without risk controls

| 20-Dec-2019 | Scientific Beta EM CW | Scientific Beta Emerging Markets | | | | | |
|---|---|---|---|---|---|---|---|
| | | 4-Factor EW | HFI 6-Factor 4S EW | HFI (Country-Neutral) 6-Factor 4S EW | HFI (Sector Neutral) 6-Factor 4S EW | HFI 6-Factor 4S EW Market Beta Adjusted (Overlay) | HFI (Sector Neutral) 6-Factor 4S EW Market Beta Adjusted (Overlay) |
| Number of Constituents | 670 | 527 | 445 | 463 | 479 | 445 | 479 |
| Turnover (transition) | - | - | 23.24% | 27.02% | 32.84% | 23.24% | 32.84% |

# Concluding Remarks

- The addition of the two Quality factors and the introduction of the HFI filter improves factor intensity and factor diversification resulting in improved absolute and relative risk adjusted return with higher tracking error

- Controlling for sector and / or market risk is a fiduciary decision
  - Market Beta Adjustment
    - An investor seeking access to the full equity market risk premium (and accepting full market volatility) should choose the Market Beta Adjustment
  - Sector-Neutrality
    - An investor looking for low tracking error and to control the conditionality of performance relating to sector rotation should consider the sector-neutral option but accept slightly lower long-term return
  - Market Beta Adjustment and Sector-Neutrality
    - An investor looking to benefit fully from the returns of equities, maximise probability of outperformance and deliver excellent relative returns with factors should consider the combination of sector-neutrality and market beta adjustment provided the investor can use futures.

# Table of Contents / Agenda

# Conclusion

- Due to its academic origins, ERI Scientific Beta attaches great importance to the risk-adjusted robustness of the indices that it constructs. This robustness is based on five good practices:

1) The search for broad academic consensus on the choice of factors and their definition.
2) Concern for parsimony to reduce the degree of freedom and therefore the risk of model mining.
3) Consistency in the index construction methods
    - protection against the risks of model mining,
    - good representation of future performance.
4) Good diversification of unrewarded risks
5) The capacity to respect the governance of investment risks through risk controls

# Disclaimer

# Follow us on:

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# Risk Management

Zachary Hanna, CFA
Deputy Chief Investment Officer

Shane Carson, CAIA, CFA
State Investment Officer

# Key Board Decisions

## Determine Investment Objective

- Fund's Purpose
- Governance – who makes which decisions?

## Determine Asset Allocation

- Strategic
- Tactical

## Oversee Implementation

- Manager Structure – number and types of manager allocations.
- Manager Selection

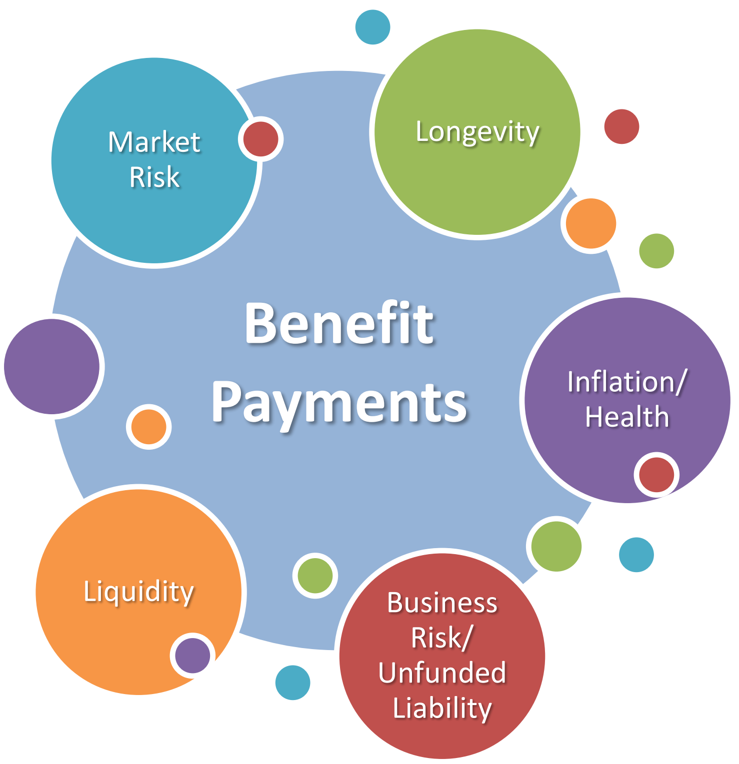
## Monitor Results

- Are the fund, asset classes and mandates performing as expected?
- Are they achieving objectives?

# What Does Risk Mean to a Retirement System?

What does Risk mean to the ARMB?

- At its most comprehensive, risk is anything that could impact the objectives of the retirement systems.
- The defined benefit systems' primary objective is to pay all benefits when they are due.
- Risk encompasses both assets and liabilities.
- Defined benefit systems are designed to be able to take risks – pooling market, longevity, and other risks across time and a broad pool of participants.
- Setting and monitoring investment risks is one of the primary roles of the ARMB.



# ARMB Risk Management

Risks should be understood, managed, and monitored:

- Understand the potential implications of risks that are expected to be compensated and set those risks at appropriate levels
- Reduce and manage uncompensated risk
- Understand the implications of risks that cannot be managed
- Monitor risks for potential control points and action
- Prioritize attention towards those risks that have the highest impact and likelihood

**Identify and Analyze**
- Capital market expectations
- Market data
- Economic outlook
- **Actuarial data**
- **Peer information**
- Consultant, manager, **staff analysis**

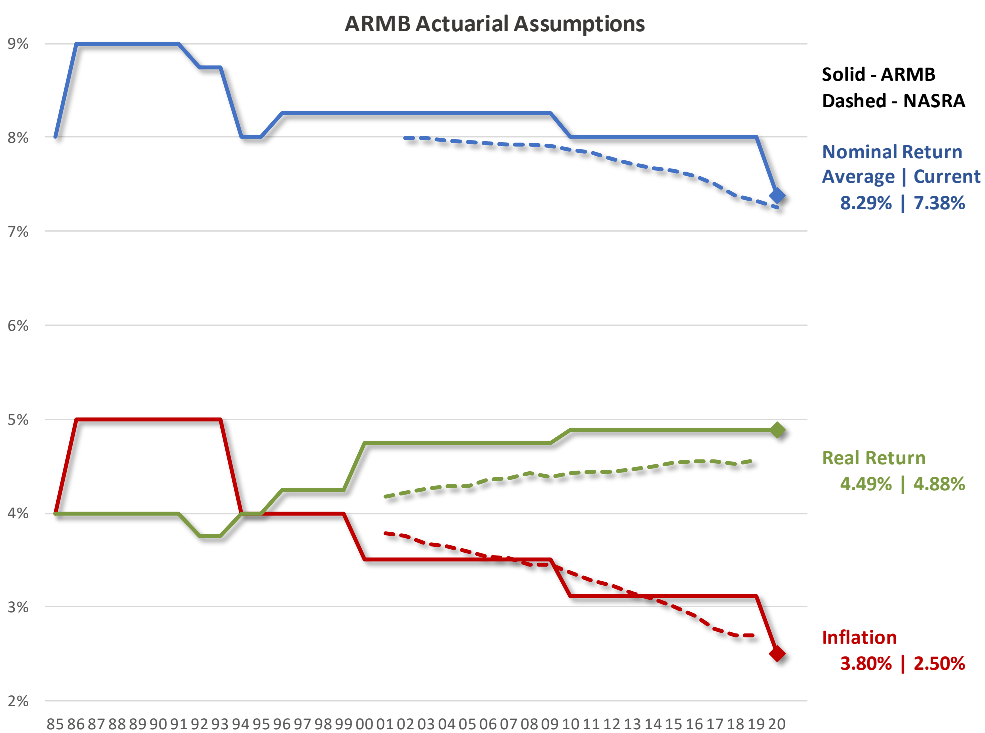
**Take Action**
- Set actuarial assumptions
- **Set asset allocation**
- Set investment policies with risk guidelines and benchmarks
- Guide portfolio construction

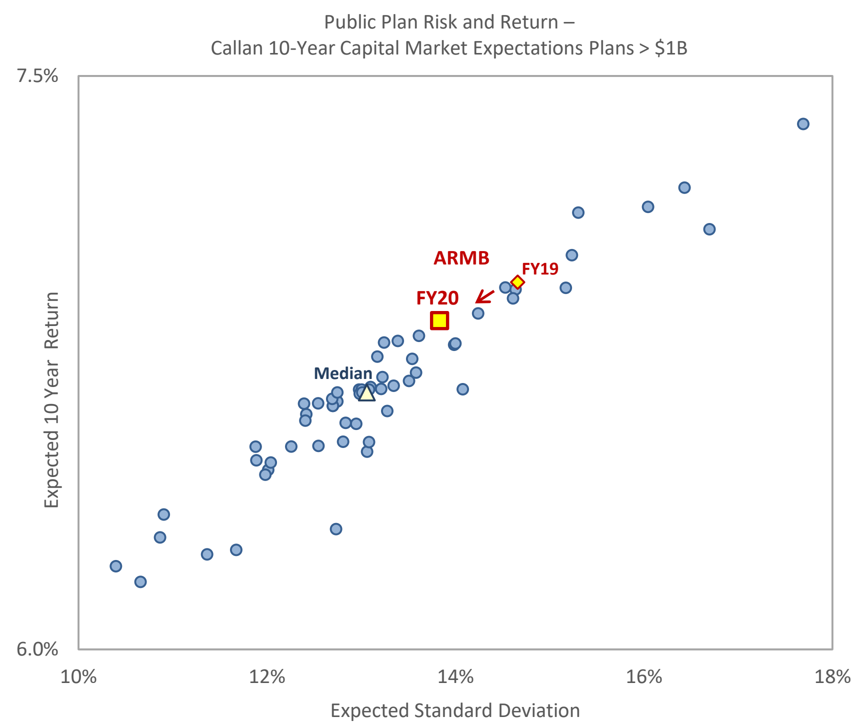

**Control**
- **Rebalancing**
- Manager structure
- Contingency plans
- Hedging?

**Monitor**
- Investment performance reports
- Accounting reports
- R&B reports
- Periodic returns (daily+)
- Internal controls
- Compliance monitoring
- **Risk reports (truView)**

# ARMB Asset Allocation and Risk Profile

- Asset allocation is the largest determinant of risk in the ARMB's portfolio.
- The ARMB's July 2019 asset allocation is consistent with meeting the long-term actuarial target of a 4.88% real return taking into account the funds' time horizon and other factors.
- Overall, the most material change was increasing the allocation to fixed income from 11% to 24%.
- The new asset allocation decreased the level of portfolio risk and increased the level of liquidity.
- The ARMB's actuarial assumptions and asset allocation are in sync and closer to other public plans.



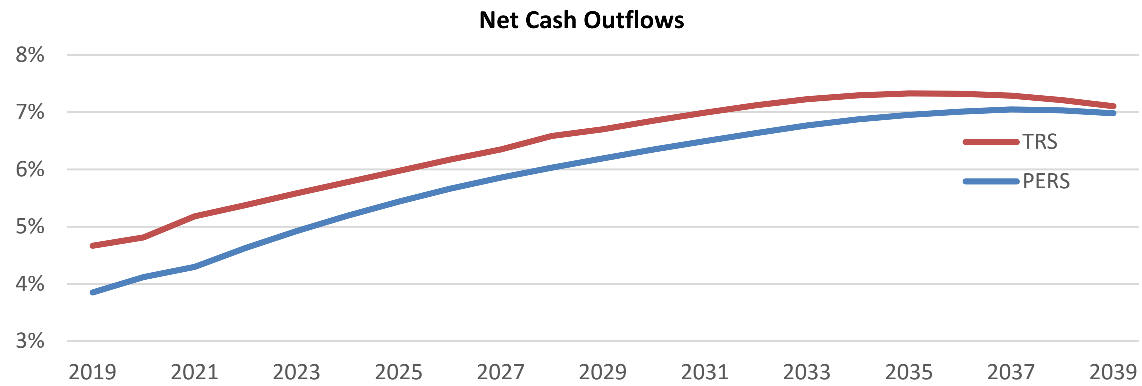
# Liquidity – ARMB Cashflow Characteristics

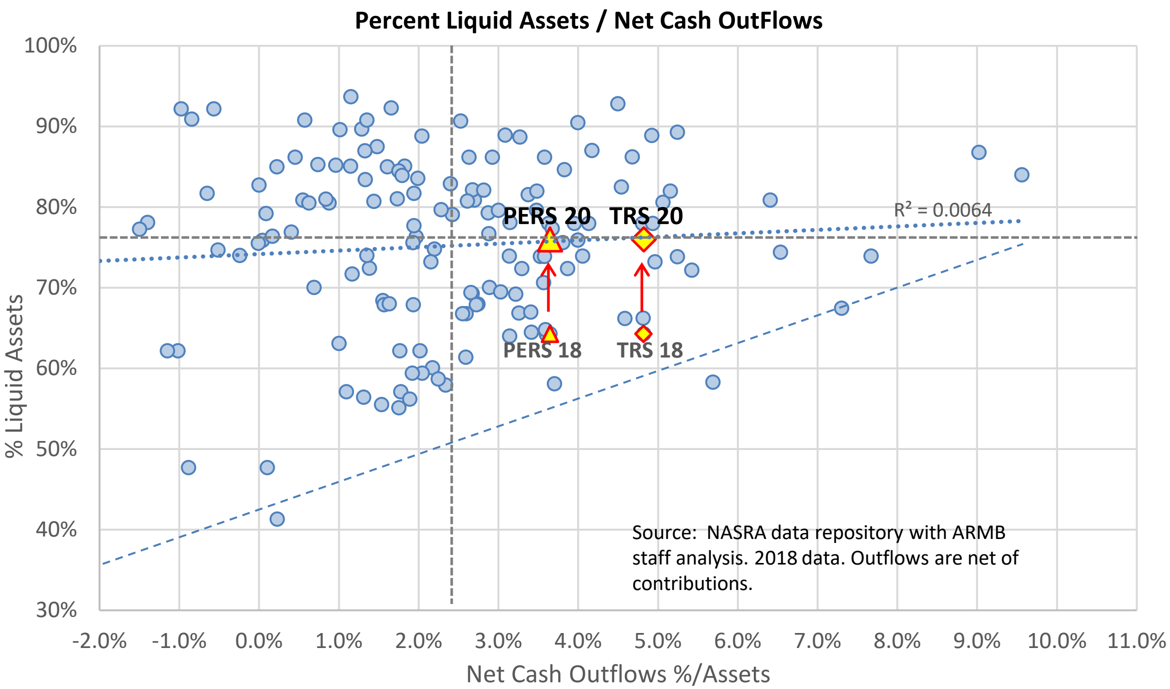
- Since the ARMB plans are closed and mature, net cash outflows will increase over time.

- Liquidity plays two important roles:
  - Meeting fund outflows
  - Maintaining the ARMB's risk posture through rebalancing

- The FY20 asset allocation results in a higher proportion of liquid assets to net cash outflows. The plans are now at the median when compared with other public plans, although there is very high dispersion.

- The current level of liquid assets should be sufficient for long-term plan liquidity needs.



# Risk Monitoring Tool: truView

- The ARMB is using truView for portfolio risk analytics. truView is State Street Global Exchange's risk measurement platform.

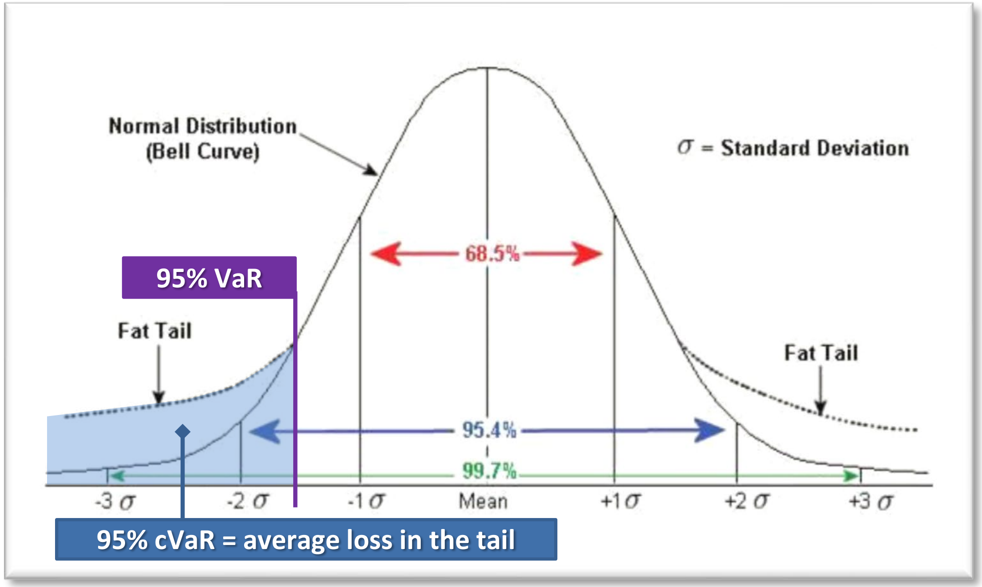
- truView analytics are run every six months and the current results are as of December 31, 2019.

- We use truView to help answer the following questions:

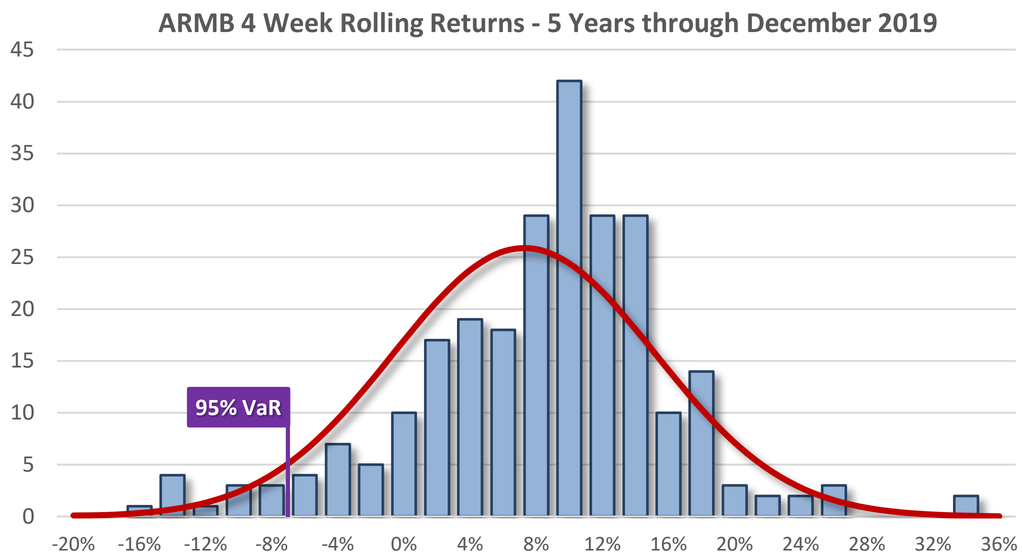
  - Is the portfolio risk positioned according to the ARMB's asset allocation?
  - What is the probability and magnitude of potential losses?
  - Is the ARMB taking more or less risk than the strategic benchmark by asset class?
  - Are specific investment mandates or managers adding to or reducing risk?
  - Does the ARMB have unexpected risk exposures or concentration?
  - How would the ARMB's current portfolio perform in historic market events or scenarios?

# What is Value-at-Risk?

- Value-at-risk (VaR)
  - A commonly used measure of potential loss.
  - VaR is the maximum expected loss with a specific frequency over a given time horizon, e.g. the ARMB's 95% VaR is 7.3%.
  - VaR can be estimated parametrically using the mean and standard deviation, but this ignores fat tails (kurtosis, skewness).
  - VaR also can be estimated using historic market information, which includes past fat tails – this is the approach truView takes.



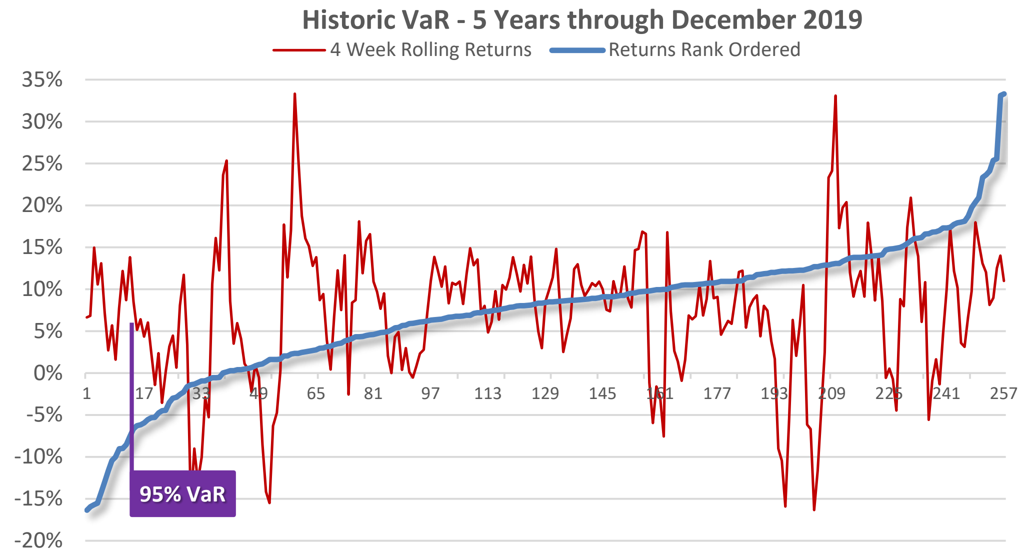

- Expected shortfall (conditional VaR or cVaR) is the average loss contained in the left tail.

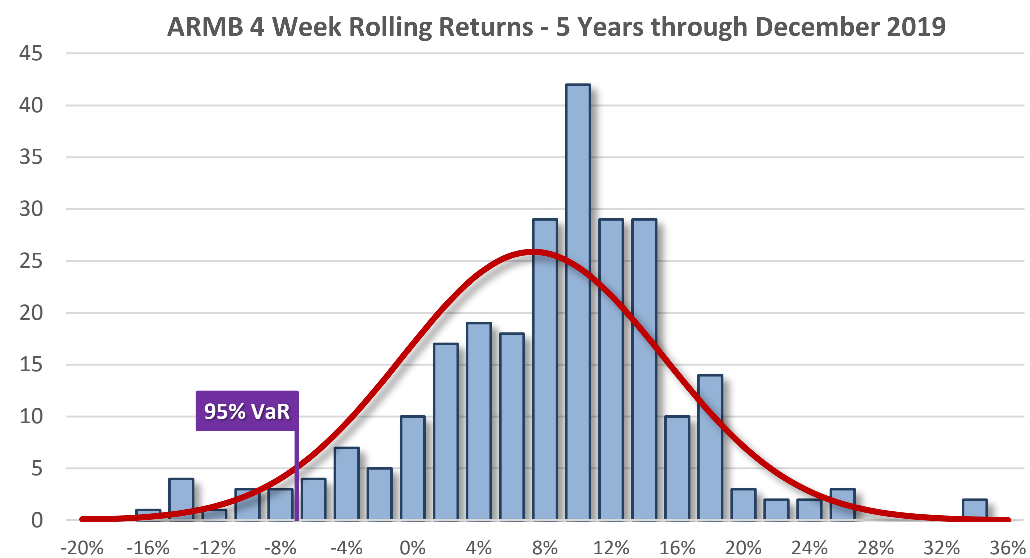



- Why are VaR and cVaR important?
  - They quantify the risk of loss for the portfolio.
  - VaR differences between historical and parametric provide insight into fat tails.

# VaR and Expected Shortfall

- Overall the historic VaR measured by truView was 7.3% and the expected shortfall (cVaR) was 11.9%. Volatility increased, but was still historically low.
- truView calculated the expected shortfall to be 1.3 times what it would have been if returns were normally distributed, which provides a useful sense of the magnitude of the fat tail.
- The ARMB's current capital market assumptions result in a parametric VaR of 14.8% and an expected shortfall of 21%.



# Asset Allocations

- No significant deviations from target allocations as of 12/31/2019.
- The underweight in Opportunistic is due to an allocation to an unfilled mandate and results in an overweight to equities.

**Asset Allocation Relative to Policy Benchmark**

| | Market Value (Millions) | Allocation (%) | Policy Benchmark (%) | Relative (%) |
|---|---|---|---|---|
| Broad Domestic Equity | 7,318 | 26.5% | 26.0% | 0.5% |
| Global Equity Ex-US | 5,330 | 19.3% | 18.0% | 1.3% |
| Real Assets | 3,710 | 13.4% | 13.0% | 0.4% |
| Broad Fixed Income | 6,520 | 23.6% | 24.0% | -0.4% |
| Private Equity | 3,045 | 11.0% | 11.0% | 0.0% |
| Opportunistic | 1,729 | 6.3% | 8.0% | -1.7% |
| **TOTAL** | **27,653** | **100.0%** | **100.0%** | **0.0%** |

- Total portfolio volatility is dominated by public equities at 68%.
- Public and private equities contribute 83% of total volatility.
- The low volatility environment of the past five years resulted in a measured volatility of 7.8% compared with the 13.8% forward expectation.

**Volatility Decomposition**

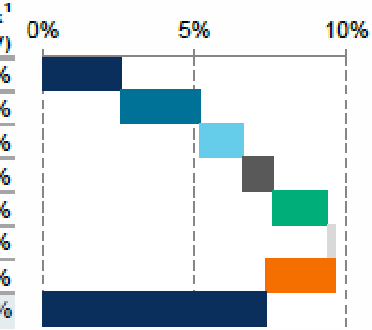
| | Market Value (Millions) | Allocation (%) | Volatility[1] (% per annum) | Volatility Contribution (% of Total Vol) |
|---|---|---|---|---|
| Broad Domestic Equity | 7,318 | 26.5% | 12.0% | 39.1% |
| Global Equity Ex-US | 5,330 | 19.3% | 12.3% | 28.9% |
| Real Assets | 3,710 | 13.4% | 9.3% | 10.7% |
| Broad Fixed Income | 6,520 | 23.6% | 2.9% | 1.1% |
| Private Equity | 3,045 | 11.0% | 11.6% | 15.9% |
| Opportunistic | 1,729 | 6.3% | 5.5% | 4.3% |
| **TOTAL** | **27,653** | **100.0%** | **7.8%** | **100.0%** |

# Asset Class Risk & Diversification

- The value-at-risk of 7.3% decreased from 6/30 primarily due to asset allocation changes.
- Public equities contributed 49.5% of the VaR for 12/31, down from 57%.
- The VaR contribution from Fixed Income increased in isolation due to the transition to an Aggregate portfolio and the addition of the Alternative Fixed Income mandates.
- Overall, asset class diversification benefit increased slightly from 2.0% to 2.3% due to the increased size of fixed income.

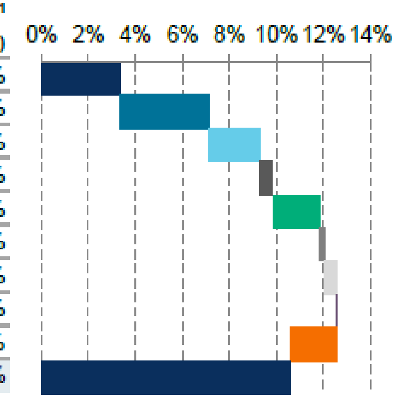
**Asset Class Risk & Diversification 12/31/2019**

| | Allocation (%) | Value-at-Risk[1] Contribution (% of Total VaR) | Value-at-Risk[1] (% of Total MV) |
|---|---|---|---|
| Broad Domestic Equity | 26.5% | 20.3% | 2.6% |
| Global Equity Ex-US | 19.3% | 29.2% | 2.6% |
| Real Assets | 13.4% | 21.0% | 1.5% |
| Broad Fixed Income | 23.6% | 7.1% | 1.0% |
| Private Equity | 11.0% | 19.9% | 1.8% |
| Opportunistic | 6.3% | 2.5% | 0.2% |
| Diversification Benefit | - | - | -2.3% |
| TOTAL | 100.0% | 100.0% | 7.3% |




**Asset Class Risk & Diversification 6/30/2019**

| | Allocation (%) | Value-at-Risk[1] Contribution (% of Total VaR) | Value-at-Risk[1] (% of Total MV) |
|---|---|---|---|
| Broad Domestic Equity | 23.3% | 23.6% | 3.3% |
| Global Equity Ex-US | 21.8% | 33.7% | 3.8% |
| Real Assets | 16.4% | 22.9% | 2.2% |
| Broad Fixed Income | 10.7% | -1.0% | 0.5% |
| Private Equity | 10.5% | 16.3% | 2.0% |
| Absolute Return | 5.7% | 1.3% | 0.2% |
| Opportunistic | 9.7% | 3.3% | 0.5% |
| Cash | 1.9% | 0.0% | 0.0% |
| Diversification Benefit | - | - | -2.0% |
| TOTAL | 100.0% | 100.0% | 10.6% |



# Equity Beta

- Equity Betas are within expectations for 12/31/2019.
- Small capitalization domestic stocks and emerging market stocks had higher betas to broader markets.
- ARMB's domestic and Global ex-US portfolios should closely parallel the respective benchmarks.

**Sub Asset Class Beta Analysis 12/31/2019**

| Asset Class / [Benchmark] | Market Value (Millions) | Allocation (%) | Beta[1] 1Y to the Benchmark | Beta[1] 5Y to the Benchmark |
|---|---|---|---|---|
| **Broad Domestic Equity / [Russell 3000]** | **7,318** | **57.9%** | **0.98** | **0.98** |
| Large Cap Pool (AYQK) | 6,728 | 53.2% | 0.96 | 0.96 |
| Small Cap Pool (AYQC) | 590 | 4.7% | 1.20 | 1.20 |
| **Global Equity Ex-Us / [MSCI ACWI Ex US IMI]** | **5,330** | **42.1%** | **1.02** | **0.94** |
| Emerging Markets Pool (AYSC) | 938 | 7.4% | 1.20 | 1.17 |
| IE Large Cap Pool (AYRC) | 4,393 | 34.7% | 0.98 | 0.89 |
| IE Small Cap Pool (AYRK) | - | 0.0% | 0.00 | 0.00 |
| **TOTAL Equity / [MSCI ACWI]** | **12,648** | **100.0%** | **1.03** | **0.99** |

# Equity VaR

- Equity Value at Risk decreased from 6/30/2019.
- Higher-risk domestic micro cap and international small cap mandates were terminated and allocations to lower-risk equity factor strategies were increased.
- Overall, the equity portfolio VaR is lower than the benchmark. However, the methodology truView uses may understate expected risk for market-cap weighted portfolios. The benchmark risk may be a better indication of equity portfolio risk as a result.

**Sub Asset Class Value at Risk Analysis 12/31/2019**

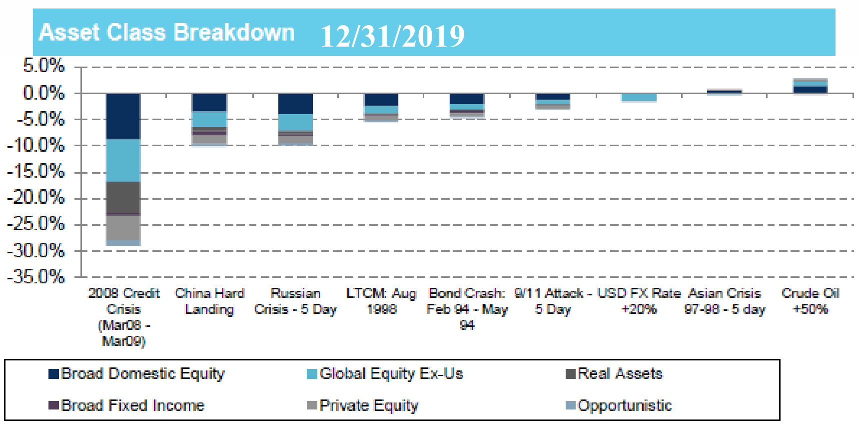
| Asset Class / [Benchmark] | Market Value (Millions) | Allocation (%) | Value-at-Risk of the Portfolio (% of Market Value[1]) | Value-at-Risk of the Benchmark (% of Market Value[1]) |
|---|---|---|---|---|
| **Broad Domestic Equity / [Russell 3000]** | **7,318** | **57.9%** | **9.87%** | **14.64%** |
| Large Cap Pool (AYQK) | 6,728 | 53.2% | 9.58% | - |
| Small Cap Pool (AYQC) | 590 | 4.7% | 15.41% | - |
| **Global Equity Ex-Us / [MSCI ACWI Ex US IMI]** | **5,330** | **42.1%** | **13.23%** | **16.74%** |
| Emerging Markets Pool (AYSC) | 938 | 7.4% | 22.49% | - |
| IE Large Cap Pool (AYRC) | 4,393 | 34.7% | 13.49% | - |
| IE Small Cap Pool (AYRK) | - | 0.0% | 0.00% | - |
| **TOTAL** | **12,648** | **100.0%** | **11.00%** | **15.38%** |

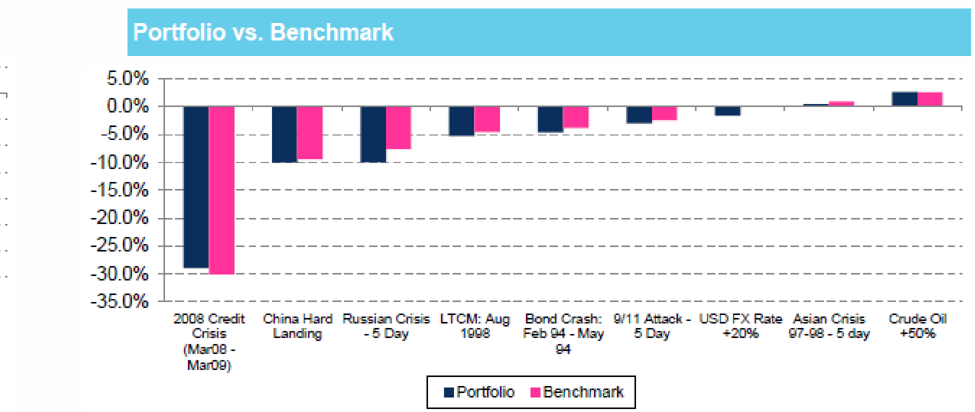
**Sub Asset Class Value at Risk Analysis 6/30/2019**

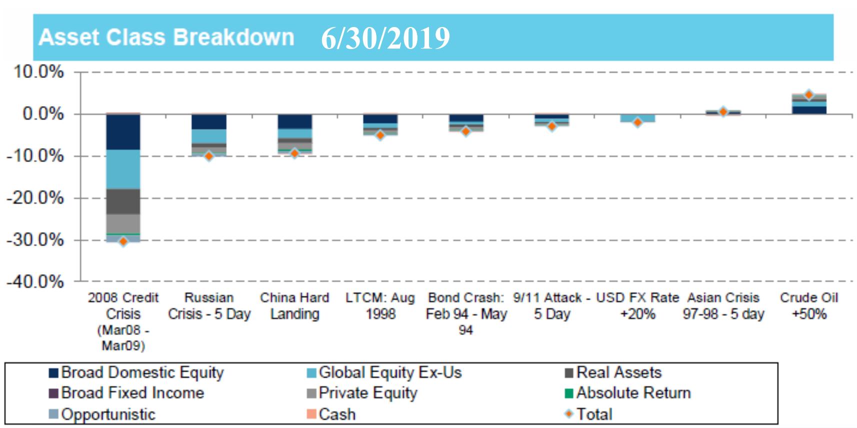
| Asset Class / [Benchmark] | Market Value (Millions) | Allocation (%) | Value-at-Risk of the Portfolio (% of Market Value[1]) | Value-at-Risk of the Benchmark (% of Market Value[1]) |
|---|---|---|---|---|
| **Broad Domestic Equity / [Russell 3000]** | **6,254** | **51.7%** | **14.28%** | **16.11%** |
| Large Cap Pool (AYQK) | 5,420 | 44.8% | 13.71% | - |
| Small Cap Pool (AYQC) | 834 | 6.9% | 15.58% | - |
| **Global Equity Ex-Us / [MSCI ACWI Ex US IMI]** | **5,840** | **48.3%** | **17.24%** | **20.27%** |
| Emerging Markets Pool (AYSC) | 964 | 8.0% | 19.13% | - |
| IE Large Cap Pool (AYRC) | 4,498 | 37.2% | 18.08% | - |
| IE Small Cap Pool (AYRK) | 377 | 3.1% | 14.99% | - |
| **TOTAL** | **12,094** | **100.0%** | **16.25%** | **17.51%** |

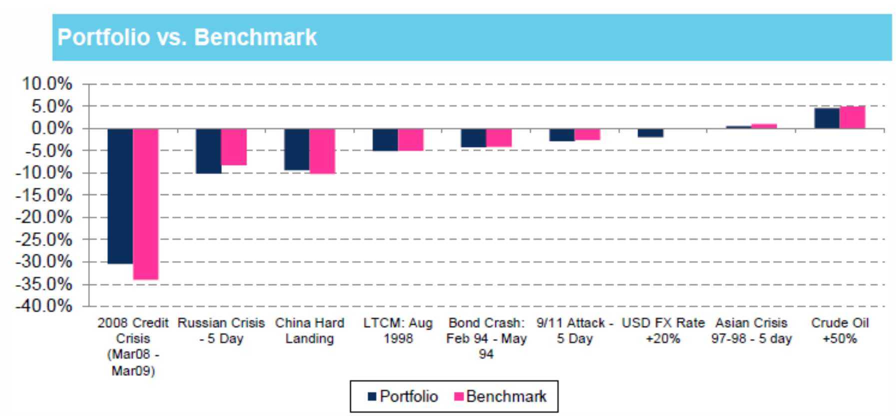
# Stress Tests

- Stress tests reveal no significant underperformance expectations versus the target benchmark.
- A repeat of the 2008 credit crisis is still the highest expected loss event at a 29% loss, down from a 31% loss with the 6/30 portfolio.



# Summary

- There were no unexpected risk exposures.
- Asset allocation is the largest determinant of risk.
- The current asset allocation and portfolio structural changes lowered the absolute level of risk and the benchmark relative risk.
- The current asset allocation also increased expected liquidity and the ability to rebalance the portfolio.

# ALASKA RETIREMENT MANAGEMENT BOARD

SUBJECT: Repeal Investment Guideline Resolutions

ACTION: X

DATE: March 19-20, 2020

INFORMATION:

BACKGROUND:

Under AS 37.10.210-220, the Alaska Retirement Management Board (ARMB) is to establish and determine the investment objectives and policies for each of the funds entrusted to it.

The ARMB has approved a series of resolutions adopting investment guidelines, as appropriate, for the investment mandates under its responsibility.

In recent years, the ARMB has approved several measures that have reduced the set of asset classes and investment mandates employed.

STATUS:

The following investment mandate resolutions correspond with mandates that the ARMB has terminated, or that are not in use:

- Absolute Return Guidelines - Resolution 2015-01
- Convertible Fixed Income Investment Guidelines - Resolution 2014-11
- High Yield Fixed Income Guidelines - Resolution 2016-01
- Inflation Indexed Fixed Income Guidelines - Resolution 2012-20
- Intermediate U.S. Treasury Fixed Income Guidelines - Resolution 2019-05
- International Fixed Income Guidelines - Resolution 2012-23
- Securities Lending Cash Collateral Investing Guidelines - Resolution 2015-23
- Taxable Municipal Bond Fixed Income Guidelines - Resolution 2014-26

RECOMMENDATION:

The Alaska Retirement Management Board repeal the investment guideline resolutions referenced in this document.

# ALASKA RETIREMENT MANAGEMENT BOARD

| | | | |
|---|---|---|---|
| SUBJECT: | Clarify Language in Manual Regarding Payment of Honoraria to Trustees | ACTION: | X |
| DATE: | March 19-20, 2020 | INFORMATION: | |

BACKGROUND

AS 37.10.250, shown below, proscribes the conditions for which Alaska Retirement Management Board (ARMB) trustees are compensated for their service on the board.

> *Trustees, other than trustees who are employees of the state, a political subdivision of the state, or a school district or regional educational attendance area in the state, receive an honorarium of $400 for each day spent at a meeting of the board or at a meeting of a subcommittee of the board or at a public meeting as a representative of the board, including a day in which a trustee travels to or from a meeting. Trustees who are state employees are entitled to administrative leave for service as a trustee. Trustees who are employees of a political subdivision of the state or a school district or regional educational attendance area in the state are entitled to leave benefits provided by their employers comparable to those provided to state employees for service as a trustee. Trustees are entitled to per diem and travel expenses authorized for boards and commissions under AS 39.20.180.*

The ARMB's Board of Trustees Investment Policies & Procedures Manual (Manual) contains language that suggests discretion with respect to the payment of honoraria.

STATUS

The red-line edit to the Manual below clarifies this.

*Education, Training, Travel and Reimbursements*

1. *Trustee education will be provided during Board meetings; trustees may also participate in an ARMB Education conference and two additional training or educational opportunities per year.*

2. *Honorariums will be paid for time expended by trustees in the manner prescribed by law.* ~~*Entitlement to honorariums set by law shall be construed to mean that Board members shall be reimbursed daily honoraria for any day in which attendance is required in person or by teleconferenced Board meetings, committee meetings, or workshops convened by ARMB; while on an ARMB-approved seminar; and while appearing on behalf of ARMB on legislative matters.*~~

~~*Attendance shall include time spent in travel to or from a meeting if such travel time is not the same day as the scheduled meeting or gathering.*~~

3. *Reimbursement for travel expenses is outlined in the state travel regulations at AAM.60.*

4. *Travel Policy. Travel by trustees and travel outside Alaska by staff of Revenue on ARMB-related business shall be subject to approval by the Chair.*

RECOMMENDATION

The Operations Committee recommends the Alaska Retirement Management Board approve the changes to the Alaska Retirement Management Board of Trustees Investment Policy & Procedures Manual, as indicated in the red-line edits in this action memo.

# ALASKA RETIREMENT MANAGEMENT BOARD

SUBJECT: Creation of Investment Committee

ACTION: X

DATE: May 1, 2020

INFORMATION:

## BACKGROUND

The Alaska Retirement Management Board (ARMB) has established standing and ad hoc committees to assist the ARMB with fulfilling its responsibilities. Committees facilitate more thorough due diligence and monitoring while making efficient use of trustee time during full board meetings. Committees do not make decisions on behalf of the ARMB but can make recommendations to the ARMB. The table below lists the current roster of ARMB committees.

| ARMB Committees | | | | |
|---|---|---|---|---|
| **COMMITTEES** | **Operations** | **Audit** | **DC Plan** | **Actuarial** |
| **Rob Johnson** | X | Chair | X | X |
| **Gayle Harbo** | X | X | | X |
| **Norm West** | X | X | X | Chair |
| **Bob Williams** | X | | Chair | X |
| **Tom Brice** | Chair | | X | X |
| **Lorne Bretz** | X | X | | X |
| **Allen Hippler** | | | X | X |
| **Commissioner Tshibaka** | X | | | X |
| **Commissioner Mahoney** | | | | X |

## STATUS

The ARMB Chair and staff have been evaluating options to more effectively utilize meeting time and recommend creating a standing investment committee (IC).

The benefits of an investing committee include:

- More effective utilization of trustee meeting time, by segmenting the monitoring of performance between the IC and Board.
- Creation of a dedicated resource to the Board for broader questions such as fund purpose & governance and to address ongoing investment-related items from the ARMB.

The IC would evaluate investment performance at all levels with a focus on individual managers and mandates, would evaluate asset class-level manager structure and plans, and would receive existing and potential external manager presentations.

The ARMB would retain all decision-making authority – including setting the asset allocation, and decisions regarding asset class-level plans. The ARMB would continue to receive general consultant presentations, including the quarterly performance review and annual private equity and real asset reviews, internal management presentations and plans, and IAC presentations and reports.

The currently envisioned allocation of responsibilities are shown in the table below.

| Activity/Area of Responsibility | Staff/Consultant | IC | ARMB |
|---|---|---|---|
| **Investment Objective** | | | |
| Fund Purpose | M, R | M | A |
| Governance | M, R | M | A |
| **Asset Allocation** | | | |
| Capital Market Assumptions | M | | M |
| Set Strategic Asset Allocation | M, R | | A |
| **Manager Structure** | | | |
| Asset Class-Level Reviews/Plans | M, R | M | A |
| External Management Reviews, Callan PE Review | M | M | |
| Internal Management Reviews/Plans | M | | A |
| Hire, Fire Managers; Conduct Manager Searches | M, R | | A |
| **Performance Monitoring** | | | |
| Plan-Level | M, R | M | M |
| Asset Class-Level | M, R | M | M |
| Manager Level | M, R | M | |

M - monitor/evaluate
R - recommend
A - approve

The IC would be comprised of the ARMB Chair (chair of the committee) and four appointed trustees. Non-voting participants would include the chief investment officer, the investment advisory council and the general consultant.

## RECOMMENDATION

The Alaska Retirement Management Board create a standing investment committee to assist the Board with monitoring and due diligence on investment-related matters.

# ALASKA RETIREMENT MANAGEMENT BOARD

| | | | |
|---|---|---|---|
| SUBJECT: | Gabriel Roeder Smith<br>Actuary Review Contract - Optional Renewal | ACTION: | **X** |
| DATE: | May 1, 2020 | INFORMATION: | |

BACKGROUND

The Alaska Retirement Management Board (Board) has a current contract with Gabriel Roeder Smith (GRS) for actuary review services.

STATUS

The contract period with GRS runs from July 1, 2017, through June 30, 2020, with two optional one-year extensions. Staff recommends that the Board exercise the first one-year optional extension of the GRS contract to June 30, 2021.

RECOMMENDATION

That the Board direct staff to exercise the first one-year contract option, extending the contract with GRS until June 30, 2021.

# PUBLIC COMMENTS:

## (SUBMITTED LETTER ATTACHED)

**Public Comment was given by the following people:**

1. Mr. Doug Woodby (Verbal/Letter Attached)
2. Mr. Elaine Schroeder (Verbal)
3. Mr. Rick Steiner (Verbal)

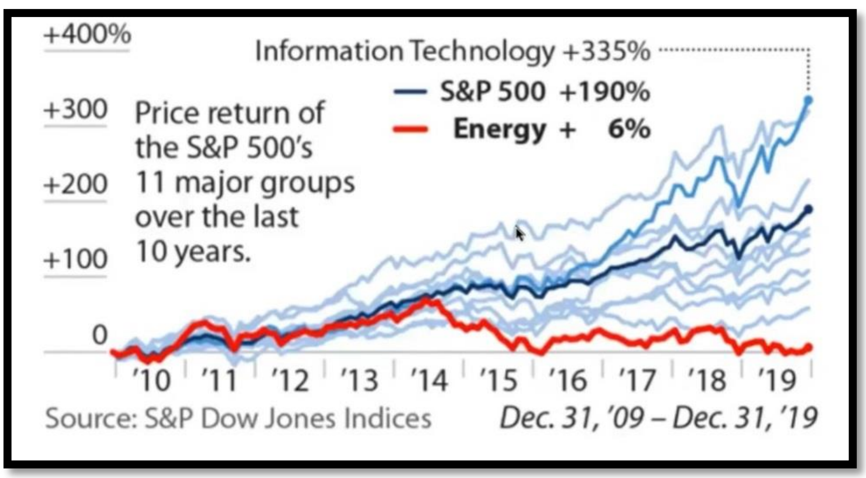
April 29, 2020

To Chairman Johnson and Trustees of the Alaska Retirement Management Board,

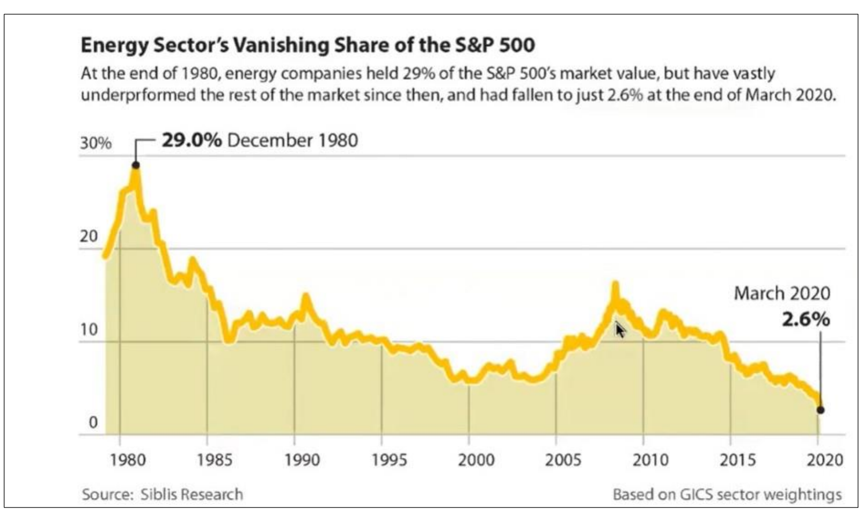
First, I thank you and the officials of the Department of Revenue for your efforts to protect and grow the pension funds for all beneficiaries. It is a lot of responsibility and I appreciate the care and concern you bring to your duties every day.

My wife and I are beneficiaries, and we care deeply about the future health of the funds. She is a beneficiary of PERS and TRS, while I am a beneficiary of PERS.

In particular, we are concerned with the decade long underperformance of the energy sector (graph below) and whether the inclusion of this sector in the pension portfolios has been a drag on the value of the funds.




It is apparent that the recent drastic reduction in the value of oil and gas assets is not simply an ephemeral anomaly, but the current expression of a four decade long downward trend of the once dominant energy sector, as shown in the following graph:



The long-term trend relative to the overall market suggests that the attractiveness of dividends from the traditional energy sector is no longer a fair rationale when compared to the loss in value and poor year to year performance in the graphs above.

**Widespread Divestment Threatens Fossil Fuel Holdings**

The global commitment to divestment of fossil fuel assets has now topped $14 trillion by 1195 institutions, including pension funds, universities, churches, and governments.[i] Significant among these is Norway's $1.1 trillion sovereign fund, which will divest companies dedicated to oil and gas exploration and production in a bid to shield itself from a long-term fall in oil prices.[ii]

Other notable institutions committed to divestment include the government of Ireland, New Zealand's public superannuation funds, pension funds of London and New York City, and the University of California system's pension and endowment funds. The managers of the UC system funds cited the financial risk of continued investment in fossil fuels as the rationale for their action.[iii]

Failure to divest has been calculated to cost pensioners thousands of dollars each:

> "A series of reports by Corporate Knights finds that, together, the state pension funds of New York, California and Colorado would have been $41 billion richer had they divested from fossil fuel stocks a decade ago: Analysis last year showed the $200 billion New York State Common Retirement Fund (NYSCRF) left $22 billion on the table by failing to divest, a foregone benefit of almost $20,000 for each of its more than one million members. Last week, the firm released similar reports for California and Colorado showing additional losses of $19 billion."[iv] (Quote from November, 2019)

The scale of those losses to state pension funds indicates that there may be material financial risk for institutions that fail to divest given the climate risk the world is facing.

**Fiduciary Risk**

Continued inclusion of fossil fuel investments in our pension portfolios poses fiduciary risks in several categories, including:

1. Transition risk – when carbon taxes or cap and trade laws are enacted in response to public concerns, there will be an accelerated move away from fossil fuel resources.
2. Stranded asset risk – fossil fuel resources in the ground will be of little value as the world transitions to renewable energy sources.
3. Litigation risk – greenhouse gas emitters risk being held accountable for climate catastrophes that create a large economic burden on governments and the tax-paying public.
4. Declining value risk – price will decline as demand declines.
5. Pricing risk – erratic and volatile pricing will increase as the fossil fuel industry declines, as recently seen with efforts of Russia and Saudi Arabia to prop up prices due to the oversupply; yet this effort was thwarted by the precipitous decline in consumption due to the current pandemic.
6. Passive investing risk – passive investing may provide for lower costs, but it doesn't allow for sufficient evaluation of the many underlying holdings, exposing the investment to embedded losses.

7. Fiduciary neglect risk – the future economic risk of the climate crisis has been authoritatively modeled and publicized (Fourth National Climate Assessment[v]); backward looking fiduciary assessments may be legitimately faulted for neglect of this state of knowledge.

**Fiduciary Duty**

The decade-long underperformance of the traditional energy sector, coupled with the accelerating financial impacts of the climate crisis, is sufficient rationale for the ARMB to proceed with a divestment of fossil fuel holdings from all asset classes. I believe this would be a responsible action within the fiduciary responsibilities of the ARMB. In fact, divestment would reduce the liability of the ARMB to the several categories of risk described above and, moreover, would be an important step to protect the long-term value of the fund.

The fact that large-scale divestment of fossil fuel holdings has accelerated world-wide suggests that it may be best to proceed with divestment before there are more precipitous declines in value and eventual asset strandings. Indeed, the question could be raised as to why, from a fiduciary neglect perspective, pension funds continue to have investments in fossil fuels. We certainly do not want our pension funds to include stranded assets. As Mr. Buffett put it: "Only when the tide goes out do you discover who is swimming naked."

Thank you for considering my concerns.

Respectfully,

Doug Woodby
Co-chair of 350Juneau

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[i] https://gofossilfree.org/divestment/commitments/
[ii] Reuters, October 1, 2019: https://www.reuters.com/article/us-norway-swf-oil/norway-sovereign-wealth-fund-to-divest-oil-explorers-keep-refiners-idUSKBN1WG4R9
[iii] https://www.latimes.com/opinion/story/2019-09-16/divestment-fossil-fuel-university-of-california-climate-change
[iv] https://www.nydailynews.com/opinion/ny-oped-ny-divest-from-fossil-fuels-already-20191126-ajjerqonqjfuhcef3jma7xdama-story.html
[v] 2018, Fourth US National Climate Assessment https://nca2018.globalchange.gov/