

Risk Valuation Analysis Discussion – Finance Office

August 3, 2010

Identifying the Value of a Defined Benefit Plan to UC Employees: The methodology used in the Total Remuneration study (“TRS”) was developed in order to put together a comprehensive description of market competitiveness for salary and benefits for all faculty and staff groups. It was not, however, developed to serve as a foundation for new plan design for a new tier for UCRP with the commitment of billions of dollars from taxpayers and families. Specifically TRS is calculated based on the expected value of all components of employee compensation at a point in time. Due to this “expected value” methodology TRS does not appropriately capture the complete value of the benefits UC provides to our employees; for example, TRS gives no value to the guarantee of investment performance underwritten by our defined benefit retirement plan versus a defined contribution plan. As such, it understates the value of the proposed New Hire Tier 1(A) or any defined benefit plan for that matter, and falsely gives the impression that the new tier plan is greatly disadvantageous to our staff and faculty.

Based on the information from Hewitt/Mercer regarding our comparator 8 institutions (primarily DC plans), the average current employer contribution for our comparators is 8.8% for retirement benefits. The New Tier Plan 1(A) would cost UC 7.3%. According to TRS, Plan 1(A) is 41% *below* the market average even though the contribution rate is only 17% below the comparator average. To illustrate how dramatically the TRS analysis undervalues the DB plans analyzed, we calculate that it would take an Employer contribution of between 13% and 14% in a new DB plan to be considered *EQUAL* to market average DC plans which average 8.8% employer contribution. Thus, the TRS methodology assumes that even with the University underwriting 7.5% investment performance [the significant value to employees of this will be addressed later in this paper], UC as the employer would need to contribute between 47% and 59% more dollars every year over the working life of an employee in order for the employee to be delivered equal value to a DC plan where the employee assumes 100% of the mortality risk and 100% of the investment risk. Further you will see that even at the 9% Employer contribution favored by some Steering Committee members, UC is still 22% below market, even though our comparator average is 8.8%. After discussions with Hewitt, Mercer and Segal regarding this issue, we believe these calculations to be misleading for the following reasons: salary differences and actuarial assumption differences.

- *Salary Differences:* Since the Total Remuneration Study is based on absolute dollars and UC’s average salary is lower than the market average, for any given level of benefit, UC’s benefit per the Remuneration Study will *always* be lower. For example, if both UC and its comparators had a 10% cost retirement benefit, since UC’s total population salary average is \$112,198 and the market average is \$124,177, UC’s benefit would be lower in total dollar terms. Salary differences account for 30% of the discrepancy.
- *Actuarial Assumption Differences:* There are actuarial methods and population assumptions that are different between the Segal Normal Cost calculations and the Hewitt Total Remuneration Study. Due to these differences, UC is getting credit for only a 6% employer contribution in the study versus our 7.3% cost of providing our pension plan. Due to this phenomenon a 7.3% DC contribution by UC would actually result in higher total remuneration for UC employees than our current modeled plan. Methodology differences account for 70% of the discrepancy.

Thus, once you account for these differences, Plan 1(A) is approximately 17% below market (7.3% vs. 8.8%) (this is true only if you give NO VALUE to the guarantee of investment performance that a DB plan provides to an employee – see below).

Finally, of particular importance is the value employees derive from having UC shoulder 100% of the investment performance risk for both the employer and employee contributions from the year they are made through the death of the employee, which in some cases encompasses over a 30 year period or longer. This value was clearly evident when we consider that the UCRP portfolio lost \$15.6 billion during the market downturn of FY 2008 and FY 2009. Currently, UCRP still has \$10.5 billion of losses left to be amortized, the interest expense on these losses will amount to an additional pension payment of \$780 million each year for the next 15 years (using current amortization policy) that UC as an employer will be required to make. We suspect that given numbers like this – and the losses friends and colleagues with 401(k)-style plans suffered – our employees see clear value in being insulated from such a financial collapse.

Indeed, the Academic Senate in 2009 acknowledged as much when, in a discussion on the pros and cons of a lump-sum cash out payment stated,

“...A retiree could instead use the lump sum cashout to purchase a commercial annuity which would provide lifetime benefits; however, because the interest rate on commercial annuities is well below the 7.5% actuarial rate of return assumed in computing the lump sum cashout for UCRP, the commercial annuity would yield a much smaller monthly benefit than the employee would receive by electing monthly retirement income from UCRP.

“...In short, an employee who elects the lump sum cashout assumes substantial investment risk.”

Surely nobody believes that this “substantial investment risk” only exists at retirement, but somehow is nonexistent prior to age 65?

In our view, the challenge is to quantify the value of the benefit to an employee of not having to assume “substantial investment risk.” Yet the TRS doesn’t calculate this valuable benefit at all. As such, for purposes of advising the President and our Board of Regents, the PEB Steering Committee cannot recommend a pension design that relies solely on the incomplete analysis in the TRS. It is important and appropriate that we consider and calculate a value to the employee when UC, as the employer, assumes 100% of the investment risk on their behalf in the defined benefit UCRP program.

Alternative Ways To Quantify The Value To Employees For *NOT* Taking Investment Risk:

In late June, the PEB Steering Committee asked us to attempt to quantify the value of the University’s investment risk during the life of an employee. We could find no simple, widely accepted methodology that addresses the charge from the Steering Committee. Below we discuss three risk valuation methods, which are accepted by the pension experts we spoke with as valid approaches.

Annuity: DB and DC plans have two distinct purposes, income replacement and capital accumulation, respectively. From a benefit standpoint, a DC plan becomes a DB plan at annuitization. Thus, to compare the relative value of the two types of plans, we calculated the annuity value of UCRP for one sample faculty member in the New Tier Plan(1A) with a full UC career and compared it to a similar annuity purchased by an individual with a DC cash balance at retirement, assuming a higher 8.8% employer annual contribution. In order for an employee to receive the same benefit they would receive under our Tier 1A plan (7.3% employer contribution), they would need to be in a DC plan with a 15.6% employer contribution (assuming an annuity discount rate of 4.5%). At a 7.5% discount rate (well above current market levels), the required DC contribution rate would be 10.7% of payroll. At either level, the benefit from our New Tier Plan would be more valuable to the employee by a comfortable margin.

It is important to note that while the value of the annuity earned for employees that leave mid-career is lower than that of full career employees, the TRS, along with our actuarial study, does incorporate employee turnover into their analysis and thus accounts for employees that leave mid-career in their total values. While UC may benefit from some employees choosing not to leave mid-career, due to the potential upside in retirement benefits that they would be giving up if they stayed until retirement, quantifying what a UC employee “gives up” in retirement benefits if they leave early is not an accurate way to compare their position had they been in a DC plan.

What is really being compared is the value of the annuity benefit the UC employee has accrued, over the cash balance that the employee would have been able to take with them, had they been in a DC plan. In addition, when valuing the UC annuity, we would need to use an annuity factor for the calculation, as simply using the expected value of the years of payout does not take into consideration individual longevity risk. Thus, similar to the analysis above, we believe a more accurate comparison would entail calculating the present value of the annuity stream a UC employee has earned and comparing it with the DC balance an employee would have accrued at another employer at the time of departure. In addition, the annuity stream should be discounted at the rate that it could be purchased in the market. A key portion of this analysis is to include an annuity factor, as these take longevity risk into account; that is, the risk that you could live much longer than the expected payout period.

Black-Scholes: The Black Scholes option pricing model – which admittedly has limitations – is another way to get at a value that the Committee seeks to establish. UCRP is invested in risky assets and if these assets are not sufficient to pay accrued benefits in the future, additional money would need to be put in to cover the total accrued benefits. This arrangement resembles a financial instrument known as a “put option.” A put option guarantees against the value of a stock falling below a certain level. UCRP, as a defined benefit plan, effectively provides such a put option via their legal ability to pay benefits accrued. While providing a put, they are also selling a call, as any upside is retained by UCRP. Thus, we calculated the net value of buying a put and selling a call. For the variables outlined in the Black-Scholes analysis presented to the Steering Committee on July 15th, a Share Price of \$1,070M (normal cost of 11.9%), a Strike Price of \$3,166.9M and a 15 year expiration period (estimate of the midpoint of a public pension’s stream of future benefit payments), a 4.5% riskless rate and an annual volatility of 10.6%, the net cost to UC of buying a put and selling a call can be calculated as approximately \$542 million or 6.28% of payroll.

Changing the riskless rate to 6%, changes the value to approximately \$251 million or 2.7% of payroll. Some might argue that the Black-Scholes model cannot be applied given the long-dated nature of pension benefits; however, the Black-Scholes model provides a theoretical framework with which to assess the magnitude of UC's risk.

Normal Cost: If we were to assume that a 4.5% discount rate is the appropriate comparable rate and were to discount our UCRP benefits at a 4.5% rate, total normal cost necessary to remove investment risk to the employer (UC), and thus mirror the residual investment risk of those comparator institutions with a DC plan, would increase to 24.1% from 11.9% for the New Hire Tier (1A) plan. With an average employee contribution of 4.6%, UC's employer normal cost contribution would increase from 7.3% to 19.5%. At a 6.0% discount rate, UC's contribution rate would increase to 13.2%. That is to say, it is UC's ability and willingness to assume investment risk on behalf of its employees that reduces its required contribution rate. If UCRP were to actuarially reduce that risk, it would require a much higher contribution rate, even though there would be no change in the benefit payout to employees. At an employer contribution rate of 13.2%-19.5% for the New Hire Tier 1(A), UC would be way above the average 8.8% contribution rate of its comparators.

The valuation exercises above are modeled using a 4.5% riskless rate, the 10 year average of a 15 year Treasury bond. We also calculated each analysis at a 6.0% discount rate, to approximate the Senate analysis, primarily focused around the yields on UC Taxable Revenue Bonds, currently 5.62% for a 20 year bond, 5.98% for a 30 year bond. (We would note the difference between a bond with the full faith and credit of the US government and a UC revenue bond, as UC cannot issue full faith & credit debt).

We believe the use of a risk-free rate (in this case 4.5%) is appropriate for several reasons. First, is the premise that once risk is taken into account, all securities have the same value, and thus any cost difference represents the cost of risk. Thus, securities with identical future payoffs must be priced equally. A defined contribution plan is essentially riskless to an employer, as once the contribution is made as the employer has no further obligation to the employee. A defined benefit plan however, guarantees a certain benefit pay-out to its employees in the form of an annuity payment once they retire. In order for UC to eliminate all of its future investment risk and thus make its situation comparable to that of employers with defined contribution plans, it would need its assets to be risk-free, such as US Treasuries, and therefore would essentially earn an annual risk-less rate. Thus, the three analyses above utilized a riskless rate as the discount factor in order to make the two plans comparable.

Secondly, employees in UCRP are not all subject to UC's credit risk. That is, UCRP currently has over \$34 billion of assets ready to pay its benefit obligations. Just as a loan rate offered to an individual is lower when there is collateral involved, the assets in UCRP represent collateral to UC employees, lowering the credit risk. Employees have substantial collateral in the form of UCRP assets and future projected contributions to the plan. Thus, a more accurate rate would be a combination of the risk-free rate for the portion of the plan obligations that are funded/projected to be funded and UC's taxable rate for the portion projected to be unfunded. As UC's plan is to achieve 100% funding status, that is have enough money in the plan to pay for all its obligations, then a risk free rate would be more a appropriate discount

rate.⁵⁸ (It is important to note that even at a 6% discount rate, each analysis shows there is tremendous additional value to a DB plan to the employee over and above that which is quantified in the Total Remuneration Study).

Finally, we do not believe a responsible investment professional, anywhere in the country, would consider it possible to secure a guaranteed return of 6% over 15 years without risk. One cannot make such broad assumptions just because our taxable pension obligation bonds would price at 6.00 – 6.50%. For example, last we checked, the market hardly sees securities from the State of California as riskless.

A central question, in this regard, for the PEB Steering Committee is this: do we want a report to go to the President and the Board of Regents that pretends there is no investment risk in achieving 7.50% per year forever? As stated above, UCRP lost over \$15 billion during the recent financial meltdown, a loss that will cost the University over \$780 million annually in interest costs, or 9% of payroll, not including the UAAL principal. Is that how we define “no risk?” How much credibility should a report have which suggests our guaranteed 7.50% return has no risk?

Conclusion: It should be very clear that a DB plan delivers benefit to the employee (and the associated cost of this benefit to the employer) BEYOND the dollar contributions put into the plan. These benefits relate primarily, but not completely, to the risk transfer from employee to employer related to investment performance. Some have argued that this risk transfer has no cost. We need only look at the State of California’s own massively unfunded DB plans, which have not had any contribution holiday, to see a vivid and proximate example of the cost of this risk. As stated by the Wall Street Journal on August 2, 2010:

This year, the Golden State is running a \$19 billion deficit, at least \$6.2 billion of which is owed for retiree pension and benefit payments. That number is expected to nearly triple in the next decade as the pension tsunami gains speed. All told, California's **unfunded pension liability is scored at more than \$120 billion**, with some estimates rising to \$500 billion.

For that, Californians can thank the state's bloated benefits, low employee and employer contributions to the pension plans, and the inflated investment-return assumptions used to hide pension costs. As investment returns have turned south, the state has had to make up for shortfalls by cutting back on higher education, parks and social services.

If we are to continue with a DB plan, as the PEB Task Force is recommending to do, we must embrace the reality that such a plan is more expensive than it appears. As shown below, the same “value” or “benefit” to our employees (using a methodology other than the incomplete TRS) would require substantially greater contributions from taxpayers and tuition-paying parents to our employees for either a more generous DB plan or a similarly constituted DC plan.

⁵⁸ Unlike securities where any price differentials would be arbitrated immediately, pension plans cannot be sold in the market, and thus, cannot be arbitrated. However, just because it is not possible to take advantage of the arbitrage value, does not mean that this value does not exist. This is the reason it is perfectly valid to use UC’s taxable bond rate as a proxy for its UCRP unfunded liability discount rate.

Alternative Normal Cost Valuation Metrics – DB vs. DC Comparison	
UCRP Tier 1A	7.3% Employer Contribution
<i>Additional Unrecorded Value Above 7.3% Employer Contribution</i>	
Annuity Method	3.4%-8.3% Employer Contribution
Black-Scholes	2.7%-6.3% Employer Contribution
Normal Cost	5.9%-12.2% Employer Contribution

It is for this reason that we support Plan 1A as fair to employees vs. other comparator plans. In a nutshell, we believe our employees will be fairly and well served by a defined benefit plan that, after a career of service to the University and when integrated with Social Security benefits, will provide an adequate lifetime retirement income - unaffected by investment risk and performance or by the risk of outliving an account balance. The UCRP benefit will in fact have a guaranteed maintenance of purchasing power at the 80% level to protect retirees from inflation. This proposed purchasing power protection provision is in addition to an annual, base building COLA. For the reasons stated in this paper we also believe that a design such as Option A is on the generous side of fair versus comparator defined contribution plans and one that has an even distribution of total replacement income across all salary levels. The other final option under consideration does not provide as even of a level of replacement income across all salary levels.