

Retirement plans for college faculty at public institutions

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Abstract

This study provides a base line cross sectional analysis of defined benefit (DB) and defined contribution (DC) retirement plans based on the largest four-year public institutions of higher education in each of the 50 states. The focus is on types of plans that are being offered and an evaluation of their risk and return. Findings provide comparative analysis on the broader trends in DB and DC plans offered by other public and private plans. © 2008 Academy of Financial Services. All rights reserved.

1. Introduction

College professors who teach at public institutions of higher education have historically been enrolled in defined benefit (DB) plans as have those employed in the corporate world. Those who remain in the system long enough to vest and be entitled to a pension receive a monthly payment for life that is based on the number of years worked, average salary, and some percentage of that salary. A majority of states and most private institutions have adopted defined contribution (DC) plans in addition to, or in place of, DB plans. The DC plan makes the risk of accumulating retirement benefits the responsibility of the faculty member and the institution is responsible for providing a vehicle for that contribution.

Trade-offs between the two types of plans include the potential lack of sufficient funds for a comfortable retirement in a DC plan versus a guaranteed retirement annuity in a DB plan.

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The DC plan provides for portability of retirement investments if the employee changes jobs, for ownership of the funds, and for investment options while a DB plan remains with the institution who owns the funds and who is responsible for choosing appropriate investments and bearing the risk of poor selections.

In this study, we select the largest four-year public institutions of higher education in each of the fifty states to provide a broad overview of the breadth and scope of plan benefits and conditions. The focus is on the availability of DB and DC plans since the end of mandatory retirement and evaluation of the risk and options of these plans. Results allow a comparison to be made by individuals in both the public and private sectors to their plans provisions and the current issues surrounding DB and DC plans. Given the educational level of faculty and their employers, we assume that the findings will shed light on the broader trends and issues in retirement plans and retirement planning that are currently offered in the workplace.

A comparison of the key features of state retirement plans includes: (1) availability of DB, DC and combination plans, (2) Social Security participation, (3) availability of health plans in retirement, (4) employer and employee contribution percentages, (5) vesting requirements, (6) minimum age requirements for retirement, (7) collective bargaining, and (8) funded ratios. These factors may influence the risks and rewards that faculty face in terms of receiving income after retirement.

Section two provides a review of the literature on factors that have affected public retirement plans. Descriptions of the data sources and methodology employed is described in section three, followed by results of the analysis of public university retirement plans in section four. Our conclusions and summary are provided in section five.

2. Review of the literature

The mandatory retirement age (MRA) for college professors began to gradually increase from 65 to 70 years of age during the late 1970s and the 1980s. The Age Discrimination in Employment Act Amendments of 1986 (Public Law 99–592) specified that the MRA be eliminated for workers, but colleges and universities had a special exemption to delay the enforcement of the elimination of mandatory retirement at age 70 until January 1, 1994. The potential impact on higher education is a significant aging of the faculty and inability to hire new faculty because of a lack of retirements. Further, DB plans provided by institutions may have to provide larger yearly benefits but for a shorter period of time.

2.1. Impact of MRA

Holden and Hansen (2000) find that early retirement incentives are effective tools in accelerating retirements. However, faculty members at major private research universities are most likely to delay retirement because of the institutions' incentives to continue with teaching and research.

An examination of the periods before and after MRA is undertaken by Clark, Ghent and Kreps (2001) based on faculty at three North Carolina universities. The mean age of faculty increases from 46.5 to 49.0 years of age and the percentage of those 55 and older increases

from 23.7% to 29.2%. Three important changes based on their analysis are: (1) that there is a “sharp decline” in retirement rates after 1994 from 15% to 4%, (2) the retirement rates for those 62 and 70 are the same, and (3) assistant and associate professors are more likely to retire than full professors.

A survey of faculty at institutions with a DC plan before and after the change in the mandatory retirement law finds a decrease of two-thirds in retirement rates for those who are 70 and 71 years of age (Ashenfelter and Card, 2002). For faculty that are over 70, half are working at 72 compared to less than 10% before the change. The results indicate pension wealth is important, but that those with higher salaries are less likely to retire and non-pecuniary factors are an influence in the retirement decision.

2.2. Factors that influence the decision to retire

A study to determine the factors that influence the decision of when to retire is reported by Lozier and Dooris (1991). Overall financial status and eligibility for full retirement benefits are found to be most important. Faculty who have DB plans retire at an average age of 63.1 versus those with DC plans who retire at an average age of 65.4.

Bahrami and Stockrahm (2001) find 12 factors that influence the faculty retirement decision. They include the end of mandatory retirement, age, current salary, expected other sources of income, early retirement incentives, and years of education. An individual’s planned retirement age increases as they get older according to Montalto, Yuh and Hanna (2000), however, the results may depend on the type of pension plan that the faculty member has chosen.

Tenured university professors who continue to work after age 70 are interviewed by Dorfman (2000). She states that the largest contributing factor to the decision to continue active full-time employment is that they enjoyed their work, both teaching and research.

2.3. Type of pension plan

Clark and Pitts (1999) study faculty at North Carolina State University and their choice of a DB or a DC plan. They argue that the choice is a function of the risks that affect the two types of plans including the probability of changing jobs, risk and return performance in financial markets, potential changes in regulations affecting the plan, uncertainty about when an individual will retire, and the impact of inflation on earnings and investments. They conclude that older new hires are more likely to enroll in the DB plan and younger new hires pick the DC plans to avoid mobility risk. For the period 1989 to 1994, the percentage of new hires that chose the DB plan ranged between 10% and 21%.

The American Association of University Professors (AAUP) survey examines the changes in retirement policies for faculty (Ehrenberg, 2000). DC plans are the most common type at private institutions but at public institutions there is much more variability. The typical private institution contributes 10% of an employee’s salary to a DC plan, but the contribution rate for public plans is not reported. For DB plans, the average salary is specified for the last three or five years and the annual retirement benefit per year of service ranges from 1.0% to 2.5% of final average salary.

Woerheide (2000) concludes that the longer an individual has worked under a DB plan, the more likely he will retire and those who have DC plans are more likely to continue working. This result is explored by a Monte Carlo simulation by Johnston, Forbes and Hatem (2001). They examine the risk levels involved in choosing between state university DB and DC plans and conclude that the DC plan must have a higher stock allocation to match the DB plan payments.

Public sector employee pension plans have received little attention until recently, when serious funding problems have emerged according to Yang and Mitchell (2005). They state that there is no national regulation about funding targets, management of funds, investment alternatives, or reporting of performance. This has produced a wide variety in plans that make it difficult to compare to corporate pension funds that are regulated by the federal government and difficult to compare to other public pension plans.

Goss (2007) simulates the pension benefits for professors who retire after 35 years of service at the age of 65, using a detailed survey of 52 Canadian university pension plans. He finds marked differences in terms of expected replacement ratios (54.3–88.2%) and IRRs (10.39–18%) based on contribution rates for both DB and DC plans, with combined (hybrid) plans having the highest replacement ratios and IRRs. The majority of plans offer annuities to retirees for both the DB and DC plans. Goss finds that the benefits are very sensitive to the inflation indexing that is used by each DB plan and that there is a wide variability in contribution rates by employees. As of 2004, more than half of all Canadian DB plans were underfunded, which may cause the contribution rate to increase.

Mannino and Cooperman (2007) define implicit compensation as the “difference between retirement account balances and expected retirement benefits.” They state that the ratio of the retired faculty’s annual pension to the last year of salary as full-time faculty for public DB plans is twice the size of those provided by private DB plans. In examining the benefits received by retirees from the Colorado Public Employees Association (PERA) plan, they conclude that there is a significant implicit compensation for all university workers, but it is highest for administrators. Their results provide evidence that the unfunded liability for PERA reflects the implicit compensation that workers receive in retirement.

Reform of public DB plans is seen as a necessary activity by Lahey and Anenson (2007) who observe that in 2004, 84% of them are underfunded because of a market downturn and an aging population. Their solution is to support a movement to DC plans from DB plans that comprise 90% of public pension plans. Further, they urge universal acceptance of mandatory disclosure laws to alert the public to the problems that are being faced by public DB plans that lack oversight by the federal government and lack of an insurance program if the plan fails.

A study of state pension plans for teachers conducted before the “windfall elimination provision” that is passed by Congress in 1983 (Social Security Online, 2004) provides an analysis of the impact of Social Security payments. Before 1983, a teacher could collect full pension benefits and full Social Security benefits. However, after 1983, Social Security payments are significantly reduced if a teacher is collecting a DB pension in a state in which they do not pay Social Security taxes.

In summarizing the review of the literature, the impact of the end of MRA is an expected increase in the age of faculty. However, the specific individual factors that are used in

making the retirement decision is much more complex than simply determining the appropriate age to retire. It includes factors such as teaching at a private or public institution, current faculty rank, pension wealth, salary, eligibility for full retirement benefits and health insurance, research productivity and teaching load, expected other sources of income, and enjoyment derived from working.

What is missing from previous research is a comparative analysis of the specifics of DB and DC pension plans from a broad range of public universities in the United States. More importantly, there is little information available to individual faculty on which to judge the fiscal condition of their specific DB plans and their risk of obtaining future benefits in relationship to other state systems. This study provides comparative information on the benefits and level of risk for these public pension plans and factors that influence the risk of the plans.

3. Data and methodology

This study provides a baseline cross sectional analysis of DB and DC plans provided by public institutions of higher education for their faculty during the 2004 to 2005 school year. Because there are constant changes in state, federal, and regulatory agency rules, as well as market conditions, this study starts with a single point in time picture of retirement plans that are in place for these universities.

3.1. Source of the data

A primary data base is developed by examining the Websites of each public institution. We examine faculty handbooks, discussions of benefits, and listing of faculty benefits as well as links to state retirement plans and publicly available investment sources. Phone calls are made for information when necessary.

We also collect secondary data from *The Chronicle of Higher Education's* Almanac Issue (2004–2005) for state population, per capita income, state contribution to operating expenses for institutions of higher education, number of public four-year institutions, and tuition and fees. The average salary for all ranks for each university is obtained from the American Association of University Professors (AAUP, 2004). Additional data are provided by the National Education Association (NEA) survey of pension plans for K-12 employees of public education and Wilshire Associates Incorporated (2004) yearly report on state retirement systems, their level of funding and their asset allocation.

3.2. Methodology

Given the shift in the corporate world to DC plans, we hypothesize that some state plans will either offer only a DC plan, switch to a DC plan, or offer a combination plan to new faculty. We first determine the type of pension plans that are offered at each school and calculate descriptive statistics for each type of plan. A subsequent follow-up on the same

institutions two years later (2006–2007) determines the changes, if any, in type of plan offered.

Both employers and employees have to contribute 6.20% of gross salary to cover the Federal Insurance Contribution Act (FICA) that funds Social Security at universities that participate. In addition, employee and employer both may contribute to state retirement plans. We hypothesize that at those universities that do not contribute to FICA, there will be a higher percentage of salary contributed to the state plans by employee, employer, or both. Descriptive statistics are calculated as well as a variety of comparisons between those universities that have DB plans and those that do not to provide data for *t*-tests of differences in means.

The risk of a faculty member not receiving a pension during their retirement years from a DB plan is expected to increase when the state retirement fund has a funded ratio that is less than one, indicating that liabilities exceed assets of the plan. A regression model is employed to provide evidence on the factors that may affect the funded ratio. Lastly, an update of the university plans is undertaken and changes are noted where appropriate.

4. Results

The 50 public institutions of higher education that are used in this study appear in Table 1, and they are selected based on their listed enrollment for undergraduate and graduate students. Average number of students per university is 27,717, but there is a large variation with a standard deviation of 11,567. The largest institutions in the sample in 2004 to 2005 are the University of Texas at Austin (52,261), the University of Minnesota at Minneapolis (50,957), and Ohio State University in Columbus (49,676). The smallest are the University of Vermont in Burlington (10,314) and South Dakota State in Brookings (9,900). This large diversity in size and geographic dispersion provides a robust picture of the types of retirement plan options, characteristics, and benefits that are available to faculty.

4.1. *Descriptive statistics for DB plans*

Based on previous research, we expected the pre-dominant type of pension plan to be a DB plan. As seen in Table 1, 34 (68%) public universities offer their faculty a DB plan. Of these, 32 rely on a state administered retirement plan and two (California and Missouri) have their own internal university wide plan. The 32 universities that use a state plan typically include public school teachers and administrators and/or other state employees. For example, in Ohio, university professors comprise 8% of those who participate in STRS (State Teachers Retirement System), a pension plan for public school teachers.

4.2. *Contributions to DB plans*

In a DB plan, funds must be accumulated and invested long term so that there will be sufficient assets to provide promised benefits. Contributions can include: (1) no contribution because the plan has more assets than needed, (2) employee contributions, and/or (3)

Table 1
Public institutions of higher education and their retirement plans

State	Institution (largest school)	Defined benefit plan		Defined contribution plan		Combination plan		Defined benefit		Defined contribution		Social Security Contribution
		1 = yes, 0 = no	Defined benefit plan	Defined contribution plan	Combination plan	Employee contribution	Employer contribution	Maximum employee contribution	Minimum employer contribution	1 = Yes, 0 = No		
Alabama	Auburn (Auburn)	1	0	0	0	5.00%	6.56%	0.00%	0.00%	1		
Alaska	University of Alaska (Anchorage)	1	0	0	0	8.65%	16.00%	0.00%	0.00%	0		
Arizona	Arizona State University (Tempe)	1	0	0	0	5.70%	5.70%	0.00%	0.00%	1		
Arkansas	University of Arkansas (Fayetteville)	1	0	0	0	6.00%	12.00%	0.00%	0.00%	1		
California	University of California (Los Angeles)	1	1	0	0	0.00%	0.00%	2.00%	0.00%	0		
Colorado	University of Colorado (Boulder)	1	1	0	0	8.02%	9.26%	5.00%	10.00%	0		
Connecticut	University of Connecticut (Storrs)	1	1	0	0	6.00%	9.27%	5.00%	8.00%	0		
Delaware	University of Delaware (Newark)	0	1	0	0	0.00%	0.00%	4.00%	11.00%	1		
Florida	University of Florida (Gainesville)	1	1	0	0	0.00%	6.19%	0.00%	10.00%	1		
Georgia	University of Georgia (Athens)	1	1	0	0	5.00%	9.24%	5.00%	0.00%	1		
Hawaii	University of Hawaii (Honolulu)	1	1	0	0	0.00%	11.49%	0.00%	0.00%	1		
Idaho	Boise State University (Boise)	0	1	0	0	0.00%	0.00%	6.97%	7.72%	1		
Illinois	University of Illinois (Urbana-Champaign)	1	1	0	0	8.00%	11.05%	8.00%	7.60%	0		
Indiana	Purdue (West Lafayette)	0	1	0	0	0.00%	0.00%	0.00%	15.00%	1		
Iowa	University of Iowa (Iowa city)	1	1	0	0	3.70%	5.75%	5.00%	6.67%	1		
Kansas	University of Kansas (Lawrence)	0	1	0	0	0.00%	0.00%	5.50%	8.50%	1		
Kentucky	University of Kentucky (Lexington)	0	1	0	0	0.00%	0.00%	5.00%	10.00%	1		

Louisiana	Louisiana State University (Baton Rouge)	1	1	1	1	8.00%	7.00%	8.00%	7.00%	0
Maine	University of Southern Maine (Portland)	0	1	0	0	0.00%	10.00%	4.00%	10.00%	1
Maryland	University of Maryland (College Park)	1	1	0	0	5.00%	9.35%	2.00%	9.35%	1
Massachusetts	University of Massachusetts (Amherst)	1	1	0	0	11.00%	5.00%	11.00%	5.00%	0
Michigan	Michigan State University (East Lansing)	0	1	0	0	0.00%	0.00%	5.00%	10.00%	1
Minnesota	University of Minnesota (Minneapolis)	0	1	0	0	0.00%	0.00%	2.50%	13.00%	1
Mississippi	Mississippi State University (Starkville)	1	1	0	0	7.25%	9.75%	7.25%	8.80%	1
Missouri	University of Missouri (Columbia)	1	1	0	0	0.00%	6.40%	0.00%	0.00%	1
Montana	Montana State University (Bozeman)	1	1	0	0	6.90%	6.90%	6.90%	4.19%	1
Nebraska	University of Nebraska (Lincoln)	0	1	0	0	0.00%	0.00%	5.50%	6.00%	1
Nevada	University of Nevada (Las Vegas)	0	1	0	0	0.00%	0.00%	10.50%	10.50%	0
New Hampshire	University of New Hampshire (Durham)	1	1	0	0	5.00%	3.97%	6.00%	5.00%	1
New Jersey	Rutgers (Camden)	0	1	0	0	0.00%	0.00%	5.00%	8.00%	1
New Mexico	University of New Mexico (Albuquerque)	1	1	0	0	7.60%	8.65%	7.60%	7.15%	1
New York	SUNY (Buffalo)	1	0	0	0	3.00%	0.36%	0.00%	0.00%	1
North Carolina	North Carolina State University (Raleigh)	1	1	0	0	6.00%	4.80%	6.00%	9.71%	1
North Dakota	University of North Dakota (Grand Forks)	0	1	0	0	0.00%	0.00%	2.00%	4.50%	1
Ohio	Ohio State University (Columbus)	1	1	1	1	9.00%	14.00%	9.00%	10.50%	0
Oklahoma	University of Oklahoma (Norman)	1	1	1	1	7.00%	11.75%	0.00%	9.00%	1

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employer contributions. California is the only university DB plan in which no contributions are made by either employees or employers. For six (18%) DB plans, the employees make no contributions but the employers do and these include Florida, Hawaii, Missouri, Tennessee, Wisconsin, and Wyoming. For the remaining 27 (78%) DB plans, both employees and employers contribute to the plan.

The average employee contribution is 4.92% of their salary and the average employer contribution is 7.46% of the employee's salary for a total average contribution of 12.38% as shown in Table 1. Employers make a larger contribution than employees and the combined contributions rates should provide for secure funding for the plans. For the six universities where employees make no contribution, the employers' average contribution is 9.07%. This is less than the total provided when both employee and employer contribute and may be reflected in a lower replacement ratio, lower funded ratio, longer vesting period and/or later age for retirement.

In eight of the DB plans (Alaska, California, Colorado, Connecticut, Illinois, Louisiana, Massachusetts, and Ohio) the employee and employer do not make any contribution to Social Security retirement benefits, saving each of them 6.2% of employee salary. The average employee contribution is 7.33% versus 4.23% for those who do contribute and the difference is statistically significant. For the employer, the average contribution is 8.95% without Social Security and 7.62% with, and this difference is also statistically significant at the 0.01 level.

Total contribution without Social Security is 16.28% for employee and employer and 11.85% when Social Security is paid. The difference of 4.43% is much less than the combined employer and employee required Social Security contribution of 12.4% and may represent a savings for the institutions and employees at the cost of a reduced total retirement benefit from the DB plan and Social Security. The windfall elimination provision of Social Security means that faculty must receive higher benefits from DB plans to compensate for a significant reduction in Social Security benefits from other employment they have earned. This is examined by looking at replacement ratios for states not contributing to Social Security versus those that do later in this paper.

4.3. Vesting, youngest retirement age, health plan availability, and collective bargaining

Vesting in a DB plan indicates that the faculty member is entitled to a retirement benefit even if they do not remain at that university. In the corporate sector, vesting can either be based on cliff vesting (five-year rule) where they are either vested in five years or not vested or a three to seven year rule in which participants are partially vested over a seven-year period. There are *no* vesting rules for public pension funds. This leads to a wide variety of vesting requirements, with the average number of years required for vesting being 5.79 years.

As seen in Table 2, The University of Wisconsin's faculty are vested immediately in their DB plan as they are in DC plans. Two universities (New Hampshire and South Dakota) require three years, three universities (Iowa, Mississippi, and Wyoming) require four years, 19 universities require five years, Florida requires 6 years, Alaska eight years, and seven (Alabama, Connecticut, Georgia, Hawaii, Massachusetts, Oklahoma, and Rhode Island) require 10 years. Of the six states that do not require an employee contribution, only Florida has a longer vesting period than the average.

Table 2
Variables in defined benefit plans

State	Institution (largest school)	Defined benefit plan		1 = yes, 0 = no	Funded ratio	Replacement ratio for 25 years
		Years vested	Youngest retirement age	Collective bargaining		
Alabama	Auburn (Auburn)	10	60	0	93.60%	0.53125
Alaska	University of Alaska (Anchorage)	8	60	1	68.20%	0.50000
Arizona	Arizona State University (Tempe)	5	62	0	104.60%	0.52500
Arkansas	University of Arkansas (Fayetteville)	5	60	0	91.90%	0.51750
California	University of California (Los Angeles)	5	50	0	117.90%	0.62500
Colorado	University of Colorado (Boulder)	5	55	0	88.30%	0.50000
Connecticut	University of Connecticut (Storrs)	10	55	1	75.90%	0.33250
Delaware	University of Delaware (Newark)	Na	Na	1	Na	Na
Florida	University of Florida (Gainesville)	6	62	1	114.96%	0.40000
Georgia	University of Georgia (Athens)	10	60	0	103.90%	0.50000
Hawaii	University of Hawaii (Honolulu)	10	55	1	84.00%	0.31250
Idaho	Boise State University (Boise)	Na	Na	0	Na	Na
Illinois	University of Illinois (Urbana-Champaign)	5	55	1	54.00%	0.55000
Indiana	Purdue (West Lafayette)	Na	Na	0	Na	Na
Iowa	University of Iowa (Iowa City)	4	55	0	89.62%	0.50000
Kansas	University of Kansas (Lawrence)	Na	Na	0	Na	Na
Kentucky	University of Kentucky (Lexington)	Na	Na	0	Na	Na
Louisiana	Louisiana State University (Baton Rouge)	5	55	0	73.90%	0.62500
Maine	University of Southern Maine (Portland)	Na	Na	1	Na	Na
Maryland	University of Maryland (College Park)	5	60	0	93.30%	0.31400
Massachusetts	University of Massachusetts (Amherst)	10	55	1	83.90%	0.62500
Michigan	Michigan State University (East Lansing)	Na	Na	0	Na	Na

Continued

Table 2
(Continued)

State	Institution (largest school)	Defined benefit plan		1 = yes, 0 = no	Funded ratio	Replacement ratio for 25 years
		Years vested	Youngest retirement age	Collective bargaining		
Minnesota	University of Minnesota (Minneapolis)	Na	Na	0	Na	Na
Mississippi	Mississippi State University (Starkville)	4	60	0	79.00%	0.50000
Missouri	University of Missouri (Columbia)	5	55	0	81.90%	0.55000
Montana	Montana State University (Bozeman)	5	60	1	99.97%	0.44625
Nebraska	University of Nebraska (Lincoln)	Na	Na	1	Na	Na
Nevada	University of Nevada (Las Vegas)	Na	Na	0	Na	Na
New Hampshire	University of New Hampshire (Durham)	3	55	1	72.19%	0.041750
New Jersey	Rutgers (Camden)	Na	Na	1	Na	Na
New Mexico	University of New Mexico (Albuquerque)	5	65	0	81.10%	0.58750
New York	SUNY (Buffalo)	5	62	1	99.60%	0.50000
North Carolina	North Carolina State University (Raleigh)	5	50	1	108.40%	0.45500
North Dakota	University of North Dakota (Grand Forks)	Na	Na	0	Na	Na
Ohio	Ohio State University (Columbus)	5	55	0	77.40%	0.55000
Oklahoma	University of Oklahoma (Norman)	10	55	0	51.40%	0.50000
Oregon	Portland State University (Portland)	5	55	1	90.00%	0.37500
Pennsylvania	Pennsylvania State (University Park)	5	60	0	114.40%	0.62500
Rhode Island	University of Rhode Island (Kingston)	10	60	1	73.20%	0.56500
South Carolina	University of South Carolina (Columbia)	5	55	0	86.00%	0.45500
South Dakota	South Dakota State (Brookings)	3	55	1	96.70%	0.40400
Tennessee	University of Tennessee (Knoxville)	5	55	0	98.00%	0.37500
Texas	The University of Texas (Austin)	5	55	0	96.30%	0.57500
Utah	The University of Utah (Salt Lake City)	Na	Na	0	Na	Na
Vermont	The University of Vermont (Burlington)	Na	Na	1	Na	Na

Continued

Table 2
(Continued)

State	Institution (largest school)	Defined benefit plan		1 = yes, 0 = no	Funded ratio	Replacement ratio for 25 years
		Years vested	Youngest retirement age	Collective bargaining		
Virginia	Virginia Tech (Blacksburg)	5	50	0	107.30%	0.42500
Washington	University of Washington (Seattle)	Na	Na	0	Na	Na
West Virginia	West Virginia University (Morgantown)	Na	Na	0	Na	Na
Wisconsin	University of Wisconsin (Madison)	0	55	0	96.50%	0.43135
Wyoming	University of Wyoming (Laramie)	4	50	0	92.20%	0.54450
	Average:	5.79	56.65		89.45%	0.48937794
	Total:			18		
	Standard Deviation	2.459113067	3.812915475		0.158184216	0.08874816

In a total of 28 (82%) universities with a DB plan, faculty must teach for five or more years to be vested in the system or as in most cases until they find out if they will earn tenure. If they leave before vesting, they are not entitled to any benefits but can usually withdraw their employee contributions to the plan. Even in cases where they become vested, leave, and work at another university the benefit may be very small because it will be based on the salary at the time they leave. The lack of a vesting requirement and the ability to transfer accumulations are strong positive arguments for faculty to choose DC plans rather than DB plans. The vesting requirement allows DB plans to keep the employer contribution for those faculty that do not vest and leave the institution, thus reducing plan liabilities.

All of the DB plans specify the youngest age at which faculty can retire. The average age is 56.65 years, reflecting the fact that 17 (50%) allow retirement at age 55. Four states allow retirement at 50 (California, North Carolina, Virginia, and Wyoming), nine states allow retirement at 60, three (Arizona, Florida, and New York) at 62, and one requires age 65 (New Mexico). A total of 30 of the 34 DB plans allow retirement before that required by Social Security for early retirement at age 62. Only Florida has a later date for retirement than the average for the six states that do not require employee contributions.

The only university that indicates that it does not offer a health plan in retirement is the University of Arkansas. However, it is difficult to determine this benefit because public pension plans are not required to report this information until 2007. Further, it may only be a supplement to Medicare benefits in the form of an additional plan that becomes available when faculty turn 65. Before that point, there may not be any health insurance available. A

detailed analysis of this specific topic is beyond the scope of this paper and is an area for further research.

What effect, if any, do collective bargaining agreements have on DB pension plans? There are 18 (36%) out of the 50 public universities that have a collective bargaining agreement. Of those 34 that have a DB plan, 13 (38%) have a collective bargaining agreement, including Alaska, Connecticut, Florida, Hawaii, Illinois, Massachusetts, Montana, New Hampshire, New York, North Carolina, Oregon, Rhode Island, and South Dakota. Collective bargaining appears at a minority of schools that have a DB plan with two (Florida and Hawaii) having no employee contribution and four (Alaska, Connecticut, Illinois, and Massachusetts) not paying Social Security.

4.4. Funded ratio and replacement ratio

To determine if a DB plan is able to meet its obligation to faculty to pay retirement benefits over their life time, a funded ratio is calculated. It measures a plan's financial health by dividing the market or actuarial value of the assets by the liabilities. If liabilities exceed assets, the plan is underfunded and if liabilities are less than assets, it is over funded. The difficult with interpreting the funded ratio is the variability in reporting by individual DB plans. Not all plans report current data and their actuaries may take up to a year to report the results. In addition, each DB plan has its own underlying actuarial assumptions about inflation rates, interest rates for investments, and salary growth that are used to estimate needed funds and calculate the funded ratio.

As shown in Table 2, for 2004 to 2005, the funded ratio shows that seven (21%) of the plans are over funded and include those in Arizona, California, Florida, Georgia, North Carolina, Pennsylvania, and Virginia. The 27 (79%) remaining plans are under funded, with 11 plans having a funded ratio of 90% to 99%, seven plans with 80% to 89%, six plans with 70% to 79%, and three with less than 70% funded ratio. The three with less than 70% are Alaska, Illinois, and Oklahoma and they have the largest problem in funding retirement benefits. Five of the six states that do not require employee contributions have a funded ratio that is less than 100%, with only Florida being fully funded. Of the eight states that do not contribute to Social Security, only California has a funded ratio that is over 100%.

To provide faculty with some idea of their expected retirement benefit based on the terms of their DB plan, a replacement ratio is calculated by dividing the first year retirement benefit by the final average salary for a faculty member. It is based on the average salary for faculty without distinctions based on rank and assumes retirement after 25 years of service (Table 2). The average replacement ratio is 48.94%, which is much less than the usual financial planning recommendation of 70% to 80% to maintain the pre-retirement standard of living. However, a retirement at 25 years might be considered an early retirement given faculty might not start their careers until age 30.

The highest replacement ratio (62.5%) occurs in four states including California, Louisiana, Massachusetts, and Pennsylvania. The lowest is in Maryland at 31.40%. Of the six states that do not require employee contributions, Missouri and Wyoming have a higher than average replacement ratio. In the eight states that do not contribute to Social Security, only

Connecticut fails to have a greater than average replacement ratio. Three of the eight states (California, Louisiana, and Massachusetts) have the highest replacement ratios.

4.5. DC plan and combined plans

Contrary to the results found in previous studies, the predominant type of pension plan offered to faculty at these major public universities in 2004 to 2005 is a DC plan, with 41 (82%) offering this type of plan. The nine states that do not have a DC plan are Alabama, Alaska, Arizona, Arkansas, New York, South Dakota, Texas, Virginia, and Wisconsin. This result clearly mirrors private universities that have the advantage of offering higher salaries and portable pension plans and may reflect the competitive environment that these large public universities face in attracting faculty.

The average maximum contribution for employees for DC plans is 4.13%, which is less than the DB average employee contribution of 4.92%. The average maximum is 6.74% compared to the 7.46% employer contribution for DB plans. If the DC plan is the faculty member's only pension plan, these contribution rates are less than the DB plans and may not provide sufficient funds on which to retire. The only state that does not contribute to Social Security and does not have a DB plan is Nevada and their contribution rate is 10.5%. Employees are not vested in DC plans because they own the funds in the plan.

Employers have gradually shifted to DC plans because they have no liability for these pension plans and they can provide a lower contribution rate than in DB plans. There is no minimum retirement age for retirement, funded ratio or replacement ratio with DC plans because the retirement benefit is the responsibility of the faculty member and not the plan.

Of the 50 state universities, 25 offer their employees both a DB and a DC plan so that faculty have the security of a fixed retirement benefit and the opportunity to increase their retirement income by contributing to a 403b or only have a DC plan. Five of the 25 universities that offer both do not make a contribution to their DC plan and simply offer it as an additional savings vehicle. In the remaining 20 plans (40%), faculty have a choice between DB and DC plans.

Five out of six states (Florida, Hawaii, Missouri, Tennessee, and Wyoming) that do not require an employee contribution for their DB plan also provide a DC plan with four of the five (Hawaii, Missouri, Tennessee, and Wyoming) not making an employer contribution to the DC plan. For these four states, the DC contribution is an opportunity for additional saving rather than an alternative plan. Of the eight states that do not make contributions to Social Security, seven offer both a DB and a DC plan. The exception is Alaska.

There are five plans that allow faculty to initially choose a DC plan and then can switch to a DB plan after a stated period of time and are listed as combined plans. By offering this option, faculty who become tenured can change their plan. The five universities that offer this option are Louisiana, Ohio, Oklahoma, Oregon, and Tennessee.

4.6. Funded ratio analysis

Recall that the funded ratio measures the DB plans ability to pay retirement benefits in the future and is a function of the present value (market or actuarial) of assets and liabilities of

the fund. We run a regression with funded ratio as the dependent variable and eight independent variables that we believe contribute to the funded ratio as shown in Table 3. The average funded ratio is 0.8932 and the standard deviation is 0.1618, indicating on average the DB funds are not fully funded.

Of the eight variables, five are negatively correlated with the funded ratio and three are positively correlated (per capita income, DB years retirement age, and the number of four year schools in the state). The negatively correlated variables are the DB employee contribution, the DB employer contribution, the DB required years for vesting, the average salary and the assumed interest rate for the DB plan. The assumed interest rate is different for each plan and is established by the actuary for the plan, the average being 8.01% for the DB plans and a standard deviation of 0.03%.

The R^2 for the linear regression is 0.666 and the F is 5.724, with two of the variables significant at the 0.01 level (DB employee contribution and the number of four year schools), and three are significant at the 0.05 level (DB employer contribution, DB required age for retirement, and assumed interest rate). Average salary and per capita income are suggestive at the 0.10 level and the DB vesting requirement is not significant.

Our interpretation of the regression results is that the negative employee and employer contributions indicated that the higher these contributions rates the lower the funded ratio. This makes sense if we assume that DB plans that are having funding problems will attempt to solve the problem by increasing the contribution levels, which can only be done up to a certain level. The required age for retirement is positive and suggests that as that age increases so does the funded ratio. Raising the required age for retirement may be part of a solution for those funds having problems and is one that has already been implemented by Social Security. The low age for retirement in some states makes this an attractive option. As the actuarially determined assumed interest rate for the DB plan decreases the funded ratio increases, which makes sense from a financial analysis viewpoint. The assumed interest rate is determined by the actuary and is a subject of debate for both public and private pension plans. The interesting variable is the number of four-year schools in a state, suggesting that the more schools in a state the better the funded ratio that would favor states with larger populations over which to spread the cost of the state sponsored DB plan.

4.7. Updates to the plans for 2006 to 2007

The most fundamental change occurs in the states that now offer DC plans that did not do so in 2004. As of 2006, four of the nine now offer DC plans and they include Alaska, Arkansas, Texas, and Virginia. Of these four, new faculty can only choose a DC plan in Alaska and Arkansas. That leaves five states (Alabama, Arizona, New York, South Dakota, and Wisconsin) without a DC plan as their main retirement option.

Four universities increased contribution rates for their plans. Arizona in 2006 increases the contribution rates for both employee and employer from 5.7% to 8.6%. Florida only requires employer contributions and it increases from 6.19% to 9%. Maryland increases from 5.00% to 8.73% for employees and 9.35% to 11.70% for employers. Ohio increases from 9.00% to 10.00% for employees.

Lastly, 10 universities force their new faculty to make an irrevocable retirement decision

Table 3
Funded ratio as the dependent variable in a linear regression model

Variables	Unstandardized coefficients	<i>t</i>	Significance
Constant	1.424	2.703	0.013
DB employee contribution	-2.261	-3.039	0.006
DB employer contribution	-1.623	-2.756	0.011
DB required years vesting	0.015	-1.703	0.102
Per capita income	1.4E-005	2.034	0.054
#4 year schools	0.007	3.404	0.002
DB years retirement age	.014	2.378	0.026
Average salary	-5.30E-006	-1.893	0.071
Assumed interest rate	-14.311	-2.349	0.028

between a DB and DC plan within the first year of being hired. Three (Georgia, Iowa, and Mississippi) require an immediate decision and North Carolina requires a decision within 60 days. Four universities (New Mexico, Oklahoma, Pennsylvania, and Texas) require a decision within 90 days, Oregon allows 180 days, and Montana provides one year. It seems strange that these universities make faculty choose such an important benefit in such a short time period.

5. Summary and conclusions

The results for this study provide faculty at public universities an opportunity to compare their retirement plans with those of the largest university in each of the 50 states. Comparative statistics are provided for type of plan (DB and DC), contribution rates for employees and employers, contribution to Social Security, vesting, minimum age for retirement, collective bargaining, funded ratio, and replacement ratios for DB plans.

A model is developed to examine the factors that affect the funded ratio for DB plans and are a measure of risk for the plans. The regression analysis used to test the model indicates that employee and employer contributions, required age for retirement, number of four-year schools in a state, and assumed interest rate for the plan are significant variables.

Several conclusions can be drawn from this comparative study. Of the 50 universities, 45 (90%) offer a DC plan and 34 (68%) offer a DB plan. Of those that offer DB plans, only California does not require contributions from either the employer or employee. Six universities require only employer contributions and 27 require both employer and employee contributions with the average being 4.92% for employees and 7.46% for employers. In eight states, there is no contribution for Social Security retirement benefits and these faculty will either receive reduced benefits or no benefits from Social Security. There are no vesting rules for public pension plans, leading to wide variability in plans. The average youngest age for retirement is 56.65 years with 50% of plans allowing retirement at 55.

A simulation of replacement ratios for DB plans after 25 years of service indicates the average is 48.94%, with California, Louisiana, Massachusetts, and Pennsylvania having the

highest ratio. A total of 79% of university DB plans are underfunded in 2004, with Alaska, Illinois, and Oklahoma have less than 70% funding. Four respond by increasing their contribution rates and two by forcing new faculty into only a DC plan by 2006. The majority of DB plans are underfunded and present a risk to the lifetime retirement benefits for faculty. These conclusions should lead faculty to carefully examine their retirement plans to determine their potential risk and return for a comfortable retirement.

What do these results suggest for other public retirement plans and those provided in the corporate world? It appears that DC plans are becoming the predominant type of retirement plan in the public arena as they have in the corporate world. The caution to faculty to carefully examine the risk and return for their DB plans is also true for all workers and this suggests that retirement plans should adopt clear and easy explanations of their conditions to employees. Additional considerations are contributions to Social Security, vesting rules, youngest age for retirement, and funded ratio.

For those who have DC plans, the issues include the amount of employer and employee contributions, contributions to Social Security, and the ability to have the plan provide annuities for the assets in the plan versus finding individual annuity plans. The responsibility for a financially secure retirement for workers who have DC plans is up to the employee and means that there should be an increased effort on the part of employers to provide educational opportunities for retirement plan decisions as well as financial planning.

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