A priority area for the public health workforce research agenda is the study of the public health labor market and how wages and benefits affect workforce outcomes, including recruiting, retention, and retirement. This study provides an example of such a study for the Department of Defense civil service workforce. We analyze the financial incentives to retire that are specifically embedded in the retirement system and how different workforce-shaping policies would affect these incentives. The study then uses a recently estimated model of the effects of financial incentives on retirement behavior among defense civilians to predict how these workforce-shaping tools would affect retirement behavior. We find that buyouts, retention incentives, and other workforce-shaping tools have a sizable effect on predicted retirement behavior and therefore, could be useful policies to help manage retirement outflows.

KEY WORDS: economics, manpower, research

Cioffi et al. describe a research agenda for public health workforce development. Among the five priority areas for a workforce research agenda is the analysis of labor market forces and the effects of wage and benefits on personnel outcomes, including recruiting, retention, and retirement. This article provides an example of such research for another workforce, the Department of Defense (DOD) civil service. The DOD civil service workforce provides a useful case study because recent demographic trends such as an aging workforce have caused difficult personnel management challenges. These demographic trends, and the resulting personnel management challenges, are likely to be relevant to the public health workforce at the federal and state and local levels. The analysis of the DOD workforce and the effectiveness of workforce-shaping tools provides some initial insight on the likely effectiveness of such tools when applied to the public health workforce. Because additional research would be required to estimate the effectiveness of such tools for the public health workforce, the analysis presented here also provides an example of the type of analysis that could be done.

To set the stage for our analysis, the article begins with background on the demographic trends in the DOD that have caused concern about the retirement
behavior among civil service personnel and the management challenges that these demographic trends pose. The article then describes the retirement system relevant for our population, the Civil Service Retirement System (CSRS), and the workforce-shaping tools that are available. These tools include retention bonuses to induce civil service workers to delay retirement and buyouts and early retirement incentives to induce them to leave earlier than planned.

The article then presents an analysis of the potential effectiveness of these workforce-shaping tools. After describing the data, we first present computations of the financial incentive to retire under the current retirement system and then simulate the changes in the financial incentive to retire under alternative workforce-shaping tools. We then turn to assessing how these incentives affect actual retirement behavior. We present estimates of the financial incentives embedded in the CSRS retirement system on retirement behavior, based on models from Asch et al. These estimates are then used to predict how the workforce-shaping tools would affect civil service retirement behavior, based on policy simulations from Asch et al. We then conclude and discuss the implications for the public health research agenda.

Demographic Trends and Personnel Management Challenges

One of the most dramatic trends affecting the federal civil service workforce in recent years is the aging of its workforce. Almost three-quarters of the DOD civilian workforce was older than 40 years in 2004 compared with about a third of the overall US workforce. The DOD civilian workforce is older than the US workforce in part because the defense department reduced its workforce in the 1990s by hiring fewer workers. Furthermore, DOD workers older than 40 years have annual continuation rates of more than 90 percent. The large percentage of older employees means that a significant fraction of the DOD workforce will be eligible for retirement in the coming years.

As workers retire, DOD managers will need to decide how to respond to the large decline in its workforce over a relatively short time span. If they decide to replace all of the workers who are retiring, they can increase hiring, increase retention of the current workforce, or outsource the services provided by those who retired. Thus, managers must define what their workforce requirements are in terms of the desired skill and experience mixes and how they will meet those requirements in terms of retention, recruiting, or outsourcing.

Another challenge is competition with the private sector for workers with the requisite skills. Private sector firms also face the problem of looming retirements among the baby boom generation and, presumably, they will also be seeking junior and mid-career replacement workers. The degree of competition from the private sector will depend on the skills that are sought and on the factors that influence the demand and supply of personnel with those skills, such as relative pay levels.

The challenges posed by an aging workforce are amplified by problems with the federal civil service personnel and compensation systems. Various commissions and studies in recent years have concluded that these systems are urgently in need of reform because they hamper workforce effectiveness. Even if the civil service can effectively compete for qualified replacement workers, some retention among retirement-eligible personnel is desirable because they possess institutional knowledge that may be impossible to replace quickly. These senior workers are important for ensuring that institutional knowledge is transferred across work cohorts.

Several workforce-shaping tools are available to federal workforce managers to address the looming retirement bulge. Early retirement and voluntary separation incentive programs (VSIPs) can help smooth the timing of retirements. Doing so can help managers ensure that retirements and separations occur when they will have the least cost or the least undesirable effects on the workforce. By the same token, retention bonuses applied to retirement-eligible workers can help managers induce workers with critical skills and knowledge who are eligible for retirement to defer their retirement until suitable replacement workers can be found and trained. Thus, financial incentives can enable managers to coordinate the timing of separations with the hiring of replacements and achieve more effective workforce continuity.

If these workforce-shaping tools are to be used for workforce planning, then a key question must first be answered: how do these policies affect retirement behavior? Our approach to studying the effects of these policies is to first analyze the financial incentive to retire and how these workforce-shaping tools affect these incentives. Then, we estimate the relationship between financial incentives and retirement behavior of DOD civil service workers and use the estimated model to

simulate how the various workforce-shaping policies affect retirement behavior.

● Description of the CSRS and Workforce-Shaping Tools

For the reasons detailed below, our analysis focuses on workers covered by the CSRS. The CSRS is a defined benefit pension program that provides an immediate, inflation-protected pension annuity to eligible personnel. The CSRS pension annuity is computed on the basis of a formula that incorporates years of covered service (YOS) and the average of the highest 3 years of base pay. To be eligible for optional retirement, the employee must be at least 55 years old with at least 30 YOS, at least 60 years with at least 20 YOS, or at least 62 years with at least 5 YOS. Thus, a worker who reaches 30 YOS at the age of 56 years is eligible to retire immediately.

Individuals who resign or separate before reaching eligibility for optional retirement are eligible for a deferred CSRS pension annuity if they have at least 5 YOS when they separate. The annuity is not paid immediately but begins at the age of 62 years. As with those who are eligible to retire, the pension annuity is computed by using a formula that incorporates YOS and highest 3 years of pay at the time of separation. For example, an individual covered by the CSRS who resigns at the age of 50 years with 10 YOS could get a deferred annuity that begins payments at the age of 62 years and that is based on pay and YOS at the age of 50 years. The annuity is not adjusted for the effects of inflation between ages 50 and 62 years.

Turning to the workforce-shaping policies, there exists an early retirement provision under the CSRS, known as the Voluntary Early Retirement Authority (VERA). These benefits are not automatic, but are offered only to those selected for the program. To be eligible, an individual must be at least 50 years old with at least 20 YOS or be any age with at least 25 YOS. The annuity payment begins immediately at the time of separation and is based on YOS and pay at the time of separation. The annuity is reduced by 2 percentage points for every year an individual is younger than 55 years. For example, an employee who is 52 years with 20 YOS could take the VERA benefit, if offered, but the annuity would be reduced by 6 percentage points.

The special VSIP is a buyout that is computed by using a formula that bases the buyout payment on the employee’s YOS, weekly pay, and age. The maximum benefit is $25,000, and federal employers have a limited authority to offer buyouts. Our analysis computes the VSIP buyout for each individual in our dataset by using the published formula.

The retention allowance is a workforce-shaping tool intended to delay retirement and is a percentage of weekly pay that can be offered to employees whose skills are considered to be critical. The retention allowance can increase pay by up to 25 percent. Importantly for our analysis, retention allowances do not increase base pay for the purposes of calculating an employee’s CSRS pension annuity.

● Data

We used administrative data for all permanent, full-time, civilian personnel in the DOD who were covered by the CSRS during the period fiscal year (FY) 1981 through FY 1996. The data were provided by the Defense Manpower Data Center. Given that the DOD is the largest federal civil service employer after the postal service and accounts for about 40 to 50 percent of civil service employment, our analysis is relevant to a substantial portion of the entire federal civil service.

We deleted from our data those who are under any other federal retirement plan, including the Federal Employees Retirement System, CSRS-interim, and CSRS-offset. We also excluded civilians receiving military retirement benefits. By making these exclusions, we could focus entirely on the retirement behavior of those covered by the CSRS without worrying that observed behavior was a response to other retirement systems.

We chose only CSRS-covered personnel for several reasons. First, the retirement plan is based on a relatively simple formula. Therefore, we were more likely to accurately compute each individual’s expected retirement annuity under the CSRS. Second, employment that is covered by the CSRS is not covered by Social Security. In other words, CSRS-covered workers do not earn credit for their service under the Social Security program, as is the case with those covered by the Federal Employees Retirement System, for example. Therefore, the retirement behavior of those under the CSRS is not confounded by the incentives of Social Security. Because it is possible that some individuals under the CSRS worked in Social Security–covered jobs before they entered the civil service, we limited our analysis to those who have at least 15 YOS in the federal government at the age of 50 years. We limited our analysis to those aged 50 years and older, and we did not model the factors that influence an individual’s incentive to stay in the civil service until the age of 50 years.

Finally, we excluded from our analysis those individuals who actually received VERA or VSIP during the defense drawdown of the 1990s. Including them would have caused us to overestimate the effect of financial incentives on voluntary retirement and separation because workers who did not take the VERA or
VSIP offer during the drawdown were likely to be invol-
untarily separated at a later date. The acceptance rate of
these programs in the 1990s was quite high, nearly
90 percent, according to the DOD’s Civilian Personnel
Management System. Because we excluded individuals
who accepted VERA and VSIP during the drawdown,
our estimates of the effects of the early retirement and
buyout programs workforce-shaping policies are not
estimates of the past success of these programs.

After making these exclusions, our analysis file had
approximately 3 million observations. All observations
were used to estimate the regression model of the effects
of CSRS incentives on the probability of retirement.
However, to conduct the analysis of how the workforce-
shaping policies affect the financial incentives to retire
and to predict the probability of retirement using the
regression model estimates, we used a one percent ran-
dom sample of the data to reduce computation time.

● Our Empirical Analysis

Our analysis has two main parts. The first part com-
putes the financial incentive to retire and the second
part models the relationship between the CSRS finan-
cial incentive to retire and actual retirement behavior.
On the basis of the estimates of this model, we then
simulate the effect of the workforce-shaping policies
on retirement behavior, holding constant observed job
and demographic characteristics.

Before discussing our findings, we first note some
limitations of our analysis. First, our analysis focuses
on the financial incentives to retire that are specifically
embedded in the employee’s retirement system. Thus,
our analysis excludes spousal earnings, other house-
hold savings and wealth, and nonfinancial factors that
might also influence the retirement decision, such as
the health of the employee or spouse. Despite these ex-
clusions, our model has good predictive power and we
compute elasticities that are consistent with those found
in other studies. We discuss model fit further below. Our
methods modeling the structure of the employer retire-
ment system rather than retirement more generally are
most appropriate for understanding small change in
retirement incentives.

● The Financial Incentives to Retire

We begin by computing each individual’s financial in-
centive to retire rather than continuing work at each
possible retirement age under the CSRS. The calcula-
tion involves several steps and is illustrated in Figure 1.
For each employee in each year of our data, we first
compute the present discounted value of their CSRS
retirement annuity if they retired or resigned at their
current age and YOS in the federal sector. The figure
shows their CSRS retirement wealth at their current age.
The computation assumed a real discount rate of 3 per-
cent, an inflation rate of 3 percent, and a maximum life
span of 99 years. The computation also incorporated
mortality risk by discounting the pension annuity with
the probability the employee would die before reaching
each future age. We then compute their expected CSRS
pension wealth at every possible future retirement or
separation age. This computation assumes an annual
real growth in earnings of 0.25 percent if the individ-
ual continues to work. The 0.25 percent assumption is
consistent with the observed earnings growth in our
data.

Figure 1 shows the average results of these calcula-
tions for individuals who become eligible for optional
retirement age at 55 years. A notable feature of the fig-
ure is that expected CSRS pension wealth jumps up at
the optional retirement age. Between the age of 54 and
55 years, the CSRS pension wealth increases because
individuals who leave at the age of 54 years cannot be-
gin collecting CSRS pension benefits until the age of
62 years. If these individuals stayed an additional year
and left instead at the age of 55 years, they would re-
ceive their CSRS benefits immediately. Because of dis-
counting, the fewer years over which the annuity is
paid, and the effects of inflation between ages 54 and
62 years, the CSRS retirement wealth increases
markedly between separating at the age of 54 and
55 years. Therefore, the CSRS embeds a strong incentive
to stay until eligibility for optional retirement is reached
because an individual eligible to retire at age of 55 years
would forego a significant financial loss under the CSRS
if he or she left before the age of 55 years. The timing of
retirement is also influenced by factors other than the

![Figure 1](image-url)
The financial incentives embedded in the CSRS such as civil service pay.

The final step involved in computing the financial incentive to retire is to compute the difference in expected CSRS pension wealth at the worker’s current age and at the age when expected CSRS pension wealth is at a maximum. For individuals who are 50 years old and are eligible for optional retirement at the age of 55 years, their pension wealth is maximized if they retire at the age of 55 years (as shown in the figure). Thus, such a person’s financial incentive to retire at the age of 50 years is the difference between the CSRS pension wealth at the age of 50 years and at the age of 55 years.

We computed the CSRS financial incentives to retire for every worker in every future year. We find that the average net incentive to retire in the DOD civil service over our data period is negative until the age of 60 years and then becomes positive. Thus, on average, the CSRS embeds a negative incentive to retire for those younger than 60 years but has a positive incentive beyond the age of 60 years. These averages reflect the YOS distribution of civilian employees at each age in the DOD. A given individual may have a profile that differs from the average. The average financial incentive also differs among subgroups. The purpose of the buyout and early retirement programs is to increase the employee’s financial incentive to separate or retire at a different age. Thus, these programs are hypothesized to increase the financial incentive to separate.

We now turn to how different workforce-shaping policies are affecting the financial incentives to retire. Table 1 shows the results for those eligible for optional retirement. The average incentive to retire immediately under the CSRS, in the absence of the buyout program, is $14,400 at the age of 55 years and $17,600 at the age of 62 years. When we recomputed the financial incentive under the assumption that every individual would receive a voluntary buyout (labeled as VSIP) up to the maximum of $25,000, the average incentive increases dramatically by 170 percent to $39,400 at the age of 55 years and by 142 percent to $42,600 at the age of 62 years. The dollar amount of the buyout is computed on the basis of a formula that depends on age, YOS, and age, as discussed earlier. Thus, the buyout has a sizable effect on the average incentive to retire among those eligible for optional retirement in the DOD data. Later, we examine the effect on retirement behavior.

The intent of the retention allowance, in contrast, is to induce individuals to defer separation and continue work in the civil service by increasing weekly pay. Because the retention allowance increases pay for as long as it is offered, but does not affect retirement benefits, we must include current and future earnings and CSRS benefits in the computation of the incentive to retire. When earnings are included, the average financial incentive to retire is negative, regardless of whether we include the retention allowance or not. Thus, the average incentive to retire does not become positive at the age of 60 years. That is, individuals want to continue to work at the age of 60 years rather than to retire when we also include earnings. Our analysis assumes that individuals would be paid maximum retention allowance of 25 percent of pay for the rest of their career. Consequently, our estimates represent the upper bound or the maximum effect we could expect on the financial incentive to retire and on predicted retirement behavior because of the retention allowance program. Adding the retention allowance causes the average incentive to retire to become more negative.*

Turning to the results, the columns on the right side of Table 1 show the average financial incentive to retire when we include both the CSRS pension wealth and current and future earnings in the calculation. In the absence of the retention allowance, the average incentive to retire among those eligible for optional retirement is negative, −$288,000 at the age of 55 years and −$250,000 at the age of 62 years. If these individuals

*It is important to note that these calculations assume that individuals exit the labor force when they leave the civil service and, consequently, have no earnings after they separate. If, instead, we assumed that individuals took a new job with positive earnings, the financial incentive to retire shown in this chart would be less negative.
Table 2 shows the findings for those DOD employees in our dataset who would be eligible for early retirement, but not for optional retirement, by virtue of their age and YOS. In other words, they are 50 years or older and have at least 20 YOS. In the absence of any VSIP buyout or early retirement incentive, we calculate that the average financial incentive to separate or retire at the current age is negative, $−266,000 at the age of 50 years and $−81,500 at the age of 59 years. Offering a voluntary separation or buyout incentive is estimated to increase the incentive to retire by 9 percent at the age of 50 years and by 31 percent at the age of 59 years, but the average CSRS incentive still remains very negative. This estimated effect is smaller than the effect estimated for those eligible for optional retirement (shown in Table 1). The effect is smaller because a 50-year-old who takes the VSIP buyout and leaves the civil service can receive only his or her CSRS annuity beginning at the age of 62 years. Thus, offsetting the buyouts incentive to leave is CSRS strong incentive to stay until the individual is eligible for optional retirement. In contrast, the buyouts incentive to leave simply reinforces the CSRS incentive to retire among those already eligible for optional retirement.

In contrast, we estimate that the average financial incentive to separate increases substantially when individuals are assumed to get an early retirement offer. At the age of 50 years, we estimate that the average financial incentive to retire nearly doubles, increasing to $−9,700. At the age of 59 years, the average incentive becomes positive, increasing to $7,600.

The National Defense Authorization Act of 2002 authorized the DOD to offer separation buyout incentives in addition to early retirement. The column on the far right of Table 2 shows our estimate of the average incentive to retire immediately among those offered both the VSIP buyout incentive and VERA early retirement incentive. The average incentive increases to $14,600 at the age of 59 years and to $32,500 at the age of 59 years. Thus, we find that the incentive to leave more than doubles when both benefits are offered.

The second part of our analysis is to predict the effects of the workforce-shaping policies on CSRS retirements. Here, we focus on average retirement behavior by age and the estimated effect of the different workforce-shaping incentive programs on retirement behavior. Figure 2 shows the percent of DOD employees who retire by age under the CSRS, pooling all CSRS-covered DOD employees in all years in our dataset. The percentage of individuals retiring under the CSRS spikes up at the age of 55, 60, and 62 years. These ages are the optional and deferred retirement ages under the CSRS.

Our approach is first to estimate regression models of the probability that an individual retires as a function of the retirement incentive variable and a set of

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**Table 2**

<table>
<thead>
<tr>
<th></th>
<th>CSRS</th>
<th>CSRS + VSIP</th>
<th>CSRS + VERA</th>
<th>CSRS + VERA + VSIP</th>
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<tr>
<td>Age 55 y</td>
<td></td>
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<tr>
<td>Average incentive</td>
<td>$−266,000</td>
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<td>$−9,700</td>
<td>$14,600</td>
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<td>Age 59 y</td>
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<td></td>
</tr>
<tr>
<td>Average incentive</td>
<td>$−81,500</td>
<td>$−56,500</td>
<td>$7,600</td>
<td>$32,500</td>
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<tr>
<td>% Change</td>
<td>31</td>
<td>110</td>
<td>140</td>
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</tbody>
</table>

**Abbreviations:** CSRS, Civil Service Retirement System; VERA, Voluntary Early Retirement Authority; VSIP, voluntary separation incentive program.

*From authors’ calculations based on 1981–1996 DOD civilian administrative data.
variables that control for the individual’s demographic and job characteristics, as described in the study by Asch et al. Unlike the first part of the analysis, the retirement incentive variable used in our primary analysis is specified as the utility of continued work in the civil service relative to the utility of retiring today. The value of continued work includes both current and future earnings, as well as future retirement earnings and the value of future leisure. We use a retirement model similar to that of Samwick. From the study by Asch et al, we present the results of estimating this model, explore its sensitivity to alternative modeling assumptions, and present results from several other types of models. This estimated model is used to simulate the effects on the predicted probability of retirement of the alternative workforce-shaping tools.

The regression analysis yields estimates of the effects of the retirement incentive variable and the other variables in the model on the probability of retiring. We estimate an elasticity of retirement for the incentive variable to be about 0.5, where this elasticity is defined as the percent change in the probability of retirement associated with a 1 percent change in the incentive variable. Thus, this estimate implies that a 10 percent increase in the incentive variable causes the retirement probability to increase from 0.08 to 0.084, a 5 percent increase. This elasticity is quite similar to other retirement elasticity estimates and to estimated elasticities of federal civil service retention with respect to relative civil service pay. For example, Black et al estimate a pay elasticity of 0.4 among administrative civil service workers.

The fit of our model is quite good. Figure 3 shows the predicted probabilities of retirement produced by the model versus the actual probabilities of retirement at each age. The predictions are made at the mean values of the explanatory variables. The good fit is not surprising because the age dummy variables that we include in the model capture factors that vary with age, such as health status, but are not included as explanatory variables in our model. All coefficient estimates and issues regarding model specification, such as the use of age dummies and the choice of a reduced form (used here) over a structural approach, are discussed in the study by Asch et al.

On the basis of our model estimates, we now simulate the probability of retirement for each individual in our data under the base case with no workforce-shaping policies and under the assumption that the individual was offered the three different programs (the buyout, the maximum retention allowance, and, for those who would be eligible, the early retirement benefit). We then computed the average predictions for those eligible for optional retirement and for those eligible for early retirement benefits.

Table 3 summarizes the findings for those eligible for optional retirement. As expected, the VSIP buyout program increases and the retention allowance reduces the average probability of retirement. For those aged 55 years and eligible for optional retirement, the model predicts an average retirement probability of 0.312. Offering the voluntary buyout increases the average predicted probability by 20 percent to 0.373. The predicted retirement probability at the age of 62 years is 0.215. The buyout increases the predicted probability by 22 percent to 0.263. The maximum retention allowance reduces

<table>
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<th>Age (y)</th>
<th>CSRS</th>
<th>CSRS + VSIP</th>
<th>CSRS + retention allowance</th>
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<tbody>
<tr>
<td>55</td>
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<td>.373</td>
<td>.250</td>
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<tr>
<td>% Change</td>
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</tr>
<tr>
<td>62</td>
<td>.215</td>
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<td>% Change</td>
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<td>-19</td>
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</table>

Abbreviations: CSRS, Civil Service Retirement System; VERA, Voluntary Early Retirement Authority; VSIP, voluntary separation incentive program.

*From authors’ calculations based on 1981–1996 DOD civilian administrative data.
Table 4 shows the results for those eligible for early, but not for optional, retirement benefits. The predicted probability of retirement at the age of 50 years in the absence of the workforce-shaping programs is quite low, .013. It is also relatively low at the age of 59 years, .068. The buyout increases the average predicted probability of retirement, by about a third to .017 for those at the age of 55 years and by about 40 percent to .096 for those at the age of 59 years.

When individuals are assumed to be offered early retirement, we find a substantial increase in the average probability of retirement. The average predicted probability increases to .05, an almost quadrupling of the probability of retirement, at the age of 50 years, and increases to .135, a doubling of the probability, at the age of 59 years. Offering both the buyout and the early retirement program increases the average predicted probabilities even more (final column of Table 4).

### Summary and Implications

Our analysis shows that workforce-shaping policies have sizable predicted effects on retirement behavior among those covered by the CSRS. Because our study did not consider the cost of offering these incentives, we cannot draw conclusions about which tool is the most efficient or cost-effective and we leave it to future studies to study these issues. Still, our study provides a basis for the DOD to consider how to use these policies to effectively manage the wave of retirements it expects over the next decade, while shaping the skill and experience mix of its workforce to better achieve its mission.

Although the estimates discussed in this article provide an indication of the effects of workforce-shaping policies that might be applied to the public health workforce, we primarily view this article as providing an example for how such estimates can be obtained. In particular, we lay out a relatively simple regression-based method to obtain the effects of financial incentives on retirement and then simulate the effects of different workforce-shaping policies on retirement behavior. Importantly, because our simulation methods do not rely on data from the implementation of the actual policies, they could be used to assess the potential effectiveness of newly formulated policies as well. Such methods could provide a useful policy tool to assess the specific needs and policy environment of the public health workforce.

### REFERENCES

