

Faculty Comments on “Risk Valuation Analysis Discussion

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Introduction and Overview of the Issues

The President’s Task Force on Post-Employment Benefits (PEB) has, as part of its charge, the responsibility to consider the competitiveness of any new designs recommended for pensions or retiree health benefits. Since 2007, UC has worked with both Hewitt Associates, LLC (Hewitt) and Mercer, LLC (Mercer)---two national consulting firms---to gauge the competitiveness of total remuneration at UC. This work culminated in a study posted on UCOP’s web site last fall, the Total Remuneration Study⁶¹. As UCOP states, that study was conducted “follow[ing] standard industry practices”. Those industry practices have not included an attempt to attribute a value to a defined benefit plan from shifting investment risk to an employer, nor did any of the three bids for conducting the total remuneration study indicate the availability of any methodology to assess the value of the shift of investment risk.

The total remuneration study methodology was intended to serve as the basis for studying the effects on UC’s competitive position from adopting proposed new designs for pension and retiree-health benefits. Results provided to the PEB Steering Committee (Steering Committee) in June/July 2010 show that the two pension plans included in the draft executive summary to be forwarded to the President are uncompetitive. As Academic Senate participants in the PEB process, each of us a member of one of the three workgroups (Pensions, Retiree Health, and Finance), we have emphasized since the PEB process began in Spring, 2009 that it is essential to maintain competitive total remuneration; to do otherwise would be highly detrimental to UC’s ability to recruit and retain excellent faculty and staff, ultimately compromising the quality of our ten campuses and five medical centers, and threatening our standing as the world’s preeminent public research university. In spite of the critical need for maintaining competitive total remuneration, no analysis of the

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⁶¹ http://www.universityofcalifornia.edu/news/compensation/total_comp_facts_nov2009.pdf

consequences of the proposals for benefits reductions were performed before the three PEB workgroups ceased their deliberations.

After reviewing the total remuneration study results showing that the proposed plans are uncompetitive, two members of the steering committee and a UCOP co-author drafted a document that purports to demonstrate substantial bias in the total remuneration study results.⁶² This analysis was introduced only after the total remuneration study demonstrated that pending proposals for plan design considered by the Pension Workgroup were uncompetitive across all employee groups. We were asked by Steering Committee Members Henry Powell (Chair of the Academic Senate) and Daniel Simmons (Vice Chair of the Academic Senate) to comment on the analysis after its presentation to the Steering Committee. The full document summarizing those earlier analyses was drafted by Steering Committee members Peter Taylor and Frank Yeary and the Associate Director in the Office of the Chief Financial Officer, Maria Anguiano (hereafter Taylor/Yeary/Anguiano). Their document has not been reviewed by the Steering Committee and does not represent a position of the Committee.

The assertion that total remuneration study is biased is based on a claim that the University, as the employer sponsor of a Defined Benefit (DB) plan, UCRP, takes on “*uncompensated* investment risk” and that a “risk adjustment” is needed to fairly reflect the value to employees of a DB pension plan. This claim is simply incorrect. In fact, the actuarial assumed discount rate recommended by the Segal Company, the Regents’ actuary, contains a substantial risk adjustment. Segal estimates the expected return of the UCRP portfolio to be 9.25%, and applies a 1.75% risk adjustment, reducing the assumed rate of return to 7.5%. Segal estimates that there is a 74% probability that the actual return will equal or exceed the assumed rate of return in any given 15-year period.⁶³ Thus, the rate of return assumption adopted by the Regents for purposes of valuing UCRS benefits and liabilities already incorporates an adjustment for the investment risk inherent in the plan. In addition, the actuarial assumptions recommended by Segal and adopted by the Regents are appropriately conservative in many respects, and this conservatism provides further assurance that the plan, if properly funded by contributions, will have sufficient funds to meet its obligations.

⁶² “Risk Valuation Analysis Discussion”, by Peter Taylor, Frank Yeary, and Maria Anguiano.

⁶³ University of California Retirement Plan ACTUARIAL EXPERIENCE STUDY: Analysis of Actuarial Experience During the Period July 1, 2002 through June 30, 2006. (April, 2007)
<http://www.universityofcalifornia.edu/regents/regmeet/may07/c14attach2.pdf>

The actuarial assumptions adopted by the Regents are appropriately conservative in another important respect. The actuarial assumed rate of salary growth used by Segal is 5.5%, which is significantly higher than the 4.0% rate used by Hewitt and Mercer in the total remuneration study. The use of a higher rate increases the projected future pension benefits, raising normal cost. If the Hewitt-Mercer assumption turns out to be correct, then Segal's normal cost calculation will turn out to have been too high, and the recommended employer and employee contributions will be more than sufficient to ensure that the plan will have sufficient funds to meet its obligations. In other words, the conservative actuarial assumption on salary growth and other key factors significantly reduce the risk that the plan will be underfunded in the future, provided that it is properly supported by contributions. The conservatism of the actuarial assumptions is an implicit risk adjustment not considered in the Taylor/Yearly/Anguiano analysis.

All three firms that bid for the total remuneration study contract use methodologies with no explicit risk adjustment, beyond the inherent conservatism in the actuarial assumptions, on investment risk, salary growth, and other factors. The University has accepted this methodology in its published descriptions of total remuneration as the basis for the University's assessment of compensation levels for all employee groups. Taylor/Yearly/Anguiano nonetheless insist that those results are biased and flawed because of the absence of what they believe is the value of the investment risk borne by the University. We assume that the consultants who have prepared this methodology do not agree; we certainly do not.

Investment risk was not the main cause of UCRP's current difficulties. The Office of the Treasurer has calculated that, if UC had made contributions equal to normal cost, rather than stopping contributions for nineteen years, UCRP would have been 120% funded as of 6/30/09, despite the market turmoil of 2008-09. Over the long run, UCRP's earnings have exceeded the 7.5% actuarial assumption; we face an unfunded liability because of the contribution holiday, not because of investment risk.

While focusing solely on downside investment risk, the Taylor/Yearly/Anguiano analysis ignores substantial institutional value to the maintenance of a defined benefit plan, much of which translates into substantial reductions in employer costs and reduces the overall value of the plan to employees.

- An employee leaving UC in midcareer gives up a large fraction of the value of their pension accumulation, amounting to two or more years of salary for many employees. This "golden handcuff" provides substantial institutional benefits to UC in retaining employees midcareer.

- The University also benefits from the fact that UCRP encourages retirements near the targeted retirement age in the Plan; employees at institutions with a defined-contribution (DC) plans have considerably greater incentives to delay retirement. In our analysis below, we term this the “golden tennis court”, an adverse outcome that UC avoids. These institutional benefits provide significant compensation to UC in return for accepting investment risk.

The Taylor/Yearly/Anguiano analysis asserts that the plan design Option B, which Segal estimates to have employer normal cost of 9.0%, appears uncompetitive when compared with a 9.0% employer contribution DC plan, and uses this as an argument to discredit the total remuneration study. If the Segal 5.5% salary growth figure is correct, then the total remuneration study does understate the value of UCRP to employees. We suspect that using a 5.5% salary growth assumption in the total remuneration study, and bringing UC salaries up to competitive levels, would result in Option B being valued as roughly competitive. On the other hand, if the Hewitt-Mercer salary growth figure is correct, then Option B is uncompetitive, even after closing the UC salary lag, and its normal cost is significantly lower than estimated by Segal; holding employee contributions constant, it would cost UC significantly less than the estimated 9.0% employer normal cost. There is no great mystery here.

Even if the Segal 5.5% salary growth assumption turns out to be correct, so that Option B turns out to be competitive, the proposed Option A remains uncompetitive for all employee groups. Nonetheless, several members of the Steering Committee advocate adoption of Option A.

Taylor/Yearly/Anguiano indicate that they “could find no simple, widely accepted methodology that addresses” the appropriate risk-adjustment, but that their three approaches are “accepted by certain pension experts we spoke with as valid.” The first phrase speaks for itself. Unfortunately Taylor/Yearly/Anguiano fail to cite the pension experts to whom they refer or any work that supports the application of their analysis.

Taylor/Yearly/Anguiano assert that the 7.5% discount rate, recommended by Segal, and which all three firms bidding to produce the total remuneration study would have used, is inappropriate, and they argue instead for a risk-free rate over a fixed fifteen year term. This same recommendation was made in the highly publicized recent term project by a group of Masters students at Stanford, and the two analyses share the same misconception about risk. The Taylor/Yearly/Anguiano’s analysis includes three proposed approaches, two of which we have previously demonstrated to be flawed. The third, newly proposed, suffers from the same problems.

The written analysis provided by Taylor/Yearly/Anguiano does not address our criticism of the approaches they have put forward. In the next section of this document, we restate our criticisms. In addition, we propose two methodologies measure the risk and institutional benefits that UC assumes in offering a DB plan. The first focuses on the appropriate valuation of the benefits to employees, while the second focuses on the risk adjustments and institutional benefits already built into the Total Remuneration methodology. Both methods indicate that the 7.5% discount factor is appropriate.

Detailed Critical Analysis of Taylor/Yearly/Anguiano Arguments

Taylor/Yearly/Anguiano suggested three approaches to valuing the benefit to employees from that risk-bearing role: an annuities approach; a Black-Scholes/option pricing approach; and a normal cost approach. We discuss these in turn.

1. The Annuities Approach

The Taylor/Yearly/Anguiano analysis values a DC plan by using the accumulation at retirement to purchase a commercial single-life fixed annuity at retirement; the payments from such an annuity would be computed using an interest rate of about 4.5%. However, only a small proportion of DC plan participants choose to purchase commercial annuities. The vast majority keep their accumulation intact and invested within the DC plan, drawing it down through the course of retirement. In other words, retirees' choices reveal that they view a commercial annuity as an unattractive option, perhaps because they wish to take on investment risk in order to earn a higher return, or they wish to leave a bequest to their children or grandchildren. In addition, we note that TIAA-CREF, which provides DC retirement savings vehicles to employees of many competing universities, heavily markets variable annuities which provide retirees with protection against mortality risk (specifically, the risk of dying very old and possibly outliving one's savings) while allowing for the higher rates of return available in equities. Thus, Taylor/Yearly/Anguiano value DC plans as if retirees in those plans were forced to make a choice that the vast majority of DC plan participants find unattractive and reject.

The Taylor/Yearly/Anguiano analysis is based on one hypothetical faculty member, who begins service at age 39 and retires at age 65. We have indicated, for several years, that it is essential not to base comparisons between DB and DC plans on such a single "typical" employee profile, as the results will be unrepresentative of the experience of all employees. DC plans are worth more, early in the career (due to the compounding of interest over a large number of years until retirement); indeed, the DC contribution from an Assistant Professor's first year of employment will, with accumulated earnings, typically contribute more dollars at

retirement than the DC contribution from the last year of employment as a full Professor. By contrast, DB plans accumulate more of their value later in the career. It is highly misleading, as a result, to compare two dissimilar plans based on any one year and any one hypothetical employee. The Taylor/Yearly/Anguiano analysis omits the portion of the career when the DC plan accumulates most value, and focuses solely on the portion of the career when the DB plan accumulates most value. The total remuneration study correctly averages over the entire population of UC employees.

2. The Black-Scholes/Option Value Approach

The first version of the Taylor/Yearly/Anguiano analysis using the Black-Scholes method contained a number of elementary errors that indicated a serious misunderstanding of option pricing.⁶⁴ The present version corrects the errors, but their argument still reduces to the argument of the Stanford graduate student study, disguised in a phony layer of sophistication.

1. The Taylor/Yearly/Anguiano analysis assumes that UCRP holds its current portfolio, but then purchases a put option and sells a call option on that portfolio, in order to eliminate the investment risk on a specific date exactly 15 years from today. They correctly compute the net cost of buying a put and selling a call on the UCRP portfolio as \$542M. Taylor/Yearly/Anguiano seem unaware of an elementary relationship for options known as put-call parity. If a portfolio contains one share of a stock at price S , along with a put on the stock at exercise price X and expiration date T , and is also short a call on the stock at the same exercise price and date, the portfolio at date T is worth exactly X ; the value of this portfolio today must be exactly X , discounted back to today at the risk-free rate. This does not depend on the Black-Scholes model at all. Taylor/Yearly/Anguiano are simply computing *the normal cost of UCRP, assuming that the UCRP pension portfolio were invested entirely in 15-year Treasury bonds paying a risk-free rate of 4.5%; it is the analysis done by Stanford graduate students in elaborate disguise*. The calculation via Black-Scholes simply obscures this fact, disguising it in a phony layer of sophistication.
2. Because Taylor/Yearly/Anguiano's calculation replicates the argument of the Stanford graduate student study, it suffers all of the flaws of that study:
 - a. When UC last bid the total remuneration study, none of the three finalist bidders proposed using a risk-free rate in valuing the pension benefit. All three used an estimated rate of return

⁶⁴ For example, they asserted the Black-Scholes value of a particular call option was approximately \$500,000, when the correct figure is approximately \$390,000,000.

on a diversified portfolio of equities and fixed-income securities. Now Taylor/Yearly/Anguiano propose overvaluing benefits by valuing UCRP benefits as if they were funded by investments in 15-year Treasury bonds.

- b. GASB requires that the unfunded liability and normal cost of UCRP be calculated using an interest rate that reflects the long-run return on a portfolio with the actual asset allocation held by UCRP; Taylor/Yearly/Anguiano's approach, like that of the Stanford graduate students, is to substitute a risk-free rate for the GASB rules.
- c. In the absence of bid-ask spreads, Taylor/Yearly/Anguiano's proposed portfolio would perform identically to a portfolio invested entirely in 15-year U.S. Treasury bonds.⁶⁵ Taking bid-ask spreads into account, the proposed portfolio is dominated by a portfolio invested entirely in 15-year U.S. Treasury bonds. The analysis would suggest that the Regents direct the Treasurer to replace UCRP the entire portfolio in 15-year Treasury bonds, which would be superior to Taylor/Yearly/Anguiano's proposed portfolio. If the Regents were to do so, they would be acting in a way that is clearly contrary to their own long-established investment policy. It would be unwise for reasons explained in the Regents' Investment Policy, as well as in material supplied on behalf of the University to University employees and retirees, by Fidelity Investments. If the University did adopt a portfolio of 15-year Treasuries, it would be required under GASB to reduce its assumed rate of return to 4.5%, which would greatly increase the unfunded liability of UCRP and require a dramatic increase in employer contributions simply to amortize the unfunded liability. In other words, the "savings" that would be obtained by using this argument to justify reduced benefits would be overwhelmed by the additional cost to the operating budget of amortizing the unfunded liability. *If UCRP retains its present portfolio and present GASB earnings assumption, the University cannot defend using a much lower earnings assumption as a justification for cutting benefits or increasing employee contributions. It is as if UCRP were making a DC employer contribution, but only offering a single investment option (15-year Treasury bonds); a DC plan with only that single option would almost certainly not meet UC's obligations under federal law.*
- d. UCRP's obligations do not come due all at once in 15 years; they are spread over many years, and stock returns exhibit mean reversion. This mean reversion, which is not taken into account

⁶⁵ It is actually infeasible to buy Taylor/Yearly/Anguiano's proposed portfolio, which consists of holding the UCRP portfolio, buying a put on the portfolio, and selling a call on the portfolio, since equity index options with a 15-year time horizon are not currently traded.

in the Black-Scholes Model, means that the risk at a fixed horizon can to a significant extent be insured away when obligations are spread over many years.

- e. The most respectable version of the Stanford graduate student argument is that pension obligations are “like” state government bonds, and so the obligation should be discounted by a rate “like the rate” on state government bonds. However, since it would not be appropriate to place tax-exempt bonds into a tax-deferred pension plan, the appropriate rate would be the rate on *taxable state bonds*, which is more like 6-6.5%, rather than the 4.5% rate that might be appropriate for 15-year Treasury bonds. Thus, the appropriate interest rate here should be 6-6.5%, not 4.5%.
- f. As we have noted, pension obligations share some characteristics of state government bonds, but they are very different in other respects. The pension accumulation of a mid-career employee declines by half or more if that employee is laid off or quits. By contrast, if an employee buys a state bond, he or she can quit UC to take another job and suffer no decline in the value of that bond. For a 45-year old employee planning to retire at age 65, the “bond” (the value of the portion of his/her pension accumulation related to past service) earns 8.6% interest annually if s/he remains at UC; the rate is high precisely because, by continuing to work at UC, the employee gradually unlocks the golden handcuff over time. So the interest rate on these peculiar state “bonds” is 8.6%, not 6-6.5%, and certainly not 4.5%.

3. The Normal Cost Approach

It is difficult to sort out what Taylor/Yearly/Anguiano have in mind here. They appear to have calculated normal cost based on investing all UCRP assets at 4.5%. The case against doing so is overwhelmingly strong, and the normal cost of 24.1% that they derive from this analysis indicates why it would be a bad idea. Since Taylor/Yearly/Anguiano do not actually advocate such an investment policy, nor are we aware of public pension plans that follow this approach, it must be the case that the compensation for bearing risk within the plan is, in fact, adequate. As we have noted, the risk is overstated by implicitly equating it to what one individual faces, or by asserting that the plan must be 100% funded at a specific date 15 years in the future. But the risk that remains is compensated for, by a risk premium embedded in the plan, and by the golden handcuff and golden tennis court values. In spite of this, Taylor/Yearly/Anguiano prefer to remain within the confines of a highly imperfect analogy between a pension and an investment in a single, state government (or UC) bond.

Taylor/Yearly/Anguiano also seem to think that the assets in the plan represent collateral to justify a risk-free rate. Since Taylor/Yearly/Anguiano emphasize the fact that these assets can decline in value, it is hard to accept this argument; they can't have it both ways. Indeed, if the assets in the portfolio were presented as collateral to an investment bank, that bank would insist on marking the assets to market each day. If the value of the assets declined, UC would be required to post additional collateral; do Taylor/Yearly/Anguiano propose immediately providing additional collateral to UC employees and retirees, now that UCRP is substantially underfunded? Their argument ignores the fact that UC retirees' pensions are treated the same as the claims of holders of UC bonds, and that no rational investor would equate a University of California pension with risk-free securities backed by the full faith and credit of the U.S. government, regardless of the plan's funding status. Taylor/Yearly/Anguiano also ignore the fact that other State of California and University of California bonds are also secured by collateral. For example, bonds used to fund student housing are secured by the revenues the housing facilities generate; general obligation bonds are secured by all the University's revenues and assets, including real estate in La Jolla, Westwood and San Francisco. Nonetheless, taxable State of California and University of California bonds bear interest rates far above those of Treasury bonds. Thus the appropriate risk-free rate must begin at the long-term State of California bond rate, in the 6.0%-6.5% range, and be further adjusted to reflect the substantial differences between pension benefits and real bonds.

Their main arguments, in fact, seem to be based on two extreme mischaracterizations of our views. First, they ask if a responsible investment professional would guarantee a 6% rate of return over 15 years without risk. We certainly agree that none would. However, this is not what UCRP guarantees, so the analogy is incorrect.

Second, they ask if the Steering Committee should report to The Regents that there is no investment risk in achieving a 7.5% return forever. Again, no one has proposed this. They correctly note that UCRP lost over \$15 billion during the recent financial meltdown. They ignore the fact that, according to the Office of the Treasurer, UCRP would still be 120% funded, had the University not chosen to finance excessive growth for nearly two decades by diverting the contributions that virtually every other public pension plan was making into the operating budget. Taylor/Yearly/Anguiano note that many of these other plans are encountering various degrees of difficulty. That is certainly correct, but this fact bears little relevance to the questions before us, and it does not justify blaming risk for the consequences of a contribution holiday that lasted nearly two decades.

The Taylor/Yearly/Anguiano paper is not based on any accepted scholarly or financial methodologies, and simply does not substitute for the standing methodology relied on by the University and presented to the Regents as a sound approach.

The Senate's Suggested Alternative

While the claim that "UCRP is just like a government bond" is subject to serious flaws, the following material attempts to work within the structure suggested by Taylor/Yearly/Anguiano to outline an economist's approach to such an analysis. Under this analysis, total remuneration study likely *overstates* the value to employees from having a defined-benefit plan such as UCRP.

**Comparing Total Remuneration Provided by
Defined Benefit and Defined Contribution Plans**

"Gentlemen prefer bonds."

---Andrew Mellon

UCRP is a defined benefit plan: the payments due are determined by a formula involving years of service, HAPC, and age at retirement. Taylor/Yearly/Anguiano have argued that these benefits are therefore "risk-free," operating like a government bond with a known payout, and that they should therefore be discounted in the Total Remuneration Study at the risk-free rate. A higher rate decreases the pension value attributed to today's service, as part of total remuneration. Lowering the rate increases that value, but also increases the present value of UC's future liabilities. As is the case with a bond, the individual employee does hold an asset that will yield a stream of payments upon retirement. A few academics in Finance have argued that, since pension benefits share certain characteristics with bonds, they should be valued like bonds; this is the respectable version developed by Robert Novy-Marx and Joshua Rauh (Novy-Marx/Rauh)⁶⁶ of the point of view expressed in the Stanford graduate student study and by Taylor/Yearly/Anguiano. We agree that this point of view has some merit, but it needs to be analyzed and applied carefully, paying close attention to the ways that pension benefits are like bonds, and the ways they are different.

A central tenet of Finance is that the valuation of a security is determined solely by the payout it provides, and in particular the expected payout and the associated risk. Novy-Marx/Rauh thus argue that the method by which a future benefit, whether a defined benefit pension or retiree health, is financed is irrelevant to the

⁶⁶ R. Novy-Marx and J.D. Rauh, The Liabilities and Risks of State-Sponsored Pension Plans, *Journal of Economic Perspectives* 4(2009), 191.

valuation; the valuation should depend only on the benefit that will be provided. Thus, Novy-Marx/Rauh argue that the valuation of defined pension benefits and future contributions by the employer to retiree health coverage should depend only on the promised stream of payments and the certainty with which they will be paid.

The goal of the total remuneration study is to put a value on *the benefits provided to employees*. But that value depends only on the benefits themselves, and the certainty (or lack of certainty) that UC will honor its commitments. In particular, it does not depend on how UC chooses to finance those benefits, unless different financing choices change the risk that UC will fail to honor its commitments. Thus, the Novy-Marx/Rauh viewpoint is quite compatible with the *goal* of the total remuneration study.

The total remuneration study requires some discount rate to determine the present value to employees of future benefits. Hewitt, in line with industry standards, has chosen to use the actuarial assumptions used in determining the normal cost and unfunded liability of the plans. These rates—7.5% for UCRP and 5.5% for retiree health—are determined under GASB rules. GASB requires that the discount rate on UCRP be the expected rate of return on UCRP assets, given the current portfolio allocation; since retiree health is not pre-funded, GASB requires that a lower discount factor be used. Novy-Marx/Rauh argue that the funding method is irrelevant to the valuation of the benefits, and the ideal goal in Total Remuneration appears to agree, if a valid methodology can be developed for determining the appropriate discount rates; that is the challenge we face.

To illustrate the distinction between employer costs and employee value, if UC were to fully pre-fund the retiree health benefit, the discount rate for the retiree-health benefit would increase from the current 5.5% to 7.5%, reducing both normal cost and the unfunded liability, *even though the terms of the benefit itself did not change*. Similarly, UC could decide to accept more exposure to risk for the assets in UCRP, reducing the share of fixed-income securities, and anticipate a correspondingly higher rate of return, reducing both normal cost and the unfunded liability. Alternatively, it could choose to invest all of the assets more conservatively, say by investing only in Treasury securities, but this would substantially increase both normal cost and the unfunded liability. Neither changes the value of future benefits to employees, except to the extent that it alters the risk that UC will fail to honor its commitments.

We describe the determination of the appropriate discount rate, using this framework, in several steps below. We begin with a discussion of the rationale for using a government bond rate, and then turn to determining

the *appropriate* government bond rate. Then we turn to the important differences between defined-benefit pensions and bonds; these differences require adjustment in the bond rate. Along with appropriately discounting the pension benefit from UCRP, the method facilitates treating pension and retiree-health benefits symmetrically.

- The rationale behind discounting UC and other government defined benefit pensions at a government bond rate:
 - The underlying rationale behind this argument is based on arbitrage, and can be expressed as follows: if two securities have exactly the same payoff, but are priced differently, then there is an opportunity for an individual to make an arbitrarily large profit by selling short the more expensive security and using the proceeds to buy the cheaper security. Accordingly, securities with the same future payoffs must necessarily be priced identically today. Since government pension benefits have equal priority, along with bond obligations and K-12 education, over most other government expenditures, Novy-Marx/Rauh argue that government pension benefits must be discounted at the interest rate on government bonds: we can determine the appropriate discount rate for pension benefits in future years using the rate that applies to government bonds of comparable maturity, taking into account the differences between pensions and bonds.
 - Note, however, that there is no market in which an individual can sell her UC retirement benefits, nor a market in which one can sell such benefits short. Such markets cannot exist for at least two important reasons:
 - Federal law regulating pension plans protects an individual's pension entitlement from claims by creditors. Thus, a contract in which an individual promises to transfer her pension benefits in return for an upfront cash payment is probably unenforceable.
 - Moral hazard and the Golden Handcuff: The pension benefit earned to date by a UC employee reflects future salary increases, *provided the employee remains employed at UC until retirement*. If the employee leaves UC employment, the value of the pension benefits earned to date plummets. Because the 13th Amendment to the Constitution prohibits indentured servitude, an employee cannot commit to remain employed at UC, and accordingly, anyone buying the employee's accrued pension benefits would not be

willing to base the payment on expected salary growth through normal retirement age. Therefore, only employees intending to leave UC employment in the immediate future would willingly sell their accrued pension benefits. As a consequence, employees planning to stay at UC until normal retirement age cannot attain a fair payment for selling their pension entitlement.

- Thus, the underlying arbitrage rationale for discounting government pension benefits at the market interest rate on government bonds is factually incorrect. The two assets can bear quite different interest rates *without creating an arbitrage opportunity*. Thus, the strong assertion, made by some, that the discount rate on government pensions must be identical to the discount rate on government bonds, is wrong.
- However, we acknowledge that state government defined pension plans bear significant risk characteristics in common with state government bonds, and there may be an argument that these common risk characteristics perhaps should lead to similar discount rates. Even though employees cannot sell their pension rights, we can seek to determine a discount rate that takes into account the similarities and differences between government pensions and government bonds.
- The first step in determining the appropriate rate is to note that the government bond rate applicable to UC defined benefit pension obligations should be the long-term rate on *State of California* bonds:
 - To the extent that the UCRP benefits are like bonds, they are University of California or State of California bonds, not US Treasuries. They are not backed by the full faith and credit of the United States government, but by The Regents, with a significant legal claim on the State of California. Thus, the appropriate risk-free rate is the prevailing rate on long-term State of California bonds, not long-term US Treasuries.
 - We are addressing the Total Remuneration study, which considers only active employees. Active employees are, on average, about 15 years from attaining the normal retirement age of 65 under all the UCRP new tier plans under consideration. Pension benefits are paid out over the period from retirement to death, which occurs on average at about 80. Thus, the benefits considered under the Total Remuneration study are payable on average about 22.5 years from now; long term bonds means 20-30 year maturity.

- In addition, the government bond rate applicable to UC defined benefit obligations should be the long-term rate on *taxable* State of California bonds.
 - The Total Remuneration study attempts to compare the value provided in DB and DC plans. Suppose we think about an individual employee's DB pension rights as if they were to be funded by a DC plan. We assume that the employee's future career will exactly match the salary increases and other actuarial assumptions used in computing normal cost. Since we have agreed that the pension obligations are in some ways like a State of California bond, we imagine UC placing a State of California bond equal in value to the normal cost corresponding to that employee, into a hypothetical DC plan each year. The purchase of the bond would be funded by the employee's contribution and an *employer contribution*. Since the hypothetical DC plan should be treated as tax-deferred, it would not be appropriate for it to hold tax-exempt bonds. Moreover, pension benefits withdrawn in retirement are taxable, so again tax-exempt bonds are an inappropriate analogy. Thus, the appropriate risk-free rate is the *rate on 20-30 year taxable State of California bonds*, not tax-exempt bonds, and certainly not US Treasuries.
- The government bond rate must be adjusted upward to compensate UC employees for UC idiosyncratic risk:
 - Bonds are priced in a market where investors are free to buy a diversified portfolio of securities, and in particular, they can buy bonds issued by a variety of states.⁶⁷ UC bonds carry systematic risk common to all state government bonds issued in the US, in the sense that the fiscal health of state governments is correlated across states. UC bonds carry additional idiosyncratic risk:
 - California's fiscal circumstances are affected by factors specific to California, notably California's housing prices and unemployment rate, and political and constitutional factors limiting California's ability to raise revenue to match expenditures.
 - UC carries its own additional idiosyncratic risk, arising from potential variability in federal research grant income and hospital net revenue, as well as its position as a discretionary item in a state budget which consists mostly of constitutionally

⁶⁷ While tax considerations may lead an individual who desires tax-exempt bonds to concentrate on bonds issued by her state of residence, no such considerations affect the purchase of taxable bonds. An individual investor wishing to hold state bonds would be best served by diversifying state-specific risks, purchasing bonds from a number of states.

mandated programs. UC's failure to make its Annual Required Contribution to UCRP makes it highly unusual among governmental pension plans. That, combined with the expansion of existing campuses, and opening of expensive new schools and programs while it is failing to meet its obligations to UCRP, creates substantial concern about its financial governance. UC's credit rating is currently higher than that of the State of California, but these factors create significant doubt about whether that rating is sustainable.

- UC's idiosyncratic risk is highly correlated with UC employees' risk of losing employment income, either through wage cuts or slow wage growth, or through layoffs.
- Finance theory predicts that there is a risk-reward trade-off for willingness to accept systematic risk, but *no* additional reward for accepting idiosyncratic risk. Empirical work suggests that the conclusions of the theory need to be tempered, but supports the view that idiosyncratic risk generally brings little additional reward. Thus, diversification generally reduces risk, while holding expected return constant.
- If the hypothetical DC plan were a real DC plan, the employee would have the option of selling the UC bond and using the proceeds to purchase a portfolio of the employee's choice which is better diversified and better matched to the employee's age, wealth, and risk tolerance. In particular, she could replace the UC bond with a broadly diversified portfolio of taxable state government bonds, resulting in a substantial reduction of risk with little or no reduction in expected return. Indeed, restricting UC employees to holding UC bonds would clearly violate federal regulations governing real DC plans. In order to make the UC benefit comparable to that in the real DC plan, there needs to be an upward adjustment in the rate of return to compensate for this idiosyncratic risk, especially because it is highly correlated with UC employees' employment income risk.
- The government bond rate needs to be adjusted to take into account the *Golden Handcuff*:
 - If an employee is laid off, or quits UC to take another job, she loses the benefit of future salary increases in the computation of the UCRP pension benefit, a dramatic reduction in

the value of the benefit attributable to service accrued at UC.⁶⁸ Consider, for example, an employee who begins UC employment at age 30, whose pension is governed by Conclave Options IIa or IIb.⁶⁹ If that employee leaves UC at age 50, the value of their 20 years of service credit is reduced by 56%, equivalent to 2.2 years of salary. For every age between 48 and 57, the loss amounts to more than 2 years' salary; it exceeds one year's salary at every age between 38 and 62.

- The total remuneration study takes into account the number of people who are expected to leave UC employment at each age.
 - However, it does *not* take into account the risk that a given employee will be one of the ones who leaves, because of a layoff, or family circumstances requiring a move, or a variety of other reasons; in order to make the UC benefit comparable to that in the real DC plan, there needs to be an upward adjustment in the rate of return to compensate for the lack of portability in UCRP and the risk that an employee will need to leave UC employment.
 - In addition, the Total Remuneration Study does not take into account the number of people who would prefer to leave to take a better job, but find they cannot afford to do so because they would forfeit too much pension value. This is a direct cost to those employees who are forced to stay at UC to preserve their pension rights, and a direct institutional benefit to UC in retention. In order to make the UC benefit comparable to that in the real DC plan, there needs to be an upward adjustment in the rate of return, recognizing the individual loss and institutional benefit of the Golden Handcuff.
- The total remuneration study does not take into account the *Golden Tennis Court* provided to faculty by DC plans:

⁶⁸ Current UCRP terms provide an Inactive COLA equal to the lesser of 2% or inflation each year between the time an employee leaves UC employment and the time of retirement. The Inactive COLA has been removed from all new Tier options being considered by the PEB Task Force.

⁶⁹ These two proposed plans are modified versions of the current UCRP, removing various options and shifting the maximum age factor from 60 to 65. II(a) has a maximum age factor of 2.25% and II(b) has the same maximum age factor as UCRP, 2.5%.

- UC and its Comparison 8 comparators are all research universities. Faculty are expected to perform outstanding research that is highly acclaimed. They are also expected to be outstanding teachers, but their teaching obligations are significantly lower than at institutions focused primarily on teaching. While research productivity holds steady or increases with age in a few disciplines, and in some individuals regardless of discipline, by and large research productivity declines with age. A faculty member whose research has slowed will receive at most modest salary increases. In a DB plan, once the employee has attained the maximum age factor, working an additional year results in at most a very modest increase and in some case an actual decrease in the employee's annual pension payment, while the employee forfeits one year of pension payments: the incentive to retire is therefore quite strong. By contrast, in a DC plan, the time required for teaching alone leaves lots of time for the tennis court and golf course; teaching an additional year draws a full salary, plus an employer DC contribution, and preserves the full DC accumulation, plus any additional earnings; there is virtually no incentive to retire. Two of the Comparison 8 universities offer two years of salary as an incentive to faculty to retire by age 70; while these incentives are funded on a pay-as-you go basis, the normal cost if they were prefunded would be approximately 3.75% of salary. Other universities offer such buyouts on a case-by-case basis.⁷⁰ These buyouts are not considered in the Total Remuneration study. Because it offers a DB plan, UC has no need to offer retirement incentives. The DB plan thus offers a valuable institutional benefit in inducing faculty to retire when the time is right. In order to make the UC benefit comparable to that in the real DC plan, there needs to be an upward adjustment in the rate of return, either by valuing the retirement incentive plans offered by DC competitors, or by valuing the option that faculty in DC plans have to keep drawing their fully salary even though their research has slowed, while giving up none of their DC pension accumulation.

⁷⁰ Note that it is irrelevant for total remuneration whether all Stanford and Yale faculty exercise the option to retire with two years' salary, and also whether all comparators offer this option. The point is that the option to delay retirement has value to faculty, and the Stanford/Yale buyouts provide an indication of the magnitude of this option value. The Stanford and Yale faculty who do *not* take the buyout will presumably continue to draw salary until age 75, 80 or older, which is even more costly to Stanford than the buy-out, unless we believe all of these faculty remain at top research form throughout their eighth decade. While we are not aware of buyouts for staff, DB plans do create the notion of a targeted retirement age. Some staff would presumably also delay their retirements, in a DC environment; thus, even if the buyout does not exist, there may be institutional benefits from UCRP and the incentive to retire that it creates.

- The retiree health valuation must be adjusted to take into account the probability that UC will terminate or further reduce those benefits:
 - If one accepts the Novy-Marx/Rauh point of view, it follows that one must also value retiree health by the long-term California taxable bond rate, adjusted to take into account the fact that the Regents can alter the terms of the retiree health program, and likely could legally terminate it at any time. The market value of a bond in which the issuer can legally refuse to pay is zero. Thus, the Novy-Marx/Rauh analysis indicates that UC's retiree health program, and similar nonguaranteed programs of our competitors, must be valued at zero.
 - In spite of this obvious symmetry, Taylor/Yearly/Anguiano analysis does not propose any adjustments to the valuation of the retiree-health benefits in the Total Remuneration Study.
 - Any assessment of the likelihood that UC will terminate its retiree health benefits is speculative at best. Certainly, pre-funding the benefit would increase the probability that the benefits would actually be paid.
 - However, any reasonable determination of the discount rate for retiree health benefits under the Novy-Marx/Rauh analysis must necessarily be substantially *higher* than the rate on long-term California bonds. Since retiree health is currently provided to retirees as a nontaxable benefit, it would be appropriate to use interest rates on long-term *tax-exempt* California bonds.

Summary and Conclusions

The PEB Task Force was not formed because UC's benefits are too generous; UC's problem is not normal cost. The Task Force was formed because of large, unfunded liabilities for both pensions and retiree health. It is the failure to pre-fund retiree health, and the failure to adequately pre-fund UCRP, that is responsible for these liabilities. In particular, *the risk to the employer inherent in a DB Plan is the not reason for the current unfunded liability*. As noted, the Office of the Treasurer has calculated that, had we contributed normal cost

each year rather than suspending contributions for nineteen years, UCRP would have been 120% funded as of 6/30/09.⁷¹

UCRP has been more than competitive only because they have been provided to employees for free, with no employee contribution. With a 5% employee contribution, UCRP is slightly uncompetitive for faculty.⁷² The proposed Option A is uncompetitive for virtually every employee group, *even after closing the gap in UC's cash compensation, and even if one aligns the assumptions of the Total Remuneration Study with the actuarial assumptions used in computing normal cost.*

The Taylor/Yeary/Anguiano analysis is simply incorrect in stating that the current defined benefit plan contains an *uncompensated* risk to the employer, or that the total remuneration study is biased and inaccurate because it does not take this risk into account. Our analysis demonstrates the flaws in asserting that a risk-free discount rate should be used, by false analogy to Treasury bonds. A correct application of the argument in Novy-Marx and Rauh, which we provided, indicates that the appropriate benchmark discount rate is the rate on long-term taxable California bonds, in the range 6.25% to 6.5%. This needs to be adjusted upward for various factors, notably the Golden Handcuff and (for faculty) the Golden Tennis Court, which will produce a rate close to or higher than 7.5%.

Some administration members of the Steering Committee apparently believe that anything less than a Draconian cut in the normal cost of pensions from UCRP is a failure. We prefer to emphasize that abandoning our commitment to preserving UC's excellence is a failure. An alternative pension plan, Conclave II(b), was dismissed by the Steering Committee and omitted from the report because it cuts *normal cost only from 17.9% to 15.1%, even though the employer's portion of normal cost is identical to Option B, only 9%. It is only 1.7% higher than in Taylor/Yeary/Anguiano's preferred Option A.* Focusing on total normal cost, rather than the employer's share, simply limits employee options. UC should not care if employees would prefer higher employee contributions and better benefits, if there is no effect on employer normal cost. And insisting on abandoning the total remuneration study methodology, to defend an additional 1.7% reduction in employer costs, seems like the very definition of penny wise and pound foolish: what isn't paid out immediately in higher salaries, to compensate for uncompetitive benefits, will instead be evident in UC's inability to recruit and retain the best faculty and staff.

⁷¹ UCOP Human Resources and Benefits, Spring 2010 Post-Employment Benefit Forums Materials.

⁷² Hewitt Associates and Mercer Human Resources, 2009 Update of UC Total Remuneration Study for Campus and UCOP and Medical Centers, October 1, 2009.