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NEW YORK CITY TEACHERS' RETIREMENT SYSTEM
INVESTMENT MEETING

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Held on Thursday, January 5, 2023
Via Videoconference

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10:12 a.m.

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ATTENDEES:

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DEBRA PENNY, Chairperson, Trustee

13

DAVID KAZANSKY, Trustee

14

THOMAS BROWN, Trustee

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BRYAN BERGE, Trustee, Mayor's Office

16

ALISON HIRSH, Trustee, Comptroller's Office

17

RUSSELL BUCKLEY, Trustee

18

PATRICIA REILLY, Teachers' Retirement System

19

SUSAN STANG, Teachers' Retirement System

20

DEVON ALEXANDER, Rocaton

21

MICHAEL FULVIO, Rocaton

22

VALERIE BUDZIK, Teachers' Retirement System

23

REPORTED BY:

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YAFFA KAPLAN

JOB NO. 8936287

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ATTENDEES (Continued):

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LIZ SANCHEZ, Teachers' Retirement System

4

THAD McTIGUE, Teachers' Retirement System

5

DAVID LEVINE, Groom Law Group

6

JOHN DORSA, Comptroller's Office

7

KOMIL ATAEV, Teachers' Retirement System

8

RON SWINGLE, Teachers' Retirement System

9

KATE VISCONTI, Bureau of Asset Management

10

KIM BOSTON, Bureau of Asset Management

11

JENNIFER GAO, Bureau of Asset Management

12

JOHN GLUSZAK, Bureau of Asset Management

13

MINJOO NA, Bureau of Asset Management

14

DAN HAAS, Bureau of Asset Management

15

VICTORIA LEE, Bureau of Asset Management

16

JANET LONDONO-VALLE, Bureau of Asset Management

17

ED BERMAN, Bureau of Asset Management

18

SANYA COWAN, Bureau of Asset Management

19

WILFREDO SUAREZ, Bureau of Asset Management

20

ENEASZ KADZIELA, Bureau of Asset Management

21

MAREK TSYZKIEWICZ, Office of the Actuary

22

KEVIN LIU, Mayor's Office

23

SANDY XU, Bureau of Asset Management

24

JACKIE YE, Bureau of Asset Management

25 JOHN ADLER, Mayor's Office

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ATTENDEES:

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AMANDA JANUSZ, Rocaton

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DEV SUBHASH, StepStone

5

MARC RIVITZ, StepStone

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JUSTIN THIBAUT, StepStone

7

ISAAC GLOVINSKY, TRS

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ARISTA AFTOOMIS, TRS

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SEAN BARBER, Hamilton Lane

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MS. REILLY: Good morning. Welcome to
the Board meeting of the Teachers' Retirement
Board for January 5, 2023. I will start by
calling the roll. Bryan Berge.

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MR. BERGE: Bryan Berge for Mayor Eric
Adams present.

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MS. REILLY: Thomas Brown?

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MR. BROWN: Here. Good morning,
Patricia.

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MS. REILLY: Good morning. Russell
Buckley?

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MR. BUCKLEY: Here on behalf of Panel
For Educational Policy Chair, Dr. Angela
Green.

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MS. REILLY: Alison Hirsh?

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MS. HIRSH: Alison Hirsh here
representing Comptroller Brad Lander. I will
have to step out at noon at which point John
Dorsa, my alternate, will take over for me.

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MS. REILLY: Thank you. David Kazansky?

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MR. KAZANSKY: Present.

23

MS. REILLY: Debra Penny.

24

MS. PENNY: Good morning. I am here.

25

MS. REILLY: Good morning. So we have a

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2 quorum, and I will turn it over to the chair.

3 MS. PENNY: Okay, thank you. Happy New
4 Year everyone. Wishing a happy and a healthy
5 one for sure. I apologize for the last-minute
6 notice of this meeting being virtual, but as I
7 was hearing of more and more people getting
8 ill, I just thought it was safer for everyone
9 to remain where they were and we will meet
10 again next month at this time but thank you.
11 So we are ready -- we are going to start with
12 -- we are in public agenda with the Passport
13 Funds, so we will start with Michael Fulvio.

14 MR. FULVIO: Thanks, Madam Chairperson.
15 Good morning, everyone. Happy New Year and
16 wishing a happy and healthy 2023. I am going
17 to share my screen and then turn it over to my
18 colleague Amanda Janusz to review November's
19 performance.

20 MS. JANUSZ: Thanks, Mike. So good news
21 is that the month of November was another
22 positive month after following a pretty
23 positive result for the month of October as
24 well. For the month of November there were
25 really two things that drove that result. One

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2 being weaker-than-expected inflation CPI
3 numbers. And the second being some signaling
4 from the Fed of slowing the pace of rate
5 hikes, both of which were met with positive
6 reaction from the market, and so really those
7 two announcements correlate to the two
8 strongest trading days of the month of
9 November and resulted here in positive results
10 for the month. In particular, the strongest
11 results came from your non-US equity
12 investments which were up double digits for
13 the month of November. But really across the
14 board positive results.

15 The one fund that outperformed its
16 benchmark for the month was the Balanced Fund.
17 And really even looking out over the trailing
18 three months, after having both a positive
19 October and November, we are looking at
20 positive absolute returns for the trailing
21 three-month period as of the end of November.
22 So overall, encouraging numbers.

23 Your Diversified Equity Fund, you can
24 see at the top of the page there, up about 6
25 and a half percent for the month. In

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2 particular, the international component of

3 that fund being the key driver of results
4 there. And down the bottom of the page, best
5 performer being the International Equity
6 Index, which was up over 13 percent for the
7 month. Any particular questions in terms of
8 November results?

9 MS. PENNY: Any questions for Amanda?
10 Okay. I guess we are good. Happy to see all
11 those positive results there for the month so
12 thank you. Great, so I guess we are on to the
13 December 2022.

14 MR. ALEXANDER: Yes, we are. I would
15 like to continue the theme -- I would like to
16 continue the theme of positive results.
17 However, December kind of ended --

18 MS. PENNY: Devon, Devon, Devon. Come
19 on.

20 MR. ALEXANDER: December's performance
21 was actually consistent with the entire year's
22 performance, which was quite negative coupled
23 with Central Banks' battle against inflation.
24 We had COVID restrictions in China and also
25 the war on Ukraine that sort of led to

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2 not-so-good performance for the end of the
3 year. However, on the bright side, we can say
4 we did have positive results as of fiscal year
5 to date, December, but for the month of
6 December, we saw the global market composite
7 benchmark was down 18 and a half percent for
8 the year and 4.6 percent for the month.

9 On the Balanced Fund Benchmark, we saw
10 that it was down by 9.06 percent for the year
11 and down by just over 1 percent for the month
12 as well. The weakest performer across there
13 was the Sustainable Equity Fund Benchmark,
14 which was down about 30 percent for both
15 strategies for the year and down by roughly 6
16 percent and 7.6 percent for the month. And
17 perhaps the strongest performer, no surprise
18 there, was the actual Balanced Benchmark --
19 actually the strongest performer there for the
20 year was actually International Composite
21 Benchmark, which was down 16.67 percent for
22 the year and down .26 percent for the month
23 but up 3.7 percent fiscal year to date. But
24 yes, as I was saying before, the performance
25 for the month was consistent with the year's

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2 performance which is down across the board.
3 Any questions there?

4 MS. PENNY: Thank you, Devon. Any

5 questions for Devon? No? Okay. Is there --
6 Liz is inviting us -- why is that? Executive
7 session up --

8 MS. SANCHEZ: I took care of it.

9 MS. PENNY: Does anyone have anything
10 else for the Passport Funds' public agenda?
11 Okay. Then we are off to the public agenda
12 for the pension fund. We start with the
13 third-quarter risk presentation. And we
14 have --

15 MR. BERMAN: Hi. Good morning.

16 MS. PENNY: -- Ed Berman from the Bureau
17 of Asset Management.

18 MR. BERMAN: Good morning. We are still
19 talking about September month-end,
20 quarter-end. So a little belated. A lot of
21 things happened in the market but let's just
22 jump straight into it. Can we have the
23 presentation on the screen, please?

24 MS. VISCONTI: Just one second.

25 MR. BERMAN: Can we have the next page,

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2 please? Thank you. So this quarter will
3 follow the same structure of the previous
4 presentation. There will be three parts all
5 together. Page 1 will give you a top-level
6 view of the portfolio risks and the
7 relationship between the portfolio and
8 strategic benchmark. Page 2 will provide a
9 granular breakdown of risks to give you a
10 sense of risk concentrations at individual
11 asset class level and page 3 will focus on the
12 forward-looking projections and that's where
13 we will show you some of the new analyses that
14 we developed at BAM as we extend our risk
15 framework. So let's start with the plan level
16 overview, and you can see on the page that the
17 total risk at the end of the quarter stood at
18 12 percent. It's an increase of about .5
19 percent from the previous quarter. It's the
20 number in the low right corner of the table.
21 Highlighted in bold font. Just to remind you
22 that this number represents the expected
23 return of the portfolio over the next 12
24 months meaning they project the gains or
25 losses of your portfolio should be within 12

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2 percent, and it also means that it's about 15
3 percent probability that the gains will be
4 larger than 12 percent and also 15 percent
5 probability that the losses may exceed minus
6 12 percent. But what does this number mean?

7 What is the intuition behind this number? Is
8 it something we should worry about? Is it a
9 good outcome? Is it consistent with the
10 investment process?

11 Broadly speaking, the level of risk is
12 determined by two main factors, by markets and
13 by the portfolio construction process. So the
14 main risk decision in the portfolio
15 construction process is to establish the
16 stock/bond split. Historically equities
17 deliver the best returns but also comes at the
18 cost of high level of risk. We captured this
19 first step of the process by the market
20 portfolio in the table, column 1 on the left.
21 It's a simple 60/40 blend of the MSCI All
22 Countries and Barclays US Ag, which is a broad
23 measure of the NASDAQ fixed income market.

24 The next step of the process is to
25 determine asset allocation within each

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2 category where we establish the ranges for US
3 equities, core fixed income, and other asset
4 classes. These decisions are reflected in the
5 strategic benchmark where the market portfolio
6 is further split into 11 components as
7 reflected in the bottom of the page. The
8 exposures for the policy benchmarks are
9 captured in column 2 in the middle of the
10 table.

11 And the final step of the portfolio
12 construction process is to fill out the
13 manager selection process and ongoing
14 portfolio balancing, any cash flows, so these
15 processes are captured in column 3, which is
16 your actual portfolio. So by applying this
17 framework, we can get a better sense of the
18 overall risk levels and what drove the
19 changes.

20 So let's start with the market
21 portfolio. That is the 60/40 blend. This
22 portfolio will be the baseline for our
23 analysis. There are three main dimensions of
24 risk that we take in this portfolio:
25 Equities, interest rate, and credit. These

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2 three dimensions are shown at the top of the
3 table on the portfolio construction, so equity
4 exposure is captured by equity allocation.
5 It's the first row of the table. It's
6 obviously 60 percent by construction. The
7 next dimension of risk is interest rate or
8 time value of money. The best way to measure

9 exposure to interest rates is through duration
10 of the portfolio.

11 What does this number mean? Simply put,
12 it's a scaling factor that translates interest
13 rate moves into the portfolio's market value.
14 The magnitude of the interest rate exposure is
15 shown in the next line which is the rate
16 duration equals to 2.5 years. It simply means
17 1 percent drop in the interest rate translates
18 to a 2.5 percent gain for the portfolio. You
19 will notice that the duration for the
20 portfolio came down during this quarter. This
21 is a direct result of an increase in the
22 interest rate as driven by Federal Reserve
23 policy. The final dimension of risk is credit
24 spread which is a measure of the default risk.
25 Only the bonds issued by private borrowers

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2 have exposure to credit risk, so for this
3 reason only about 40 percent of the Barclays
4 Ag has exposure to credit risk since 60
5 percent of index are treasuries and agency
6 securities. Much like the above, the exposure
7 to credit spread is measured by spread
8 duration which is just multiplied to translate
9 spread changes into market portfolio value.
10 So the credit spread duration of 1.5 means a 1
11 percent decline in credit spreads translates
12 to a 1.5 percent gain for the portfolio.

13 So how did this portfolio construction
14 translate into risk measures? You can see on
15 the bottom of the table on portfolio risks, we
16 represent two measures of risk here. Let's
17 start with the total risk which stands at 11.6
18 percent at the end of Q3. So it's basically
19 just an expected 12-month return for the
20 portfolio with the usual disclaimer 15 percent
21 probability more, 15 percent probability less.
22 You can notice that the total risk for the
23 market portfolio increased this quarter by .5
24 percent. This is a direct result of
25 volatility in the market as we go through this

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2 historical extraordinary period.
3 At the end of September, the VIX Index,
4 a measure of equity volatility closed at a
5 level over 30 points versus the pre-COVID
6 average of 18. The actual fixed income market
7 at the end of the September, the MOVE Index,
8 which is a measure of fixed income vol, closed
9 about 160, close to the highest historical
10 level outside of the Global Financial Crisis

11 as compared to the pre-COVID average of around
12 60.

13 So the total risk will give you a
14 measure of the portfolio's future expected
15 performance over the next year. The other
16 risk measure we show here is more short-term
17 measure, and that's the beta to S & P 500.
18 It's a measure of how the portfolio will move
19 on average when the overall stock market
20 increases or decreases. So the beta of the
21 market portfolio shown at the bottom of the
22 table stands at .57. It's almost unchanged
23 from the previous quarter. It's interesting
24 to note that the beta is actually smaller than
25 the asset allocation of .6. The reason for

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2 that is the allocation to fixed income and
3 international equity. The decline of beta
4 versus asset allocation is a result of
5 diversification in the portfolio.

6 So now let's move from the market
7 portfolio, which is a baseline analysis to the
8 policy benchmark which captures the asset
9 allocation decisions. You can see in column 2
10 of the table. You will notice that the
11 strategic is slightly higher asset allocation
12 but comparable rates of credit exposure. A
13 drop in the rates duration versus the market
14 portfolio comes mostly from allocation to high
15 yield which tends to be oversure of maturity.
16 A small decline in spread duration comes from
17 allocation to TIPS as they have no credit risk
18 being government bonds.

19 So how did the risk levels of policy
20 benchmark compare to the market portfolio? It
21 held quite well. As you can see at the bottom
22 of column 2, the total risk level remains
23 almost unchanged despite a higher allocation
24 to equity. This is a good outcome. We expect
25 varied returns from asset allocation, not an

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2 increase in risk, so I take it as a positive.

3 So finally, let us consider the
4 portfolio itself which is shown in the column
5 3. You can see that the portfolio is closely
6 aligned with its benchmark but let's go over
7 the small differences. There is a small
8 change in asset allocation for this quarter
9 which I don't really see as material. We will
10 see more details on the next page. You will
11 also realize there is a small duration
12 overweight versus strategic benchmark. While

13 the portfolio is managed flat to benchmark on
14 the rates exposure, the small overweight comes
15 from the ETI allocation which means the
16 exposure to mortgages, therefore increase in
17 duration.

18 So how does this translate into risk
19 measures? You can see them at the bottom of
20 the table on the right. Again, the risk
21 measures are broadly in line with the policy
22 benchmark, but we should go over some
23 differences. Let's start with the total risk
24 which is only about 6 percent higher than the
25 benchmark. A trend similar to the previous

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2 quarter. This increase in risk is driven
3 primarily by allocation to private markets,
4 mostly to private asset allocation, which is
5 mapped against the Russell 3000. So it's not
6 surprising that the beta to S & P is also
7 slightly higher than the strategic benchmark,
8 and related to this is the third measure we
9 haven't talked about so far, active risk.
10 Similar to total risk measure, active risk is
11 a forward-looking assessment of the expected
12 excess returns of the benchmark.

13 So the active risk of 2.1 percent means
14 that we expect the excess returns of the
15 portfolio over the next 12 months to be within
16 a 2.1 percent range with the usual disclaimer,
17 15 percent probability more and 15 percent
18 probability of bigger losses. Almost all of
19 active risk is driven by the allocation to
20 private equity. Out of the total 2.1 percent
21 of active risk, about 1.5 percent comes
22 straight from the US buyout strategies.
23 Active risk increased this quarter by about 23
24 percent, mostly driven by market factors but
25 about three-quarters of it was due to the

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2 impact of markets on the private equity
3 strategies.

4 And finally, I want to draw your
5 attention to the chart on the right-hand side
6 of the page. Here you can see the evolution
7 of risk over the past 12 months for the
8 portfolio. Chart 1 shows the time as of total
9 risk, and you can see that the relationships
10 we have been discussing today have been stable
11 over time. You can also notice how the
12 overall risk level declined slightly by the
13 end of the year and the previous year 2021 and
14 then started to trend higher from January of

15 21. This is driven entirely by the market
16 volatility, and the similar trend is
17 noticeable for the active risk chart at the
18 bottom of the page. It trends slightly higher
19 from the low of 1.5 percent in December.
20 Again, it's the impact of market fall. I will
21 pause here if there are any questions for the
22 total portfolio level. Otherwise we will move
23 to the next page.

24 MR. BUCKLEY: Chair, if I may?

25 MS. PENNY: Go ahead, Russell.

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2 MR. BUCKLEY: Hi, Ed. This is Russell.
3 I want to ask a couple of clarifying questions
4 just to make sure I am understanding all the
5 information correctly. When you say there is
6 a 15 percent chance above and below relative
7 to the 2.1 percent active risk, I think it was
8 also for the total risk as well, you are
9 talking about one standard deviation away from
10 the mean essentially?

11 MR. BERMAN: Correct. That's exactly
12 what it is.

13 MR. BUCKLEY: So excluding the second
14 and third standard deviation outside of what
15 we would expect or rather measuring the median
16 saying it's going to fall within that 68
17 percent, give or take of a normal standard
18 deviation graph?

19 MR. BERMAN: Well, this is -- we use the
20 measure of volatility to assess risk and the
21 volatility is one standard deviation move.
22 Assuming normal distribution obviously, two
23 standard deviations is just a multiplier from
24 the risk level. It gets more complicated from
25 there. There are more dimensions to risk

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2 management, and I will be more than happy to
3 discuss them. It may be a little too dense
4 for this meeting. It will take more than a
5 half hour but more than happy to discuss.

6 MR. BUCKLEY: Understood. I am trying
7 to see if I could capture the high-level
8 points, make sure I am understanding the
9 content correctly.

10 MR. BERMAN: This is just a one standard
11 deviation move. This is what you would expect
12 in like normal day-to-day markets. One
13 standard deviation move happens several times
14 a month. Most of the losses actually happened
15 in the winds of the distribution. So normally
16 we are more concerned with the tail risk.

17 MR. BUCKLEY: Got it. Do we ever talk
18 about tail risk?

19 MR. BERMAN: I will be more than
20 interested to have a broad conversation about
21 what the Teachers would like to see in this
22 presentation and actually am very much open to
23 your suggestions and would welcome a chance to
24 have a discussion, but I think that's
25 definitely something I would like to pursue.

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2 MR. BUCKLEY: Before you move on, when I
3 look at these two line graphs, I appreciate
4 the detailed look at the last year or so. I
5 would be curious maybe during the next
6 presentation to see them over a longer period
7 of time maybe, you know, 60 months or maybe
8 120 months. I think I am just trying to
9 understand the historical context of these
10 numbers. That might help me better
11 understand. I don't know if other trustees
12 feel the same.

13 MR. BERMAN: Sure. We can definitely
14 show this information. One would caution the
15 portfolio trended significantly over this
16 period of time.

17 MR. BUCKLEY: Yes. Please use your
18 discretion in determining what an appropriate
19 time period would be. I think I need more
20 than a year to fully grasp the context, to put
21 the year in context without 2022, which was an
22 extraordinary year in some respects.

23 MR. BERMAN: Yes. We can definitely
24 provide more information, but I would also
25 love to have a chance to have a broader

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2 discussion of the information you would like
3 to see in this presentation. There is a lot
4 of different risk measures, and assessing the
5 risk exposure to such a complex portfolio is
6 obviously a monumental task.

7 MR. BUCKLEY: Agreed. Thank you.

8 MR. BERMAN: So move to the next page?

9 MS. PENNY: I think so. Great. Thank
10 you.

11 MR. BERMAN: So here we take a look at
12 what's happening inside the portfolio. So we
13 will review the exposure in more detail at the
14 asset class level and also try to see how the
15 allocations contribute to the performance.
16 First of all, let's focus on column 1 where we
17 show the asset class allocation and the tilts
18 against the strategic benchmark. We show here

19 the allocations without parking place
20 adjustment, so it's the actual allocations
21 shown against the strategic benchmark.
22 You can see that the public allocations
23 are closely aligned with the benchmark but
24 there are slight differences in the private
25 markets. Notably private equity allocation

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2 exhibits a slight overweight, about 1.8
3 percent, whereas the other private allocations
4 are slightly below target. Hope there are no
5 surprises here.

6 Next focus on column 2 where we show the
7 total risk level at each asset class level and
8 the contribution to the portfolio in total.
9 The same information is actually shown in the
10 chart at the bottom of the page which may be a
11 little bit easier to follow, and here we show
12 allocations in blue and risk contributions in
13 orange.

14 Several observations to be made about
15 this chart. First of all, you may notice that
16 equity makes a disproportionately high
17 contribution to the total risk level. The
18 allocations that punch well above their weight
19 are US equity and private equity, both of them
20 heavily domestic. You will also notice that
21 fixed income provides a useful balance to the
22 portfolio to compensate for the high risk
23 level of equities. Core fixed income and TIPS
24 have almost negligible contribution risk
25 despite having material market value exposure.

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2 This type of risk contribution is typical for
3 a multi-asset portfolio and is completely in
4 line with the investment process.

5 I also want to draw your attention to
6 column 3 which is active risk at the asset
7 class level. Here we assess the active risk
8 for each asset class against its own
9 benchmark. Several observations stand out.
10 First of all, active risk of public markets is
11 well-contained, about 1 percent for equities
12 and very small for fixed income. The slightly
13 higher levels of active risk for developed
14 ex-US which is consistent with allocation to
15 active managers, and I was told not to mention
16 specific managers in public session but some
17 of your managers are running active risk up to
18 8 percent. Active risk for US public equities
19 is much smaller, which affects a large use of
20 passive managers. There was no material

21 change this quarter for active risk for public
22 managers. If anything, active risk came down
23 slightly but it's not that material; it's
24 about a 10-basis-point decline. Active risk
25 for fixed income public active managers

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2 remains almost unchanged from the previous
3 quarter.

4 Finally, we see a large level of active
5 risk on alternatives, which is not surprising
6 given the idiosyncratic nature for this asset
7 class. Specifically for private equity
8 against the Russell 3000, active risk stands a
9 18.3 percent which is an interest of 15
10 percent from the previous quarter. This high
11 level of active risk is intuitively correct as
12 we saw significant decoupling in performance
13 between the private and public markets. Most
14 of active risk for private equity comes from
15 allocation to US buyout strategies, both large
16 and small. At the system level, the active
17 risk of 2.1 percent -- you can see this number
18 at the top of the table -- is driven almost
19 entirely by private allocation. Specifically
20 the private equities strategies contribute 3
21 quarters of the total risk level primarily
22 driven by US buyout managers.

23 So what does it all mean for
24 performance? Remember that we define risk in
25 terms of the ability of the portfolio to

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2 generate returns, be it positive or negative.
3 So let's turn to column 3 where we show the
4 12-month returns for each asset class.

5 The first observation is that every
6 single note on the public markets is colored
7 red. This reflects the historically difficult
8 markets that we have been experiencing. Both
9 equity and fixed income markets sold off,
10 which delivered the worst performance for the
11 60/40 portfolio going back almost 100 years
12 and the losses for some asset classes exceed
13 our risk forecast, especially where we rely on
14 active managers. I would like to point out
15 developed ex-US where the loss of minus 31
16 percent significantly exceeded the risk
17 forecast of 20 percent. The same is true
18 about the excess return of minus 4.56 percent
19 being far more than the active risk of 2.7.

20 The returns for most of the passive US
21 equity strategies are comparable to the risk
22 forecast. The fixed income markets

23 specifically went through a highly unusual
24 period as the rates increased at a very
25 historically fast paced. The first half of

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2 this year delivered the worse rate of returns
3 since the 18th century and were clearly seen
4 in the returns on the public side.

5 The absolute returns exceeded the risk
6 forecast by a wide margin, but more
7 importantly the excess returns are reasonably
8 close to the active risk forecast. The
9 alternatives on this account delivered
10 performance that provide a couple of
11 diversifiers to the public markets. Private
12 equity and private credit returns are both in
13 line with the risk forecast. A real standout
14 is the historic performance of private real
15 estate which exceeded the risk forecast by a
16 factor of almost 2.

17 I will pause here for any questions at
18 the asset class level. If not, can we have
19 the next page please?

20 MS. PENNY: I think you can go on.

21 MR. BERMAN: So you will notice this
22 page looks different from the previous
23 quarter. Here we represent our
24 forward-looking projections for your
25 portfolio. We obviously do not know what the

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2 future will bring. So instead we are focusing
3 on the major economical factors that impact
4 the performance of your portfolio, and we are
5 trying to identify which factors we need to
6 watch out to understand the future
7 performance. Fundamentally there are three
8 groups of macro factors that impact the
9 economy markets and by extension the
10 performance of your portfolio. Let's start
11 with the equity markets which are always the
12 most important component of risk and returns
13 as we just discussed.

14 Equities have traded in almost every
15 country in the world, but the three most
16 important markets are the United States, the
17 European Union and China, or more broadly
18 emerging markets. Together these three
19 centers capture about two-thirds of the global
20 equity consolidation with the USA being 41
21 percent. These three markets are identified
22 in the first three lines of this table by the
23 indices the S & P 500, the Euro STOXX and MSCI
24 EM, which is in the first three lines of the

25 table.

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2 The second bucket is rates. That is the
3 cost of capital. We highlight three rates
4 here that are most important for the portfolio
5 lines 4 to 6. The 2-year treasury note is the
6 best proxy for the Federal Reserve policy rate
7 since it captures both the rate hikes and the
8 market expectation for the future policy. The
9 10-year treasury note is representative of the
10 broad economy as it's used as a benchmark for
11 mortgages and investment grade debt. Finally,
12 the euro/dollar exchange rate stands for the
13 dollar in the international markets since the
14 dollar has been the global standard of
15 currencies.

16 Finally, the third bucket, commodities,
17 captures the dimensions of the real economy
18 which produces goods and services. Copper in
19 line 7 stands for global manufacturing since
20 copper prices correlate highly with industrial
21 output. Oil, line 8, stands for the demand
22 for energy which is the critical component of
23 any economical activity or transportation, and
24 finally, inflation on line 9, which is the
25 macro factor that doesn't need introduction.

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2 It dominated our lives in the past year.
3 The next step in our analysis is to
4 identify how much the prices of these factors
5 may change in the future. So there is
6 obviously no way for us to forecast these
7 levels, but we use risk models to estimate
8 market in flight move. In this case we are
9 asking the question what would be the worst
10 monthly market move to happen over the last
11 year. You can see the results of this
12 calculation on the next column on the table
13 under "Market Move". These monthly market
14 moves are estimated to have an 8 percent
15 probability of occurring which corresponds to
16 roughly once a year. I tell people all the
17 time these are not market forecasts. All
18 these market moves have the same likelihood.
19 They are corresponding to a monthly move for
20 the next year.

21 I want to pause here for a moment to
22 appreciate the magnitude of these market
23 shifts. These are truly big numbers across
24 all three buckets. Notice we are not
25 forecasting the direction of the move. It

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2 could be either up and/or down. For example,
3 our models are the material likelihood that
4 the equity markets may experience a 30 percent
5 move up or down in the next year. Also notice
6 among the three equity indices, the EM has the
7 lowest volatility and therefore the lowest
8 risk. Somewhat unusually, the risk of
9 European markets exceeded those of the US,
10 which reflected a difficult macro economic
11 environment for the European economies. The
12 numbers in the rates bucket are also unusually
13 large. A market move of 100 basis points for
14 a 2-year treasury note would have been
15 unthinkable just a couple of years ago.
16 Similarly, a 10 percent move for the
17 euro/dollar rate is shockingly big in the
18 context of the past 20 years.
19 Finally, the commodities bucket. A 57
20 percent move for oil means that the oil prices
21 can move from the current level of 77 dollars
22 within the range of 34 to 120. In truth, this
23 feels consistent with the market over the past
24 couple of years when the prices moved from
25 being negative to 140 I think was the high.

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2 Similarly, the monthly change for inflation,
3 almost 3 percent, indicates how uncertain the
4 current macro environment is.
5 So what does it mean for your portfolio?
6 The results are captured in the next two
7 columns. Both the portfolio and strategic
8 benchmark which puts the results into two
9 categories, risk-on, which is colored green,
10 represents a rally in the market and risk-off,
11 colored red, represents a selloff. So all
12 together we show you 18 possible outcomes for
13 your portfolio and 18 outcomes for the
14 benchmark. I am not going to read the
15 numbers, instead focusing on the main takeaway
16 with the goal of identifying on the factors
17 which have an outsized impact on your
18 portfolio.
19 Let's start with equities, lines 1
20 through 3 in the table. I will be focusing on
21 the risk-on column, but the conclusions will
22 be similar to the risk-off column. You can
23 see that the -- among the three markets, the
24 US equities have by far the largest impact on
25 the portfolio. I found this to be a positive

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2 result. Whereas the global economy is facing

3 multiple headwinds and likely heading toward a
4 recession, the United States stands as a
5 strong economy with a better potential to
6 deliver stronger performance. China and
7 Europe face their own set of challenges,
8 different in each case, but on a relative
9 basis your portfolio is somewhat insulated
10 from the effects of these risks.

11 Next, let us look at the rates bucket.
12 I find the results to be most interesting.
13 The portfolio is not actually that much
14 sensitive to the federal fund policy. For
15 160-basis-point decline in the 2-year rate, a
16 mild projection of about a 1 percent increase
17 in the portfolio now. The move is slightly
18 larger for the 10-year, close to 2 percent,
19 but still not that much significant.

20 But look at the move for the dollar
21 exchange rate. Clearly the US dollar has an
22 outsized impact on the performance. A decline
23 in the dollar exchange rate of 10 percent will
24 increase the value of your portfolio by 5.5
25 percent. And finally, the commodities bucket.

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2 In this case the price of copper has a strong
3 impact on the portfolio. Just to remind you
4 that we use copper prices as a proxy for the
5 overall economic activity since the demand for
6 copper is highly correlated with GDP growth,
7 and the impact of copper prices is quite high,
8 even larger than the dollar. A rally in
9 copper prices of 35 percent will be hugely
10 positive as the portfolio gains 6.5 percent.
11 Oil price will have a similarly large impact
12 on the portfolio, but copper clearly is the
13 dominant contributor.

14 Related to that is an impact of
15 inflation. It's probably not surprising that
16 inflation is one of the most important factors
17 for the performance of your portfolio. Maybe
18 somewhat counterintuitive but the portfolio
19 turns positive in an environment of rising
20 inflation. The same thing applies to
21 commodities as the portfolio benefits from a
22 rise in commodity pricing. You can notice
23 that your portfolio gains almost twice the
24 rate of inflation increase.

25 So let me summarize the main takeaways

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2 from the forward-looking projections. First,
3 the main economic factors in your portfolio
4 are the domestic equities. Then the European

5 and Chinese stock markets. The trend of US
6 dollar exchange rate, weakening of the dollar
7 will have a beneficial impact on performance
8 and inflation. The rise in level of inflation
9 will have a positive return. I find this
10 useful to understand the main risks and
11 exposure in your portfolio and to connect the
12 expected performance with the headline news
13 that we read every day. Basically
14 diversification of the portfolio across the
15 asset classes. You can see it in the chart on
16 the bottom of the page where we show the
17 performance of the individual asset classes
18 for the highlighted scenarios.

19 Almost all asset classes perform in the
20 same direction. The largest risk
21 concentration in the portfolio comes from US
22 public and private equity allocation.
23 Interestingly, the core fixed income
24 allocation don't have any material impact on
25 the performance under either stress test and

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2 3, the portfolio outperforms the benchmark
3 under every single stress test. This is true
4 for the risk-on scenario where the
5 outperformance is desirable but unfortunately
6 also for the risk-off scenario where the
7 portfolio performs the same or worse than the
8 benchmark. And this conclusion is consistent
9 with the observations we made in the first two
10 pages. So I will stop here and open for any
11 questions.

12 MS. PENNY: Thank you. Any questions
13 for Ed?

14 MR. BUCKLEY: If I can ask one more.

15 MS. PENNY: Sure, Russell.

16 MR. BUCKLEY: Thank you. I am looking
17 at the risk-on and risk-off columns here.
18 Almost every single one at TRS is outside the
19 policy benchmark, so for the risk-on, TRS is
20 above the policy benchmark and everything
21 except for the European stock market and then
22 same thing for the risk-off. TRS is always
23 below the policy benchmark. Is that internal
24 leverage? What's causing that?

25 MR. BERMAN: I wouldn't call it

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2 leverage. It's the risk level of the
3 portfolio is slightly above the benchmark. We
4 saw it on the previous page. On page 1 we saw
5 there is an active risk component. Right? So
6 ideally what we would like to see the risk-on

7 outperformance and the risk-off to cushion the
8 blow, right? So ideally. It's not that easy
9 to achieve for such a well-diversified huge
10 portfolio, but I think the purpose of this
11 table is to show that given the assumption put
12 into this stress test, we did not actually see
13 the desired outcome. That's actually the
14 point of the stress test.

15 MR. BUCKLEY: Thank you.

16 MR. BERMAN: I think you need a good
17 gateway. As we are moving forward the
18 strategic asset allocation in the next few
19 months might be a good point discussion, which
20 is exactly the point why we show the results
21 here.

22 MS. PENNY: Any other questions for Ed?
23 Okay. No? Thank you very much, Ed. That was
24 a very interesting presentation.

25 MS. HIRSH: Just want to jump in here

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2 and reiterate something Ed mentioned on behalf
3 of BAM, which is he has been eager since
4 coming on board in July to have a meeting with
5 trustees to get a better sense what would be
6 helpful and effective in a risk presentation
7 and that is something that is on the table
8 that we are going to move forward on in the
9 next month or so. So just wanted to flag
10 that.

11 MS. PENNY: Thank you. Does anyone else
12 have anything for public agenda? Hearing
13 none, do I have a motion to go into executive
14 session?

15 MR. BROWN: So moved.

16 MS. PENNY: Thank you, Mr. Brown. Do I
17 hear a second?

18 MR. KAZANSKY: Second.

19 MS. PENNY: Thank you, Mr. Kazansky.
20 Any questions? All those in favor of moving
21 into executive session, please say aye.

22 Aye.

23 MS. HIRSH: Aye.

24 MR. BUCKLEY: Aye.

25 MR. BERGE: Aye.

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2 MR. KAZANSKY: Aye.

3 MR. BROWN: Aye.

4 MS. PENNY: Any opposed? Any
5 abstentions? Okay. We are moving to
6 executive session.

7 MS. HIRSH: One thing. I think Thad
8 wanted me to mention, we have asked John Adler

9 to join the executive session for the
10 discussion of excluded company list, so he
11 will be joining us.
12 MS. PENNY: Great. Any questions on
13 that? And I have asked Victoria Lee to join
14 us as well. As you know, I will be retiring
15 February 1st, and Victoria has been
16 instrumental in my transition.
17 (Discussion off the record.)
18 MS. PENNY: Okay. We are all back. All
19 right. We are back in public session. Susan
20 Stang, would you please report out?
21 MS. STANG: Certainly. In executive
22 session we received a preliminary performance
23 review for the pension fund, we discussed the
24 excluded company list, we received a
25
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2 presentation from MSCI, we received annual
3 implementation plans for private equity and
4 real estate. Consensus was reached on both.
5 MS. PENNY: Okay. Thank you very much.
6 Does anyone have anything else? Okay.
7 Hearing none, do I hear a motion to adjourn?
8 MR. KAZANSKY: So moved.
9 MS. PENNY: Thank you, Mr. Kazansky. Do
10 I hear a second?
11 MR. BROWN: Second.
12 MS. PENNY: Thank you, Mr. Brown. Any
13 discussion? All those in favor, please say
14 aye.
15 Aye.
16 MS. HIRSH: Aye.
17 MR. BUCKLEY: Aye.
18 MR. BERGE: Aye.
19 MR. KAZANSKY: Aye.
20 MR. BROWN: Aye.
21 MS. PENNY: Any opposed? Any
22 abstentions? Okay. We stand adjourned.
23 Happy and healthy new year.
24 (Time noted: 1:31 p.m.)
25
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6
7 I, YAFFA KAPLAN, a Notary Public
8 within and for the State of New York, do
9 hereby certify that the foregoing record of
10 proceedings is a full and correct

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by me therein.

IN WITNESS WHEREOF, I have hereunto
set my hand this 17th day of January,
2023.

YAFFA KAPLAN