Office of Internal Oversight Services

INTERNAL AUDIT DIVISION

REPORT 2021/080

Audit of investment risk management in the Office of Investment Management of the United Nations Joint Staff Pension Fund

Risk management needs to be strengthened by systematically codifying the Fund's investment appetite, beliefs and strategies, recalibrating the risk budgeting methodology, and improving the use of risk analytics

27 December 2021
Assignment No. AS2021-801-03

Audit of investment risk management in the Office of Investment Management of the United Nations Joint Staff Pension Fund

EXECUTIVE SUMMARY

The Office of Internal Oversight Services (OIOS) conducted an audit of investment risk management in the Office of Investment Management (OIM) of the United Nations Joint Staff Pension Fund (UNJSPF). The objective of the audit was to assess the adequacy and effectiveness of governance, risk management and control processes in ensuring effective investment risk management in OIM. The audit covered the period from 1 January 2018 to 30 September 2021 and included a review of: (i) risk governance, strategy and culture; (ii) risk budgeting; (iii) additional risk management practices; and (iv) preparedness for new investment products and programmes.

The audit indicated that for effective investment risk management, OIM needs to systematically codify investment appetite, beliefs and strategies, recalibrate the risk budgeting methodology and risk limits, and improve risk analytics.

OIOS made five recommendations. To address the issues identified in the audit, OIM needed to:

- Systematically codify its investment risk appetite, beliefs, and strategies with specific excess return and information ratio targets at the Fund level and at asset class/portfolio level to strengthen effective risk management;
- Review and recalibrate the current risk budgeting methodology to ensure reasonable limits are set and aligned with OIM's investment strategies at all levels, and document the methodology in sufficient detail in the Risk Manual;
- Ensure that the limitations of the current risk system for measuring the tracking errors of the Global Emerging Markets portfolio are effectively addressed through the ongoing procurement process for a new risk system;
- Review the additional risk limits for Public Equities and Fixed Income to ensure their reasonableness and effectiveness in controlling risks; and
- Identify, design and implement a set of value-adding risk analytics, including more in-depth analysis of existing risk metrics and factor analysis, to aid in investment management and optimal risk taking.

OIM accepted the recommendations and has initiated action to implement them. Actions needed to close the recommendations are indicated in Annex I.

CONTENTS

Audit of investment risk management in the Office of Investment Management of the United Nations Joint Staff Pension Fund

I. BACKGROUND

1. The Office of Internal Oversight Services (OIOS) conducted an audit of investment risk management in the Office of Investment Management (OIM) of the United Nations Joint Staff Pension Fund (UNJSPF).

2. UNJSPF was established in 1949 by the General Assembly to provide retirement, death, disability, and related benefits for the staff of the United Nations and other organizations admitted to the membership in the Fund. The investments of the Fund are managed by OIM with an asset portfolio of $86.8 billion as of 30 September 2021. Under the authority of the Secretary-General, the Representative of the Secretary-General for the investment of the assets of the Fund (RSG) has the fiduciary responsibility to manage the investments in the best interests of the Fund's participants and beneficiaries. In June 2021, OIM appointed a Chief Investment Officer (CIO) at the D-2 level who, under the supervision of the RSG, is fully responsible for investment management.

3. The Fund's long-term investment objective is to meet or exceed a 3.5 per cent real return. Table 1 shows the annualized nominal returns adjusted for inflation as measured by the United States Consumer Price Index (US CPI) to arrive real returns over different time horizons as of 30 September 2021.

Table 1: UNJSPF investment performance in nominal and real terms as of 30 September 2021

	Rate of Return (%)								
	1 year	**2 years**	**3 years**	**5 years**	**10 years**	**15 years**	**20 years**	**25 years**	**50 years**
UNJSPF Nominal Return	16.92	13.11	9.9	10.00	8.98	6.67	7.76	7.40	8.57
US CPI	5.39	3.36	2.81	2.59	1.92	2.03	2.18	2.24	3.88
UNJSPF Real Return	**10.94**	**9.43**	**6.90**	**7.22**	**6.93**	**4.55**	**5.46**	**5.05**	**4.51**
3.5% Real Return Objective	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Excess Real Return	7.19	5.73	3.28	3.60	3.31	1.01	1.9	1.5	0.97

4. OIM defines investment risk as the probability or likelihood of occurrence of losses relative to the expected return on any particular investment; it includes market risk, liquidity risk and credit risk. Investment risk can be expressed in absolute terms as volatility of asset price or an amount or percentage of a fall in capital value (at a certain probability), or in relative terms as divergence from an investment benchmark. Investment return is inseparable from investment risk, and higher return often entails higher risk-taking.

5. The major determinant of long-term investment return and risk is the Strategic Asset Allocation (SAA) which is assessed and updated quadrantally in UNJSPF through the Asset and Liability Management (ALM) study. Within the acceptable range around SAA, the Fund may overweight or underweight particular asset class(es) to optimally position itself in light of expected short-term market movements. The Fund's asset allocation as of 30 September 2021 and their comparison to SAA are shown below.

Chart 1: Asset allocation as of 30 September 2021

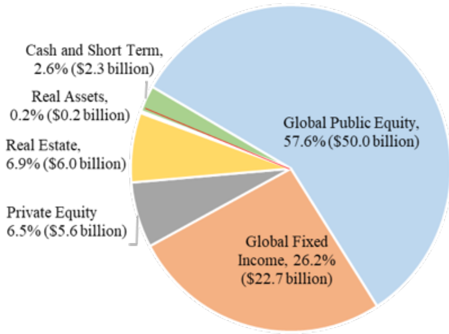


Table 2: Comparison to SAA target

Asset Class	Actual	Target
Global Public Equity	57.6%	45.0%
Global Fixed Income	26.2%	29.0%
Private Equity	6.5%	9.0%
Real Estate and Real Assets	7.1%	16.0%
Cash and Short Term	2.6%	1.0%
Total	100.0%	100.0%

6. While OIM's Investment Team plays a central role in implementing the SAA, the Risk Team of the Risk and Compliance Service is responsible for monitoring the level of risk taken to pursue returns. As of 30 September 2021, the Risk Team had an authorized strength of eight posts (one P-5, three P-4, three P-3 and one G-7); additionally, four new posts were proposed for 2022 which are under consideration of the General Assembly at the time of the present audit. The Risk Team is headed by the Deputy Director for the Risk and Compliance Service (DDRC), who reports to the RSG.

7. Comments provided by OIM are incorporated in italics.

II. AUDIT OBJECTIVE, SCOPE AND METHODOLOGY

8. The objective of the audit was to assess the adequacy and effectiveness of governance, risk management and control processes in ensuring effective investment risk management in OIM.

9. This audit was included in the 2021 risk-based work plan of OIOS due to the risks associated with investment risk management in OIM.

10. OIOS conducted this audit from September to November 2021. The audit covered the period from 1 January 2018 to 30 September 2021. Based on an activity-level risk assessment, the audit covered risks areas relating to: (i) risk governance, strategy and culture, (ii) risk budgeting; (iii) additional risk management practices; and (iv) preparedness for new investment products and programmes.

11. The audit methodology included: (a) interviews with key personnel; (b) review of relevant documentation and processes; (c) analytical review of data; and (d) questionnaire.

12. The audit was conducted in accordance with the International Standards for the Professional Practice of Internal Auditing.

III. AUDIT RESULTS

A. Risk governance, strategy and culture

1. Risk governance

13. OIM aims to ensure that risk management processes are embedded in key decision-making through its Risk Management Framework (RMF) which was formalized in the revised Risk Manual of 14 October 2020. According to the Manual, the main governance functions regarding the RMF consist of: (i) the

Investments Committee which advises the RSG on investment policy, risk control, diversification and best practices; (ii) the RSG who leads the entire operations of OIM including risk management; (iii) the Risk Committee which oversees enterprise-wide risk management and compliance matters; and (iv) the Risk and Compliance team which supports the implementation of RMF.

14. OIM created a Risk Committee in December 2017 to assist and advise the RSG in exercising his oversight role in respect of OIM-wide risk management issues and controls. The Committee was chaired by the RSG since then until September 2020 when the Committee's terms of reference (TOR) was revised, with the DDRC assuming the chairperson's role. The revised TOR states that the purpose of the Risk Committee, as authorized by the RSG, is to oversee implementation of, and adherence to, the RMF to ensure that the risk objectives and controls prescribed in the Investment Policy Statement and the Risk Manual are implemented.

15. The Risk Committee has broad responsibilities, including many matters that fall under the operational responsibilities of the DDRC, such as review and approval of changes to the RMF including new risk limits and risk budget proposals. Therefore, the oversight role of chairperson of the Committee and the operational role as the head of the Risk and Compliance function were assumed by the same person. Per the revised TOR, the chairperson also has the authority to reject any proposal presented to the Committee regardless of the voting outcome. OIM stated that the Risk Committee was intended to serve as a discussion forum to assist the DDRC in making decisions on risk-related matters in an open and transparent manner. The "veto" power of the Committee's chairperson was to ensure that the incumbent has utmost independence as the Chief Risk Officer, and that voting is conducted to achieve transparency, including the RSG's voting record on risk matters. OIM also stated that reporting lines will not be compromised since the RSG can overrule the decisions made by the internal committees in accordance with the authority delegated to him by the Secretary-General.

2. Risk appetite and strategy

16. It is an industry practice to have a fund's risk appetite[1], investment strategy and risk management strategy closely aligned. OIM's Investment Policy Statement provides the risk appetite defined by the United Nations Joint Staff Pension Board as follows: "The Fund has very low appetite for the risk of losing its long-term sustainability and not being able to meet its long-term financial commitments." This risk appetite was translated into a quantitative risk tolerance (or limit) of two per cent around the Fund's current contribution ratio of 23.7 per cent. This low funding risk appetite, together with the Fund's long-term investment objective of 3.5 per cent real rate of return, was factored into the 2019 ALM study and resulted in a 70 per cent allocation to growth assets[2] in the Fund's SAA[3], which is the core of the Fund's investment strategy and forms the basis for the Fund's policy benchmark.

17. Since the Pension Board's risk appetite was expressed in funding/contribution terms, it may be used for setting the SAA, but not for guiding day-to-day investment risk management to control absolute or active risk. OIM did not separately articulate and document its appetite (such as low, medium or high tolerance) for various investment risks, despite setting different limits for them.

[1] The aggregate level and types of risk that an entity is willing to accept, or to avoid, in order to achieve its business objectives.
[2] Or risk assets, which have higher price volatility (risk) and potentially higher returns in the long run.
[3] The SAA was selected to maximize the probability that the required contribution ratio to keep the Fund fully funded stays within the range of 21.7 to 25.7 per cent.

18. Nevertheless, OIM implemented an investment risk strategy that focuses on active risk through a risk budgeting[4] process since 2012 which involves setting the overall risk budget for the Fund and allocating the budget among different asset classes and portfolios. OIM's risk budgeting methodology uses tracking error[5] to measure and allocate active risk according to the target excess returns (or alpha) that the Fund supposedly aims to achieve at the Fund level and at the asset class/portfolio level. However, the Fund's short-term investment objective was broadly defined as "to meet or exceed the return of the policy benchmark", with no specific alpha target formally set for the Fund's portfolio and sub-portfolios. Similarly, OIM's investment beliefs and strategies on how to add value or create alpha were not systematically codified per industry best practices, especially for Public Equities.

19. During the annual risk budgeting exercise for 2020 and 2021, due to lack of formalized alpha and information ratio[6] targets at the Fund level cascading down to the asset class and portfolio level, the Risk Team followed a bottom-up process to obtain from OIM's Senior Investment Officers the alpha targets for their portfolios. The Risk Team also obtained information ratios from the industry to use as targets for OIM. However, it is uncertain whether such estimated targets were in line with OIM's investment beliefs and strategies which were not systematically codified. Further, the targets were not validated or harmonized by OIM senior management to ensure their reasonableness and consistency.

20. As detailed in Sections B and C of the report, the additional risk limits and metrics also have certain shortcomings and limited utility in managing investment risks. Overall, OIM's investment risk strategy, with various segmented components, was yet to be made an integrated whole that is based on and closely aligned with the Fund's overall risk appetite and investment strategies. To achieve this, OIM needs to systematically define its investment risk appetite, beliefs and investment strategies at the Fund level and at the asset class/portfolio level, and also set specific alpha targets.

(1) OIM should strengthen risk management by systematically codifying its investment risk appetite, beliefs, and strategies with specific excess return and information ratio targets at the Fund level and at the asset class/portfolio level.

OIM accepted recommendation 1 stated that it is currently implementing recommendations from the Asset Allocation and Benchmark study which will be finalized by the second quarter of 2022. OIM is also reviewing the Investment Policy Statement and after that will review the Investment Procedures to include more details on the investment risk appetite, beliefs and strategies with specific excess return and information ratio targets that will serve as an input for the Risk Team to implement a new risk budget methodology.

3. Risk culture

21. In an effective risk culture, personnel involved in investment management shall have adequate: (i) recognition of the importance of embedding risk management in investment decision-making processes; (ii) involvement in developing and implementation of the risk strategy; (iii) understanding and buy-in of the risk management tools and practices; and (iv) interaction and collaboration with the risk management function. In other words, investment officers and risk officers shall have co-ownership of the risk management strategy and practices, which should be integrated into investment management processes. To

[4] Risk budgeting is an integrated dynamic risk management process that involves risk measurement, risk attribution and risk allocation. The purpose is to ensure that a fund is rewarded for the risks it is taking, i.e., to achieve optimal risk-adjusted return.
[5] Tracking error is defined as the standard deviation of the difference between the returns of the portfolio and the returns of the benchmark. It is active risk measure that indicates how actively a fund or portfolio is managed relative to its benchmark. The more a portfolio deviates from its benchmark, the higher its tracking error.
[6] Information ratio is a measure of risk-adjusted return. It is calculated by dividing excess return with tracking error.

assess OIM's risk culture and risk management practices, OIOS conducted interviews and issued a questionnaire seeking the feedback from investment officers.

22. In general, OIM's investment officers recognized the importance of investment risk management and were aware of the risk limits, including risk budgets. However, understanding of the methodology used to derive the risk limits was limited because the methodology was only presented to the Senior Investment Officers. Investment officers at large questioned the usefulness of the current deck of risk metrics in the Risk Dashboard, including tracking error, for their investment management and risk control. As explained in Section B and C of this report, multiple factors contributed to the lack of their buy-in, including: (i) issues with the risk budgeting methodology and the risk budgets set; (ii) the technical limitations of the risk system in measuring tracking error for the Global Emerging Markets (GEM) portfolio; and (iii) use of two different systems by the Investment and Risk Teams for risk monitoring.

23. The interaction and collaboration between the Investment and Risk teams also needed to be strengthened. Investment officers acknowledged that the Risk Team was historically understaffed, and the individual risk officers were responsive to their requests. However, their general perception of the role played by the Risk Team was more of a risk reporting function that assists management in risk monitoring, instead of a "thought partner" that drives dialogue and exchange of ideas, especially risk analysis that can help the Investment Team in making trading decisions. Investment officers expected that the interaction and collaboration would be strengthened through improvement of the risk management strategy and practices, especially dynamic risk analysis that could help them manage their portfolios and risks more effectively.

24. Considering that the recommendations made in this report collectively address the various aspects of risk culture in OIM, OIOS does not make a separate recommendation on it.

B. Risk budgeting

25. Since its launch in 2012, OIM has used three different risk budgeting methodologies. The one developed in-house in response to a consultant's recommendation in 2018 had various flaws and was only used for risk budgeting for 2019. The Risk Team then used a new methodology introduced by the previous RSG for 2020 and 2021 risk budgeting. In calculating tracking errors, OIM uses a quantitative model to estimate active risks going forward (on an *ex-ante* basis). *Ex-ante* tracking errors are considered more useful in risk control and portfolio construction in contrast to *ex-post* tracking errors which are generally used for reporting of realized risks. Unless otherwise specified, *ex-ante* tracking error is used in this report.

1. Setting risk budgets

(a) Information ratios used as input

26. The current methodology used by OIM for risk budgeting requires two parameters as input to derive the risk budgets (or soft limits): target excess returns and information ratios. As described in Section A above, the target excess returns were obtained from the Investment Team. The Risk Team obtained peer group information ratio data for public equities from an investment manager database. The underlying assumption for using peer group information ratios was that OIM could achieve similar risk-adjusted returns in the long run. As shown in Table 3, tracking error for an asset class/portfolio was calculated by dividing the target excess return with the peer group information ratio. A risk budget derived in this manner is sensitive to the values of the two input parameters. Therefore, calibrating them is important for setting reasonable risk budgets. OIOS examined the way the risk budgets for 2021 were set.

Table 3: Risk budgets for 2020 and 2021 (in basis points)

	Risk budgets set for 2020		Risk budgeting for 2021*			Risk budgets set for 2021		Changes in limits from 2020-21	
Portfolios	Soft limits	Hard limits	Target excess returns (A)	Peer group Information Ratio (B)	Calculated Tracking Error (=A/B)	Soft limits	Hard limits	Change in soft limits	Change in hard limits
Total Fund	100	250	23	0.23	100	100	250	0	0
Global Public Equities	295	300	36	0.22	169	295	350	0	50
North America	144	170	30	0.14	218	218	250	74	80
Europe and Middle East	109	150	41	0.31	132	109	150	0	0
Asia Pacific	113	150	30	0.26	114	114	150	1	0
Emerging Markets	392	500	110	0.19	581	581	650	189	150
Small Cap	811		300	0.20	1500				
Fixed Income	180	190	37	0.20	183	183	190	3	0
US Securitized	100	120	20	0.20	100	100	120	0	0
US Treasury	100	120	20	0.20	100	100	120	0	0
Emerging Market Debt	250	300	20	0.20	250	250	350	0	50

* Based on industry information ratio data as of 30 September 2020

27. Information ratios are very volatile at individual manager and industry levels. Thus, the peer group data for certain periods may not be available or reliable, requiring appropriate adjustments. For instance, the Risk Team planned to use the 15-year median information ratio of peers as its target information ratio. However, for risk budgeting for 2021, the 15-year 25th percentile information ratio of the peer group used for North America Equities as the median was negative; the average of the 15-year 25th percentile and the median information ratios was used for GEM Equities because the median was close to zero. There is no assurance that the information ratios obtained this way are reasonable and realistic for OIM's portfolios despite the adjustments. There are other shortcomings with the information ratios of the peer group, including a survivor bias as managers that did not perform well may have gone out of business and their data was not captured. As stated in Section A above, ideally the information ratios used for risk budgeting should be defined by the Investment teams based on their investment beliefs and strategies.

(b) Risk budgets for Global Public Equities and the whole Fund

28. Most of the calculated tracking errors were adopted as the risk budgets for the corresponding asset class/portfolio, but the Risk Team used its judgement when setting the final budget for others. For instance, the 2020 soft limit – 109 basis points (bps, or 1.09 per cent) – for Europe and Middle East public equities was kept even though the calculated tracking error for 2021 was 132 bps. This was done to account for the conservative investment strategy followed by the Investment Team, in line with the spirit of risk budgeting to allocate risk according to the investment strategy. However, the same rationale was not applied when setting the risk budget for Global Public Equities. The Risk Team kept the 2020 risk budget of 295 bps for 2021 instead of using 169 bps which was calculated based on the methodology, simply because of its disinclination to lower the budget. As a result, the risk budget for Global Public Equities may be unreasonably high.

29. While a bottom-up approach was used for setting risk budgets for the Public Equities and Fixed Income portfolios, the soft limit for the whole Fund was set at 100 bps, which was inconsistent with OIM's positioning as an active manager that aims to maximize investment return within the risk appetite set by the Pension Board. In practice, either the risk budget for the whole Fund is too low, or those for the Public Equities and Fixed Income portfolios are too high even after the allocation effect (overweighting of equities)

and diversification effect between the two asset classes is considered[7]. Consequently, there could be scenarios where the soft limit for the Fund is exceeded while the tracking errors of individual portfolios are still significantly below their soft limits, even when Global Public Equities are not overweighted relative to the policy benchmark.

(c) Hard limits

30. As shown in Table 3, the hard limits (scenarios of a tracking error reaching what is referred to as a red zone by OIM, for which actions must be taken to bring down the tracking error) were set by adding a subjective number of bps to the soft limits based on the judgement of the Risk Team. Five bps were added to the 295-bps soft limit to form the hard limit for Global Public Equities for 2020, and another 50 bps were added for 2021. Likewise, 80 and 150 bps were added to the 2020 hard limits for North America and GEM Equities, respectively, considering their higher soft limits for 2021. The gap between the soft and hard limits for different asset classes and portfolios are inconsistent. For instance, while the hard limit is only marginally higher than the soft limit for Fixed Income, the hard limit is 150 per cent higher than the soft limit for the whole Fund. Hard limits set without an inherent and consistent logic can also be out of sync with each other and less effective in practice because they are almost impossible to breach given OIM's conservative investment strategies.

2. Relevance and utility of risk budgets in practice

(a) Realized tracking errors

31. By definition, an index fund should have a tracking error of zero relative to its benchmark. According to industry research, enhanced index funds typically have tracking errors in the 100 to 200 bps range, and most traditional active managers have tracking errors around 400 to 700 bps. Despite lack of articulated active risk appetite, OIM has demonstrated strong risk-aversion for internally managed portfolios. The historical *ex-post* tracking errors of the Developed Markets public equity portfolios and the Fixed Income portfolio were between 49 and 187 bps for all periods (1, 3, 5, 7, 10 and 15 year) as of 30 September 2021, and were on a general downward trend. Their three-year rolling *ex-post* tracking errors followed a similar trend, falling from around 250 bps to about 50 to 150 bps in the last 10 years[8]. The conservative strategy was also obvious from a snapshot of the current asset allocation of the four regional equity portfolios relative to their benchmarks as of 18 October 2021: except for the GEM portfolio, sector tilts (deviations of sector weights from the benchmark) were rarely above 50 bps for all 11 economic sectors. Such a low appetite for active risk would make a risk management strategy focused on active risk less relevant.

(b) Use of risk budgets

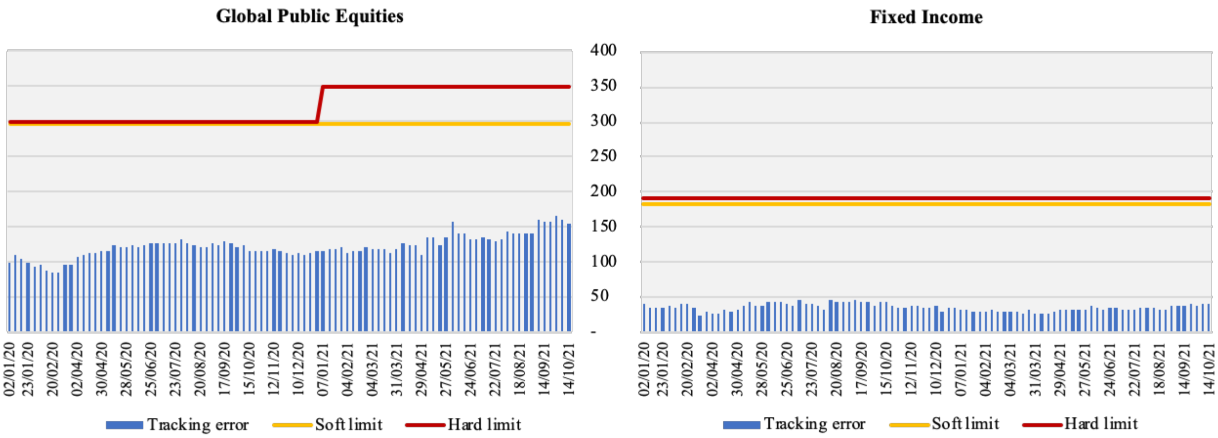
32. As shown in Chart 2, the *ex-ante* tracking errors of the Global Public Equities and Fixed Income portfolios were in general significantly lower than their risk budgets since implementation of the new methodology. The two asset classes consumed less than 50 and 25 per cent of their respective risk budgets during the period from January 2020 to October 2021. The same is true for their main sub-portfolios, i.e., the four regional equity portfolios, Mortgage-Backed Securities and US Government Bonds. Therefore, the risk budgets were either under-utilized to generate higher returns or set too high.

---

[7] Diversification effect occurs when the prices of different assets are not perfectly correlated, i.e., with correlation quotient below is 1. Diversification results in lower TE for parent portfolios.

[8] It is unclear what caused the decrease of the active risk taken by the Fund.

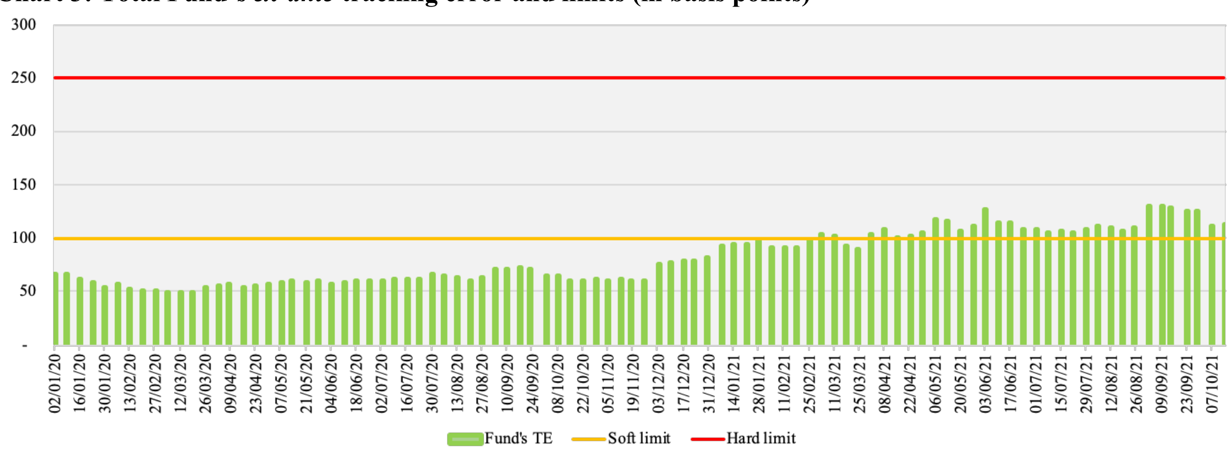
Chart 2: Tracking error versus soft and hard limits in 2020-2021



Note: The hard limit for Global Public Equities was increased from 300 to 350 from 2020 to 2021.

33. In contrast to the limited use of risk budgets at the level of the two major asset classes and their sub-portfolios, the Fund as a whole has consistently used more of its risk budget and frequently exceeded its soft limit (as shown in Chart 3) since March 2021. Considering that Global Public Equities and Fixed Income account for approximately 90 and 6 per cent of total active risk of the Fund, respectively, the disparity of budget utilization at the Fund level and at asset class level indicates the possible misalignment of the risk budgets, even after considering the allocation effect (overweighting of Public Equities) and diversification effect. The CIO raised the breach of the soft limit at the Fund level during the Internal Investment Committee's meeting of 4 June 2021, but no action was taken after the Risk Team opined that it was technically not a breach (of the hard limit) and was being monitored. The Risk Team subsequently analyzed the breach and attributed it to the Small Cap portfolio.

Chart 3: Total Fund's *ex-ante* tracking error and limits (in basis points)



(c) Sensitivity of tracking error to active exposure and impact of Small Cap

34. Through simulations (shown in Table 4) conducted by the Risk Team upon OIOS' request, it was evident that the *ex-ante* tracking error of the Global Public Equities portfolio was insensitive to significant changes in active exposure (over or under weights relative to the benchmarks). It was mainly because the active weights of the four regional portfolios relative to their benchmarks as of 30 September 2021 were not significant, and doubling or eliminating the active weights at the regional portfolio level did not have a large impact on the tracking error of total equities. In other words, it was due to the overall conservative

investment style of the Fund. The insensitivity makes it even harder to exceed the high limits set for Global Public Equities. Meanwhile, the Small Cap portfolio contributed more than 30 per cent to the active risk of Global Public Equities inspite of its small allocation at 7 to 8 per cent. Whereas OIM did not set risk budgets for, and had no control over, its tracking error, the Small Cap portfolio can generate enough noise and sound false alarms. According to the Risk Team, there is no good solution for the issue since the management of the Small Cap portfolio is outsourced.

Table 4: Simulations of active exposures and tracking errors (in basis points)

	Soft limit	Base case (30 Sep. 2021)		Double active weights* except non-actionable**	Eliminate active weights except Small Cap	Increase allocation to non-actionable by 20% and keep other active weights
		Active weight (%)	Tracking error			
Total Fund	100	0	117	135 (+18)	95 (-22)	141 (+24)
Global Public Equities	295	0.7	164	174 (+10)	157 (-7)	172 (+8)

* Refers to active weights at regional Equity portfolio level and Fixed Income sub-asset class level. Each individual Equity and Fixed Income portfolio's structure including sector tilts and holdings remain the same.
**Non-actionable refers to Small Cap Equity and private investments.

(d) Documentation of risk budgeting methodology

35. The current risk budgeting methodology was described in a PowerPoint presentation when it was rolled-out in 2019. The current Risk Manual had a section on risk budgeting but did not elaborate on how the risk budgets and weight limits were derived. The lack of sufficient documentation may have contributed to the lack of understanding and buy-in of the methodology by OIM's investment officers. In OIOS' opinion, the Performance Manual, which is part of the Risk Manual, can be used as a benchmark for documentation of the methodology.

3. Conclusion

36. In summary, industry information ratios are not ideal for risk budgeting for OIM. The approaches used to set soft and hard limits for individual portfolios, Global Public Equities and the whole Fund have followed different logic, resulting in potentially unreasonable limits and misalignment between them. Specifically, the arbitrarily set soft limit for the whole Fund and for Global Public Equities are likely misaligned. Limited use of the risk budgets allocated to the asset classes and individual portfolios also raises the question whether the Fund is taking adequate risks to maximize returns, or whether the risk limits are set too high except for the whole Fund. Without clearly articulated investment beliefs and strategies, it is difficult to conclude one way or another.

37. Considering these issues, OIOS is of the view that the current risk budgeting methodology and soft and hard limits need to be reviewed and recalibrated. OIOS notes that the Risk Team had drafted a proposal in March 2020 to switch from security-based to factor-based risk modelling because the latter is more suitable for long-term institutional investors and better aligned with best practices. As active risk can be defined as a fund's or portfolio's deviation from its benchmark's factor exposures, risk budgeting can be also be factor-based.

(2) OIM should: (i) review and recalibrate the current risk budgeting methodology by applying lessons learned and exploring factor-based risk modelling and budgeting to ensure that reasonable limits are set and aligned with OIM's investment strategies at all levels; and (ii) document the methodology in sufficient detail in the Risk Manual.

OIM accepted recommendation 2 and stated that the Risk Team planned to review the risk budgeting methodology with the assistance of an external consultant. The Request for Proposal (RFP) for the consulting service was issued in December 2021 and is expected to be finalized in the first quarter of 2022. The Risk Team will therefore work on that during 2022 and expect to complete the task in the first quarter of 2023.

4. System limitations in measuring the tracking error of the GEM portfolio

38. For the GEM equity portfolio, there were two unique technical issues with measurement of the tracking error due to limitations of the risk management system used by the Risk Team. One is its inability to "look through" the Exchange Traded Funds (ETFs) which are stock-like shares of funds that invest in many different stocks and are often held by the GEM portfolio to expand coverage of different markets. The Risk Manager system grouped the ETFs into the financial sector but the individual stocks held by the ETFs were mostly from the technology sector, resulting in an artificially inflated tracking error of the financial sector for the GEM portfolio. The other limitation of the system is its inability to account for the discrepancies between the local prices of stocks on the Taiwanese market and the prices of their corresponding American Deposit Rights (ADRs)[9] traded on the United States stock market. The daily price movements of the local stocks and their ADRs are not in sync due to time difference of trading activities. As the benchmark index for the GEM portfolio captures the former and the risk management system the latter, an artificial divergence is created that inflates the GEM portfolio's measured tracking error.

39. According to the GEM team, these two limitations of the Risk Manager system created "noise" accounting for as much as 60 to 70 per cent of the *ex-ante* tracking error for the GEM portfolio. The Risk Team used two-day moving average prices in 2021 to smooth out the differences but it did not fully address the problem. The GEM team, like other Investment teams, have been using the trading and portfolio management system for risk monitoring. Meanwhile, OIM is currently in the process of procuring a new risk system. Ideally, the Office should use one integrated system for risk management.

(3) OIM should ensure that the limitations of the current risk system for measuring the tracking errors of the Global Emerging Markets portfolio are effectively addressed through the ongoing procurement process for a new system.

OIM accepted recommendation 3 and stated that it will go through an RFP process for a new risk system and will include this recommendation in the RFP requirements. The RFP is expected to be finalized in 2023 (including contract negotiation and implementation).

C. Additional risk management practices

1. Additional risk limits

40. Apart from the risk budget, OIM established the active weight limits (lower and upper limits) by region, country and sector for public assets. According to the Risk Team, these limits were set in line with the risk budgets. That is, when the upper or lower weight limits are exceeded, the risk budgets would likely be exceeded as well. Similar to the hard-to-breach risk budgets, these weight limits were widely set and allow positions significantly higher or lower than the benchmark weights. For instance, the upper and lower limits for North America Equities are 13.19 per cent higher and lower than the benchmark weight, making it almost impossible to breach. In addition, the Fixed Income investments are subject to other limits such

[9] Stock-like securities listed in the United States against local stocks issued in various domestic markets outside of the United States.

as non-investment grade securities limits, off-benchmark limits, and duration limits. These limits provide considerable flexibility in actively managing the portfolio. For instance, while the latest Investment Policy Statement, which was yet to be issued at the time of the audit, would allow for the first time investing in non-investment grade securities, the maximum allocation to such securities was set at as high as 40 per cent in the Emerging Market Debt portfolio. Similarly, the risk limits collectively allow the off-benchmark exposure of 20 per cent including a 10 per cent allocation to non-investment grade bonds. Further, the duration limits of two-year shifts in both directions appear excessively wide as a range.

41. For the portfolios of Private Equity, Real Estate and Real Asset investments, OIM uses a different methodology for their risk limits, as it is difficult to gauge active risk-taking of private investments mainly because their benchmarks are not investable and have no market-based information. By combining the information of public and private markets, peer group behaviour and other factors, OIM sets the concentration limits by region, strategy and asset type. For instance, buyout strategy cannot exceed 80 per cent of total Private Equity investments, and co-investment is limited to 5 per cent. OIM needs to review the additional risk limits for these two portfolios to assure their reasonabless.

(4) OIM should review the additional risk limits for Public Equities and Fixed Income to assure their reasonableness and effectiveness in controlling risks.

OIM accepted recommendation 4 and stated that the Risk Team planned to review the additional risk limits with the assistance of an external consultant. The RFP was issued in December 2021 and is expected to be finalized in the first quarter of 2022. The Risk Team will therefore work on that during 2022 and expect to complete the task in the first quarter of 2023.

2. Risk Dashboard

42. In addition to risk budgeting, the Risk Team generates weekly risk reports (referred to as the Risk Dashboard) that are circulated to the Investment teams. The Dashboard presents absolute and relative risk statistics for the whole Fund, the policy benchmark, the individual portfolios and their benchmarks. Apart from tracking error, additional metrics in the report include Standard Deviation (as a measure of volatility or absolute risk), absolute and active Value at Risk (VaR) [10], or tail risk using Conditional Value at Risk (CVaR) [11]. The report shows contribution to active risk, portfolio risk and benchmark risk at the individual asset class and benchmark levels. The results of stress testing[12] under 14 financial or economic events, such as the 2008 financial crisis, are also included.

43. Despite the richness of the additional risk measures reported, their utility was not optimal because there were no investment risk limits set using these measures. It is thus difficult for an investment officer or stakeholder to judge whether the level of risk taken by the Fund as a whole or by each portfolio is reasonable (unlike the tracking errors which can be compared to the soft and hard limits). The Risk Team conducted analyses of breaches of risk budgets but did not provide actionable interpretation or takeaways based on other risk data, including reasons for the weekly changes.

3. ALM risk monitoring

[10] VaR is a risk measure that quantifies the extent of possible financial losses of a fund, portfolio, or position over a specific time frame at a confidence or probability level. For instance, there is a 95 per cent chance that the daily loss of a portfolio will not exceed 20 per cent of its total value (or there is a 5 per cent chance the loss will exceed 20 per cent).

[11] CVaR, also known as Expected Shortfall or Expected Tail Loss, is a risk measure used to evaluate market risk or credit risk of a portfolio. CVaR measures the average loss over a period at a specified confidence or probability level. For instance, there is a 5 per cent chance that the average daily loss of a portfolio will be 30 per cent of its total value.

[12] An analytical technique to show how a financial institution will be affected by certain financial events or situations, for instance,

44. In response to the recommendations arising out of a comprehensive study commissioned by the Pension Board in 2017, OIM engaged an external consultant[13] to assist in monitoring of ALM risk (i.e., the funding status) in 2018. The quarterly reports produced by the consultant, inter alia, provide an update on the Fund's three-year forward-looking funding status in terms of real rate of return, funding ratio and the required pension contribution rate under the Fund's strategic and current asset allocations. The methodology used by the consultant is similar to that of an ALM study but with different inputs. The results heavily rely on the consultant's assumptions about the expected returns and volatility of various asset classes in the next three years, which were updated on a quarterly basis. The consultant's report is not designed to provide actionable advice for investment risk management.

4. Need for dynamic risk analyses

45. In response to OIOS' question, OIM investment officers provided suggestions to improve the usefulness of the existing risk metrics and for the Risk Team to provide more value-adding risk analysis. The Risk Dashboard can be enhanced by incorporating attribution analysis of what triggered the declines or increases in the risk data, and recommendations on what actions could be taken to protect the portfolio or take advantage of the movements.

46. The investment officers also pointed out the need for analysis of potential risk scenarios and events. If investment officers have a reasonable understanding of the likelihood of a potential risk event or economic development and its impact on their portfolios, they can make an informed decision on whether to trim or increase their exposure to certain sectors that are sensitive to such events and developments. For instance, what would be the impact on a portfolio assuming that US dollar exchange rates go up or down by a certain percentage. Compared to industry practices, there is also a need to quantify the Fund's sensitivity to various market risks such as changes in the equity market, interest rates, and credit spread[14] at different levels.

47. Factor investing has been an established industry trend. A factor is a security or portfolio characteristic that drives systematic returns. Liquidity, momentum (cumulative total local 11-month return), quality (profitability, efficiency, and earnings quality), size (market capitalization), volatility and dividend yield are among the commonly known factors. Factor analysis has been used for performance and risk attribution, i.e., to identify the exposure of a fund or portfolio to different factors, and the sources of their performance and risk. Factor analysis is a major area that the Risk Team can assist the Investment teams to perform. The Risk Team has access to a system from an industry leader to conduct sophisticated factor analysis.

48. These value-adding risk analyses are in line with OIM's vision to transform the Risk Team to more of a "thought partner" for investment managers. The Risk Team can collaborate with the Investment teams to determine what narratives should be added to the reported risk metrics and what additional analyses, apart from factor analysis, can be conducted regularly or on ad-hoc basis to assist investment decision-making.

(5) OIM should, with collaboration between the investment, portfolio construction and the Risk teams, identify, design and implement a set of value-adding risk analytics, including more in-depth analysis of existing risk metrics and factor analysis, to aid in investment management and optimal risk-taking.

[13] The consultant was also conducted to perform the 2019 ALM study.
[14] Differential between the yields or implied interest rates of corporate and government bonds.

OIM accepted recommendation 5 and stated that the Risk Team planned to review the existing risk metrics methodology with the assistance of an external consultant. The RFP was issued in December 2021 and is expected to be finalized in the first quarter of 2022. The Risk Team will therefore work on that during 2022 and expect to complete the task in the first quarter of 2023.

D. New investment products and programme

1. Risk parameters and compliance measures for new products and programme

49. OIM's Investment Policy Statement states that it may use derivative instruments such as futures, swap and forward contracts for increasing efficiency, lowering the transaction costs, and hedging risks. Since the use of such instruments requires OIM to trade on margin which allows large positions in derivatives for a small amount of outlay, the Secretary-General requested the General Assembly in 2020 to authorize him to engage in margin trading. In addition, OIM proposed the establishment of securities lending programmes to enter into repurchase[15] transactions (i.e., repo or reverse repo). The General Assembly approved these initiatives in its resolution 75/246 on a trial basis for two years, but requested submission of more detailed proposals including compliance measures with a view to ensuring strict adherence to the existing policies and accountability framework and a cost-effective investment strategy.

50. Given the request of the General Assembly, OIM formed a working group to prepare the business cases for these initiatives. OIM estimated one-time and recurring costs of these initiatives at $827,500 and $1,487,568 respectively, as shown in Table 5 below. While the business cases explain the known benefits of the proposed instruments, they did not adequately quantify the potential impact on the Fund's portfolio to demonstrate their cost-effectiveness as requested by the General Assembly.

Table 5: Summary of proposed products and programme

Type of contract	Underlying asset	Primary objective	One-time cost	Recurring cost (per annum)	Potential yearly benefits
Future (derivative)	US Treasury Bills	Interest rate risk hedge	$70,000	$645,438	Unknown
Swap / Forward (derivative)	Cashflows based on foreign exchange	Currency risk hedge	$152,500	$227,465	Unknown
Repo / Reverse repo (securities lending)	US Treasury Bills Exchange Traded Fund	Enhanced return	$605,000	$614,665	$1,300,000
Total			**$827,500**	**$1,487,568**	**Unknown**

51. Moreover, OIM was yet to establish the policy governing these transactions and managing the related risks. For example, there have been no guidelines as to its approach to and parameters for the use of investment leverage in trading on margin or making collateralized loans. While the use of derivatives solely for risk hedging purposes may not be considered as leverage, the business case indicated purposes other than risk management. Reinvesting cash in securities lending programmes can also be considered use of leverage. Since there are varied ways to define investment leverage, OIM needs to clarify in the policy what constitutes investment leverage, including underlying leverage products and how to measure and monitor it. Also, there is a need to develop other guidelines to manage the risks associated with counterparties, collateral management, reinvestment of collateral cash and others, as well as actions to be taken in the event of breaches.

[15] Repurchase or reverse repurchase agreements which are legally a sale and repurchase of a fungible security and economically a collateralized loan of cash and securities

52. While derivatives can be a useful conduit for gaining or reducing exposure to currency risk and interest risk, their execution requires a cautious approach based on clearly defined investment strategy and risk management policy. Similarly, additional income to be generated through securities lending programmes needs to be properly balanced with associated risks and operational requirements. OIOS is of view that it is essential to delineate the investment strategies for the new investment products and programme and establish corresponding risk parameters and compliance measures before their implementation. OIM stated that it was still in the process of assessing the viability of these initiatives, pending the approval of the General Assembly for the related resource requirements. Considering this, OIOS does not make any recommendation on this matter.

2. Co-investments

53. In 2021, OIM launched another initiative of investing in an operating company alongside the fund manager as the majority financial sponsor (i.e., co-investment). Co-investment is expected to contribute to the Fund's portfolio in terms of diversified strategy, enhanced returns and saving of investment cost, among other things. As of 30 September 2021, OIM was in the pre-closing phase for five equity co-investment deals in a total commitment amount of $250 million. The sponsors of these deals are four fund managers with whom OIM has had a relationship in investing in their commingled funds. The Risk Team discussed with the Investment team the risks specific to co-investment, and at the time of the audit, it was in the process of establishing a mechanism to monitor such risks. OIOS will review the effectiveness of the mechanism in a separate audit at a future date.

IV. ACKNOWLEDGEMENT

54. OIOS wishes to express its appreciation to the management and staff of OIM for the assistance and cooperation extended to the auditors during this assignment.

(*Signed*) Eleanor T. Burns
Director, Internal Audit Division
Office of Internal Oversight Services

ANNEX I

STATUS OF AUDIT RECOMMENDATIONS

Audit of investment risk management in the Office of Investment Management of the United Nations Joint Staff Pension Fund

Rec. no.	Recommendation	Critical[16]/ Important[17]	C/ O[18]	Actions needed to close recommendation	Implementation date[19]
1	OIM should strengthen risk management by systematically codifying its investment risk appetite, beliefs, and strategies with specific excess return and information ratio targets at the Fund level and at the asset class/portfolio level.	Important	O	Receipt of documentation showing OIM's codified investment appetite, beliefs and strategies with specific excess return and information ratio targets at the Fund level and at asset/portfolio level.	30 September 2022
2	OIM should: (i) review and recalibrate the current risk budgeting methodology by applying lessons learned and exploring factor-based risk modelling and budgeting to ensure that reasonable limits are set and aligned with OIM's investment strategies at all levels; and (ii) document the methodology in sufficient detail in the Risk Manual.	Important	O	Receipt of evidence showing the updated risk budgeting methodology and risk limits aligned with OIM's investment strategies and detailed documentation of the methodology in the Risk Manual.	30 June 2023
3	OIM should ensure that the limitations of the current risk system for measuring the tracking errors of the Global Emerging Markets portfolio are effectively addressed through the ongoing procurement process for a new system.	Important	O	Receipt of evidence showing that the limitations of the current risk system for measuring the tracking errors of the Global Emerging Markets portfolio have been effectively addressed.	31 December 2023
4	OIM should review the additional risk limits for Public Equities and Fixed Income to assure their reasonableness and effectiveness in controlling risks.	Important	O	Receipt of evidence showing that the additional risk limits for Public Equities and Fixed Income have been reviewed and adjusted where appropriate.	30 June 2023
5	OIM should, with collaboration between the investment, portfolio construction and the Risk teams, identify, design and implement a set of value-adding risk analytics, including more in-depth analysis of existing risk metrics and factor analysis, to aid in investment management and optimal risk-taking.	Important	O	Receipt of evidence showing that a set of value-adding risk analytics have been identified, designed and implemented	30 June 2023

[16] Critical recommendations address those risk issues that require immediate management attention. Failure to take action could have a critical or significant adverse impact on the Organization.
[17] Important recommendations address those risk issues that require timely management attention. Failure to take action could have a high or moderate adverse impact on the Organization.
[18] Please note the value C denotes closed recommendations whereas O refers to open recommendations.
[19] Date provided by OIM in response to recommendations.

APPENDIX I

Management Response

UNITED NATIONS — NATIONS UNIES

INTEROFFICE MEMORANDUM — **MEMORANDUM INTERIEUR**

To: Mr. Gurpur Kumar
Deputy Director Internal Audit Division OIOS

DATE: December 22, 2021

Reference: AS2021/801/03

From: Mr. Pedro Guazo
Representative of the Secretary-General
for the investment of UNJSPF assets

Signature: Pedro Guazo (Dec 22, 2021 13:28 EST)
Email: pedro.guazo@unoim.org

Ms. Isabela Perle Munch
Chief Risk and Compliance Officer
Office of Investment Management

Signature: Isabela Munch
Email: isabela.munch@unoim.org

SUBJECT: Draft report of an audit of investment risk management in the Office of Investment Management of the United Nations Joint Staff Pension Fund (Assignment No. AS2021/801/03)

1. OIM acknowledges receipt of the draft report of an audit of investment risk management in the Office of Investment Management of the United Nations Joint Staff Pension Fund (Assignment No. AS2021/801/03).

2. OIM would like to take this opportunity to thank the Office of Internal Oversight Services and staff for their comprehensive effort including the on-going collaboration during the thorough review and analysis, and the detailed findings, observations and recommendations.

3. OIM has attached the completed form provided (APPENDIX I -Audit recommendations) including detailed responses and comments to the recommendations related to OIM.

APPENDIX I

Management Response

Audit of investment risk management in the Office of Investment Management of the United Nations Joint Staff Pension Fund

Rec. no.	Recommendation	Critical[1]/ Important[2]	Accepted? (Yes/No)	Title of responsible individual	Implementation date	Client comments
1	OIM should strengthen risk management by systematically codifying its investment risk appetite, beliefs, and strategies with specific excess return and information ratios targets at the Fund level and at the asset class/portfolio level.	Important	Yes	RSG, CIO, CRCO	3Q2022	OIM is currently implementing recommendations from the Asset Allocation and Benchmark study which will be finalized by 2Q2022. OIM is also reviewing the IPS and after that will review the Investment Procedures to include more details on the investment risk appetite, beliefs and strategies with specific excess return and information ratio targets that will serve as an input for the Risk team to implement a new risk budget methodology.
2	OIM should: (i) review and recalibrate the current risk budgeting methodology by applying lessons learned and exploring factor-based risk modelling and budgeting to ensure that reasonable limits are set and aligned with OIM's investment strategies at all levels; and (ii) document the methodology in sufficient detail in the Risk Manual.	Important	Yes	CRCO, Senior Risk officer	2Q2023	Risk team planned to review the Risk Budgeting methodology with the assistance of an external consultant. The RFP was issued in December 2021 and the selection process is expected to be finalized on the 1Q2022. Therefore, the Risk team will be working on that

[1] Critical recommendations address those risk issues that require immediate management attention. Failure to take action could have a critical or significant adverse impact on the Organization.
[2] Important recommendations address those risk issues that require timely management attention. Failure to take action could have a high or moderate adverse impact on the Organization.

Management Response

Audit of investment risk management in the Office of Investment Management of the United Nations Joint Staff Pension Fund

Rec. no.	Recommendation	Critical[1]/ Important[2]	Accepted? (Yes/No)	Title of responsible individual	Implementation date	Client comments
						during 2022 and expect to complete this task on 1Q2023.
3	OIM should ensure that the limitations of the current risk system for measuring the tracking errors of the Global Emerging Markets portfolio are effectively addressed through the ongoing procurement process for a new system.	Important	Yes	CRCO; Senior Risk officer	4Q2023	OIM will go through and RFP process for a new risk system and will include this recommendation in the RFP requirements. The RFP is expected to be finalized in 2023 (including contract negotiation and implementation).
4	OIM should review the additional risk limits for Public Equities and Fixed Income to assure their reasonableness and effectiveness in controlling risks.	Important	Yes	CRCO; Senior Risk officer	2Q2023	Risk team planned to review the additional risk limits methodology with the assistance of an external consultant. The RFP was issued in December 2021 and the selection process is expected to be finalized on the 1Q2022. Therefore, the Risk team will be working on that during 2022 and expect to complete this task on 1Q2023.
5	OIM should, with collaboration between the investment, portfolio construction and the Risk teams, identify, design and implement a set of value-adding risk analytics, including more in-depth analysis of existing risk metrics and factor analysis, to aid in investment management and optimal risk-taking.	Important	Yes	CRCO; Senior Risk officer	2Q2023	Risk team planned to review the additional risk limits methodology with the assistance of an external consultant. The RFP was issued in December 2021 and the selection process is expected to be finalized on the 1Q2022. Therefore, the Risk

Management Response

Audit of investment risk management in the Office of Investment Management of the United Nations Joint Staff Pension Fund

Rec. no.	Recommendation	Critical[1]/ Important[2]	Accepted? (Yes/No)	Title of responsible individual	Implementation date	Client comments
						team will be working on that during 2022 and expect to complete this task on 1Q2023.