Defined Contribution Savings Plans in the Public Sector: Lessons from Behavioral Economics

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Abstract: In the private sector, defined contribution savings plans have largely displaced traditional defined benefit pensions. In the public sector, in contrast, traditional defined benefit pensions are still the norm, although some jurisdictions have followed the private sector and shifted either in whole, or in part, to a primarily defined contribution system. Going forward, fiscal pressures are likely to generate more movement in this direction, and even in states with a primary defined benefit plan, supplemental defined contribution plans are almost always offered to employees. In this paper, we apply the lessons we have learned about individual savings behavior in private sector defined contribution savings plans and from behavioral economics to the unique institutions of the public sector. with respect to savings behavior to the unique institutions of the public sector.

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Over the past 30 years, employer provided defined contribution (DC) savings plan have largely displaced traditional defined benefit (DB) pensions in the private sector. In 1975, there were 2.4 active defined benefit plan participants for each participant in a private sector defined contribution savings plan. By 2007, these proportions had almost reversed, with 3.4 active defined contribution savings plan participants for each defined benefit plan participant (Figure 1). Several factors have been implicated in this shift, including increased regulatory costs for defined benefit pension providers following the passage of the Employee Retirement Income Security Act (ERISA) in 1974, the legislated creation of an attractive (to employers) alternative to the defined benefit pension through section 401(k) of the Internal Revenue Code in 1978, and an interest by workers in portable pension benefits as the labor force has become more mobile.

The picture in the public sector is very different. In most jurisdictions, a traditional defined benefit pension is still the primary retirement benefit offered to employees. But some jurisdictions have followed the private sector and shifted either in whole, or in part, to a primarily defined contribution system. Going forward, fiscal pressures are likely to generate more movement in this direction. Even in states with a primary defined benefit plan, supplemental defined contribution plans are usually offered to employees, and for some public sector employees, could be an important (potential) source of retirement savings.

The distinction between defined benefit and defined contribution plans is an important one. In a defined benefit plan, participants have little impact on the income that they will receive in retirement other than through their choice of when to retire (or end their employment). Plan sponsors dictate the pension formula that determines the level of retirement income received by participants; they determine how much money to set aside today to meet those needs in the future; and they are responsible for managing the assets that have been put aside to fund future pension benefits. All of these tasks are done with the help of highly trained financial professionals.

In a defined contribution plan, participants are often left to navigate the retirement savings landscape on their own with little in the way of guidance from their employer or plan sponsor. Although there are many details of defined contribution plans that vary across plan sponsors, individuals are usually tasked with determining whether or not to participate, selecting a contribution rate, and choosing an asset allocation. These decisions can be overwhelming for ordinary employees, many of whom have little financial expertise. The consequences of charging

individuals with limited financial capabilities to make complicated financial decisions for themselves has been well document in the literature: individuals procrastinate, their savings outcomes are heavily influenced by plan design features such as employer-selected defaults, they place too much weight on information that is not relevant (e.g., past returns) and too little weight on information that is (e.g., fees).

In this paper, we apply the lessons we have learned about individual savings behavior in private sector defined contribution savings plans to the unique institutions of the public sector. We start by first surveying the public pension landscape, evaluating the generosity of public sector defined contribution and defined benefit pension plans and describing the types of defined contribution plans that are available. One distinguishing feature of defined contribution plans relative to defined benefit plans is the level of choice required of participants, so we next turn to the types of choices faced by employees with respect to defined contribution plans in the public sector and how these choices compare to those of employees in the private sector. We conclude by discussing how previous research might inform better design of defined contribution plans in the public sector.

I. The Public Sector Pension Landscape

Defined Benefit and Defined Contribution Plans in the Public Sector

There are over 2500 different public employee retirement systems providing benefits to the over 20 million individuals employed in the public sector.[1] For most of these employees, the primary retirement benefit is a traditional defined benefit pension plan: according to Snell (2010a), "91 percent of full-time state and local government employees are covered by a traditional, defined benefit retirement plan." Although defined contribution plans are making some inroads in the public sector, quantifying their importance is difficult because the data collected on public sector retirement plans has been largely focused on defined benefit plans.

Pensions & Investments collects data on the 1000 largest retirement plan sponsors (public and private) in the U.S., as measured by assets under management. Of the 1000 largest plans in

[1] The number of retirement systems comes from the U.S. Census Bureau: http://www.census.gov/govs/retire/2008ret05a.html (accessed August 4, 2010). The total number of retirement systems is comprised of 218 state systems, 160 county systems, 2054 municipal/township systems, and 118 school and special district systems. The number of public sector employees comes from the U.S. Bureau of Labor Statistics: http://www.bls.gov/cps/cpsaat15.pdf (accessed August 5, 2010).

2009, 222 are classified as public plans.[2] In this subset of public plans, the DB plan is still king of the hill: only 6% of the total assets under management are in defined contribution savings plans. But 94 of the 222 largest public pension plan sponsors have a DC plan component, and 38 of these plans have over $1 billion in DC plan assets.[3]

To get a more complete picture of the role of DC plans in the public sector, we compiled information on the retirement plans offered to new hires going forward (that is, we assess the plans in place for newly hired employees, not the plans that may exist for more tenured employees but that are not currently available to newly hired employees), for all 50 states and the District of Columbia, the 20 largest cities, and the 20 largest counties in the U.S. (as measured by population). Public plans vary in the types of employees that are covered. Some jurisdictions have a single plan for most or all public sector employees, whereas others have separate plans for different categories of public employees, e.g. teachers, public safety workers, or elected officials. In Tables 1A (states) and 1B (counties and cities), we list the plans available to a general public sector employee in each of the jurisdictions listed. Note that some plans are listed for all three types of jurisdictions—for example, a state plan that covers public sector workers employed at all levels of government within the state could show up as a plan covering state, county and city employees.

At all levels of government, the principal retirement plan for most jurisdictions is a defined benefit pension. But some jurisdictions have jettisoned a primary DB plan in favor of either a primary DC plan, a hybrid DB/DC plan, or are giving participants a choice between a DB and a DC or a hybrid DB/DC plan. At the state level, 13 states have some sort of DC component in their primary retirement plan. Three states—Georgia, Indiana, and Oregon—have a primary defined benefit plan with a mandatory defined contribution component. Two states—Alaska and Michigan—have switched to an entirely DC system for new employees. The District of Columbia also has a DC only plan for new employees.[4] Seven states give new employees a choice of primary plan. In Colorado, Florida, Montana, North Dakota (for exempt employees), and South Carolina, new employees have the choice between a DB and a DC plan; in

[2] Pensions & Investments classifies plans as being corporate, public, union, or miscellaneous. A handful of plans classified as "miscellaneous" appear to be public plans (e.g., the Federal Retirement Thrift plan, or the Illinois State Universities plan). In the numbers reported here, we follow the Pensions & Investments categorization.
[3] By way of comparison, Apple Computer has $1 billion in DC assets under management and no DB assets.
[4] Nebraska had a DC only plan for new state employees from 1967 to 2002, but replaced this with a cash balance plan for new employees starting in 2003.

Washington, new employees have the choice between a DB only plan and a DB plan with a mandatory DC component; and in Ohio, new employees have the choice between a DB only plan, a DB plan with a mandatory DC component, or a DC only plan. Utah will join the ranks of states with a choice of primary plan in 2011 following a recently legislated pension reform that gives employees a choice between a DB and a DC plan. Figure 2 shows a timeline of the state plan changes over the past 25 years that involve adding a defined contribution or hybrid DB/DC option to the retirement system, replacing a defined benefit plan with a DC plan, or in the case of Nebraska, replacing a DC plan with another type of plan. Since 1997, 11 states have incorporated some type of DC element into their primary retirement plan—about 1 state per year on average.

Relatively fewer new employees in the largest cities and counties in the U.S. have a primary plan that is something other than defined benefit only: only 6 of the 40 cities and counties listed in Table 1B. At the city level, both Indianapolis, IN and Columbus, OH belong to state-wide public employee retirement systems that, as discussed above, have a defined contribution element. San Diego, CA has a defined benefit plan with a mandatory DC component. And Jacksonville, FL gives new employee the choice between a DB and a DC plan. At the county level, Wayne County, MI has a defined benefit plan with a mandatory DC component, while King County, WA gives new employees the choice between a DB only plan and a DB plan with a mandatory DC component.

Regardless of the nature of their primary retirement plan, all of the jurisdictions in Table 1 have a supplemental defined contribution savings plan available to employees, and a non-trivial fraction have two different supplemental options. The role of primary defined contribution plans in the states without a primary defined benefit plan is obvious. The need for, and role of, supplemental defined contribution plans depends in large part on how well the primary defined benefit and defined contribution plans are meeting the retirement income needs of public sector employees.

The Adequacy of State Defined Benefit Pensions

Tel evaluate the role of defined contribution plans in the public sector, it is important to understand something about the defined benefit pensions that the defined contribution plans have either replaced, or complement. Public sector defined benefit pensions are often perceived by the public as being quite generous. To evaluate this claim, we calculate the retirement income

replacement rate for a stylized public sector employee—Joe the Bachelor. Our goal is to assess the extent to which Joe's employment generates an annuity-like stream of income in retirement under each state's primary retirement plan. We include in Joe's retirement income the annual stream of benefits to which Joe is entitled under each state's DB plan or the DB component of a hybrid plan (if relevant). Because in some states Joe's employment may entitle him to a stream of retirement income under social security, we also include Joe's social security income in our calculation. And because the taxation of state pension income varies across states, we evaluate Joe's after-tax income relative to his pre-retirement salary. We do not make any assumptions about any other sources of income that Joe may have in retirement, nor do we try to make assumptions about Joe's potential wealth accumulation in defined contribution plans and the type of replacement rate they would generate. Our goal is to assess the extent to which Social Security and Joe's public sector defined benefit pension (if any) replace his pre-retirement income. Appendix A includes more details on the assumptions and methodology we use in calculating Joe's retirement income replacement rate.

In Figures 3 and 4, we plot Joe's retirement income replacement rate across the different plan options available in all of the states and the District of Columbia. The plans are grouped by type and are ordered alphabetically by state postal code abbreviation within group: cash balance plans are orange, defined benefit plans are blue, DC only plans are red, and hybrid DB/DC plans are green. States that offer employees a choice of different retirement plans show up in the graph multiple times, once in each group for which they have a relevant plan option. The plans of states whose newly hired employees are not participating in Social Security are outlined in black.[5]

In Figure 3, we assume that Joe retires with a final annual salary of $50,000, whereas in Figure 4 we assume that Joe retires with a final salary of $100,000. In both Figures 3 and 4, we show Joe's replacement rate under X different scenarios:

A) Joe retires at age 65 having worked for 40 years, all of it in the public sector
B) Joe retires at age 60 having worked for 35 years, all of it in the public sector
C) Joe retires at age 60 having worked for 35 years, the first 5 in the private sector and the last 30 in the public sector

[5] The states whose newly hired public employees do not participate in social security are: Alaska, Colorado, Louisiana, Maine, Massachusetts, and Ohio. Some states in which newly hired employees are part of the Social Security system have older cohorts of employees that are not a part of the Social Security system.

D) Joe retires at age 60 having worked for 35 years, the first 30 in the private sector and the last 5 in the public sector

E) Joe retires at age 60 having worked for 35 years, the first 15 in the private sector and the last 20 in the public sector

F) Joe retires at age 60 having worked for 35 years, the first 20 in the public sector and the last 15 in the private sector

There are several things to note about the patterns in these figures. First, because the Social Security system is progressive, Joe's replacement rate is always lower when his final average salary is $100K than when it is $50K.[6] When Joe has a 35-year career entirely spent in the public sector (the second histogram in Figures 3 and 4), his replacement rate in DB only plans is 17% lower on average with a $100K final income than with a $50K final income.

Second, in the DB only plans and the hybrid DB/DC plans, Joe's replacement rate is increasing in the time he has spent working in the public sector (40 vs. 35 vs. 30 vs. 20 years). This is due to the nature of the typical defined benefit pension formula in which benefits are increasing in years of service. In some states, however, the defined benefit replacement rate is capped, so that additional years of service do not translate into a higher pension benefit after some point. At $50K in final income in the DB only plans, the average changes in Joe's replacement rate that results from increasing the years of public sector work from 20 to 30, from 30 to 35, and from 35 to 40 are 14%, 6%, and 5% respectively.

Third, holding fixed Joe's income at retirement, the total length of this career, and the division of his time between the public and the private sector, there is substantial heterogeneity in his replacement rate across states with DB only plans. For example, at $50K in income and with 35 years of work all spent in the public sector, the average replacement rate across all DB only plans is 91%. But if Joe worked in Pennsylvania, his replacement rate would be much higher 109%. In contrast, if Joe had worked in Maine, also a state with a DB only pension, his replacement rate would be 61%, a difference of 48 percentage points relative to Pennsylvania. The average replacement rate in the states with hybrid DB/DC plans is lower on average than in the states with DB only plans, 67% vs. 91%, although Joe would retire in these states with a stock of accumulated wealth in his DC component of these plans, so the comparison between

[6] The exceptions occur in the states with DC only plans that do not participate in Social Security, where the replacement rate is 0% regardless of Joe's income.

these states and the DB only states is an apples-to-oranges comparison. Nonetheless, there is also substantial variation in the replacement rate in the small number of hybrid DB/DC plans, ranging from a low of 35% in Ohio to a high of 85% in Oregon. In the DC only plans under the assumptions above about Joe, his replacement rate is either 0 (in the states that do not participate in Social Security), or a constant 38% (the replacement rate that he gets from Social Security alone).

Fourth, conditional on working partly in the public sector and partly in the private sector, Joe has a higher replacement rate if he ends his career in the public sector relative to if he starts his career in the public sector (Figures 3E vs. 3F, or 4E vs. 4F). For example, if Joe retires with a final average salary of $50K and works 20 years in the public sector and 15 years in the private sector, his replacement rate is 14% higher on average if he works first in the private sector and then ends in the public sector than the other way around (71% vs. 57%). This is because the defined benefit pension formulas are a function of Joe's *nominal* final average salary in the public sector.[7]

Fifth, in the scenario where Joe works only 5 years in the public sector, there are many states with a defined benefit system in which Joe is not entitled to *any* DB pension because he does not satisfy the plan vesting requirements. In these states, Joe's replacement rate is determined solely by his Social Security benefit and the tax code. In most of these states, Joe would receive a refund of his contributions to the state pension system if the system requires employee contributions and he leaves before vesting.[8] This would give Joe a stock of accumulated wealth that he could choose to save until retirement, much like a defined contribution plan, although as with defined contribution balances (or other sources of income), we do not attempt to convert these pension refunds into the replacement rates that are shown in Figures 3 and 4.

And finally, there are six states that do not participate in the Social Security system: Colorado, Louisiana, Maine, Massachusetts, Nevada and Ohio. This means that neither Joe nor

[7] In contrast, Social Security is a function of Joe's prior earnings after they have been indexed for wage growth in the economy. In a defined contribution plan, Joe's account balance would not be linked directly to his wage growth or level of wage growth in the economy. But if wage growth and investment returns in the economy are positively correlated, then Joe's account balance would be related to some extent to wage growth.

[8] In most states with DB plans, if Joe leaves public sector employment before he is vested, the refund he receives is of his contributions only. He does not receive any investment return on his contributions, nor does he receive any part of any employer contributions made on his behalf.

his public sector employer make contributions to the social security system while Joe is employed in the public sector, and consequently, Joe's public sector earnings history is not counted in determining his potential social security benefits. In these states, outlined in black in Figures 3 and 4, Joe's income in retirement in the scenarios where Joe works entirely in the public sector (A and B) is comprised entirely of his defined benefit pension because he has no private sector work history. In the states with DC only plans, those who do not participate in Social Security have a 0 replacement rate. In scenarios C and D, even though Joe has some private sector work experience, it is not long enough to qualify Joe for Social Security, so in these cases as well Joe's income in retirement is comprised entirely of his defined benefit pension. In scenarios E and F, Joe works in the private sector long enough to qualify for Social Security in addition to his public sector pension, but he is subject to the Social Security windfall elimination provision (WEP) which will result in a lower Social Security benefit than what he would get if his private sector work experience were the entirety of his career. As explained on the Social Security web site:

> "Social Security benefits are intended to replace only a percentage of a worker's pre-retirement earnings. The way Social Security benefit amounts are figured, lower-paid workers get a higher return than highly paid workers…Before 1983, people who worked mainly in a job not covered by Social Security had their Social Security benefits calculated as if they were long-term, low-wage workers. They had the advantage of receiving a Social Security benefit representing a higher percentage of their earnings, plus a pension from a job where they did not pay Social Security taxes. Congress passed the Windfall Elimination Provision to remove that advantage."
> (Source: http://www.ssa.gov/pubs/10045.html, accessed August 7, 2010.)

The replacement rates in Figures 3 and 4 account for the effect of the windfall elimination provision on Joe's social security benefits in the states that do not participate in Social Security.

Interestingly, the replacement rates of the states that do not participate in Social Security are, if anything, lower than the average replacement rates in states that do participate in Social Security. In fact, in many of the scenarios in Figures 3 and 4, the lowest replacement rates are in states that do not participate in Social Security. Evidently any additional generosity in the state pension benefit formula in these states does not compensate for the lack (or reduction) in Social Security income in retirement.

Figures 3 and 4 show the replacement rates for Joe the Bachelor if he starts working in the public sector today. In Figure 5, we take scenario A and plot the replacement rate that Joe

would get if he retired today under the rules in place for individuals reaching retirement today (including the current tax code), against the replacement rate that Joe would get at retirement if he was newly hired today and if the pension and tax rules in effect for newly hired employees do not change between now and Joe's eventual retirement. For most states, the benefits for currently retiring Joe and future retiring Joe are fairly close to the 45-degree line, indicating that pension plan generosity has not changed much over time, at least not for employees who spend their entire careers in the public sector. In the states where defined benefit pension generosity has changed, defined benefit plans have, for the most part, lowered their retirement income replacement rates. This is certainly the case in the states that have replaced a DB plan with a DC plan. In the states where retirement plan generosity has changed, replacement rates have fallen by an average of 9%.

Several states have made recent pension plan changes that decrease the generosity of their defined benefit pension but that do not show up in the scenario plotted in Figure 5. For example, an increase in the years of service at which employees vest would reduce benefit generosity for employees who leave the public sector with years of service greater than the old but less than the new vesting requirement. Similarly, an increase in the combination of age and years of service required to claim a full pension benefit would also decrease generosity for some subset of employees. Many states have adopted so-called "anti-spiking provisions". Anecdotally, public sector employees and employers have been accused of "spiking" pay in the final year or two before retirement as a way to increase the stream of future pension benefits, since the pension formulas depend on some measure of final average pay. This spiking could take the form of extremely high levels of overtime, or short-term "promotions" into higher paying jobs. In our calculations, we assume that Joe has 1% real wage growth each year until 5 years before retirement, at which point we assume that his pay is flat until reaching retirement, so the replacement rates that we generate are not influenced by spiking. But in practice, stricter anti-spiking provisions would be one way in which the generosity of defined benefit pensions is being reduced that would not show up in Figure 5.[9] States are also reducing the generosity of the retiree health insurance that they provide to eligible retired workers, a benefit that we do not incorporate into our replacement rate calculation but one that can be very valuable to some

[9] In practice, the anti-spiking provisions take the form of caps on the annual salary growth that will be used in calculated a worker's pension benefit.

retired employees.[10] The general point is that public sector retirement benefits are becoming less generous over time along several dimensions, many of which don't show up in the stylized calculations that we have done here. The current fiscal situation facing many jurisdictions will likely precipitate many more such changes.

From the data presented in Figures 3 and 4 it is hard to make a blanket conclusion about the retirement income adequacy of state defined benefit pensions. For some retiring public sector workers, their state defined benefit pension is probably more than adequate, especially when coupled with the retiree health insurance that is available offered to public sector retirees.[11] The tremendous heterogeneity in replacement rates across states for equivalent workers with defined benefit only plans, however, suggests that either some states have overly generous pensions, or that some states have pensions that alone are inadequate. If the latter, then there is certainly a role for supplemental savings plans to help fill the gap. Similarly, to the extent that pensions are becoming less generous in some of the less visible ways discussed above, this may also increase the need for supplemental savings plans. And for those workers whose public sector careers are so short that they receive little, if anything, in the way of public pension benefits, there is also a role for supplemental savings plans.

The Adequacy of State Defined Contribution Pensions

The adequacy of defined contribution savings plans is more difficult to assess than that of defined benefit plans because their adequacy depends significantly on participant behavior—are employees participating, how much are they contributing, and what type of asset allocation do they choose? In most private sector 401(k) plans, there are many ways employees can come up short: they can delay enrolling in the plan, they can choose a contribution rate that is too low to generate the necessary resources to maintain consumption in retirement, and they can choose an inappropriate asset allocation (e.g., investing heavily in employer stock, or choosing only very conservative asset allocation, or investing in high fee funds).

Table 2 lists some of the features of the defined contribution savings plans in states that have a primary plan that is entirely DC, or the choice of a primary plan that includes a DC only

[10] States have been making retiree health insurance less generous by charging higher premiums, increasing deductibles and copayments, and increasing the service requirements for eligibility (Clark and Morrill, 2010).
[11] Clark and Morrill (2010) find that states with more generous retiree health insurance also have higher pension replacement rates.

option (supplementary DC plans and the DC component of hybrid DB/DC plans are not included in Table 2). Just as there is heterogeneity in the generosity of the DB plans in states with a primary DB plan, there is also heterogeneity in the generosity of the DC plans in the states with primary DC plans. Some plans are better designed to set employees up for adequate retirement wealth accumulation than others.

In contrast to most private sector defined contribution savings plans in which savings plan participation is optional, public sector retirement plan participation is mandatory for most employees.[12] In all three jurisdictions that only have a defined contribution plan, participation is automatic and employees cannot opt out. Similarly, in the states that give employees a defined contribution plan as an option, participation in one of the plan options is required. Participation in the defined contribution plan, however, requires active enrollment as in all states with plan choice the default plan is the defined benefit plan or, the case of Washington state, the hybrid DB/DC option.

In the private sector, most defined contribution plans are funded by elective employee contributions and an employer contribution that is contingent on, and related to, the employee's contribution (e.g., the employer will match 50% of employee contributions up to a maximum of 3% of pay). The structure of contributions in state defined contribution plans is very different. Only one state, Michigan, allows for variable employee contributions that are matched by the employer, as is the norm in the private sector. Instead, public sector defined contribution plans are characterized by a non-contingent employer contribution, ranging from 4% in Michigan to over 10% in Colorado. Most also have a mandatory (and fixed) employee contribution, ranging from 4% to 8%, although two jurisdictions (Washington, DC and Florida) do not allow employee contributions at all. The minimum combined employer/employee contribution ranges from a low of 4% in Michigan to a high of almost 19% in Ohio.

The one aspect of public and private sector defined contribution plans that is largely the same is the investment options. The number of investment options ranges from 10 to the low 20s with only one exception, South Carolina, which differs because it has four different investment fund managers and a total of 85 funds. All of the fund menus have a set of investment options that span the risk-return spectrum, and most have incorporated target date funds into their

[12] States often exempt some groups of employees from retirement plan participation, although these employee groups tend to be a small (e.g., temporary or part-time workers).

investment menu. The default fund is either an age-appropriate target date fund or a balanced fund with one exception, Michigan, where the default is a fixed income fund. This is in line with the private sector which has also moved toward target date and balanced fund defaults that satisfy the Qualified Default Investment Alternative (QDIA) guidelines following the passage of the Pension Protection Act in 2006.

Employees are always immediately vested in their own contributions in both the private sector and in the state DC plan listed in Table 2. The vesting of employer contributions varies across jurisdictions, from immediate vesting (in South Carolina) to cliff vesting after 5 years (Montana). Most states, however, have a vesting schedule in which employees become progressively more vested in their employer contributions over time, becoming fully vested after 4 or 5 years. As with the investment menus, the range of vesting schedules also mirrors what we observe in private sector plans.

Relatively to private sector defined contribution savings plans, public sector plans are generally better poised to set employees up for a secure retirement. In the DC only states, participation is mandatory and automatic. Colorado and Ohio have combined employer/employee contribution rates exceeding 18%. Four other states have combined employer/employee contribution rates equal or exceeding 10%, which is about equal to the average combined employer/employee contribution rate among private sector savings plan participants. But some states have rather low combined employer/employee contribution rates: Michigan at 4% (although with optional employee contributions and the employer match it could be higher), Washington at 5%, North Dakota at 8%. In these states, many employees will likely need additional savings to ensure a secure retirement.

II. Behavioral Economics and Savings Outcomes

We now turn to a brief summary of the literature on behavioral economics and savings outcomes. We will then, in Section III, apply the findings from this research to the institutions of the public sector retirement plans that we have described above in Section I.

Several recent papers document a pervasive lack of general financial literacy in the U.S. population (e.g., Lusardi and Mitchell, 2006, 2007; Lusardi, Mitchell and Curto, 2010; Lusardi and Tufano, 2009; Applied Research and Consulting, 2009). This lack of financial literacy carries over to the specific domain of their employer sponsored retirement plans. Gustman,

Steinmeier, and Tabatabai (2007) and Stevens and Chan (2008) show that many respondents to the Health and Retirement Survey do not understand important features of the retirement plan to which they belong, including whether the plan is a defined benefit or a defined contribution plan, the age at which they qualify for full benefits, and the relationship between continued work and future benefits. Choi et al. (2006) similarly show that many employees in a defined contribution savings plan are unable to correctly articulate the employer match that they face. Finally, Brown and Weisbenner (2009) document confusion about which of the plan options available to employees in the State Universities Retirement System of Illinois.

As noted in the introduction, complicated financial decisions can be overwhelming for many individuals, especially those who have little financial expertise and only limited financial experience. Saving for retirement can be especially daunting as it involves making long-term commitments that are both large and consequential. And the nature of the task is such that many individuals never develop significant expertise. Individual learning is slow to occur because many choices are made infrequently and their outcomes are realized only with substantial delay and significant noise, while social learning is limited first by the fact that many financial shocks are common, and second by the rapid pace of financial innovation that quickly renders acquired knowledge obsolete.

The consequences for savings plan outcomes in this context have been well documented. There are several broad patterns of behavior that emerge from the literature. First, individuals procrastinate when faced when complicated choices. In the context of retirement saving, this implies not saving at all. Carroll et al. (2009) document substantial procrastination in 401(k) savings plan enrollment in a large private sector savings plan, even though the costs of delay can be substantial (Choi, Laibson and Madrian, forthcoming). Conversely, Choi, Laibson and Madrian (2009a) and Beshears et al. (2010) show that simplifying the process of savings plan enrollment leads to sizeable increases in savings plan participation.

A second broad pattern of behavior is that decisions with respect to savings plan participation, contributions rates, and asset allocation are all heavily influenced by plan design features that, in standard economic models, should matter little. The best evidence on this front is the sensitivity of outcomes to the plan defaults. Madrian and Shea (2001), Choi et al. (2004 and 2006), and Beshears et al. (2008) document substantial increases in savings plan participation following employer adoption of automatic enrollment, which changes the default savings plan

participation status from being out of the plan to being in the plan. They also document sizeable shifts in both contribution rates and asset allocation toward the automatic enrollment defaults on these margins. There are many other examples of default effects on savings plan outcomes: allowing employees to choose future automatic increases in their contribution rates leads to sizeable increases in savings (Thaler and Benartzi, 2004); portfolios have much more overall exposure to employer stock when the employer match is defaulted into employer stock (Benartzi, 2001; Choi et al. 2005; Choi, Laibson and Madrian, 2009b); the fraction of pension beneficiaries choosing a joint and survivor annuity increased substantially when this option became the legal default for married individuals (Holden and Nicholson, 1998; Saku, 2001).

Defaults are not the only plan design feature that influence savings outcomes—there are several examples of other plan design features that also influence outcomes in significant ways. Employee contribution rates are heavily influenced by the employer choice of the match threshold in plans that provide employer matching contributions (Choi et al. 2006). And in plans without an employer match, employee contribution rates are influenced by whether mandatory contributions are labeled as employee or employer contributions (Card and Ransom, forthcoming). Several authors have found that asset allocation choices are sensitive to the structure of the investment menu (Benartzi and Thaler, 2001; Brown, Liang and Weisbenner, 2007; Karlsson, Massa, and Simonov, 2007).

A third broad pattern is that individuals pay too much attention to information that should not matter, and too little attention to information that should matter. For example, individuals chase past returns in both their asset allocation choices (Benartzi, 2001; Choi et al. 2004; Calvet, Campbell and Sodini, 2009) and contribution rate choices (Choi et al. 2009) while paying too little attention to the importance of mutual fund fees (Choi, Laibson and Madrian, 2010).

A fourth pattern is a reliance on heuristics and rules of thumb in decision making. For example, Benartzi and Thaler (2001) document what they call “naïve diversification”: individuals diversify by investing in several different mutual funds, but they fail to account for the underlying correlations in returns across the funds when making their choices. Choi et al. (2006) show that in choosing contribution rates, employees place disproportionate weight on numbers that are divisible by 5.

Finally, individuals do a poor job of integrating various aspects of their financial lives; rather, they appear to be engaged in various types of mental accounting (Choi, Laibson and Madrian, 2009; Card and Ransom, forthcoming).

III. Implications for Public Sector Retirement Plans

What are the implications of these behavioral patterns for thinking about how well public sector retirement plans serve the needs of government employees?

Public sector retirement plans are both simpler, and more complicated, than savings plans in the private sector. To the extent that complexity helps drive some of the behavioral patterns described above, there are reasons to think that things could be both better and worse in the public sector.

We start by considering the situation of employees who face a primary defined benefit plan. Relative to defined contribution savings plans, defined benefit plans have been characterized as being less complicated to their participants, at least in terms of the choices they require of individuals. This is almost certainly true—defined contribution plans demand, or at least allow, a substantial amount of individual autonomy, whereas defined benefit plans require almost no choice on the part of participants, at least up until the time or retirement. But there are many complicated features of defined benefit plans that may have nonetheless have implications for employee savings outcomes in the supplemental savings plans they are offered. The formulas determining defined benefit pension payouts seem relatively straightforward on the surface—final average salary multiplied by years of service multiplied by a retirement factor. But these formulas often have complicated wrinkles—limits on the growth in final wages that will count in the formula, or rules about the combination of age and years of service that must be met to get a full benefit—that make them less transparent than they initially seem. As noted earlier, many individuals do indeed have misconceptions about the nature of the retirement benefits to which they are entitled. These misconceptions may lead individuals to make suboptimal decisions about whether or not to save, or how much to save, in supplemental savings plans.

By their nature, defined benefit plans reward tenure. Most payout formulas depend directly on years of service; they also depend directly on some measure of final average pay, which is itself often related to tenure, particularly for unionized public sector workers. Workers who, for whatever reason, leave the public sector before becoming vested or with low levels of tenure, will be entitled to very little.[13] Any misconceptions that employees have about the likely duration of their public sector career or the benefits to which they would be entitled should their

[13] In most states, employees in DB plans who leave public sector employment before they are vested, are entitled to a refund of their own contributions only. Some states credit a rate of interest to employee contributions.

career be shorter (or longer) than they anticipated, may also lead individuals to make suboptimal savings decision along the way.

Finally, in states that do not participate in Social Security, the windfall elimination provision of Social Security greatly complicates making an accurate assessment about the level of income that employees will receive in retirement. As explained earlier, the windfall elimination provision results in a reduction in social security payments to employees in states who do not participate in social security and who have long enough private sector careers that they qualify for social security benefits in addition to their public sector pension. Unfortunately, the statements that social security sends to participants do not necessarily account for the effects of the windfall elimination provision (the social security administration may not even know that an individual is employed in the public sector if the state is not participating in social security). This, too, may lead individuals to make suboptimal savings decisions while they are employed, and in this case, probably in the direction of saving too little or retiring too early.

In some states, employees have a choice of plans in which to participate. To the extent that either DB or DC plans are complicated, having to choose between them adds yet another layer of complexity. In this case, employees do not typically have the option of procrastination—there is a timeframe in which a decision must be made.[14] But in fact, the decision does not need to be made, because the employer must specify a default plan for those individuals who do not choose. Table 3 lists the states that have a choice of primary plan, which plan is their default option, and the fraction of new employees choosing each option for the states from which were able to get that information. In all of the choice states that have a DC only plan as one of the options, the default plan is the defined benefit plan. Washington is the one choice state in which the defined benefit plan is *not* the default; rather, the default is a hybrid DB/DC plan. Consistent with the previous research on defaults, the default option in all the states for which we were able to obtain plan election data is by far the most prevalent option: 79% to 94% of new employees are in the default plan.

Beshears et al. (2008) discuss several reasons why defaults may be persistent. Two seem particularly relevant here: the complexity of the decision-making task may induce procrastination in making a choice, and the potential perception of the default as an endorsement.

[14] For the states with a plan choice in Table 2, employees have from 30 days to twelve months to opt-out of the default plan.

The choice between multiple retirement plans is likely to be complicated for most workers, and lacking strong preferences, the default may be particularly likely to be perceived as the correct course of action. Yang (2005) and Goda and Manchester (2010) both document strong default effects among employees who have a choice between a DB and a DC plan. In the organization studied by Goda and Manchester, the default was age-based: employees above age 45 were who did not make an active choice were defaulted into the DB plan, while employees under age 45 were defaulted into the DC plan. They find that employees who are just above the age 45-cutoff are 60 percentage points more likely to be in the defined benefit plan than employees who are just below the age 45-cutoff. Their analysis suggests, however, that even though the defaults were incredibly persistent, the age-based default rule used at the organization they studied was close to optimal. The firm studied by Yang, in contrast, designated the DB plan as the default for all employees. Like Goda and Manchester, Yang finds that the default is very persistent, and particularly so for young employees (<30), a group whom she calculates is least likely to benefit from being in the DB plan.[15]

No one has yet examined the extent to which employees actually ended up ex post in the plan that gave them the highest benefits. The dramatic difference that Goda and Manchester find in the fraction of employees in the DB plan around age 45 change in the default suggests that even if such a default rule is optimal on average, there could be many employees who nonetheless end up in a plan that is suboptimal for them individually. Given the very large impact that the default has on realized outcomes in the context of plan choice, more thought is needed on how to optimally structure defaults in this context taking into account how employee behavior responds to the default choice. An alternative approach to designating a default option would be to require employees to make an active choice of their primary plan, although in this setting employees could easily make mistakes unless efforts are made to help employees quickly and easily learn the relative merits of each option.[16]

An interesting wrinkle to the plan choice decision is whether or not the choice is reversible. In some states in which employees have a choice of plans, their choice, once made, is fixed. In other states, however, employees have at least one, sometimes multiple, opportunities

[15] This result is consistent with the findings of Beshears et al (2010) who find that the employees who persist at what appears to be a sub-optimal default contribution rate tend to be of lower socio-economic status.
[16] See Carroll et al. (2009) for evidence on the impact of requiring employees to make an active decision on savings plan participation.

to switch between plans. This, of course, complicates things even further. But it may also change the psychology of the original decision-making task. To the extent that employees make a mistake, or to the extent that their circumstances change, they do have an opportunity (or opportunities) to undo their original decision, and this flexibility could be valuable. But to the extent that employees know that their decision is reversible in the future, they may take less care to make an appropriate choice today.

In states with a DC only plan, all states remove at least one layer of complexity by automatically enrolling employees in the DC plan with a non-contingent employer contribution. Most go a step further by also requiring a fixed contribution on the part of employees, some at high enough rates that employees will likely be well positioned going into retirement. The default investment fund is increasingly a target date fund. Although target dates are not perfect, they are diversified across asset classes. From the participant perspective, they also offer the promise of active management without future action on the part of the employee.

The defined contribution complexity in public plans comes when we consider the supplemental savings plans that are an additional option in most jurisdictions. As noted above in our discussion of DB plans, not all DB plans are generating high retirement income replacement rates. And regardless of plan generosity, it is not always straightforward for employees to figure out how much money they will get in retirement from their DB pension and Social Security, and this may lead to mistakes in saving optimally in any supplemental savings plans that are offered. Similarly, in some states with a DC only plan or a DC option, the DC plan does not automatically give employees a high enough savings rate to guarantee a secure retirement. And even though the amount that is being saved is more transparent than in the primary DC plans than in a DB plan (even if its translation into retirement income is not), many jurisdictions have supplemental DC plans than seem unnecessarily complicated. For example, a state may have one provider with one set of investment options administering its primary DC plan, another provider with a completely different set of investment options managing its first supplementary plan, and yet a another provider with a third set of investment options for a second supplementary plan. If there are multiple supplementary plans, employees who desire to supplement their primary benefits would have to choose which supplementary plan to use first. Like the choice between a DB and a DC plan discussed above, this is not necessarily a straightforward decision.

The more problematic aspect of defined contributions plans from a retirement income perspective is that they are not automatically annuitized upon retirement. Rather, employees must take some action to convert their plan balances into a steady stream of retirement income, or they must manage spending down their wealth in retirement on their own. Annuitization rates out of non-annuitized wealth tend to be very low, the so-called annuity puzzle. Relative to the public sector, state pension plans do marginally better on this front. In defined benefit plans, only three states allow employees the option of taking a lump sum rather than the defined benefit annuity. The trend in the private sector, in contrast, has been towards allowing employees to take a lump sum, and anecdotally, when this option is allowed, a very high fraction of employees choose the lump sum rather than the annuity. In defined contribution plans, many states do have an annuity option available, although it is unclear how many employees in these plan use this option to annuitize upon reaching retirement. But in the private sector, most defined contribution plans do not even have an annuity option.

IV. Conclusions

In this paper we have provided an overview of the public sector pension landscape in the U.S. Although defined benefit plans remain the primary plan of choice, some jurisdictions, particularly at the state level, have opted for DC only plans or, more frequently, given employees a choice between a tradition DB plan or a parallel DC or hybrid DB/DC plan. And all jurisdictions have one or more supplementary DC plan available to employees.

Among the primary DC and DC plans, we document substantial heterogeneity in plan generosity across states. There are plans of both varieties that are very generous, giving long-term public sector employees a high retirement income replacement rate in the case of DB plans, or setting employees up to accumulate a substantial stock of wealth at retirement in the case of DC plans. But there are also primary plans of both varieties that are much less generous and for which some supplemental savings may be necessary to maintain workers' standard of living in retirement.

We conclude by discussing how the recent research on behavioral economics and savings outcomes applies to the institutions and choices that employees face in public sector retirement systems. There are some aspects of public sector defined contribution retirement plans that are better designed from a behavioral perspective than their private sector counterparts, for example,

automatic enrollment with mandatory employee contributions and non-contingent employer contributions. But there are other aspects of public sector savings plan design that are more complicated and confusing than typically found in the private sector, and, at least in private sector savings plans, complexity often leads employees to make mistakes. Complexity in public sector plans comes from offering employees the choice between different types of primary plans, offering employees multiple supplementary plans, and offering employees the choice of multiples providers either within or across plans. More research is needed to determine how well public sector employees do when faced with these types of choices.

Appendix A: Calculation of Retirement Income Replacement Rates

Our calculation of the retirement income replacement rates in Figures 3,4 and 5 incorporates both the defined benefit pension income available to state retirees and their social security income. We do not transform retirement wealth into an income stream in retirement, so other sources of retirement wealth, such as from a defined contribution savings account, are not included. This is by design—our goal is to assess the extent to which public sector employment generates an annuity-like income stream in retirement.

Assumptions

Our calculations of retirement income replacement rates are based on a stylized public sector employee, Joe the Bachelor. For the scenarios illustrated in Figures 3 and 4, we make the following assumptions:

- Joe was born on January 1, 1945 and entered the labor force in either 1970 (if he has a 40-year career) or 1975 (if he has a 35-year career).
- Joe retires on January 1, 2010 when he reaches age 65
- Joe is single when he retires
- Joe's earnings trajectory is independent of the sector in which he is employed.
- Joe retires with a final average salary of either $50,000 (Figure 3) or $100,000 (Figure 4).
- Joe's earnings grow at real annual rate of 1 percent up until age 60, at which point his earnings are flat at either $50,000 (Figure 3) or $100,000 (Figure 4) until he retires at age 65. This makes Joe's final average salary, which is used in the defined benefit pension formulas, the same as his final salary in the majority of states.
- We calculate Joe's nominal wage profile up until age 60 from his real wage profile using the Social Security Administration wage index factors. Note that Social Security only indexes wages up through age 60.
- In calculating Joe's defined benefit pension income, we assume that Joe is covered by the plan rules in effect for new employees going forward (scenarios in Figures 3 and 4)
- In Figure 5, we also calculate Joe's defined pension benefit pension income assuming that Joe is covered by the plan rules in effect for newly eligible employees on January 1, 1975.

Calculating Defined Benefit Pension Income for State Employees

We calculate the public pension benefits for all states, including the District of Columbia, which either have either a defined benefit or a hybrid DB/DC plan for their general employees. If a public retirement plan has a hybrid DB/DC structure, we only calculate the defined benefit portion of the available retirement benefit. Joe's public pension benefit is zero for those states with defined contribution or cash balance plans; it is also zero for the defined contribution portion of states' hybrid DB/DC plans. If Joe does not satisfy the plan's vesting rules for a particular scenario, then he is ineligible to receive a pension benefit. If Joe satisfies the vesting rules for a particular scenario, we calculate his normal, unreduced yearly retirement benefit using the plan rules in place for newly eligible employees in 2010. Even though Joe is not a newly eligible employee himself in 2010, this gives us a measure of pension plan generosity in place for new employees like Joe going forward. For Figure 5, we also calculate the pension benefit Joe would receive under the plan rules in place for newly eligible rules on January 1, 1975. If the state subsequently increases its pension plan generosity, we assume that Joe switches to the newer plan that provides a greater future retirement benefit if he is offered the option of changing plans.

In calculating Joe's retirement benefits, we follow each plan's documented rules. For every scenario, we calculate his pension income assuming a pre-retirement final salary of $50,000, and also $100,000. We calculate Joe's final average salary, which is used in each state's defined benefit pension benefit formula, from Joe's nominal earnings profile. His years of credited service consist solely of his public-sector tenure which varies by scenario. Once we have calculated the yearly pension benefit provided by each plan, we compare these amounts with the plan's minimum and maximum allowances, if they exist, and we modify his pension benefits, if necessary, to satisfy these constraints.

Calculating Social Security Benefits for State Employees

We assume that Joe begins starts claiming his Social Security benefit when he retires in 2010 at age 65. In order to calculate the benefit amount, we use Joe's nominal earnings profile and take the lower of his nominal earnings and the maximum Social Security-taxable earnings for each year of his career. Next, we index the resulting values, multiplying them by the index factors discussed above. To obtain his average indexed monthly earnings (AIME), we sum the 35 years of highest indexed earnings, divide by 420, which is the number of months in 35 years, and round to the nearest lower dollar. Then, using the 2007 bend points of $680 and $4100, we multiply the first $680 of the AIME by 0.9, the amount over $680 and less than or equal to $4100 by 0.32, and the amount over $4100 by 0.15. We add the three values generated from the previous step and round to the nearest lower 10 cents to get the primary insurance amount (PIA). To account for cost-of-living adjustments (COLAs), the PIA is increased

beginning in 2007, the year that Joe reaches age 62. We multiply his PIA by the 2007 COLA factor, with the resulting amount rounded to the next lower dime; we then repeat this process using the 2008 COLA factor. In effect, we obtain the full monthly Social Security benefit. However, since Joe chooses to receive his benefit prior to reaching the normal Social Security retirement age of 66 for individuals in his birth cohort, his benefit is reduced. In Joe's case, his benefit is reduced by 5/9 of 1 percent for each of the 12 months that he receives a benefit before age 66. After making this reduction, we multiply the revised monthly benefit by 12 to obtain his annual Social Security benefit.

For states whose general employees are covered by Social Security, Joe is entitled to the above benefit. However, for states that do not provide coverage, Joe only receives a Social Security benefit if he has at least 10 years of substantial earnings through employment in the private sector. If the Joe's years of creditable earnings are less than 30, Joe's benefit is reduced in accordance with the Windfall Elimination Provision. For those states without Social Security coverage, when Joe has 20 or fewer years of substantial earnings in the private sector, we change the 0.9 multiplicative factor for the first 2007 bend point to 0.4 and compute the resulting Social Security benefit.

Calculating Federal and State Taxes

Once Joe retires at age 65, we assume that his pension and Social Security benefits are his only potential sources of income. Using the NBER's TAXSIM, we calculate Joe's federal income tax liability using the 2009 tax rules (the most recent effective tax rules). Because TAXSIM does not distinguish public vs. private sector pensions in calculating state income tax liabilities, and because many states have preferential tax treatment for public sector pension income, we calculate state liabilities on our own, also using the 2009 tax rules. We first subtract state individual income exemptions, if applicable, for public pensions and Social Security from Joe's respective public pension income and Social Security income. Next, we add together the remaining taxable pension and Social Security income, and we subtract applicable state individual income tax personal exemptions and standard deductions from this remaining income. Following these subtractions, we obtain Joe's state taxable income; if his state taxable income is zero or negative, we assume that he has zero state individual income tax liability. Otherwise, we apply the state individual income tax brackets to his taxable income and calculate his initial state tax liability. Afterwards, we subtract any tax credits for which Joe is eligible from this initial liability. The remaining amount, so long as it is non-negative, represents his state individual income tax liability; otherwise, we assume that Joe has zero state tax liability.

Calculating Retirement Income Replacement Rates

To calculate Joe's retirement income replacement rate, we add together his annual public pension income and his annual Social Security benefit to obtain his gross retirement income. We subtract federal and state taxes from his gross retirement income to get his after-tax income. Finally, we divide this after-tax income by his pre-retirement income, which is either $50,000 or $100,000. The resulting numbers are the replacements rates that are plotted in Figures 3, 4 and 5 and discussed in the text.

TABLE A1. State Participation in Social Security for Newly Hired Public Employees and the State Taxation of Public Pension Benefits

State	Participates in Social Security	Has an Income Tax	Taxation of State Pension Benefits
Alabama	Yes	Yes	Public pension fully excluded from taxable income
Alaska	No	No	No personal income tax
Arizona	Yes	Yes	$2,500 public pension exclusion
Arkansas	Yes	Yes	$6,000 public pension exclusion
California	Yes	Yes	Public pension fully taxed
Colorado	No	Yes	$24,000 exclusion for social security and public and other qualified pension income for those 65+
Connecticut	Yes	Yes	Public pension fully taxed
Delaware	Yes	Yes	$12,500 public pension exclusion for those 60+
District of Columbia	Yes	Yes	Up to $3,000 on pension income for those 62+
Florida	Yes	No	No personal income tax
Georgia	Yes	Yes	$35,000 retirement income exclusion
Hawaii	Yes	Yes	Public pension fully excluded from taxable income
Idaho	Yes	Yes	Public pension fully taxed
Illinois	Yes	Yes	Public pension fully excluded from taxable income
Indiana	Yes	Yes	Public pension fully taxed
Iowa	Yes	Yes	$24,000 public pension exclusion
Kansas	Yes	Yes	Public pension fully excluded from taxable income
Kentucky	Yes	Yes	$41,110 public pension exclusion
Louisiana	No	Yes	Public pension fully excluded from taxable income
Maine	No	Yes	Exclusion of $6,000 minus SS benefits
Maryland	Yes	Yes	$24,500 pension exclusion for those 65+
Massachusetts	No	Yes	Public pension fully excluded from taxable income
Michigan	Yes	Yes	Public pension fully excluded from taxable income
Minnesota	Yes	Yes	Public pension fully taxed
Mississippi	Yes	Yes	Public pension fully excluded from taxable income
Missouri	Yes	Yes	May deduct the greater of $6,000 or 50% of public penion for those 62+; pension exemption limited to the amount of SS income

Montana	Yes	Yes	Pension exclusion of up to $3,600 if AGI<$30,000
Nebraska	Yes	Yes	Public pension fully taxed
Nevada	No	No	No personal income tax
New Hampshire	Yes	No	No personal income tax
New Jersey	Yes	Yes	$15,000 pension exclusion for those age 62+ if AGI<=$100,000
New Mexico	Yes	Yes	Retirement income exclusion of up to $2500 for those with AGI<=$39,667
New York	Yes	Yes	Public pension fully excluded from taxable income
North Carolina	Yes	Yes	$4,000 public pension exclusion
North Dakota	Yes	Yes	Public pension fully taxed
Ohio	No	Yes	Retirement income tax credit of up to $200 if retirement income >= $500
Oklahoma	Yes	Yes	Retirement income exclusion of up to $10,000
Oregon	Yes	Yes	Tax credit of up to 9% of pension income if household income <$22,500
Pennsylvania	Yes	Yes	Public pension fully excluded from taxable income
Rhode Island	Yes	Yes	Public pension fully taxed
South Carolina	Yes	Yes	Public pension exclusion of up to $15,000 for those 65+
South Dakota	Yes	No	No personal income tax
Tennessee	Yes	No	No personal income tax
Texas	Yes	No	No personal income tax
Utah	Yes	Yes	Tax credit of up to $450
Vermont	Yes	Yes	Public pension fully taxed
Virginia	Yes	Yes	Pension exclusion of up to $12,000 for those 65+
Washington	Yes	No	No personal income tax
West Virginia	Yes	Yes	$2,000 public pension exclusion; additional retirement income exclusion for those age 65+
Wisconsin	Yes	Yes	$5,000 pension exclusion for those 65+ if AGI<$15,000
Wyoming	Yes	No	No personal income tax

Note: State participation in Social Security is categorized for newly hired public sector employees. Some states in which newly hired employees are part of the Social Security system have older cohorts of employees that are not a part of Social Security.

References

Applied Research and Consulting (2009). Financial Capability in the United States: (http://www.finrafoundation.org/web/groups/foundation/@foundation/documents/foundation/p120536.pdf, accessed August 9, 2010).

Benartzi, Shlomo, and Richard Thaler (2001). "Naive Diversification Strategies in Retirement Saving Plans," *American Economic Review* 91.1, pp. 79-98.

Benartzi, Shlomo (2001). "Excessive Extrapolation and the Allocation of 401(k) Accounts to Company Stock?" *Journal of Finance* 56.5, pp. 1747-1764.

Beshears, John, James Choi, David Laibson, and Brigitte Madrian (2010). "Simplification and Saving," working paper.

Beshears, John, James Choi, David Laibson, and Brigitte Madrian (2008). "The Importance of Default Options for Retirement Saving Outcomes: Evidence from the United States," in Stephen J. Kay and Tapen Sinha, editors, *Lessons from Pension Reform in the Americas*, Oxford: Oxford University Press, pp. 59-87.

Brown, Jeffrey, Nellie Liang, and Scott Weisbenner (2007). "Individual Account Investment Options and Portfolio Choice: Behavioral Lessons from 401(k) Plans," *Journal of Public Economics* 91, p. 1992-2013.

Brown, Jeffrey and Scott Weisbenner (2009). "Who Chooses Defined Contribution Plans?" In Jeffrey R. Brown, Jeffrey Liebman, and David Wise (Ed.), *Social Security Policy in a Changing Environment*, 131-161. Chicago, IL: University of Chicago Press.

Calvet, Laurent, John Campbell, and Paolo Sodini (2009). "Measuring the Financial Sophistication of Households," *American Economic Review* 99(2), p. 393-98.

Card, David and Michael Ransom (forthcoming). "Pension Plan Characteristics and Framing Effects in Employee Savings Behavior," *Review of Economics and Statistics*.

Carroll, Gabriel, James Choi, David Laibson, Brigitte Madrian, and Andrew Metrick (2009). "Optimal Defaults and Active Decisions," *Quarterly Journal of Economics* 124(4), pp. 1639-1674.

Chan, Sewin and Ann Huff Stevens (2008). "What You Don't Know Can't Help You: Worker Knowledge and Retirement Decision-Making". *Review of Economics and Statistics* 90(2):): 253-266.

Choi, James, David Laibson and Brigitte Madrian (forthcoming). "$100 Bills on the Sidewalk: Suboptimal Investment in 401(k) Plans," *Review of Economics and Statistics*.

Choi, James, David Laibson and Brigitte Madrian (2010). "Why Does the Law of One Price Fail? An Experiment on Index Mutual Funds," *Review of Financial Studies* 23(4), April, pp. 1405-1432.

Choi, James, David Laibson and Brigitte Madrian (2009b). "Mental Accounting in Portfolio Choice: Evidence from a Flypaper Effect," *American Economic Review* 99(5), December, pp. 2085-2095.

Choi, James, David Laibson, and Brigitte Madrian (2009a). "Reducing the Complexity Costs of 401(k) Participation Through Quick Enrollment," in David Wise, editor, *Developments in the Economics of Aging*. Chicago: University of Chicago Press.

Choi, James, David Laibson, Brigitte Madrian, and Andrew Metrick (2009). "Reinforcement Learning and Savings Behavior," *Journal of Finance* 64(6), December, pp. 2515-2534.

Choi, James, David Laibson, Brigitte Madrian, and Andrew Metrick (2006). "Saving for Retirement on the Path of Least Resistance," in Edward J. McCaffrey and Joel Slemrod, editors, *Behavioral Public Finance: Toward a New Agenda*, New York: Russell Sage Foundation, pp. 304-351.

Choi, James, David Laibson, Brigitte Madrian, and Andrew Metrick (2005). "Passive Decisions and Potent Defaults." In David A. Wise, ed., *Analyses in the Economics of Aging*, Chicago: University of Chicago Press, 2005, pp. 59-73.

Choi, James, David Laibson, and Brigitte Madrian (2004). "Plan Design and 401(k) Savings Outcomes," *National Tax Journal* 57, June, pp. 275-298.

Choi, James, David Laibson, Brigitte Madrian, and Andrew Metrick (2004). "Employees' Investment Decisions About Company Stock," in Olivia S. Mitchell and Stephen P. Utkus, eds., *Pension Design and Structure*, New York: Oxford University Press, pp. 121-36.

Clark, Robert L. and Melinda Sandler Morrill (2010). "Retiree Health Plans in the Public Sector." Working paper.

Department of Labor, Employee Benefit Security Administration (2007), "Private Pension Plan Bulletin Historical Tables, http://www.dol.gov/ebsa/pdf/privatepensionplanbulletinhistoricaltables.pdf (accessed December 13, 2007).

Department of Labor, Employee Benefit Security Administration (2010), "Private Pension Plan Bulletin: Abstract of 2007 Form 5500 Annual Reports," http://www.dol.gov/ebsa/pdf/2007pensionplanbulletin.pdf (accessed August 4, 2010).

Goda, Gopi Shah and Colleen Flaherty Manchester (2010). "Incorporating Employee Heterogeneity into Default Rules for Retirement Plan Selection," NBER Working Paper No. 16099.

Gustman, Alan, Thomas Steinmeier, and Nahid Tabatabai (2007). "Imperfect Knowledge of Plan Type," NBER Working Paper No. 13, 379.

Holden, Karen C. and Sean Nicholson (1998). "Selection of a Joint-and-Survivor Pension," Institute for Research on Poverty Discussion Paper No. 1175-98. University of Wisconsin, Madison.

Karlsson, Anders, Massimo Massa, and Andrei Simonov (2007). “Stock Market Participation and Pension Reform,” in Olivia Mitchell, Beth Soldo, and Brigitte Madrian, eds., *Transitioning to Retirement: How Will Boomers Fare?*, Oxford University Press.

Lusardi, Annamaria, Olivia Mitchell, and Vilsa Curto (2010). “Financial Literacy among the Young,” *Journal of Consumer Affairs* 44.2, p. 358-380.

Lusardi, Annamaria and Peter Tufano (2009). "Debt Literacy, Financial Experiences, and Overindebtedness." NBER Working Paper Series, w. 14808.

Lusardi, Annamaria, and Olivia Mitchell (2007). “Financial Literacy and Retirement Preparedness: Evidence and Implications for Financial Education.” *Business Economics* 42(1): 35-44.

Lusardi, Annamaria and Olivia Mitchell (2006). “Financial Literacy and Planning: Implications for Retirement Wellbeing,” Pension Research Council Working Paper n. 2006-1.

Madrian, Brigitte and Dennis Shea (2001). “The Power of Suggestion: Inertia in 401(k) Participation and Savings Behavior.” *Quarterly Journal of Economics* 116: 1149-1187.

Saku, Aura (2001). "Does the Balance of Power Within a Family Matter? The Case of the Retirement Equity Act." IGIER Working Paper 202. Milan, Italy: Innocenzo Gasparini Institute for Economic Research.

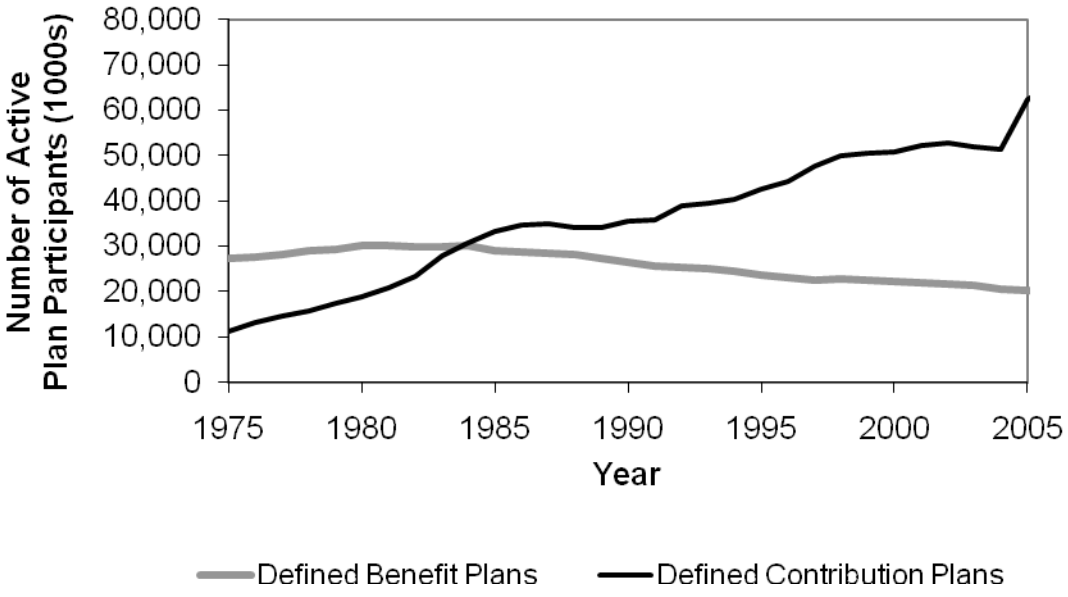
Snell, Ron (2010a). “Pension Reform: Not Easy, but Worth It,” *State Legislatures*, July/August 2010, 32-34 (http://www.ncsl.org/?tabid=20716, accessed August 6, 2010).

Snell, Ron (2010b). “State Defined Contribution and Hybrid Pension Plans”, National Conference of State Legislatures, June 2010 (http://www.ncsl.org/LinkClick.aspx?fileticket=yGsmFhwoq7E%3d&tabid=18511, accessed August 6, 2010).

Thaler, Richard, and Shlomo Benartzi (2004). "Save More Tomorrow: Using Behavioral Economics to Increase Employee Savings," *Journal of Political Economy* 112.1, Part 2, pp. S164-S187.

Yang, Tongxuan (Stella) (2005). Understanding the Defined Benefit versus Defined Contribution Choice. Pension Research Council Working Paper No. 2005-4.

FIGURE 1.
The Changing Composition of Employer Sponsored Retirement Plans in the Private Sector



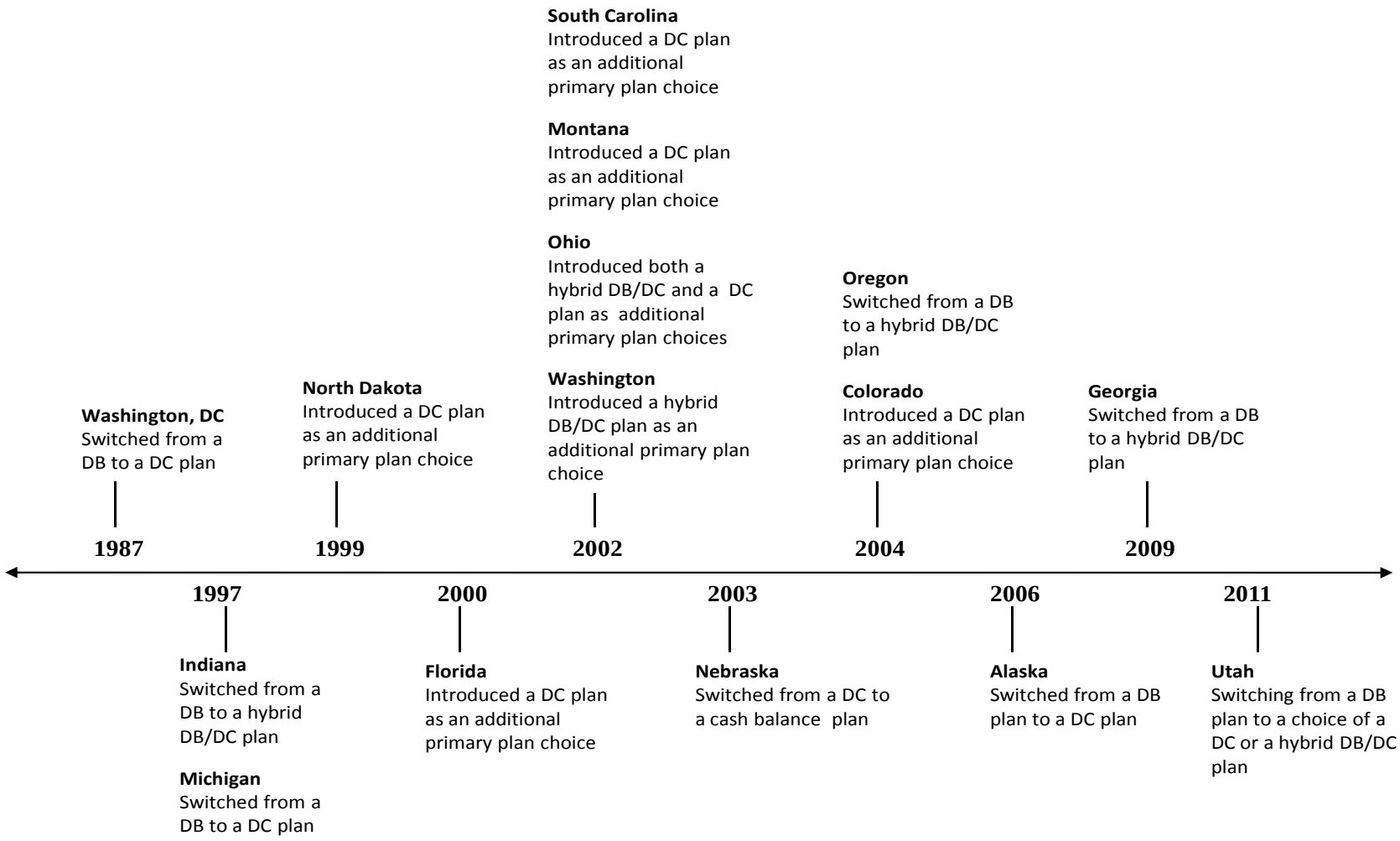


FIGURE 2. Timeline of State Defined Contribution Primary Retirement Plan Changes

FIGURE 3. Joe the Bachelor's Replace Rate under Various Scenarios (Final Average Salary of $50,000 Annually)

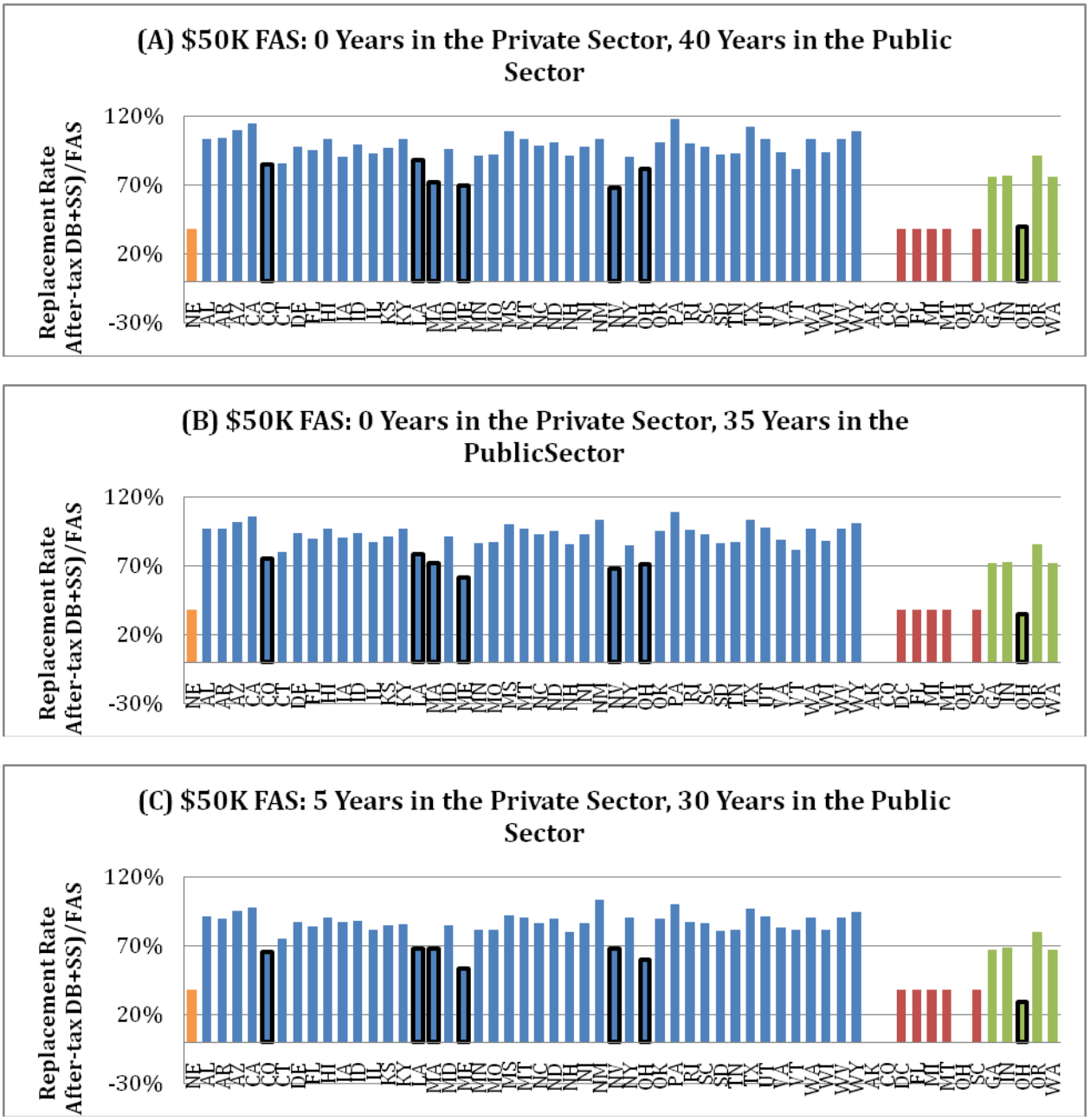


FIGURE 3 (cont'd). Joe the Bachelor's Replace Rate under Various Scenarios (Final Average Salary of $50,000 Annually)

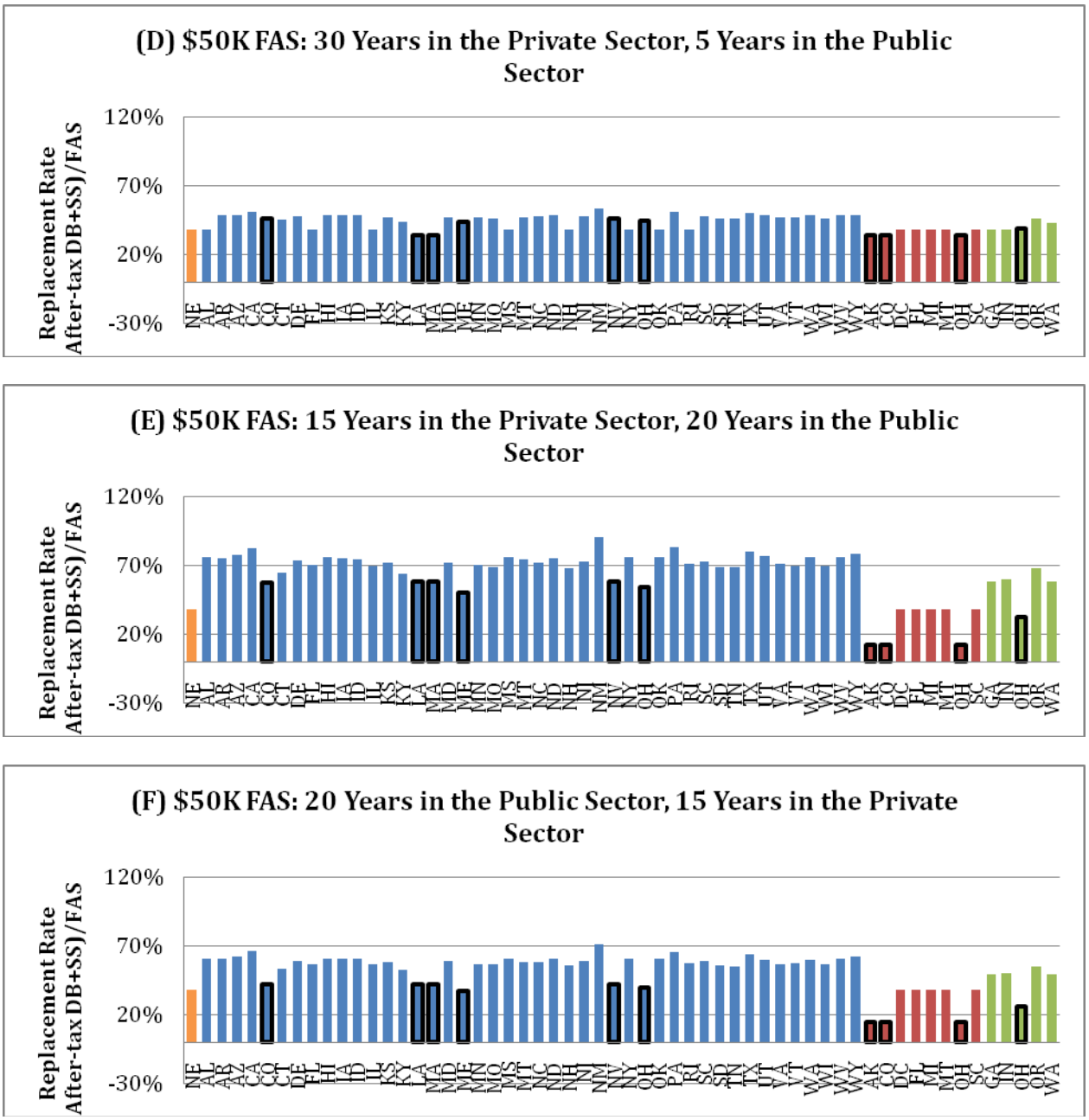


FIGURE 4. Joe the Bachelor's Replace Rate under Various Scenarios (Final Average Salary of $100,000 Annually)

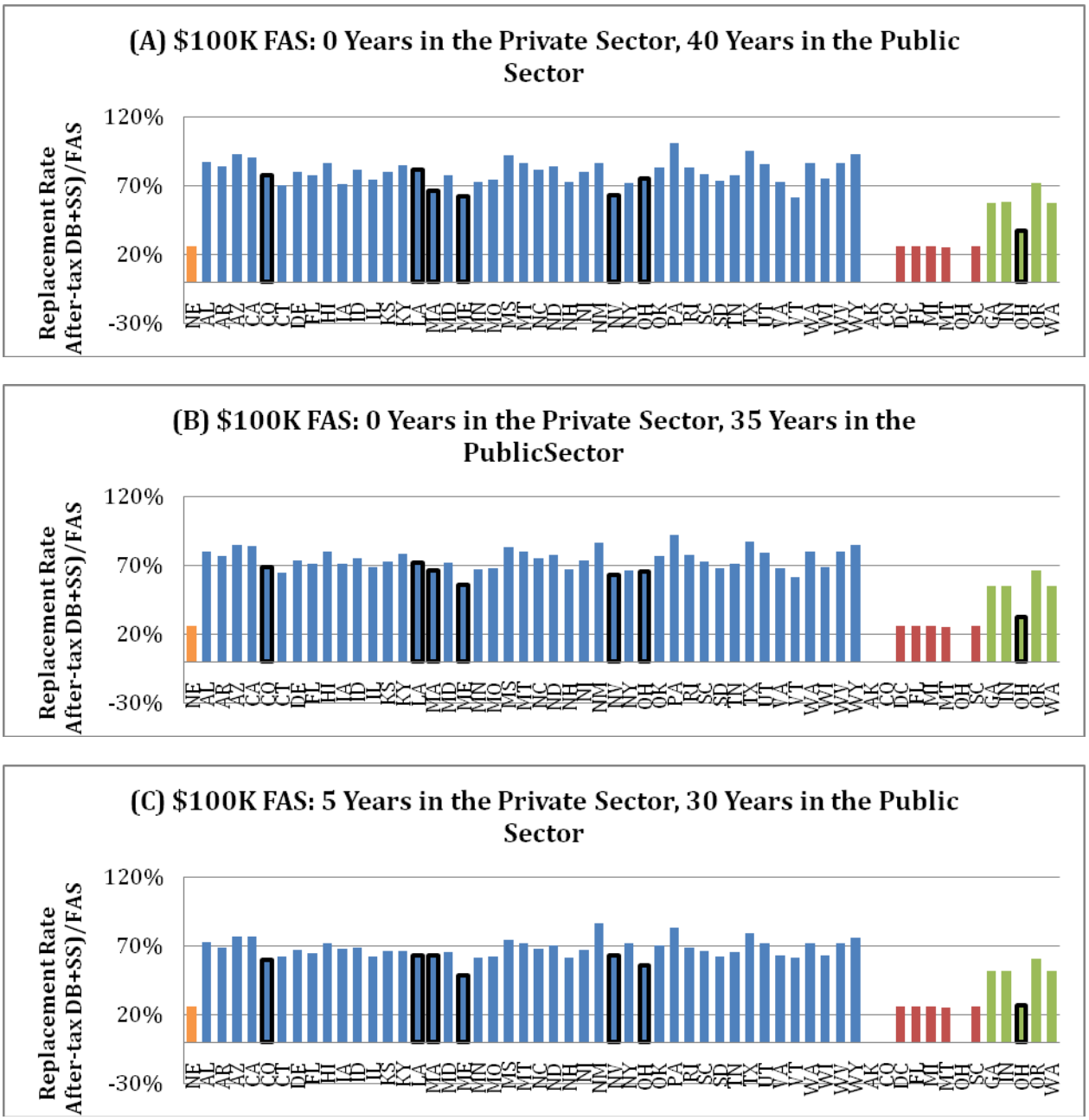


FIGURE 4 (cont'd). Joe the Bachelor's Replace Rate under Various Scenarios (Final Average Salary of $100,000 Annually)

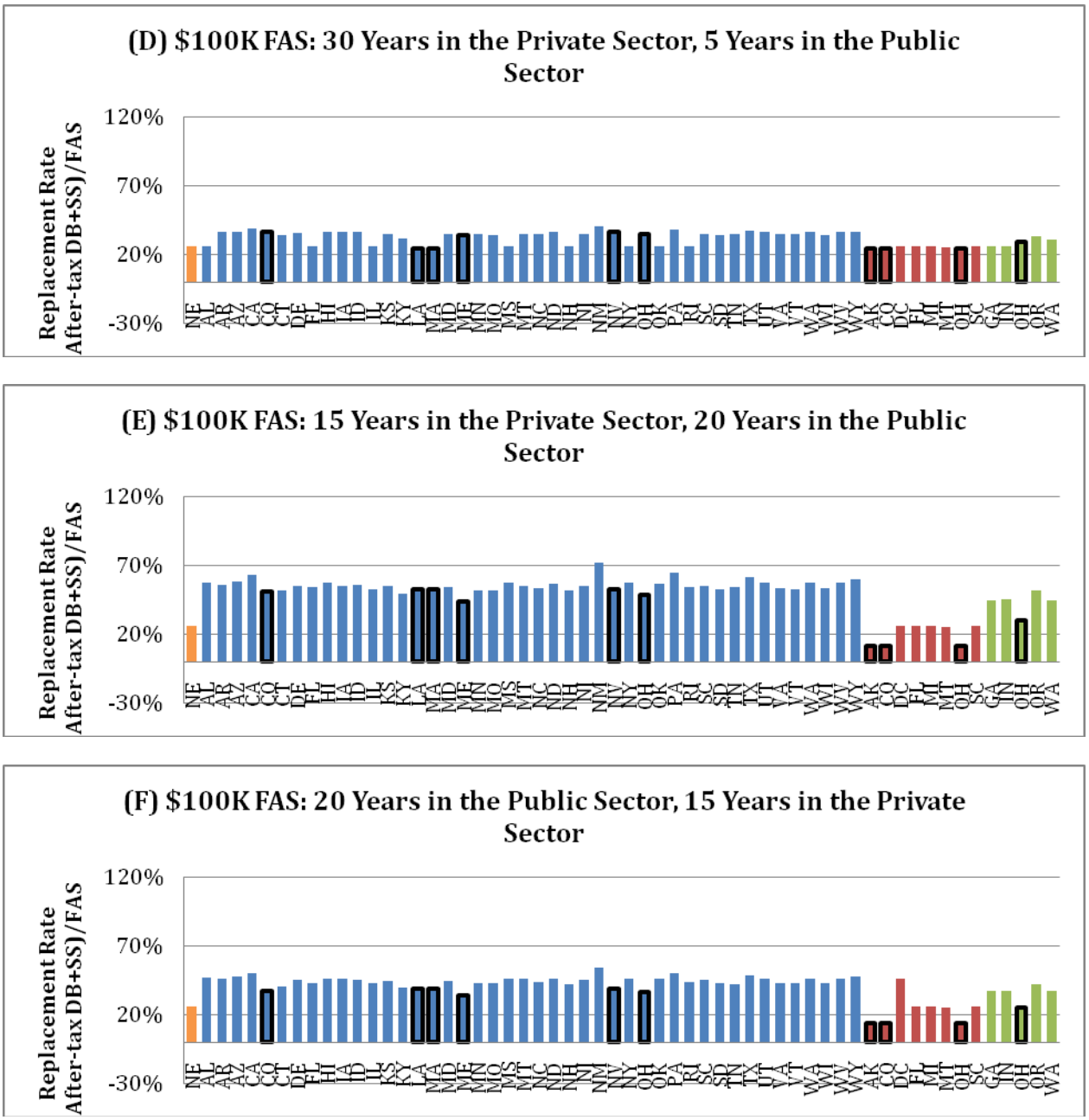


FIGURE 5.
The Changing Generosity of State Retirement Plans Over Time

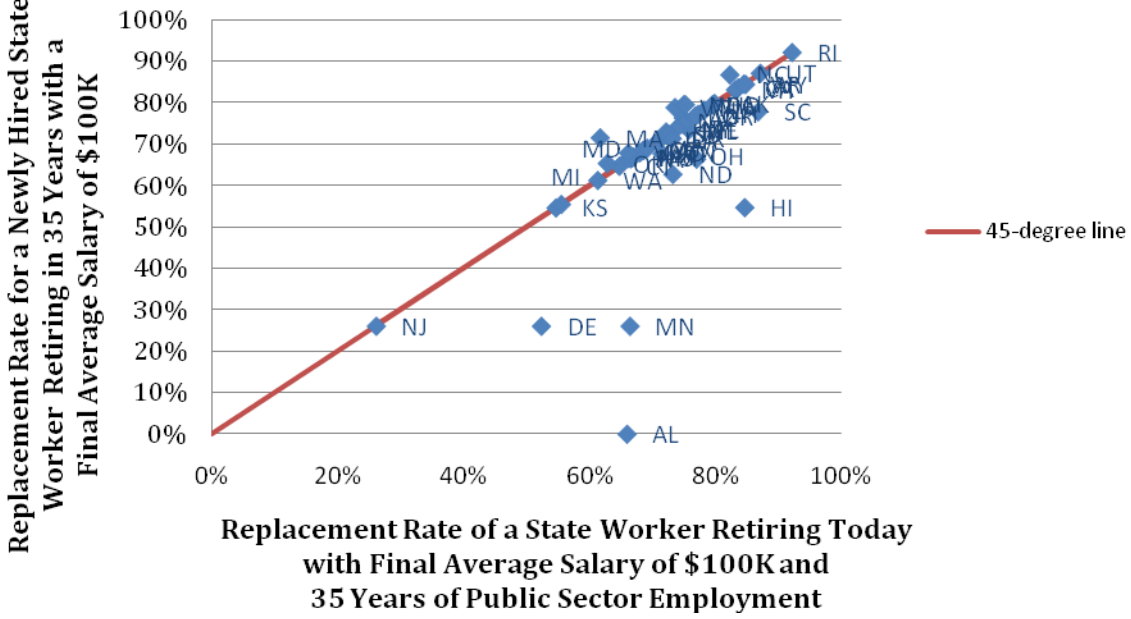


Table 1A. Retirement and Savings Plans Available to Newly Hired General State Employees

State	Primary plan	Optional DC plans	State	Primary plan	Optional DC plans
Alabama	DB	457	Montana	Choice of DB or DC	457
Alaska	DC	457	Nebraska	Cash Balance	457
Arizona	DB	457	Nevada	DB	457
Arkansas	DB	457	New Hampshire	DB	457
California	DB	401(k) and 457	New Jersey	DB	457
Colorado	Choice of DB or DC	457	New Mexico	DB	457
Connecticut	DB	457 and 403(b)	New York	DB	457
Delaware	DB	403(b) and 457	North Carolina	DB	401(k) and 457
District of Columbia	DC	457	North Dakota[a]	DB	457
Florida	Choice of DB or DC	457	Ohio	Choice of DB, DC, or Hybrid DB/DC	457
Georgia	Hybrid DB/DC	401(k) and 457	Oklahoma	DB	401(a) and 457
Hawaii	DB	457	Oregon	Hybrid DB/DC	457
Idaho	DB	401(k) and 457	Pennsylvania	DB	457
Illinois	DB	457	Rhode Island	DB	457
Indiana	Hybrid DB/DC	457 and 401(a)	South Carolina	Choice of DB or DC	401(k) and 457
Iowa	DB	457 and 401a	South Dakota	DB	457
Kansas	DB	457	Tennessee	DB	457 and 401(k)
Kentucky	DB	457 and 401(k)	Texas	DB	457 and 401(k)
Louisiana	DB	457	Utah[b]	DB	401(k) and 457
Maine	DB	401(a) and 457	Vermont	DB	457 and 401(a)
Maryland	DB	401(k), 401(a) and 457	Virginia	DB	457 and 401(a)
Massachusetts	DB	457	Washington	Choice DB or hybrid DB/DC	457
Michigan	DC	457 and 401(k)	West Virginia	DB	457
Minnesota	DB	457	Wisconsin	DB	457
Mississippi	DB	457	Wyoming	DB	457
Missouri	DB	401(a) and 457			

[a]North Dakota gives a small group of state employees (<10%) a choice between a DB and a DC plan.
[b]Starting in 2011 Utah state employees will have a choice between DB and a DC plan.

Table 1B. Retirement and Savings Plans Available to Newly Hired General County and City Employees

County	Primary plan	Optional DC plans	City	Primary plan	Optional DC plans
Los Angeles County, CA	DB	457	New York City, NY	DB	401(k) and 457
Cook County, IL	DB	457	Los Angeles, CA	DB	457
Harris County, TX	Cash balance	457	Chicago, IL	DB	457
Maricopa County, AZ	DB	457	Houston, TX	DB	457
Orange County, CA	DB	457	Phoenix	DB	457 and 401(a)
San Diego County, CA	DB	457 and 401(a)	Philadelphia, PA	DB	457
Kings County, NY	DB	457 and 401(k)	San Antonio, TX	Cash balance	457
Miami-Dade County, FL	DB	457	Dallas, TX	DB	457 and 401(k)
Dallas County, TX	Cash balance	457	San Diego, CA	Hybrid DB/DC	401(k) and 457
Queens County, NY	DB	457 and 401(k)	San Jose, CA	DB	457
Wayne County, MI	Hybrid DB/DC	457	Detroit, MI	DB	457
San Bernardino County, CA	DB	457 and 401(k)	San Francisco, CA	DB	457
Riverside County, CA	DB	457	Jacksonville, FL	Choice of DB or DC	457
King County, WA	Choice of DB or hybrid DB/DC	457	Indianapolis, IN	Hybrid DB/DC	457
Broward County, FL	DB	457	Austin, TX	DB	457
Clark County, NV	DB	457	Columbus, OH	Choice of a DB, a hybrid DB/DC, or a DC only plan	457
Santa Clara County, CA	DB	457	Fort Worth, TX	DB	457
Tarrant County, TX	Cash balance	457	Charlotte, NC	DB	401(k) and 457
New York County, NY	DB	457 and 401(k)	Memphis, TN	DB	457
Bexar County, TX	Cash balance	457	Boston, MA	DB	457

TABLE 2. Characteristics of State Primary Defined Contribution Retirement Savings Plans

	States with primary DC plan only				
	Participation	**Employee contributions**	**Employer contributions**	**Investment options**	**Vesting**
Alaska	Automatic and immediate	Mandatory 8%	5% non-contingent contribution	10 funds, target date fund default	100% after 5 years 0-0-25-50-75-100
Michigan	Automatic and immediate	Optional up to 100%	4% non-contingent contribution; 100% match on employee contributions up to 3% of pay	22 funds, fixed income default	100% after 4 years 0-0-50-75-100
Washington DC	Automatic after 1 yr. service	None	5% non-contingent contribution	17 funds, target date fund default	100% after 5 years 0-0-20-40-60-100
	States with choice of primary plan that includes DC only option				
	Participation	**Employee contributions**	**Employer Contributions**	**Investment options**	**Vesting**
Colorado	Opt-in	Mandatory 8%	10.15% non-contingent contribution	21 funds, balanced fund default	5 years 50-60-70-80-90-100
Florida	Opt-in	None	9% non-contingent contribution	20 funds, balanced fund default	1 year 0-100
Montana	Opt-in	Mandatory 6.9%	4.19% non-contingent contribution	15 funds, balanced fund default	5 years 0-0-0-0-0-100
North Dakota[a]	Opt-in	Mandatory 4%	4.12% non-contingent contribution	20 funds	4 years 0-0-50-75-100
South Carolina	Opt-in	Mandatory 6.5%	5% non-contingent contribution	85 funds, target date default fund	Immediate
Ohio	Opt-in	Mandatory 10%	8.73% non-contingent contribution	16 funds, target date default fund	5 years 0-20-40-60-80-100
Utah (starts 2011)	NA	Allowed	10% non-contingent contribution	NA	4 years

[a]North Dakota gives a small group of state employees (<10%) a choice between a DB and a DC plan.

TABLE 3. Plan Defaults in States that Offer a Choice of Primary Plan

State	Retirement plan options	Fraction of new employees electing each option
Colorado	Defined Benefit (default)	--
	Defined Contribution	--
Florida	Defined Benefit (default)	79%[a]
	Defined Contribution	21%[a]
Montana	Defined Benefit (default)	--
	Defined Contribution	--
North Dakota[e]	Defined Benefit (default)	--
	Defined Contribution	--
Ohio	Defined Benefit (default)	87%[c]
	Hybrid DB/DC	5.6%[c]
	Defined Contribution	7.4%[c]
South Carolina	Defined Benefit (default)	--
	Defined Contribution	--
Washington	Hybrid DB/DC (default)	81%[d]
	Defined Benefit	19%[d]

We calculate the fraction of new employees electing each option from the annual reports of the states that report active members by year for each plan.

[a] Florida: the fraction of new employees hired between 2000 to 2009

[b] North Dakota: the fraction of new employees hired between 1999 and 2009

[d] Ohio: the fraction of new employees 2003 and 2008

[d] Washington: the fraction of new employees hired between 2002 and 2008

[e] North Dakota gives a small group of state employees (<10%) a choice between a DB and a DC plan. The numbers in this table are for all state employees (which is what is reported). Based on conversations with pension and human resources administrators in North Dakota, the fraction of