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**Peaks, Cliffs and Valleys:  
The Peculiar Incentives in Teacher Retirement Systems and  
their Consequences for School Staffing**

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***Abstract***

*This paper examines the pattern of incentives for work versus retirement in five state teacher pension systems. We do this by examining the annual accrual of pension wealth from an additional year of work over a teacher's career. Accrual of wealth is highly non-linear and heavily loaded at arbitrary years that would normally be considered mid-career. One typical pattern exhibits low accrual in early years, accelerating in mid-late fifties, followed by dramatic decline, or even negative returns in years that are relatively young for retirement. We consider five states for specific analysis: We identify key factors in the defined benefit formulas that drive such patterns, and likely consequences for employee behavior. We examine the efficiency and equity consequences of these systems and lessons that might be drawn for pension reform.*

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## Introduction

Pensions have long been an important part of compensation for teachers in public schools. Traditionally, it has been argued, current compensation (salaries) has been relatively low for public employees, but pension benefits have been relatively high. This mix of current versus deferred income was rationalized by the contention that the public good was best served by the longevity of service that would be induced by these pension plans.<sup>1</sup> In recent decades, however, evidence is growing that many of these plans, by encouraging early retirements, may actually *shorten* rather than lengthen professional careers.

This highlights the growing disconnect between the operation of state teacher pension systems and the larger public discussion of pension and Social Security solvency in an era of longer life spans and the impending bulge of retirees. Nearly all proposed remedies for fixing Social Security involve raising retirement ages as part of the menu. By contrast, there is little discussion of the incentives to retire even earlier in teaching; indeed, early retirement schemes are commonplace.

The cost side of employee benefits also affects labor markets by driving a wedge between the amount paid by employers and the take-home pay received by teachers. The sharp rise in that wedge due to employee health insurance costs is well documented. However, less well known are the growing costs and large unfunded liabilities for teacher pension plans and retiree health insurance. In Ohio, for example, where public school teachers are not covered by Social Security, the combined contributions of teachers and

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<sup>1</sup> NEA, 1995, p. 3. As the NEA report points out, however, this purpose has “been lost for many in the mists of time,” and “many pension administrators would be hard-pressed to give an account of why their systems are structured as is except to say that ‘the Legislature did it’ or ‘It is a result of bargaining.’”

school districts for retirement benefits currently stand at 24 percent. But even this large “tax wedge” falls well short of what is needed and pension officials are recommending a phased increase to 29 percent, to shore up funding for pensions and retiree health benefits. At this level, retiree benefits for teachers and other professionals would be consuming well over \$1,000 of the annual per student expenditures. The costs of school retiree benefits are consuming a growing share of K-12 spending in much the same way that the benefit overhang of GM, Chrysler and Ford finally forced them to overhaul their retiree benefits.

As teacher retiree benefit costs spiral ever upward, it is important to begin asking what effect these systems have on recruitment, retention, and workforce quality, and whether these are efficient expenditures. A substantial literature in labor economics demonstrates that the incentives in pension systems matter, not only for the timing of retirement, but for labor turnover and workforce quality (Friedburg and Webb, 2005; Asch, Haider, and Zissimopoulos, 2005; Ippolito, 1997; Stock and Wise, 1990 ).

Unfortunately, little of this literature pertains to teacher pensions. While there have been many studies of the effect of current compensation on teacher turnover (e.g., Murnane and Olsen, 1990; Stinebrickner, 2001; Hanushek, Kain, and Rivkin, 2004; Podgursky, Monroe, and Watson, 2004), the econometric literature on teacher pensions is very slender. The only published econometric study to date is Ferguson, et. al. (2006), who find that Pennsylvania teachers’ retirement decisions were highly responsive to incentives for early retirement.<sup>2</sup>

In this article, we analyze the incentives embedded in teacher pension systems by examining the pattern of pension wealth accumulation over a teacher’s career. As we

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<sup>2</sup> See also Brown (2006).

shall see, these systems feature dramatic peaks, cliffs and valleys in pension wealth accumulation that can greatly distort career decisions – or punish teachers for not adapting their plans to the system’s benefit structure. In many states, teachers will accumulate very little pension wealth until their early 50s, at which point they can suddenly reap very large increases. But if they stay much beyond such a pension “peak”, they can suffer declines in pension wealth – punishing them for staying too long. This is one simple pattern, with no compelling rationale, but systems can also exhibit even more bizarre accumulation patterns, which reward or punish teachers at arbitrarily chosen points in their career.

Our main contribution in this paper is to illustrate graphically the peaks and valleys in pension wealth accumulation that operate over the course of a teacher’s career in a representative set of state systems. They are in contrast with the much smoother path of pension wealth accumulation under more modern professional pension plans that tie benefits more closely to contributions, and which, as a result, provide more neutral incentives for career decisions.

### How Teacher Pensions Work

Public school teachers are almost universally covered by traditional defined benefit (DB) pension systems. We say “traditional” because these are the types of plans that were the norm in both the public and private sector until recent decades. However, this is no longer the case in the private sector where employers have shifted dramatically to 401k-type defined contribution (DC) systems and restructured their DB systems as

well (more on this below).<sup>3</sup> In a traditional DB system, the employer has an obligation to provide a regular retirement check to employees upon their retirement.

Typically, a DB teacher pension plan requires that both teachers and employers make a contribution each year to a pension trust fund. In general these contributions (and the associated benefits) are larger for the 30 percent of teachers who are not part of the Social Security system and smaller for those who are covered. For example, in Maryland, a state in which teachers are part of the Social Security system, during the 2005-06 school year, employees contributed 2 percent and school districts paid 11 percent for a combined total of roughly 13 percent. This was in addition to the 12.4 percent combined employer and employee contribution to the Social Security system. By contrast, in Ohio public school teachers are not covered by Social Security. Teachers contribute 10 percent and districts 14 contribute percent, for a combined total of 24 percent.

In theory, at any point in time, these contributions and the investment returns they have earned, should equal or exceed actuarial accrued liabilities; however, this is rarely the case. In many states the teacher pension systems have large unfunded liabilities.<sup>4</sup> And as large as these are, they do not include future costs for retiree health insurance -- an issue that is now beginning to appear on education finance radar screens.<sup>5</sup>

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<sup>3</sup> Data collected by the U.S. Department of Labor show that DC plans now predominate in the private sector (EBRI, 2006).

<sup>4</sup> The unfunded liabilities and funding ratios for the five states included in this study, as of 2006, are: AR (\$2.3b, 80.3%), CA (\$19.6b, 87.0%), MA (\$8.5b, 71.0% [1/1/07]), MO(\$5.2b, 82.6%), OH (\$19.4b, 75.0%).

<sup>5</sup> Most retiree health insurance benefits are paid by school districts out of current revenues. Under new GASB accounting standards school districts and states are required to begin reporting these unfunded liabilities, but not to fund them. It is expected that many school districts will be reporting large unfunded liabilities in the coming year.

Once a teacher is vested (usually 5 or 10 years), she becomes eligible to receive a full pension upon reaching a certain age and/or length of service. Different versions of these eligibility rules are discussed below, but they typically allow a teacher to draw a full pension well before age 65, especially if she has been working since her mid-20s.

Benefits at retirement are usually determined by a formula of the following sort:

$$(1) \quad \textit{Annual Benefit} = r(S,A) \cdot S \cdot \textit{FAS}.$$

In this expression,  $S$  denotes years of service, the final average salary ( $\textit{FAS}$ ) is an average of the last few years of salary (typically three) and  $r$  is a percentage that we will call the “replacement factor” that may be constant, but is often a function of service and age ( $A$ ). In Missouri, for example, teachers at normal retirement earn 2.5 percent for each year of teaching service. Thus, a teacher with 30 years of service would earn 75% of the final average salary. So if the final average salary were \$60,000 she would receive:

$$\textit{Annual Benefit} = .025 \times 30 \times \$60,000 = \$45,000,$$

payable for life. If the teacher were to separate from service prior to being eligible to receive the pension, the first draw would be deferred and the amount of the pension would be frozen until that time. Once the pension draw begins, there is typically some form of inflation adjustment, although the nature of it varies from state to state.

Table 1 summarizes some of the key parameters of DB pension plans in five states. While not randomly chosen (we inhabit two of these states), they are broadly representative of the universe of teacher pension funds. More complete such tables are published by the NEA and others, showing similar variation in these pension parameters across states.<sup>6</sup> While these types of comparative tables provide useful information about the individual pieces of the pension system, they do not tell us about the composite effect

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<sup>6</sup> NEA (2004), Loeb and Miller (2006).

of the system when it is fully assembled and running. To appreciate the powerful incentive effects of these systems, and thus make informative comparisons among states, we use the data in Table 1 to examine the way in which teachers accumulate pension wealth with each year of employment.

### Pension Wealth and Earnings Wealth

Data on the parameters of teacher pension plans can be used to generate estimates of the magnitude of pension benefits using the concept of present value. When an individual retires under a DB plan he or she is entitled to a stream of payments that has a lump sum value that can be readily determined, using standard actuarial methods. By the same token, the stream of earnings over one's worklife can also be converted to a lump sum for the purpose of comparison. It is simply the cumulative earnings over time, with interest accrued. Hence, the two streams of income – earnings during one's worklife and pension benefits during retirement – can be placed on a common footing.

Formally, consider an individual's pension wealth,  $P$ , at some potential age of separation,  $A_s$ . The stream of expected payments may begin immediately, or may (perhaps must) be deferred until some later retirement age. The present value of those payments is:

$$(2) \quad P(A_s) = \sum_{A \geq A_s} (1+r)^{(A_s-A)} f(A/A_s) \cdot B(A/A_s),$$

where  $B(A | A_s)$  is the defined benefit one will receive at age  $A$ , given that one has separated at age  $A_s$ , and  $f(A | A_s)$  is the conditional probability of survival to that age.

The benefit stream may itself be a choice among alternative streams open to the individual, based upon the choice of when to begin receiving payments, since receipt

prior to “normal” retirement may entail a penalty, depending on age and years of service. In modeling pension wealth below, we assume that individuals separating at age  $A_s$  will choose the stream of payments that maximize present value.

In principle,  $P(A_s)$  represents the market value of the annuity. If, instead of providing a promise to pay benefits, the employer were to provide a lump sum of this magnitude upon separation, the employee could buy the same annuity on the market. The teacher’s pension wealth,  $P(A_s)$ , is the size of the 401k that would be required to generate the same stream of payments the individual would be owed upon separation at age  $A_s$ .

Figure 1 depicts the pension wealth, in inflation-adjusted dollars, for a 25-year-old entrant to the Ohio teaching force who works continuously until leaving service at various ages of separation.<sup>7</sup> The salary schedule assumed is that of the state capital (Columbus, Ohio) and we assume all cells of this schedule grow at 2.5%. We assume a 5% interest rate, and use a Federal unisex mortality table.<sup>8</sup>

Clearly, the accumulation of pension wealth is not smooth and steady, but rises with fits and starts after age 50, due to rules of eligibility for early retirement and the like. During her first 24 years in the classroom, this teacher accumulates about \$315,000 in pension wealth. However, over the next six years she accumulates more than \$100,000 *per year* and crosses the million dollar mark at age 56. Pension wealth reaches a peak by her early sixties and then starts to decline.

For purposes of comparison, it is useful to define one’s earnings wealth analogously to that of pension wealth:

$$(3) \quad E(A_s) = \sum_{A < A_s} (1 + r)^{(A_s - A - 1)} W(A),$$

<sup>7</sup> Similar diagrams can be drawn for individuals entering service at different ages. See below.

<sup>8</sup> The table, for 2003, is drawn from IRS Revenue Ruling 2002-62 Appendix B.

where  $W(A)$  is one's annual wage at age  $A$ . Thus  $E(A_s)$  is simply cumulative earnings with accrued interest. It can be thought of as the lump sum that would have been sufficient to fund the stream of earnings, as evaluated at the age of separation. Since pension wealth is the present value of a stream of payments going forward and earnings wealth is the present value of a stream of payments going backwards, both evaluated at the same point in time (at age  $A_s$ ), they are comparable measures, capitalizing these two components of compensation.

Figure 2 depicts pension wealth as a percentage of cumulative earnings,  $P(A_s)/E(A_s)$ . This measure has a fairly intuitive interpretation, expressing deferred compensation as a percent add-on to compensation during one's working life.<sup>9</sup> The pension wealth measure  $P(A_s)/E(A_s)$  also has a more concrete interpretation, from the funding side. It represents the percentage of earnings that must be set aside each year (from employer and/or employee) in order to fully fund the pension benefits, for any given age of separation. Clearly, those individuals who retire in their mid-to-late 50s receive significantly more in benefits than has been contributed to the system on their behalf, while those who separate from service earlier in their career do not. Figure 2 therefore illustrates the inequities that are built into the system. Since all Ohio teachers contribute 10 percent of their earnings to the pension fund, the net benefits are even more unequally distributed than the gross benefits.

Comparable diagrams for other states typically show a single peak in pension wealth, as a percent of cumulative earnings, but there is significant variation due to the

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<sup>9</sup> Of course, the employee will typically (but not always) contribute to the pension fund, so the *net* benefit is the difference between  $P(A_s)/E(A_s)$  and the employee's contribution, as a percent of earnings.

specifics of each state's benefit formula.<sup>10</sup> In addition, a state's pension wealth curve often has distinct segments, with markedly different slopes, which means the annual increments to pension wealth at different ages can vary quite dramatically, as we shall presently show.

### Annual Change in Pension Wealth, as a Measure of Deferred Compensation

The evolution of a teacher's pension wealth over her career captures the incentives embedded in the pension system. Properly calculated, the change in pension wealth is simply a measure of deferred compensation, which can be compared with current compensation. Specifically, it is useful to distinguish between changes in wealth due to a change in the stream of payments (evaluated at the same point in time) and a change in the point in time at which the same stream of payments are capitalized. The latter piece is simply the interest on the previous year's wealth – it is the return to capital, not labor. It is the former piece – the change in wealth due to a change in the stream of payments – that is the proper measure of labor income, either in current or deferred compensation.

Formally, the annual income from deferred compensation is the change in pension wealth net of interest on the prior year's pension wealth<sup>11</sup>:

$$(4) \quad p(A_s) \equiv \Delta P(A_s) - r \cdot P(A_s - 1).$$

This can be expressed more explicitly as:

$$(5) \quad p(A_s) = \sum_{A \geq A_s} (1+r)^{(A_s-A)} [f(A/A_s)B(A/A_s) - f(A/A_s - 1)B(A/A_s - 1)] - (1+r)B(A_s - 1/A_s - 1)$$

<sup>10</sup> See Costrell and Podgursky (2007a) for these other diagrams.

<sup>11</sup> Analogously, it can be easily shown that the change in earnings wealth, net of interest on the prior year's earnings wealth is simply the annual earnings income:  $e(A_s) \equiv \Delta E(A_s) - r \cdot E(A_s - 1) = W(A_s - 1)$ .

As stated earlier, this is the effect of deferring separation on the expected stream of pension payments.

Let us examine (5) in more detail. The first term represents the increase in expected pension payments from  $A_s$  forward. We see from the bracketed expression, which is positive, that this is due to the rise in benefits from the pension formula ( $B(A | A_s) > B(A | A_{s-1})$ ), as well as the higher probability of surviving to receive each benefit payment ( $f(A | A_s) > f(A | A_{s-1})$ ).

Note that if  $A_s$  is at an age or service level where the formula allows one to accelerate the first pension draw (e.g. age 50 in Arkansas or age 46 in Missouri, as shown in Figures 4 and 5 below), then one or more of the  $B(A | A_{s-1})$  terms are zero while the corresponding  $B(A | A_s)$  terms are positive. Thus, at such an age the annual income from deferred compensation includes the sudden addition of one or more years of pension payments, frontloaded. Conversely, if one was already eligible to receive a pension the previous year, at age  $A_{s-1}$ , then deferring separation forgoes that benefit payment, as shown in the last term in (5).

In sum, the income from deferred compensation in any given year has several conceptual pieces: (i) the rise in expected benefit payments due to the formula (more years of service, higher final average salary, and, in some states, a higher replacement factor); (ii) at certain break points in the formula, additional years of pension eligibility; and (iii) later in one's career, the loss of a year of benefits from deferring separation.

## Pension Spikes

The next set of charts (Figures 3-7) is the most important for an analysis of labor market behavior. Here we show the change in pension wealth arising from an additional year of work, expressed as a percent of salary for Ohio and four other states. Behind each of these charts is a pension wealth accrual chart such as that in Figure 1. Each of these charts answers the question posed above: how much does a teacher's pension wealth change if she works an additional year? Specifically, we consider *deferred* income received from employment (net of interest on prior pension wealth), given in (4), expressed as a percent of the teacher's *current* salary income.<sup>12</sup>

Consider Ohio, depicted in Figure 3. A teacher who enters service at age 25 accrues pension wealth during her early years on the job starting at roughly ten percent of annual earnings and gradually rising to 34 percent in her 24<sup>th</sup> year (age 49). However, her 25<sup>th</sup> year of experience yields quite a bonanza in pension wealth. In that year her pension wealth jumps by 176 percent of her annual earnings. And each of the next five years also yield deferred income that equals or exceeds her current income. The growth of pension wealth drops off sharply over the next few years, followed by yet another sharp spike at age 60 (35 years experience). Beyond age 60, and in spite of the fact that both she and her employer are continuing to make large contributions to the retirement fund, pension wealth actually shrinks (net of interest), and at an accelerating rate.

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<sup>12</sup> It is important to note that the pension accrual concept used here is different from the actuarial concept. The actuarial concept is based on the assumption that the individual will work to a given "normal" retirement age, independent of the age at which the accrual is being evaluated. It is calculated to guide the employer in providing prudent reserves, and it results in smooth curves. The economist's concept, depicted here, is based on the individual's actual year of separation; it is calculated to depict the incentives for individual decisions about separation. As has been previously established in the economics literature, these curves have sharp kinks, leading to strong incentives to stay or leave at various ages.

Note that every one of the five state systems displays sharp pension spikes. In Arkansas, a particularly sharp spike occurs at age 50, as depicted in Figure 4. In that year, our teacher would earn an increase in pension wealth worth almost five times her salary. In other words, a teacher with a \$50,000 salary would earn total compensation of nearly \$300,000 for that year of teaching, before dropping off precipitously the next year. The spikes for our representative teacher in Missouri, California, and Massachusetts also occur in her early to mid-50's, as depicted in Figure 5-7.

What gives rise to such sharp spikes in pension wealth, followed by reductions? At first blush one might imagine that pension wealth accrual would be fairly steady. After all, both the teacher and employer are making the same contributions year after year. But that is the wrong way to think about these teacher pension funds. Teacher pension wealth is only loosely tied to contributions. The primary drivers in changing pension wealth are changes in the annual annuity payment (determined by equation (1)) and the number of years the teacher can expect to collect. It is the latter that is often the wild card in these systems

For example, during the first 24 years of teaching (to age 49), our Ohio teacher had to wait until age 60 to collect her full pension. However, her 25<sup>th</sup> year of teaching (at age 50) allows the teacher to begin drawing her pension five years earlier, thereby producing a sharp spike in wealth accrual. Spikes in several of these systems are triggered by the fact that beyond a certain number of years of experience, teachers can start collecting their pension at an earlier age. In other states, spikes are created by enhancements to the benefit formula at specified ages or years of experience.<sup>13</sup>

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<sup>13</sup> See Costrell and Podgursky (2007a) for a detailed analysis of the effect on these diagrams of variations in state formulas. [http://www.caldercenter.org/PDF/1001070\\_Efficiency\\_Equity.pdf](http://www.caldercenter.org/PDF/1001070_Efficiency_Equity.pdf)

Finally, and quite importantly, note that once teachers get past the spike (or spikes), pension wealth accrual turns negative. For all these states this occurs by the early sixties, and in some states it does so much earlier. This is not because the annual pension annuity falls. In fact, it is rising (although eventually teachers hit a pension cap typically set at 100 percent of earnings). Rather pension wealth falls because the teacher collects the pension for one fewer years and the annual payment is not enhanced sufficiently to offset this loss.

These charts also illustrate how legislatures alter these incentive structures periodically, even if the public policy impact may not always have been fully understood at the time. In the cases of California and Massachusetts (see Figures 6 and 7), these spikes were created by benefit enhancements enacted when pension funds were flush, following the bull market of the 1990s. Ohio's multiple-spiked system also reflects benefit enhancements enacted over the years – it used to have a single spike at age 60.<sup>14</sup>

### Incentive Effects of Pension Spikes

There are two key incentives created by the spikes in pension wealth accrual – a pull and a push as it were. First, teachers have a strong incentive to stay on the job – a pull – until they reap the benefit of the spikes. Even if a teacher is no longer suited to the job, it may well be worth “putting in one’s time” for a few more years if it means collecting several hundred thousands of dollars in pension wealth.

Second, once a teacher is beyond the spike and into the region of negative wealth accrual, the pension system creates a disincentive to stay on – a push out the door – even

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<sup>14</sup> See Costrell and Podgursky (2007b), Figure 7 and Appendix A: “History of Ohio’s Pension Formula Since 1965.” More generally, this report contains more detail on the Ohio system.

if one excels at the job. At this point, the pension system serves as a two-fold tax on earnings, first by the required employee contribution and second by the negative deferred income; together, these can easily offset much or even all of one's salary. That is, the reduction in pension wealth from working an additional year can approach or exceed the teacher's take-home pay, in which case her total compensation is little or nothing: she may even be paying for the privilege of teaching.

There is ample evidence that such incentives affect behavior. Anecdotal evidence is commonplace of teachers (and others) timing their retirement decisions to the parameters of the benefit formula; pension systems routinely provide on-line pension calculators to help their members do so. Labor economists have developed more systematic evidence of the behavioral impact of defined benefit pensions in other fields, particularly in the private sector. There has been much less research on teacher pensions, but that which is available indicates strong incentive effects.

Consider the case of Missouri. Missouri's pension system features a "rule of eighty," under which a teacher is eligible to receive a full pension once the sum of age and service equals eighty. This feature drives the pension spike depicted in Figure 5. Figure 8 shows the retirement patterns in Missouri, by graphing the frequency of retirements against the sum of age and service. Clearly there is a strong peak of retirements in the vicinity of eighty years, consistent with the incentives created by the benefit formula.<sup>15</sup>

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<sup>15</sup> See Podgursky and Ehlert (2007). As noted above, Ferguson, Strauss and Vogt (2006) and Brown (2006) also provide evidence that teacher retirement decisions respond to pension incentives, in Pennsylvania and California, respectively.

### Pension Accrual Patterns at Different Entry Ages

Figures 1-7 assumed entry at age 25. This entry age is representative – we have estimated from a national sample of new retirees that their median entry age was 25 to 26.<sup>16</sup> However, it is important to consider some variation in this pattern, especially with the rise of alternative paths into teaching, as well as the traditional career interruptions of teachers.

At first blush, it might seem that the spikes would simply be displaced to the left or right depending on the entry age of the teacher. Things are not that simple, however, since the spikes depend in part on the interaction of age and service years. For example, if a teacher is eligible for regular retirement at age 60 or service years equal to thirty, then the magnitude of the spike when service years hit 30 will depend on the difference between a teacher's age at that point and age 60. In this section, we illustrate some of these complexities by analyzing the Ohio pension scheme.

Figure 9 shows the pattern of deferred income over the careers of three entrant groups. The red curve is the three-peaked pattern of the 25-year-old entrant depicted previously, in Figure 3. The blue curve represents a 22-year-old entrant – an entry age that is actually a bit more common than age 25. It, too, has three peaks, but they are moved three years to the left, appearing at ages 47, 52, and 57. The peak at age 52 is particularly pronounced: a 22-year-old entrant will, in her 30<sup>th</sup> year of service, raise her pension wealth by the equivalent of *four times her salary*. This is a bigger spike than for the 25-year-old entrant because her 30<sup>th</sup> year of service now qualifies her for three extra

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<sup>16</sup> We tabulated the ages of first year teachers from the 2003-04 Schools and Staffing Surveys.

years of pension payments (starting at age 52 instead of 55).<sup>17</sup> Finally, the green curve represents the 30-year-old entrant. For her, the first two peaks collapse into one at age 55, and the final peak occurs 10 years later, upon her 35<sup>th</sup> year of service.

Our analysis of Ohio and other states suggests that the curves for 25-year-old entrants are, in fact, indicative of the patterns for entry at the most common entry ages. The accrual patterns for older entrants, such as age 30, are not quite as striking, but those for younger entrants, such as age 22, are even more idiosyncratic, and more strongly tilted toward early retirement.

#### Unintended Consequences: Employment After “Retirement”

We have seen that teacher pension systems often have strong incentives built into them to encourage teachers to retire at relatively young ages. Clearly, many teachers, even if they nominally “retire” in their 50s, will continue with labor market work of some sort for many years. Given concerns about “teacher shortages” and pressures from the No Child Left Behind Act to make sure that all classrooms are staffed with qualified teachers, it makes little sense for districts to nudge qualified and effective teachers out the door at such early ages. Not surprisingly, all of these teacher pension systems have provisions allowing educators to continue to teach and collect their pension (a practice called “double dipping”). These provisions seem to be expanding. Here are some examples.<sup>18</sup>

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<sup>17</sup> For the 25-year-old entrant, the 30<sup>th</sup> year of service did not qualify her for any extra years of pension: her 25<sup>th</sup> year of service qualified her for pension at age 55, but by time she reached her 30<sup>th</sup> year, she was already 55. However, her 30<sup>th</sup> year did qualify her for the full phase-out of the penalty for early retirement.

<sup>18</sup> See also Bragg (2003).

1. Part time employment. All of the pension systems considered here allow teachers who have retired to continue to work in covered employment on a part time basis (without accruing additional benefits).

2. Employment in shortage areas. Many states permit retired educators to teach full time for a specified period of time in “shortage” fields.

3. Break in employment. Some states allow teachers to return to full-time employment and collect their pension after a specified break in service. In California the required break is 12 months. In Ohio, a retired teacher can return to work the next day, but must wait two months before receiving pension benefits.

4. DROP plans. Many states have implemented Deferred Retirement Option Plans (DROP's). These permit teachers to continue working full time for a specified period of time (one to ten years), during which all or most of their pension check goes into what amounts to an individual retirement account. These provide an incentive for teachers to retire and return to work.

Figure 10 provides an example using the Arkansas T-DROP plan. Under this plan, a teacher can keep working after “retirement,” with 72% of her pension check going into a retirement account for her and accumulating interest until she actually leaves teaching. Figure 10 assumes the teacher exercises this option beginning at age 53 (after 28 years of service). Under this simulation, the T-DROP essentially eliminates the pension penalty for continuing to teach beyond 28 years. The impact may be different under other states' DROP systems.

Of course, there is no obstacle to retirees resuming employment in other fields, or even in teaching itself, by crossing a state line or a district boundary to work in a different

pension system. For example, Missouri teachers in the state pension system can retire and work full time in the St. Louis or Kansas City systems, or they can cross the border and work in Kansas.

The result of all of these practices is that the decision to “retire” (i.e., collect a retirement check) is not necessarily the same as a decision to quit teaching in public schools. Unfortunately, we are aware of no comprehensive national data on this topic. Limited data from a national survey conducted by the U.S. Department of Education suggest that at least five percent of the public school teaching workforce is also collecting a teacher pension. A longitudinal study of Missouri teachers found that 12 percent of teachers worked at least one year part- or full-time following retirement.

The significance of these practices has not been fully explored. They have no parallel in the private sector, since early retirement incentives there are always part of a downsizing effort, not one that offers re-employment. In teaching, by contrast, early retirement incentives have a completely different origin, namely legislatively enacted benefit enhancements, typically under heavy union lobbying. Re-employment provisions are often a delayed response to the unintended (if often predictable) problems created by these incentives. In other words, these provisions are *ad hoc* fixes to some of the perverse incentives created by enhanced pension spikes.

Post-retirement employment blurs the distinction between current and deferred compensation. At the very least, this calls into question the meaning of published data on teacher compensation. In addition, as re-employment becomes easier, the incentive to “retire” at or near a pension spike becomes more pronounced – there is no downside if employment can continue. It might also be in the district’s interest, if the pension costs

are borne by the state. One might expect, therefore, that “retirements” would become further concentrated at those points, maximizing the total cost to taxpayers.

### More Unintended Consequences: Health Insurance

Another consequence of early teacher retirement is a linked demand for retiree health insurance coverage. Since Medicare eligibility does not begin until age 65, teachers who retire in their fifties have a gap of many years in coverage. In light of this, many school districts and states have extended health insurance coverage to retirees. Unlike the teacher pension system, payments for these benefits are typically pay-as-you-go (i.e., no trust fund is created to pay for these future liabilities). Under new government accounting rules (GASB 43 and 45) benefit plans and employers will need to begin providing annual estimates of these liabilities in their financial statements. First hints at the figures are staggering. LA Unified, which provides complete health insurance coverage for all retirees, initially estimated a five billion dollar unfunded liability, as of July 2004. The following year it was increased to ten billion dollars.<sup>19</sup> A recent report by the Cato Institute estimates that the unfunded liabilities of state and local governments under GASB 45 could total \$1.5 trillion.<sup>20</sup>

The consequences of early teacher retirements for publicly-funded health liabilities have not been studied. The shift from active employee to retiree does not, in itself, increase the demand for health insurance. However, to the extent that early

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<sup>19</sup> The factors that contributed to that increase were, in descending order of importance: (i) a change in the discount rate applied; (ii) change in actuarial cost methods; (iii) health care cost increases; (iv) increased life expectancy and changes in retirement and turnover assumptions; and (v) one year of interest on the previous liability and additional benefits paid.  
[http://notebook.lausd.net/pls/ptl/docs/PAGE/CA\\_LAUSD/FLDR\\_ORGANIZATIONS/COMMITTEE\\_MAIN/ABT\\_HOME/ABT\\_AGENDA/ITEM%203%20-%20HWACTUARIAL.PDF](http://notebook.lausd.net/pls/ptl/docs/PAGE/CA_LAUSD/FLDR_ORGANIZATIONS/COMMITTEE_MAIN/ABT_HOME/ABT_AGENDA/ITEM%203%20-%20HWACTUARIAL.PDF)

<sup>20</sup> Edwards and Gokhale (2006). See also Deloitte Research (2006).

retirement increases the total number of individuals – active and retired – relying on the school system for health insurance, the cost to taxpayers is increased.

### Options for Reform: Cash Balance or Defined Contribution Plans

The underlying problem with DB systems is their distortion of retirement incentives, stemming from the broken link between benefits and contributions. DC systems and cash balance (CB) plans restore that link. Many large corporations have switched to DC and CB plans over the last twenty years. Some public entities, including a few teacher pension systems (Ohio's is one), have also started to offer DC or CB-type options in their plans.

CB plans are very similar to DC plans, in that both systems tie benefits closely to contributions. Under a CB plan, employees and employers contribute a certain percentage of earnings to an individual retirement account, the same as under DC. The main difference is that in a CB plan, the return is guaranteed by the employer (typically at a rate comparable to risk-free Treasury bonds), so the market risk is not borne by the employee. Often the debate over DB vs. DC plans focuses on the issue of who bears the market risk, rather than retirement incentives. Since our subject here is the incentives, we focus here on CB plans, where the question of employee risk-bearing does not arise.

The neutrality of CB plans with regard to age of separation can be simply depicted. In the pension wealth accrual graphs (Figures 3 – 7), the irregular curves would simply be replaced with flat lines, at a percentage given by the sum of employee and employer contributions (see Figure 3). There are no spikes, inducing teachers to stay to their mid-fifties and then to leave. Pension wealth never declines: if a teacher wants to

work another year, the account grows by the contributions, plus the investment return. This can then be converted to an annuity (many CB plans do this automatically). If a teacher works another year, the starting annuity is increased in an actuarially fair manner, since there is one less year of retirement to cover.

Such a retirement-neutral plan leaves the employee much more latitude to decide when to retire or switch careers, based on individual preferences. It also makes it easier for schools to retain effective teachers, who might otherwise be driven by the pull-push incentives of pension spikes. In our view, this is preferable to the heavy-handed DB formulas, supplemented by makeshift DROP formulas or other re-employment provisions. Finally, it is fiscally more stable, since benefits are tied closely to contributions. Unfunded liabilities do not arise so readily, and legislatures have less opportunity to enhance benefits by shifting costs to future generations of taxpayers and teachers.

### Conclusion

Policy discussions about teacher recruitment, retention, and quality often focus on salary. However, pension policy also has important consequences for the teaching workforce. In the recruitment of young teachers, the attraction of pension benefits may seem distant and uncertain, especially since young workers often change jobs. The costs, however, are incurred from the start in contributions to the plan that can exceed 20% between employer and employee. Many young teachers, who are paying off student loans, attempting to start families and buy homes, might prefer more of their

compensation up front rather than diverted into a system from which they may well never benefit.

In addition, pension policy has powerful effects on K-12 school finance. Teachers who retire in their mid-fifties draw pension benefits for periods of time that are likely to equal or exceed their years of classroom service. A teacher retiring at age 55 with a \$50,000 annual pension (indexed) has received an annuity valued at over \$1 million. In addition, she may well receive heavily subsidized retiree health insurance for a good while.

A new or reworked retirement system should embody several key features:

- *Neutrality.* Each additional year of work should increase additional pension wealth in a fairly uniform way. There should be no spikes or cliffs at any particular years of service. Longevity decisions by individuals and their employers should be based on personal priorities and education needs.
- *Transparency.* The accrual of benefits should be simple and clear. There should be no opportunities for “gaming” the system.
- *Portability.* Young professionals change jobs. That is why the private sector has moved toward systems that do not penalize young mobile workers. The current DB systems redistribute income from young mobile teachers to high seniority incumbents. Portability may help attract more energetic, young mobile teachers. It may also help attract mid-career switchers, such as engineers and other technical workers who could make valuable math and science teachers.
- *Sustainability.* The pension system should be self-funding. The system should not be subject to the pattern of benefit enhancements when the stock market is up,

followed by funding shortfalls and contribution hikes when the market turns sour. Individual benefits should be tied to contributions by and for the individual teacher. It is this disconnect between contributions and benefits that is the source of much legislative mischief, by allowing costs to be shifted to future generations of taxpayers and teachers.

DC and CB systems satisfy all these conditions far better than the traditional – and outdated – DB teacher pension systems. To build and maintain a qualified teacher workforce in today’s labor market, states should fundamentally reform their retirement benefit systems.

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Table 1

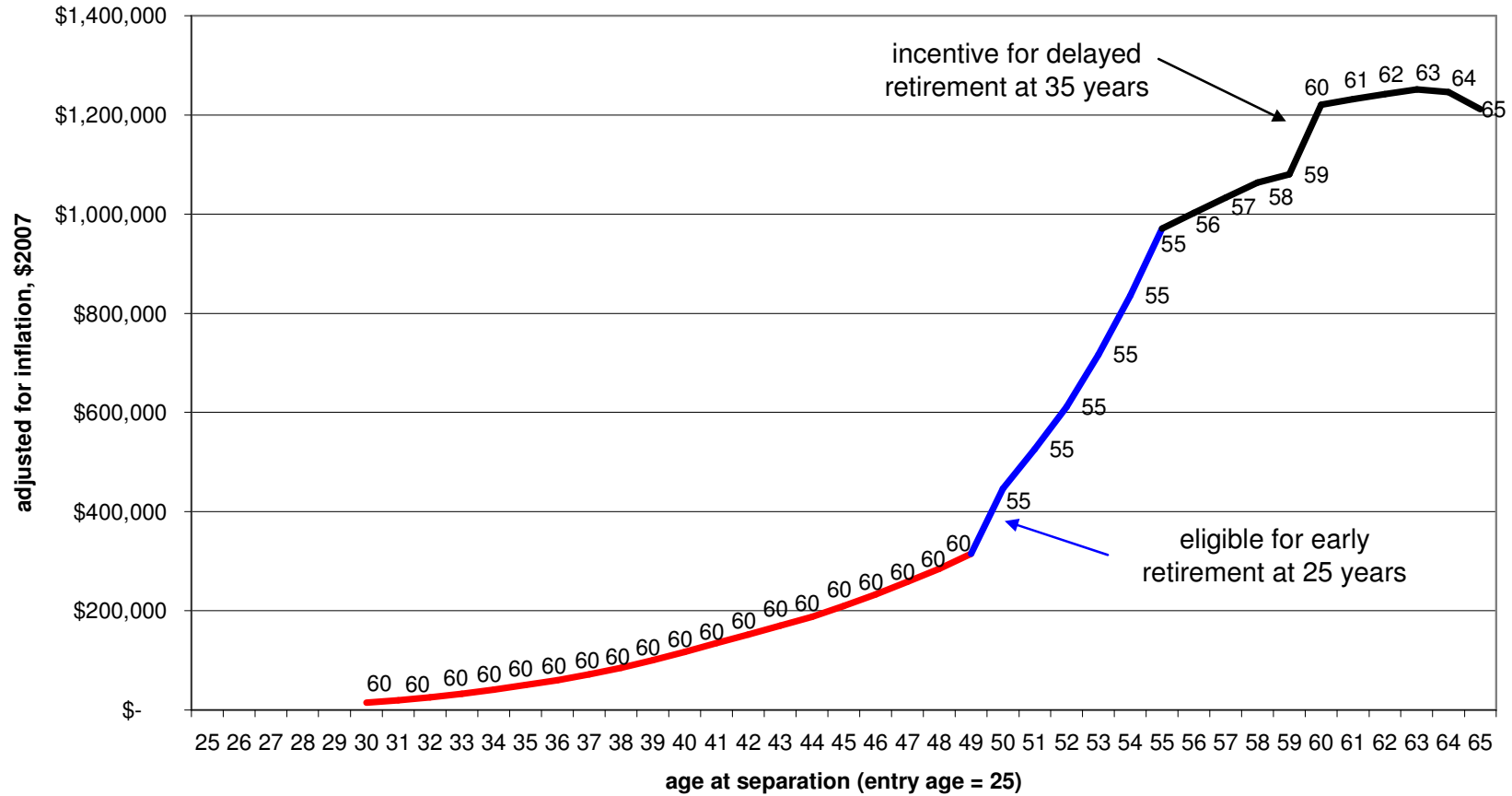
Key Features of Selected State Defined Benefit Teacher Pension Plans

	Ohio	Arkansas	California	Massachusetts	Missouri
In Social Security	No	Yes	No	No	No
Vesting (years)	5	5	5	10	5
Retirement Eligibility	Age=60; or Age=55 if Service = 25; or Service = 30	Age = 60; or Service = 25	Age = 55; or Age = 50 if Service = 30	Age = 55; or Service = 20	Age = 60; or Service = 30; or Age + Service = 80
Contribution Rates	District 14% Teacher 10%	Employer 14% Teacher 6%	District 8.25% Teacher 6%*	State, varies Teacher 11%	District 11.5% Teacher 11.5%
Replacement factor (percent per year of service)	Yrs 1-30: 2.2% Yr 31: 2.5% Yr 32: 2.6%, ...  For $S \geq 35$ , add 6% to total  For $S < 30$ and age < 65, adjustment % applies	2.15% + \$900   For $S < 28$ , benefit reduced $5\% \times (28-S)$	Linear segments: 1.1% at age 50 1.4% at age 55 2.0% at age 60 2.4% at age 63  For $S \geq 30$ , add 0.2% to factor, to max of 2.4%	Linear: 0.1% at age 41 to 2.5% at age 65  For $S \geq 30$ , add $2\% \times (S-24)$  Max replacement = 80%	2.5%, $S \leq 30$ , 2.55%, $S > 30$
COLA formula	3%, simple	3%, simple	2%, simple, plus floor of 80% initial purchasing power	3%, simple, on first \$12,000	CPI, compound, up to 1.80 maximum factor

Sources: State pension fund web sites.

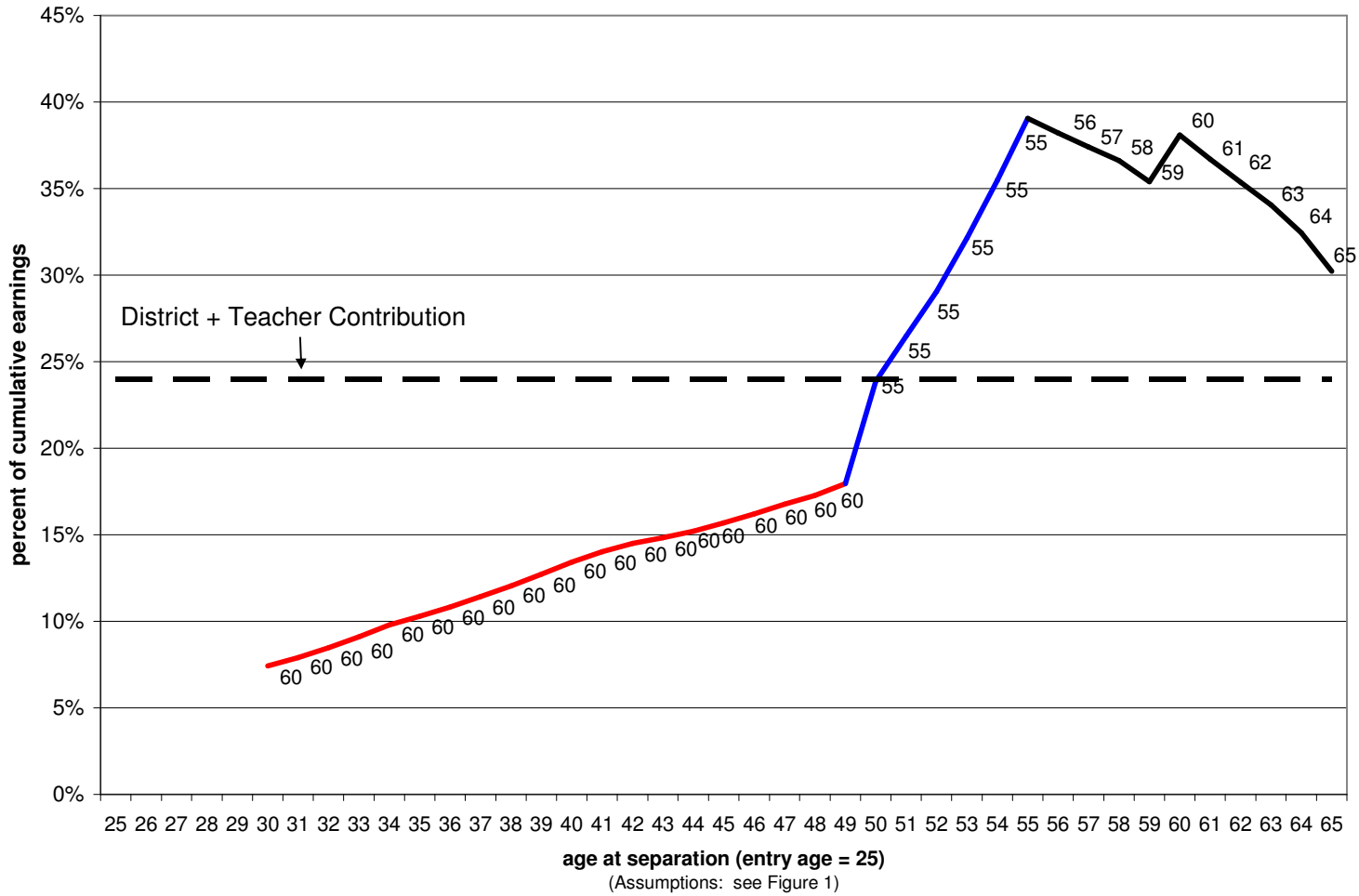
\* An additional 2% contributes to a supplemental defined contribution plan.

**Figure 1. Pension Wealth, in Dollars: Ohio**  
 age of first pension draw indicated

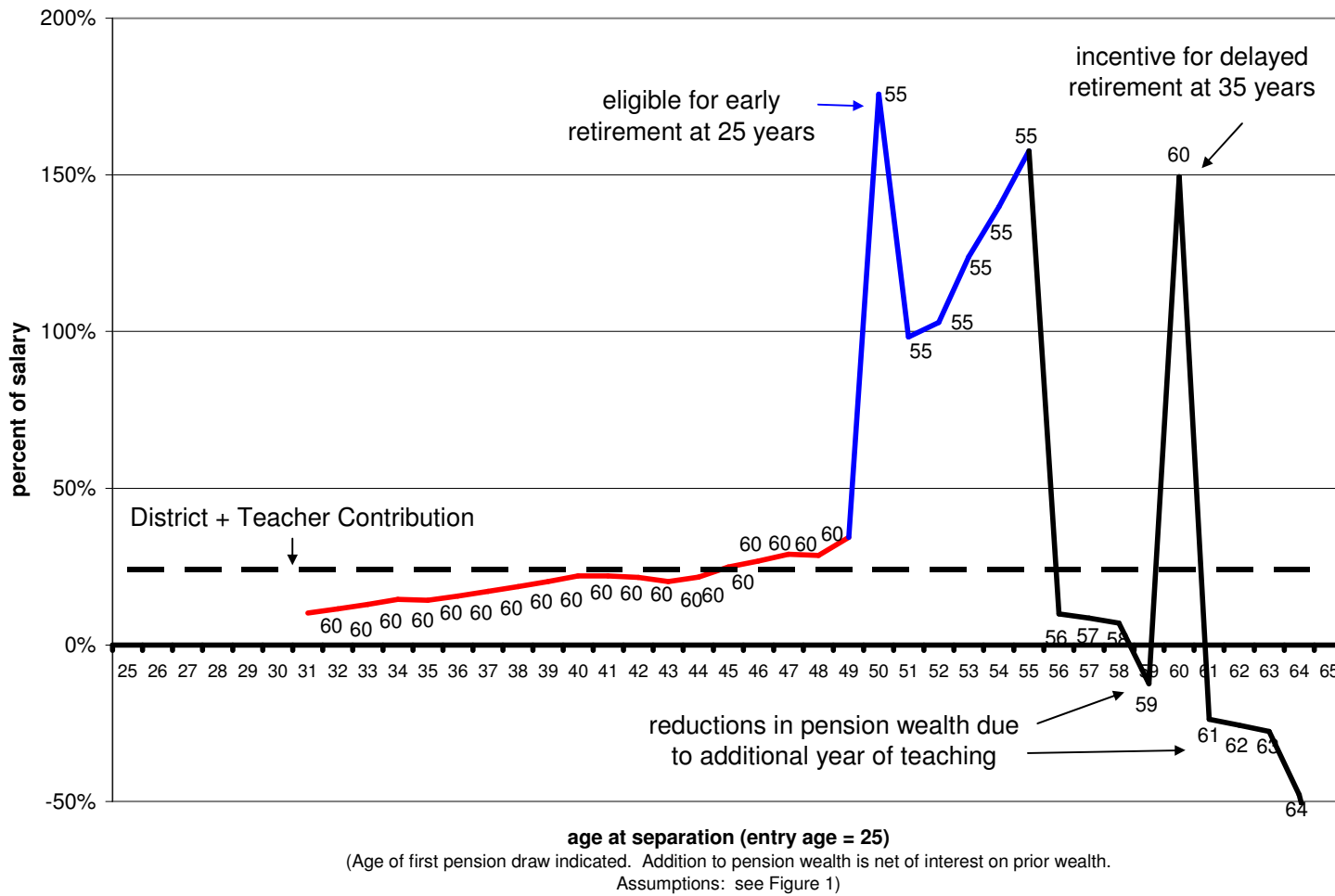


(Assumptions: 2006-2007 Columbus salary grid, all cells assumed to grow at 2.5% inflation, COLA = 3%, interest rate = 5%, unisex 2003 Mortality Table from IRS Revenue Ruling 2002-62 Appendix B.)

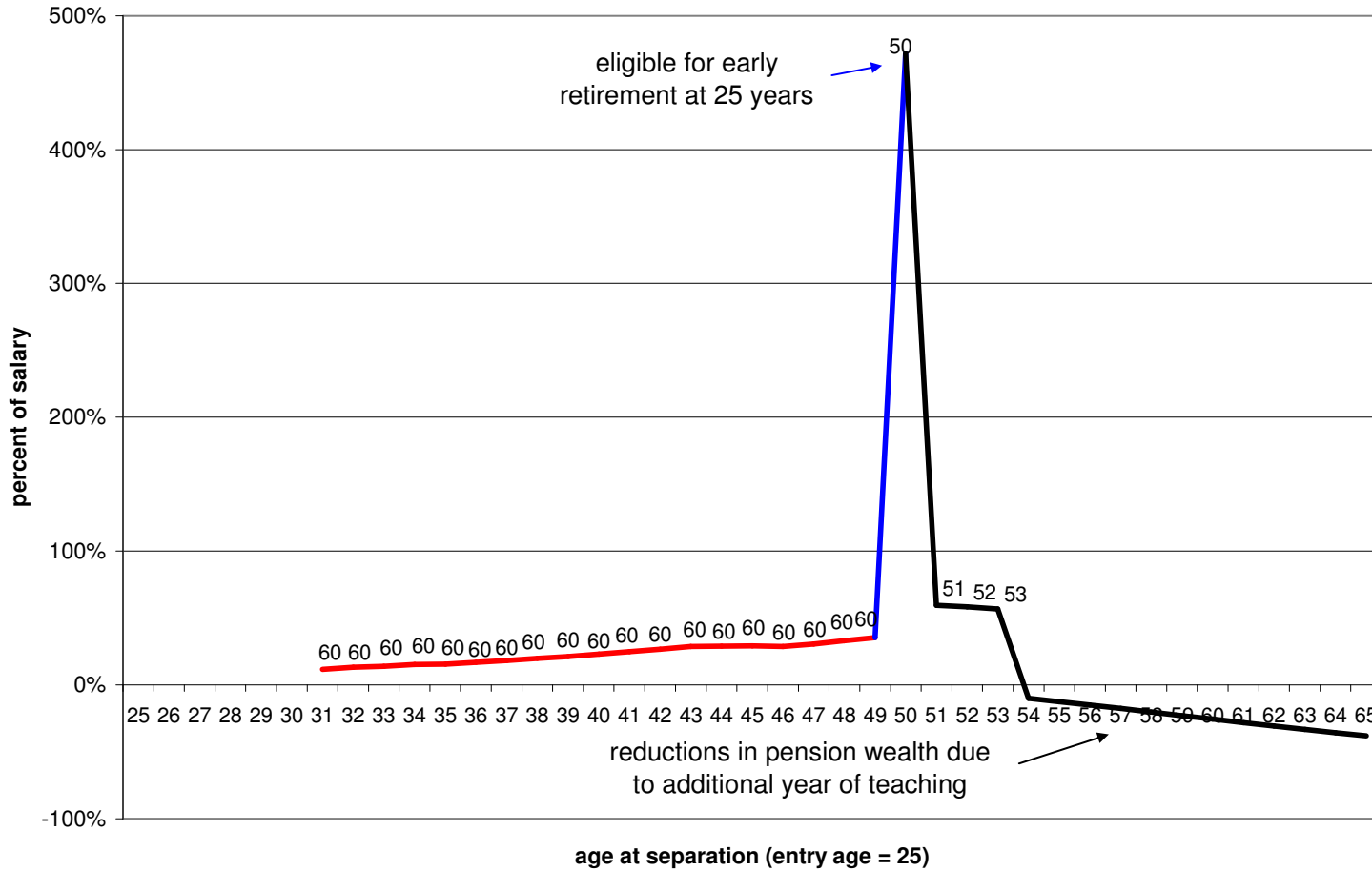
**Figure 2. Pension Wealth as % of Cumulative Earnings: Ohio**  
 age of first pension draw indicated



**Figure 3. Deferred income per year, as percent of salary: Ohio**  
 Addition to Pension Wealth from an Additional Year of Teaching

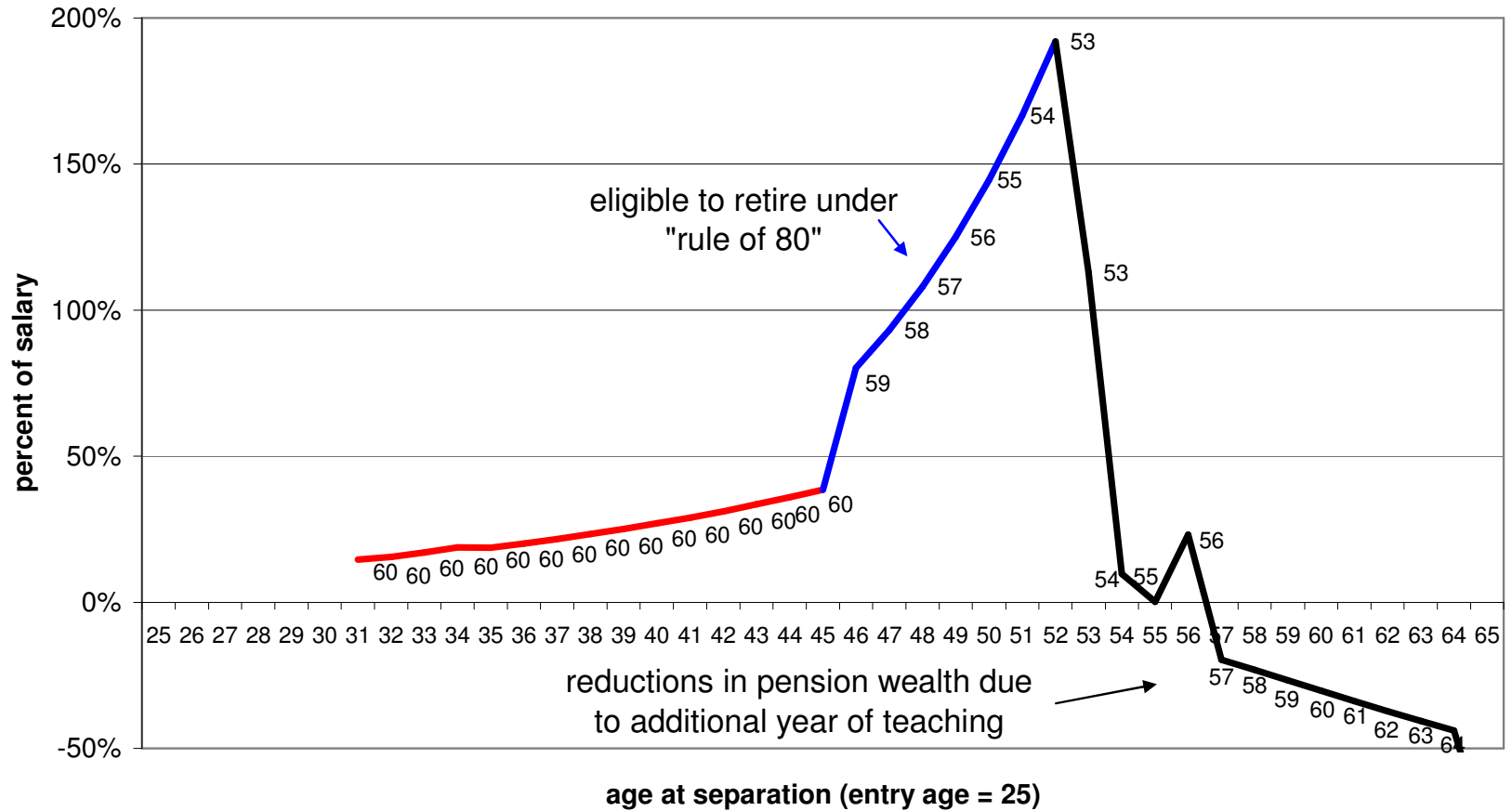


**Figure 4. Deferred income per year, as percent of salary: Arkansas**  
 Addition to Pension Wealth from an Additional Year of Teaching



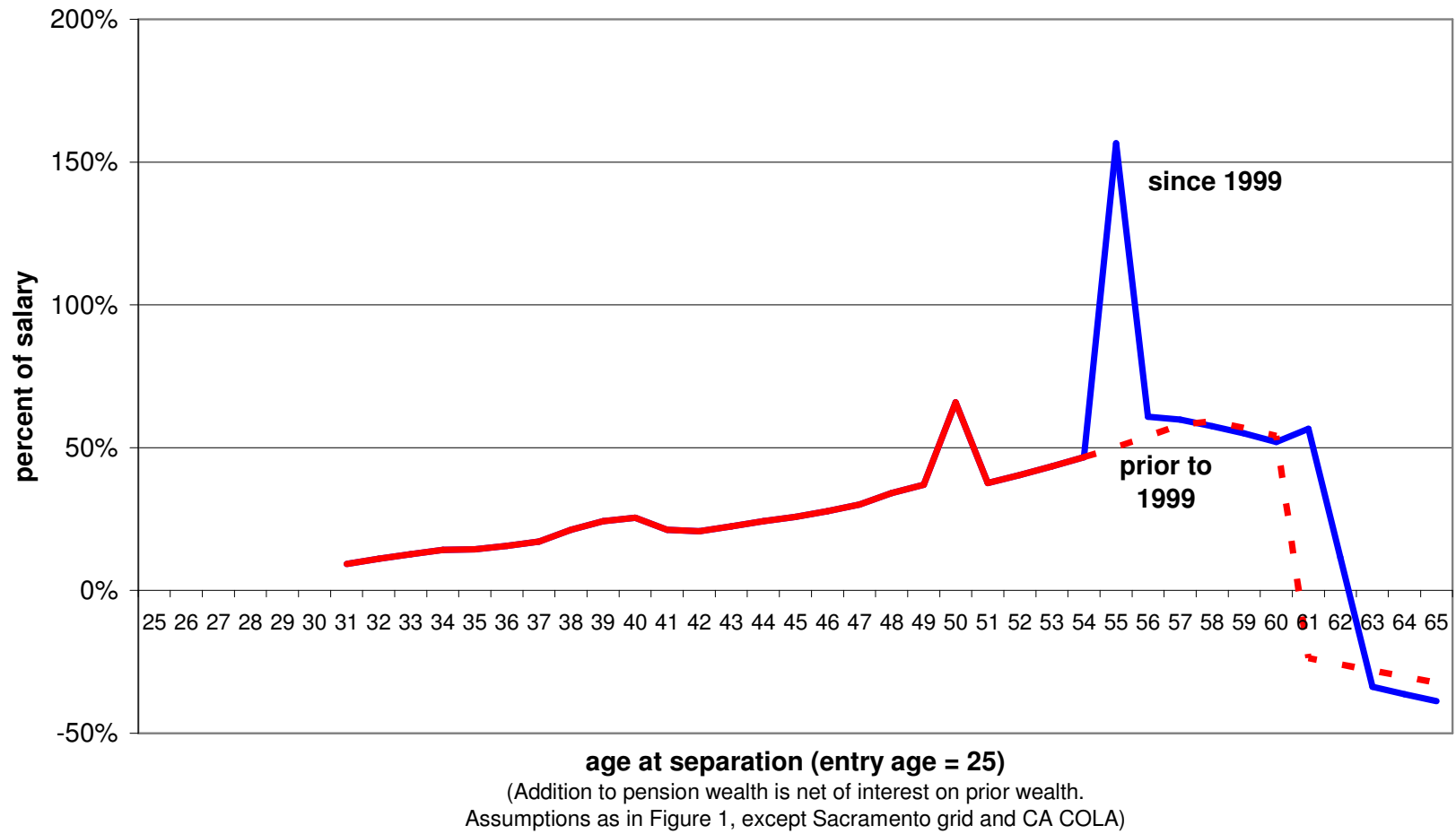
(Age of first pension draw indicated. Addition to pension wealth is net of interest on prior wealth. Assumptions as in Figure 1, except Little Rock salary grid and AR COLA.)

**Figure 5. Deferred income per year, as percent of salary: Missouri**  
 Addition to Pension Wealth from an Additional Year of Teaching

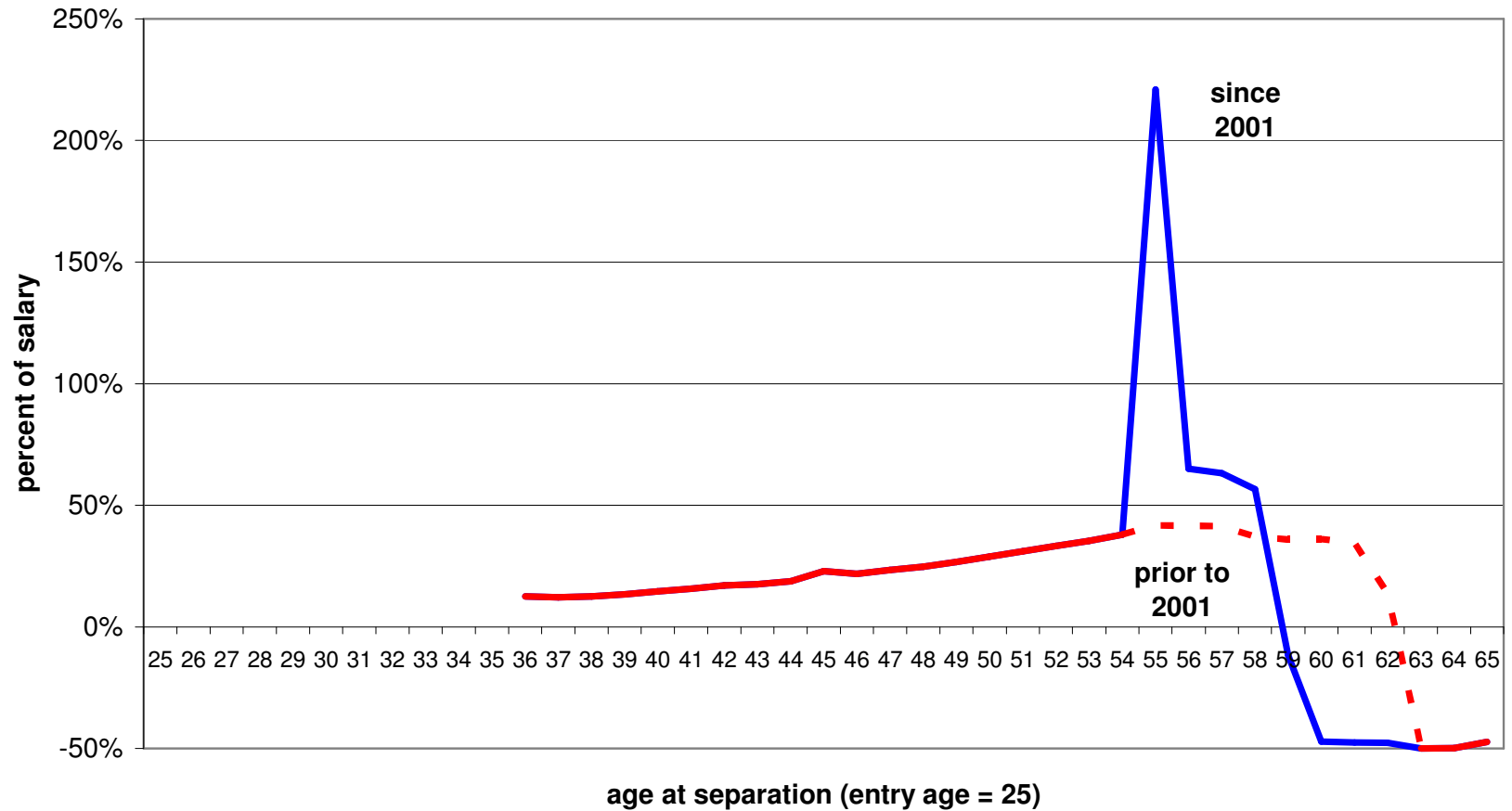


(Age of first pension draw indicated. Addition to pension wealth is net of interest on prior wealth. Assumptions as in Figure 1, except Jefferson City salary grid and MO COLA.)

**Figure 6. Deferred income per year, as percent of salary: California**  
 Addition to Pension Wealth from an Additional Year of Teaching

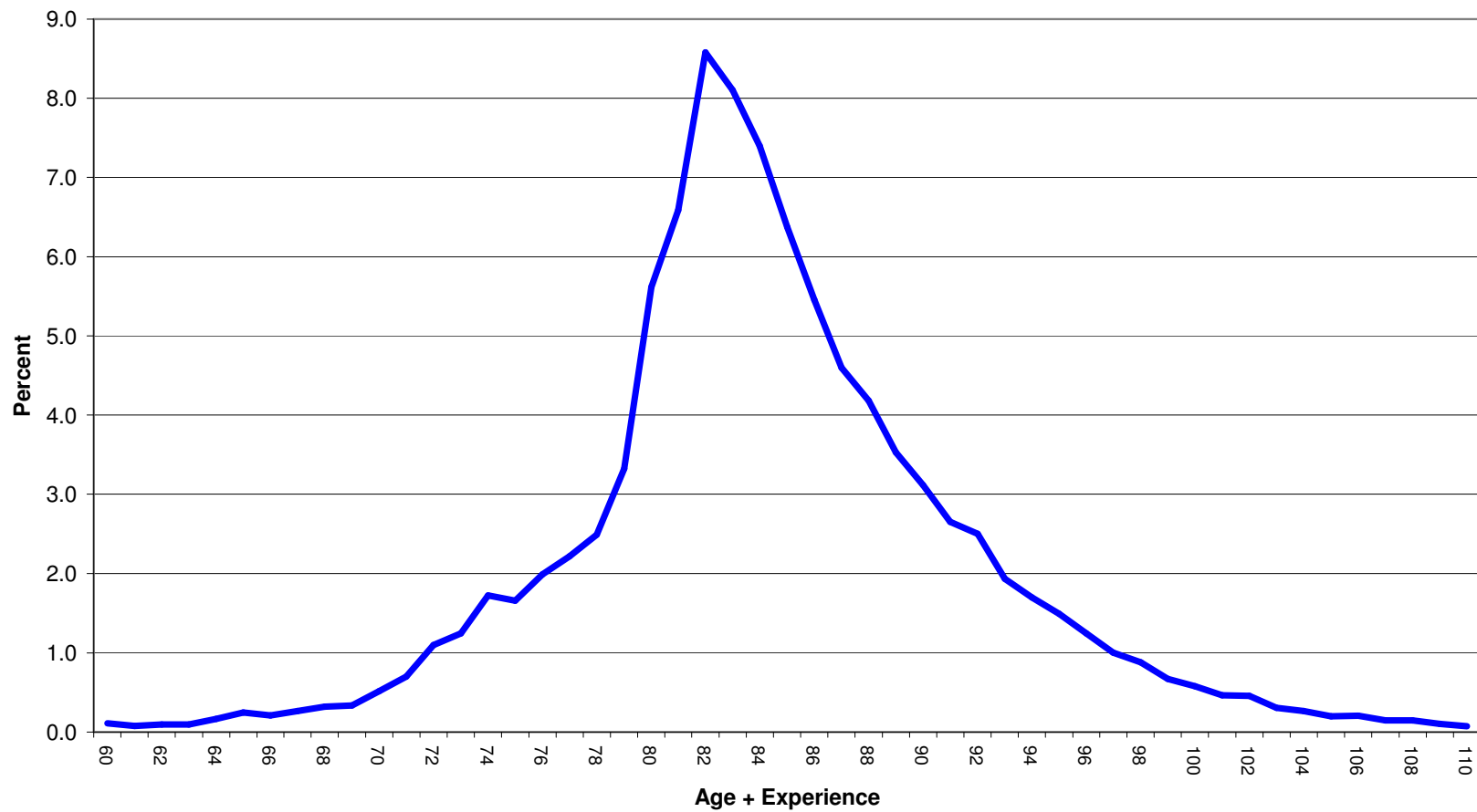


**Figure 7. Deferred income per year, as percent of salary: Massachusetts**  
 Addition to Pension Wealth from an Additional Year of Teaching



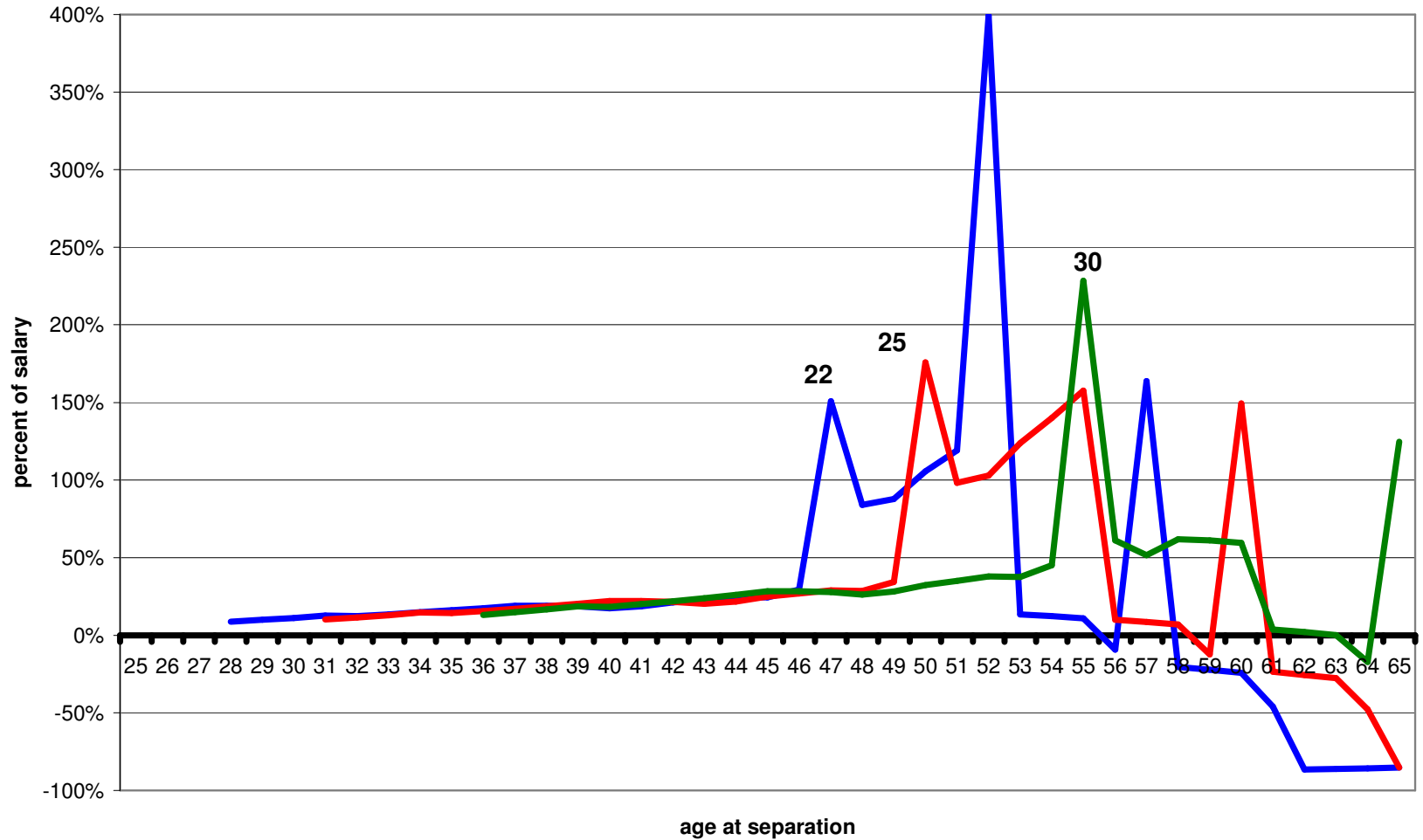
**age at separation (entry age = 25)**  
 (Addition to pension wealth is net of interest on prior wealth.  
 Assumptions as in Figure 1, except Boston salary grid and MA COLA)

**Figure 8. Distribution of Recent Retirees under Missouri's "Rule of 80"**



Mid-career to late career teachers who retired between 1990-91 and 2005-06. Excludes St. Louis and Kansas City.  
Source: Podgursky and Ehlert (2007).

Figure 9. Deferred Income as Percent of Salary, Ohio: Entry ages 22, 25, 30



(Assumptions: see Figure 1. Source: Costrell and Podgursky (2007b))

**Figure 10. Deferred income per year, as % of salary: Arkansas with T-DROP**  
 Addition to Pension Wealth from an Additional Year of Teaching

