

# Update and comments regarding the USS 2017 Actuarial Valuation of Sept. 1, 2017

Working party on pension valuation, Imperial College London

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## 1 Executive Summary

The USS pension valuation is highly contentious and no clear consensus has been reached, nor it is likely that a consensus will be reached. This short document outlines concerns and comments that the College might wish to consider.

- Moving the investment from equity further into bonds might not be optimal and in the long-term interest of the scheme. The analysis motivating this strategy has to be more comprehensive and detailed. This is a very important point in our opinion as there is a serious risk in that rushing to “de-risk” will simply lock-in a (perceived or actual) deficit to the detriment of the scheme. It is important to realise that the words “de-risking” are being mis-used. Moving the scheme to less risky investments appears a “good” thing, but these less risky investments have historically poor returns and now is probably an optimally poor time to make this change. Other institutions within UUK appear to have misunderstood that de-risking now is potentially “risking” instead.
- Lack of transparency remains a key issue. Without the details of the valuation methodology and outputs and how they are used in the optimization leading to the investment strategy it is very hard for an expert to make any assessment of the methodology and of the outputs. We believe a full disclosure of the methodology and of the inputs and outputs should be made, including future distributions of assets minus liabilities in unstressed and stressed scenarios, more risk figures and sensitivities, standard errors and other measures of statistical uncertainty in simulations. We made these recommendations already in our earlier documents [5, 9, 10]. This is also in line with the standards of the actuarial profession: for example, the TAS 100 documentation [1] states that

“Users for whom actuarial information is created should be able to place a high degree of reliance on that information’s relevance, transparency of assumptions, completeness and comprehensibility, *including the communication of any uncertainty inherent in the information*” (emphasis added).

Moreover, the TAS 300 documentation [2] states that

“Communications shall include sufficient information to enable the user to understand the level of prudence in the assumptions and the resulting actuarial information. [...] indication or description of the volatility of the future funding level and the major causes of the volatility. [...] information about complex matters should not be excluded on the grounds that it might be too difficult for some readers to understand. [...] an analysis of the sensitivity of the results of the calculations to changes in key assumptions.”

- Other issues regarding transparency, such as mortality, the discount rate, assumed salary increases are also lacking. The argument is apparently that each of these is a relatively small factor in isolation, however if all are taken to be the most pessimistic values then the compound effect could be substantial. Again, one would expect to see a full sensitivity analysis covering a wide range of economic scenarios to have been performed. In layman’s terms, one would expect to see error-bars on the quoted valuations, deficits and so on. It is not difficult to create scenarios where the scheme is strongly in surplus, it is strange that these are absent from all USS discussions, and this leads one to question whether over-pessimistic values for every parameter have been taken. This question arises due to lack of transparency, USS claim to have run such scenarios and hence they should be disclosed.
- As we mentioned in [10], we believe the valuation of pension schemes should be carried out in line with best practices in both finance and life insurance. The analysis should be based on several simulated joint scenarios for relevant risk factors, including their dependence and correlations. Ideally, scenarios would include future interest rates, mortality rates, salary increases, inflation, sovereign risk, FX risk,

commodities, and other possibly related risk factors. The relevant dynamics to be simulated should be calibrated to market data as much as possible, including market volatility. Statistical outputs including percentiles at different confidence levels, simulations standard errors if resorting to Monte Carlo simulation, and other statistics that may help increase transparency should be provided. Sensitivities to inputs and parameters would also help transparency.

- UUK and/or the College should engage a pensions expert such as Professor Teemu Pennanen from King's College, who works explicitly on this topic.

## 2 Background

In November 2014, in response to a request from central College, a working group, containing expertise in Mathematical Finance, Statistics, Actuarial science and experience in decision making for large external pension funds, was drawn together from the Departments of Mathematics and Physics. The group assessed the proposed changes to pension management and produced a detailed response document [5]. The document reports the group efforts in analyzing the available data, creating and investigating modelling scenarios and extracting historical data from College accounts. A number of detailed recommendations had been proposed. We refer to the original response for the detailed criticism and proposals.

Following the availability of the update documents [6], [7] and the related summary from Universities UK [8], we provided a further brief update in the document [9]. Furthermore, we provided a response to the USS questions to experts in January 2016 in the format of a short document [10], building on our two previous responses.

In November 2016 USS published a response document [11] to issues raised by the valuation forum, partly including answers to our “questions to experts” response above [10]. Moreover, in February 2017 USS published a methodology document for the 2017 valuation [12]. Finally, in September 2017 USS made available an updated actuarial valuation document [13]. In this brief document we respond to the 2016-2017 USS documents [11, 12, 13], taking into account the First Actuarial report [14] commissioned by UCU. Our responses concern *the valuation inputs/outputs and the methodology*. Our response draws on our previous documents [5, 9, 10].

The working party met with USS and ORTEC on Nov. 24, 2017. Following our examination of the ORTEC documentation and the three papers in particular:

“Ortec Finance Scenario approach”, “Relevance of Scenario models”, and “Technical Specifications: Dynamic scenario generator”, we found a number of points on the methodology that were not clear and we submitted a number of technical questions, including the following ones that we repeat from above:

1. Can we have a precise description of how the trends and the speed of convergence to long term means are estimated in the models used for USS assets and liabilities scenario generation?
2. Can we have the exact inputs that have been used, including judgemental adjustments (what the document “Ortec Finance Scenario approach” calls “view and expert opinions”, as we suspect these are key in determining the outcome). Can we also ask how these are included in the models precisely, and how such inputs/adjustments relate to current market practice?
3. Can we see a distribution and percentiles of the simulated Assets, Liabilities, and Assets minus Liabilities at different time horizons and confidence levels, as one does in value at risk or expected shortfall analysis? The distribution would be under the physical measure as in risk management.
4. Can we see the point above for different values of the expert views and stressed inputs, so as to see how the distribution is sensitive to inputs and can we also have a sensitivities analysis in terms of the main inputs? A few sensitivities are available in the USS reports but more are needed.
5. Where no-arbitrage or risk neutral valuation is used for some variables in the valuation, can we see the market risk premia that are assumed in the relationship between the physical measure and the risk neutral measure for those variables? Can we also know what calibration inputs are used for the risk neutral model calibration?

USS and ORTEC, at a meeting on Nov. 24, started answering these points and point 3 in particular by producing a few histograms and outputs. However we feel a more thorough answer to the points above is needed. Also, we would like to have more clarity on the economic principles behind the valuation. In a deterministic world the main problem pension funds face would have a simple solution: the least amount of initial capital needed to face future liabilities is given by discounting the projected claim payments by the future rates of investment returns. This is the classical best estimate encompassed by actuarial practice. However, the world is not deterministic and the future is not known. Attempts to adjust the incorrect valuations include the introduction of risk margins or adjusting the discount rates. Such “improvements” hardly address the problem of hedging the claim payments and as a consequence result in problematic valuations, especially under unexpected market conditions.

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