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# The Role of Employers in Phased Retirement: Opportunities for Phased Retirement Among White-Collar Workers

## **Abstract**

[Excerpt] While the labor market for older workers has many unusual features, the small number of phased retirements is certainly one of the more curious. The basic idea of phased retirement is that an older worker remains with his or her employer while gradually shifting from full-time work to full-time retirement. For decades experts have proclaimed the advantages of this type of retirement. Moreover, employees often express an interest in taking a phased retirement. In a recent national survey of the older population, more than half of the respondents age 55 to 65 said they would prefer to gradually reduce their hours of work as they age. Yet, all indications are that phased retirements are rather rare. Past studies indicate that within a cohort of older workers, less than ten percent took phased retirement; most people simply moved from full-time work to full-time retirement. Nothing in the more recent data indicates that this has changed greatly.

## **Keywords**

ILR, Cornell University, labor economics, employer, role, retirement, phased retirement, white-collar, worker, employee, full-time work, work, opportunity

## **Disciplines**

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**The Role Of Employers In Phased Retirement: Opportunities For Phased Retirement Among White-Collar Workers**

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## **The Role Of Employers In Phased Retirement: Opportunities For Phased Retirement Among White-Collar Workers**

### **I. Introduction**

While the labor market for older workers has many unusual features, the small number of phased retirements is certainly one of the more curious. The basic idea of phased retirement is that an older worker remains with his or her employer while gradually shifting from full-time work to full-time retirement. For decades experts have proclaimed the advantages of this type of retirement. Moreover, employees often express an interest in taking a phased retirement. In a recent national survey of the older population, more than half of the respondents age 55 to 65 said they would prefer to gradually reduce their hours of work as they age.<sup>1</sup> Yet, all indications are that phased retirements are rather rare. Past studies indicate that within a cohort of older workers, less than ten percent took phased retirement; most people simply moved from full-time work to full-time retirement.<sup>2</sup> Nothing in the more recent data indicates that this has changed greatly.<sup>3</sup>

One possible explanation for the low levels of phased retirement is limited opportunity. Perhaps employers provide limited opportunities for workers to take phased retirement. As a result, despite worker interest in phased retirement, few are able to actually work out a suitable arrangement with their employer.

While little is known about opportunities for phased retirement, at least in principle, such opportunities are knowable. Take a randomly selected older worker, and ask her employer whether -- if she proposed a phased retirement today -- there are conditions under which she would be permitted to do so. If there are, then we know an opportunity exists. Of course, the worker may not view that opportunity as particularly

attractive. It may involve a change of tasks or a change in pay and fringes that the worker would find unacceptable. Indeed, the worker may look at the employer's conditions and decide that either full retirement or full time work would be preferable. Regardless of such preferences, the point is that both the worker and an outside observer can know that an opportunity exists.

This paper examines opportunities for phased retirement. It is built on a survey of 950 establishments that investigated how employers would react to a worker's request for phased retirement. The survey was funded by the Sloan Foundation. It first asked employers whether a "generic" older white-collar worker would be permitted to take phased retirement. At a later point in the survey, a similar question was posed for an actual older worker. Using these data it is possible to examine how opportunities for phased retirement vary across types of establishments as well as types of workers. More specifically, using these data in combination with the Health and Retirement Study (HRS), this paper seeks to address three questions:

- (1) What fraction of older white-collar workers have good opportunities for phased retirement?
- (2) To what extent does an older white-collar worker's opportunity for phased retirement depend upon the characteristics of his or her establishment (e.g., industry, size, type of pension).
- (3) To what extent does an older white-collar worker's opportunity for phased retirement depend upon his or her demographic characteristics (e.g., age, gender, education).

The remainder of the paper is organized into two sections. The next section describes the establishment survey and presents key results on establishment level policies. Section III then discusses establishment survey data on a specific older worker, the HRS data, model estimation, and predicted opportunities.

## **II. Assessing Opportunities for Phased Retirement**

### **A. The Survey**

The survey obtained data on 950 establishments between June 2001 and November 2002. An establishment is defined as a single physical location at which business is conducted or services or industrial operations are performed. An establishment may or may not be part of a larger organization; for example some grocery stores are owner operated while others are part of a large corporation. For purposes of studying phased retirement, establishment level data is arguably better than data collected from a parent organization. In contrast to (say) a survey of upper-level executives at corporate headquarters, establishment level respondents are more likely to know how policy is implemented in practice. In order to obtain detailed information in a relatively brief interview, the survey focused on white-collar workers.<sup>4</sup> The sample was restricted to establishments not engaged in either agriculture or mining with twenty or more employees and with at least two white-collar employees who were age 55 or older.<sup>5</sup> The latter restriction insures that questions about phased retirement are relevant to the establishment's current situation.

The sample universe was the Dun and Bradstreet Strategic Marketing Record for December 2000. The main source of these data is credit inquiries, although information is

also obtained from the U.S. Postal Service, banks, newspapers, yellow pages, and other public records. In order to insure adequate numbers of large establishments, the sample was stratified by establishment size. The subsequent results are weighted to provide representative results.

The survey was conducted by telephone by the University of Massachusetts Center for Survey Research. After contacting the establishment, the interviewer asked for the person who is best able to answer questions about flexible work schedules and employee benefits, for example a human resource manager or a benefits manager. Interviews were conducted with a CATI (Computer Assisted Telephone Interviewing) system, thereby permitting an interview to be completed over several phone calls. Although this technology simplified the interview process, new technologies on the respondent side (in particular AUDIX and answering machines) complicated matters. The median number of telephone calls to complete an interview was 10, with 10% of the interviews requiring 30 or more calls to complete.

The overall response rate was 61%. Most of the nonresponse occurred when screening establishments for eligibility (e.g., at least two white-collar employees age 55+), and before respondents knew the purpose of the survey. Interviews were completed in 89% of the establishments that were successfully screened. This is on a par with other establishment level telephone surveys.<sup>6</sup>

#### B. Asking About Phased Retirement

After asking a series of question about the characteristics of the establishment and its human resource and pension policies, the interviewer posed the following question:

Q1 Think of a secure full-time white-collar employee who is age 55 or over. One day that person comes to you and says that at some point in the next few years he/she may want to shift to a part-time work schedule at this establishment. Could this person's request to shift to part-time employment be worked out in a way that would be acceptable to your establishment?

If the response was “yes” or “in some cases,” then we asked further questions about what form this hours reduction might take.<sup>7</sup>

It should, perhaps, be noted that whereas phased retirement usually means gradual reduction in hours, this question asks about a shift from full-time to part-time. In designing the survey, it was decided to focus on a rather concrete form of phased retirement – a shift from full-time to part-time. If a respondent said such a shift was possible, the interviewer followed up with questions about what the respondent meant by “part-time.”

As indicated in Figure 1 the majority of establishments offer opportunities for some kind of phased retirement: fully 73% of the establishments indicated that “yes,” something could be worked out, while another 14% said that something could be worked out “in some cases.”<sup>8</sup>

Employers who said “in some cases” usually talked about possible scheduling difficulties or problems with getting the work done. For example,

*You'd have to find someone else to take up the slack.*

*[There are] issues with client deliverables and client contacts; [we need a person who is] easy to contact when not here; we need flexibility in an emergency; if they have Friday off and there's an emergency Friday we would need them to come in.*

*[It] would require [us] to train someone else, and hire another part-time person*

Saying that phased retirement can be worked out is not, of course, the same as saying that it is likely. An employer may take a hard look at both the employee and



current business conditions before letting a specific employee take phased retirement. In addition, the terms under which the employer is willing to work out phased retirement may not be acceptable to the employee. How will health insurance be handled? Will it be possible to supplement salary with pension payments? Can an employee have a change of heart and return to full-time work? At the outset, however, it is important to emphasize that phased retirement can be defined in many ways, some of which imply very limited opportunities for phased retirement.

Table 1 illustrates this point. The table begins with the 73 percent of establishments that give an unambiguous “yes” to the question about whether some form of phased retirement could be worked out. Some of these employers are only willing to work out phased retirement if the employee officially retires, and then returns to the establishment as a rehire. If those establishments are excluded, the percentage that can work out phased retirement drops to 68 percent. Some employers will permit phased retirement if another person can be found to share the job. Of course, that can be difficult; indeed, in small establishments it may be impossible. Excluding establishments that require job-sharing drops the percentage that can work out phased retirement to 59 percent. Continuing down the table, we see that if phased retirement is defined as permitting older workers to shift from full-time to part-time work before official retirement, without job sharing, with no change in health insurance, with pension payments that supplement salary, and consent to return to full-time work if desired, then only 6 percent of the establishments permit phased retirement.

In this section phased retirement is defined in the broadest possible terms: can something be worked out? The goal is to determine whether opportunities exist. If they

do, then we probe deeper to understand the conditions under which phased retirement is possible. Since these opportunities take a variety of forms, at least at the outset we want to consider all of those forms.

These opportunities are often real in the sense that employees have actually taken phased retirement. We know this because if a respondent told us that something could be worked out before official retirement, we asked whether in the last three years a white-collar worker age 55 or over had actually shifted from a full-time to a part-time work schedule. Fully 36% said “yes.”<sup>9</sup>

Phased retirement can occur either before or after official retirement.<sup>10</sup> This was brought home during the design phase of the survey. In discussions with several managers, we learned that employers often try to avoid hours reductions before official retirement, preferring instead that workers first retire and then come back as part-time or contract workers. The survey indicates that such preferences are not widespread. As indicated in Figure 2, most employers were willing to accommodate hours reductions regardless of whether they occur before or after official retirement. Indeed, only 7% indicated that the hours reduction should occur after official retirement.

Regardless of whether the hours reduction occurs before or after official retirement, most establishments handle phased retirement on an informal basis. About a third of the sample has any sort of formal written policy, and about a third of those indicate that the policy is flexible and tailored to individual cases.<sup>11</sup> These flexible formal policies usually permit hours reductions as long as certain conditions are met. For example, one respondent spoke of the problem of finding another person to fill the other half of the job.

*It depends on if it is difficult to recruit. For instance if it is a med tech, [it can be] difficult to find a part time med tech in nursing ... [we] probably can not accommodate that schedule easily.*

Figure 3 presents data on formal and informal policies for establishments that said some form of phased retirement was possible. As indicated there, informal policies are the rule in both hours reductions before and after official retirement.

In most establishments phased retirement is “conditional.” While an establishment may permit phased retirement, a specific worker’s opportunity for phased retirement depends on the employer’s assessment of the situation. The opportunity can depend on the nature of the job, business conditions, or finding someone to cover the work. In these establishments a request for phased retirement is like a request for a different job assignment; it may get a positive response in some situations and be turned down in others.

*He would be able to continue the craft part of it, but not the supervision part of the job.*

*Depends on school’s need--may change grade levels.*

*Probably not unless another person was hired to take up the slack.*

### C. Establishment Characteristics and Phased Retirement

The survey also permits an assessment of how phased retirement policies vary with establishment characteristics. Since other papers go into detail on that topic (see Hutchens and Grace-Martin 2004), it is sufficient to summarize results here.

1. Although establishment size is not closely linked to opportunities for phased retirement, size of the parent organization does matter. Small organizations are more likely to permit phased retirement.
2. Industries differ in their opportunities for phased retirement. Opportunities tend to be greatest for establishments in the service sector. Opportunities tend to be most limited in public administration (excluding health, education, and social services).
3. Expanding and contracting establishments differ in their opportunities for phased retirement. Establishments that increased their employment over the last three years were more likely to report that phased retirement could be worked out.
4. An establishment is less likely to permit phased retirement when a large percentage of the white-collar workforce is unionized.
5. Establishments that employ part-time white-collar workers are more likely to permit phased retirement than those that do not.
6. Opportunities for phased retirement are most limited for managers and least limited for professionals.

Some of these results modify the earlier literature. For example, previous studies indicated that phased retirement is prevalent in health, education, and social services as well as public administration.<sup>12</sup> These results are different with regard to public administration, which pertains to local, state, and federal governments. Examples of establishments in this sector are police departments, fire departments, and prisons. Fully 29% percent of the establishments in this sector indicate that phased retirement is not possible.

Other results are new but not especially surprising. For example, it is reasonable that phased retirement is more likely when the establishment has part-time workers (item 5). In this case the employer does not have to create a new job for the phased retiree. Perhaps more noteworthy is the fact that this effect remains large and statistically significant in multivariate models. Similarly, it is no surprise that expanding establishments are more able to accommodate phased retirement than contracting establishments (item 3). Finally, managers are not good candidates for phased retirement because management is usually a full-time job (item 6). The phased retiree would presumably have to stop being a manager.

Still other results are surprising. In particular, it was a surprise to find that large organizations (and not large establishments) are associated with fewer opportunities for phased retirement (item 1), and that unionized establishments are less likely to permit phased retirement (item 4). Both results hold in multivariate models, and both could conceivably be due to employer preferences for handling phased retirement informally. For different reasons, both unions and large bureaucracies often frown on informal arrangements. Unions usually prefer the codification of a contract, and large bureaucracies usually prefer the consistency imposed by a personnel policies handbook. That preference for policies and practices that are codified and consistent may have the effect of limiting opportunities for phased retirement.

### **III. Opportunities for Phased Retirement and Individual Characteristics**

Although the above establishment-level information is useful for understanding how opportunities for phased retirement differ across establishments, it does not address

the question that motivates this paper: what fraction of older white-collar workers have good opportunities for phased retirement? It is quite possible that while 73 percent of the establishments permit some form of phased retirement, most of those establishments are small and employ few older workers. If older white-collar workers tend to be concentrated in the establishments that do not permit phased retirement, then 73 percent could be a wild exaggeration of opportunities for phased retirement.

#### A. Survey Information on a Selected Worker

To get at that issue, the survey sought information on one older white-collar worker from each establishment. The interview proceeded as follows:

So far, we have been talking about general policies at your establishment. I'd now like to ask about more specific situations. In order to answer these questions, it is easiest to talk about an actual person who does an actual job in your establishment.

To begin with, I would like you to give me the first names of three [MEN/WOMEN] age 55 or over who are full-time white-collar employees in your establishment. If it would make you more comfortable, you can give me fictitious names, but please think of specific employees. You should know the work of these employees reasonably well. For example, they may be people you supervise. If possible, it would be best if these three employees have different job titles.

This question was randomized on gender. Roughly half of the employers were asked for three men, while the other half were asked for three women.<sup>13</sup>

Given the three first names, we then randomly selected one of the names and asked questions about the selected worker, that worker's job, and that worker's opportunity for phased retirement. Of course, if the employer had indicated that phased retirement was not permitted at the establishment, then we did not ask about the selected worker's opportunities. If, however, phased retirement was possible, we asked the following:

Q2. Earlier you indicated that it might be possible for a full-time employee age 55 or over to shift to a part-time work schedule.<sup>14</sup> On a scale from 1 to 5, where 1 means not at all likely and 5 means very likely, how likely is it that [fill person's first name] could shift into a part-time position.

This information on the selected worker can be used to examine the fraction of older white-collar workers *in the population* who have good opportunities for phased retirement. Three steps are involved. First, estimate a multivariate model of the probability that an older individual with characteristics  $X$  who is working in an establishment with characteristics  $Z$  has a good opportunity for phased retirement. For current purposes, “good” is defined as a 4 or 5 on the five-point scale in Q2. Second, use that estimated model to predict whether survey respondents in the Health and Retirement Study (HRS) have a good opportunity for phased retirement. Third, using population weights in the HRS, calculate the predicted fraction of older white-collar workers in the population who have good opportunities for phased retirement.

More formally, using the establishment level data on a selected worker estimate a model of the form,

$$Y_j = X_j B_1 + Z_j B_2 + e_j, \text{ where}$$

$Y_j$  is a dummy (0,1) variable indicating whether the selected worker in establishment  $j$  received a 4 or 5 on Q2,


$X_j$  is a vector of characteristics of the selected worker in establishment  $j$ ,

$Z_j$  is a vector of characteristics of establishment  $j$ ,

$B_1$  and  $B_2$  are coefficients, and  $e$  is an error term.

The HRS provides a representative sample of  $N$  older workers. For each worker we observe a vector of characteristics  $(X_i, Z_i)$ ,  $i = 1, \dots, N$ . Given the estimated coefficients,

$\hat{B}_1$  and  $\hat{B}_2$ , one can predict  $\hat{Y}_i$  in the HRS as  $\hat{Y}_i = X_i \hat{B}_1 + Z_i \hat{B}_2$ . A population estimate of the fraction of older white-collar workers who have good opportunities for phased retirement, is computed as  $\sum_1^N \hat{Y}_i w_i$ , where  $w_i$  is the population weight of the  $i$ -th observation in the HRS.

Of course, like any methodology this methodology rests on assumptions. To obtain consistent predictions of the phased retirement probability in the HRS sample, the distributions of any unobservable determinants of  $Y$  must be the same in both datasets. By implication, if these distributions are the same, then we can obtain consistent predictions even when relevant variables are missing. In essence, while the  $\hat{B}$  may be biased, the predicted  $\hat{Y}$  will not be.<sup>15</sup>  other potential problem is that there may be differences in the questions asked in the two surveys. Even if wordings do not differ, respondents differ; in the HRS a worker responds while in the establishment data an employer responds. This problem is mitigated to the extent that  $X$  and  $Z$  deal with concrete and quantifiable characteristics of the worker or the establishment (e.g., age, gender, number of employees).

## B. Estimating $B_1$ and $B_2$

The data from the establishment survey were used to estimate four models with different measures of phased retirement. Model 1 is the broadest definition of phased retirement, while models 2 through 4 examine increasingly more restrictive definitions. The four models are,

Model 1: The selected worker is in an establishment where phased retirement is feasible,



Model 2: The selected worker is not only in an establishment where phased retirement is feasible, but would be a good candidate for phased retirement (4 or 5 on Q2).

Model 3: The selected worker not only meets the criteria of model 2, but would not have to officially retire and could remain in the same job.

Model 4: The selected worker not only meets the criteria of model 3, but would have same health insurance as when working full-time.

Results are presented in Table 2.

To be used for prediction in the HRS, the explanatory variables (X and Z) in these models must be restricted to variables that are available in the HRS. As indicated in Table 2, the models were estimated on measures of establishment size, industry, region, occupation, age, years of education, job tenure, gender, union status and pension type. By implication, some rather important explanatory variables are excluded from the models because they are not available in the HRS. Specifically, the models do not include variables indicating presence of part-time jobs in the establishment, the size of the parent organization, or the employer's assessment of the selected worker's job performance. As such, the estimated coefficients in Table 2 must be viewed with caution.

Still, the results are interesting. For purposes of exposition, we focus on the third model, leaving it to readers to peruse the other models in Table 2. For the third model note that in terms of statistical significance, neither establishment size, nor industry, nor region are particularly important. In contrast, the coefficient on the selected worker's union status is large, negative, and statistically significant. This is, of course, thoroughly consistent with the establishment level results summarized in Section II.C. It is also interesting to note that the coefficient on the age of the selected worker is positive and

statistically significant. Since the sample is restricted to workers over 55, this indicates that comparatively young older workers have fewer opportunities for phased retirement than their older counterparts. This result shows up again in the subsequent predictions. Finally, the results indicate that establishments with both a defined benefit and a defined contribution pension are less likely to permit phased retirement than those with just a defined contribution pension.

### C. Using the HRS for Prediction

The HRS provides a representative sample that can be used to predict an individual's opportunities of phased retirement. The HRS starts with a sample of men and women who are age 51-61 in 1992, and thereafter re-samples these people every two years. Since the establishment survey focused on employees who were age 55 and over, the ideal wave for our purposes is the 1996 wave. In 1996 the HRS sample was age 55 – 65. Since  $B_1$  and  $B_2$  were estimated in a sample of older full-time white-collar workers employed in establishments with more than 20 employees, we selected a similar sample in the HRS. After applying these conditions and using the sampling weights in the HRS, our HRS sample represents 3,252,671 white-collar workers.

For the purpose of comparison, the composition of both the establishment survey and the HRS sample are presented in Table 3. In general, the results in Table 2 indicate that both data sources have similar characteristics. See, for example, industry, occupation, and region. There are, however, variables for which they differ. Although the establishment survey over-sampled large establishments, it was not designed to replicate the distribution of workers across establishment sizes. Thus, this establishment survey

has more people working in smaller establishments (41%) than does the HRS (24.8%). Related to this, since small firms often use defined contribution pensions, unlike the HRS, most of the people in the establishment survey have a defined contribution pension plan.

#### D. Who Has a Good Opportunity for Phased Retirement?

Using the estimated coefficients for the four models in Table 2 along with the HRS data, we computed four sets of predictions. These are presented in the top row of Table 4. For model 1, a predicted 87% of the HRS sample is working in an establishment where the employer's response to Q1 is “yes” or “in some cases”. That is, of course, quite similar to the number in the establishment data (see Figure 1). Thus, while the establishment data left open the question of whether older white-collar workers are concentrated in sectors where phased retirement is not permitted, this result resolves the matter. In fact, most older white-collar workers are in an establishment where the employer is willing to work out some form of phased retirement.

The results for model 2 indicate the predicted fraction of the HRS sample that is not only working in an establishment that permits phased retirement, but that would also be a good candidate for phased retirement (4 or 5 on Q2). The fraction is a surprising 50%. Thus, roughly half of all older white-collar workers who work in an establishment with 20 or more employees, could approach their employer about phased retirement and get a positive response.

The results for model 3 indicate the predicted fraction of the HRS sample who (a) would be a good candidate for phased retirement (4 or 5 on Q2), (b) would not have to

officially retire, and (c) could remain in same job. We expect a lower fraction in this model than in model 2 since the conditions for phased retirement are more restrictive, and that is the case. The predicted fraction for this model is less than 30%.

Finally, the results for model 4 indicate the fraction of the HRS sample who (a) would be a good candidate for phased retirement, (b) would not have to officially retire first, (c) could remain in same job, and (d) could have the same health insurance as when working full-time. Thus, in addition to the conditions in model 3, this model requires that an older employee be able to keep his/her health insurance benefits during phased retirement. Here the average probability drops to less than 10%. In the U.S., health insurance complicates phased retirement.

Who has particularly good opportunities for phased retirement? For ease of exposition, we focus here on the third model. Of course, readers who prefer alternative definitions of phased retirement will want to examine the other columns in Table 4. Consider industry. Note that opportunities for phased retirement are highest in construction, wholesale and retail trade, and other services. There are two reasons for such differences across industries. First, the coefficients in Table 1 differ across industries. Second, the composition of white-collar workers differ across industries. For example, an industry may have more union workers or more workers under age 60, and in consequence have a lower probability of phased retirement.

Reading down the Model 3 column, it appears that opportunities for phased retirement are greatest when the older white-collar worker is employed in a small establishment (less than 49 employees). Managers are much less likely to have opportunities for phased retirement – at least while remaining in their current job.

Opportunities do not appear to vary much with years of education or gender. Age is, however, important with older workers enjoying greater opportunities. Region also appears to be important, with greater opportunities in the West than in other regions. Individuals who are not covered by a union contract have greater opportunity for phased retirement options, as do workers with less than 5 years of job tenure.

The pension results in Table 4 deserve special attention. Aspects of defined benefit (DB) pensions can be incompatible with phased retirement. If benefits are based on salary in the final year prior to retirement, then a move to part-time work can result in a substantial reduction in future pension benefits. This is not an issue in a defined contribution (DC) plan like a 401(k), because benefits are not based solely on salary in the final year prior to retirement. In addition, Internal Revenue Service regulations make it quite difficult for an employee with a defined benefit plan to use pension benefits to supplement salary when taking phased retirement with the employer who administers the pension. This is less of an issue for a defined contribution plan, since defined contribution plans can be set up so that an active employee over age 59½ can supplement earnings with pension benefits. As such, we would expect the prevalence of phased retirement to be lower at those establishments with defined benefit pension plans.<sup>16</sup>

The pension results in Model 3 are consistent with this. Opportunities for phased retirement are greatest for workers with either no pension or a DC pension, and lowest for workers with a standalone DB plan or a DB plan combined with a DC plan. It is not surprising that the last category – DB combined with DC – provides no better opportunities than a simple DB pension. If shifting to half-time employment results in

lower lifetime benefits from the DB plan, then regardless of the presence of a DC plan, phased retirement will be avoided.

It is important to sound a word of caution on these pension results. Workers with DB plans have other characteristics that reduce opportunities for phased retirement. In particular, DB plans are associated with large organizations and unions, and that association drives some of the pension differences in Table 4. In multivariate models that control for both organization size and presence of a union, pension variables tend to have small and statistically weak effects. One interpretation would be that a change in the pension law that make DB plans more compatible with phased retirement may have small and weak effects on actual opportunities for phased retirement. This is because workers covered by DB plans would continue to be in unions and in large organizations. They would have low probabilities of phased retirement even if there were changes in the law covering DB plans.

#### **IV. Conclusion**

This paper examines opportunities for phased retirement among older white-collar workers. A recent establishment survey funded by the Sloan Foundation asked about opportunities for phased retirement for older white-collar workers. The survey found that in most establishments employers are willing to work out some form of phased retirement. While that is a useful result, it leaves open a question about what fraction of the population of older white-collar workers are in establishments where phased retirement is feasible. It is conceivable that while most establishments permit phased retirement, a minority of older white-collar workers are employed in those

establishments. To assess opportunities for phased retirement in the population, this paper combines information from the establishment survey with data from the Health and Retirement Study. The results indicate that, in fact, more than 80 percent of white-collar workers are employed in an establishment that permits some form of phased retirement. Indeed, the results indicate that about 30 percent of older white-collar workers are employed in an establishment that would not only allow them to take phased retirement prior to official retirement, but would let them remain in their current job.

The results also indicate that opportunities depend on both establishment and worker characteristics. Although effects can depend on how phase retirement is defined, workers in public administration, workers under 60, workers with defined benefit pension plans, and union workers tend to have more limited opportunities for phased retirement.

This paper began with the observation that phased retirements are rare despite the fact that surveys of employees often indicate a strong interest in phased retirement among older workers. The paper conjectured that this scarcity of phased retirements is due to employer behavior, i.e., employers constrain opportunities for workers to take phased retirement. The results of this paper indicate that that explanation is insufficient. It fails to capture the nuance of what is going on. In fact, employers are quite open to phased retirement.

There would seem to be two plausible explanations for why phased retirement is so rare. First, it is conceivable that although employers are open to phased retirement, workers are not aware of it. That seems unlikely. People usually seek to clarify what is possible in their workplace, and there tends to be a collective memory for past precedent. One way to examine this is to compare our results with results from an HRS question that

asked respondents whether they could reduce the number of hours in their regular work schedule. We would expect that the fraction answering “yes” to this question would be somewhat higher than the fraction in model 3 in Table 4. Recall that model 3 is the predicted fraction of the HRS older white-collar workers who would (a) be likely to obtain phased retirement, (b) not have to officially retire, and (c) remain in the same job. In fact, within our sample of older white-collar workers 25% answered “yes” to the HRS question, while model 3 in Table 4 predicts that 29% could take phased retirement. That difference could indicate that workers are not aware of their opportunities, but it could also be a consequence of statistical error.

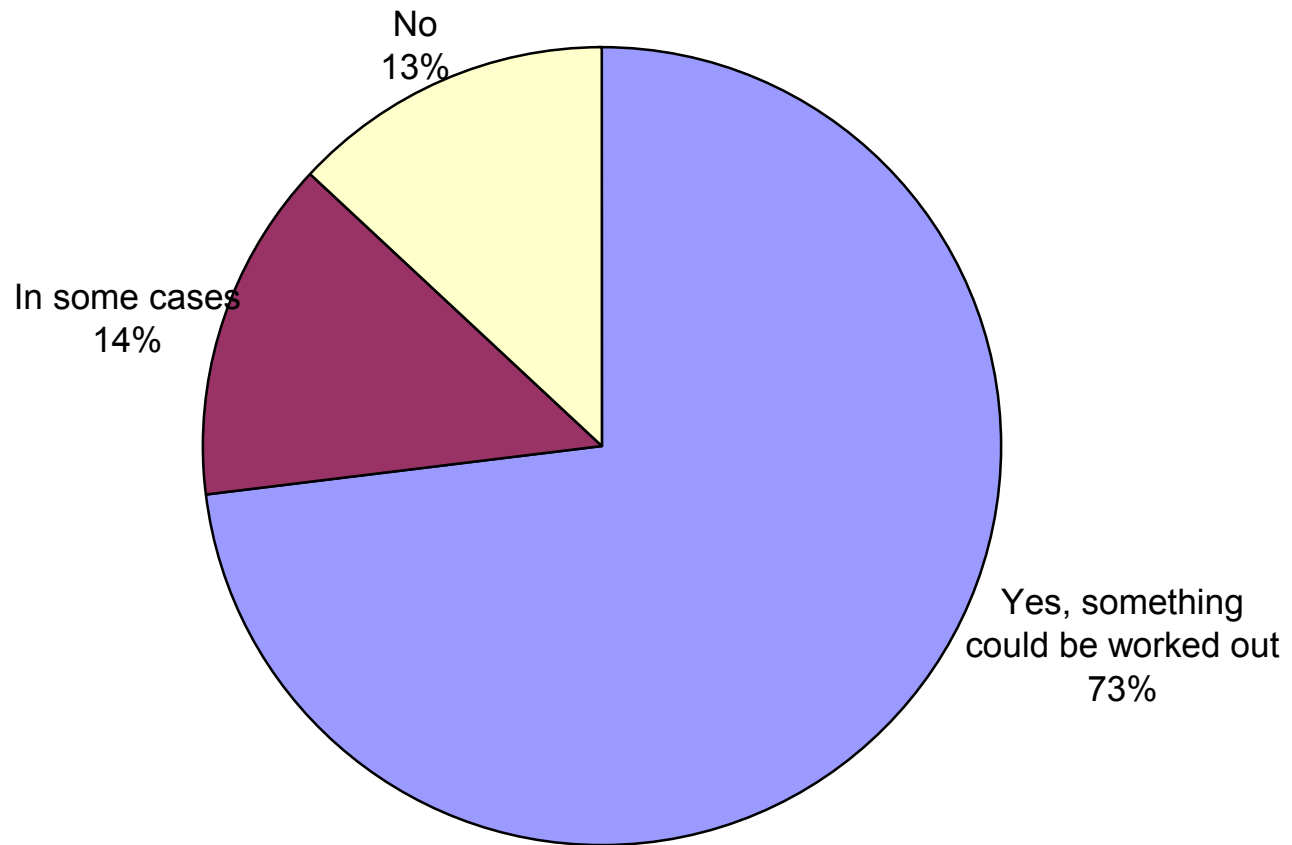
We favor a second explanation for the scarcity of phased retirements: the terms of the employer’s offer are frequently not attractive to older workers. Employers are primarily interested in informal arrangements where they maintain control over the how, when, and who of phased retirement. Moreover, the employer’s phased retirement offer can often imply a change in health insurance as well as a different set of tasks. It could be that many older workers look at the terms of such an offer and decide that they would rather not take phased retirement. They would rather either remain full-time workers or become full-time retirees. And phased retirement remains rare as a result.



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Figure 1: Percentage of Establishments That Would Allow an Older White-collar Employee to Reduce Hours



**Table 1: Percentage of Establishments Allowing Various Forms of Phased Retirement**

| <b>Case</b>   | <b>Percentage</b> |
|---|-------------------|
| Employer says “yes,” some form of phased retirement could be worked out                                   | 73%               |
| Employer permits phased retirement before official retirement   | 68%               |
| Employer permits phased retirement before official retirement and does not require job sharing            | 59%               |
| <b>The phased retirement arrangement would include:</b>   |                   |
| Health insurance equivalent to that provided to full-time workers   | 16%               |
| Equivalent Health insurance with salary supplemented by pension payments                                  | 7%                |
| Equivalent Health insurance, pension payments, and – if desired – the person can return to full-time work | 6%                |

Figure 2: Percentage of Establishments Allowing Various Forms of Phased Retirement

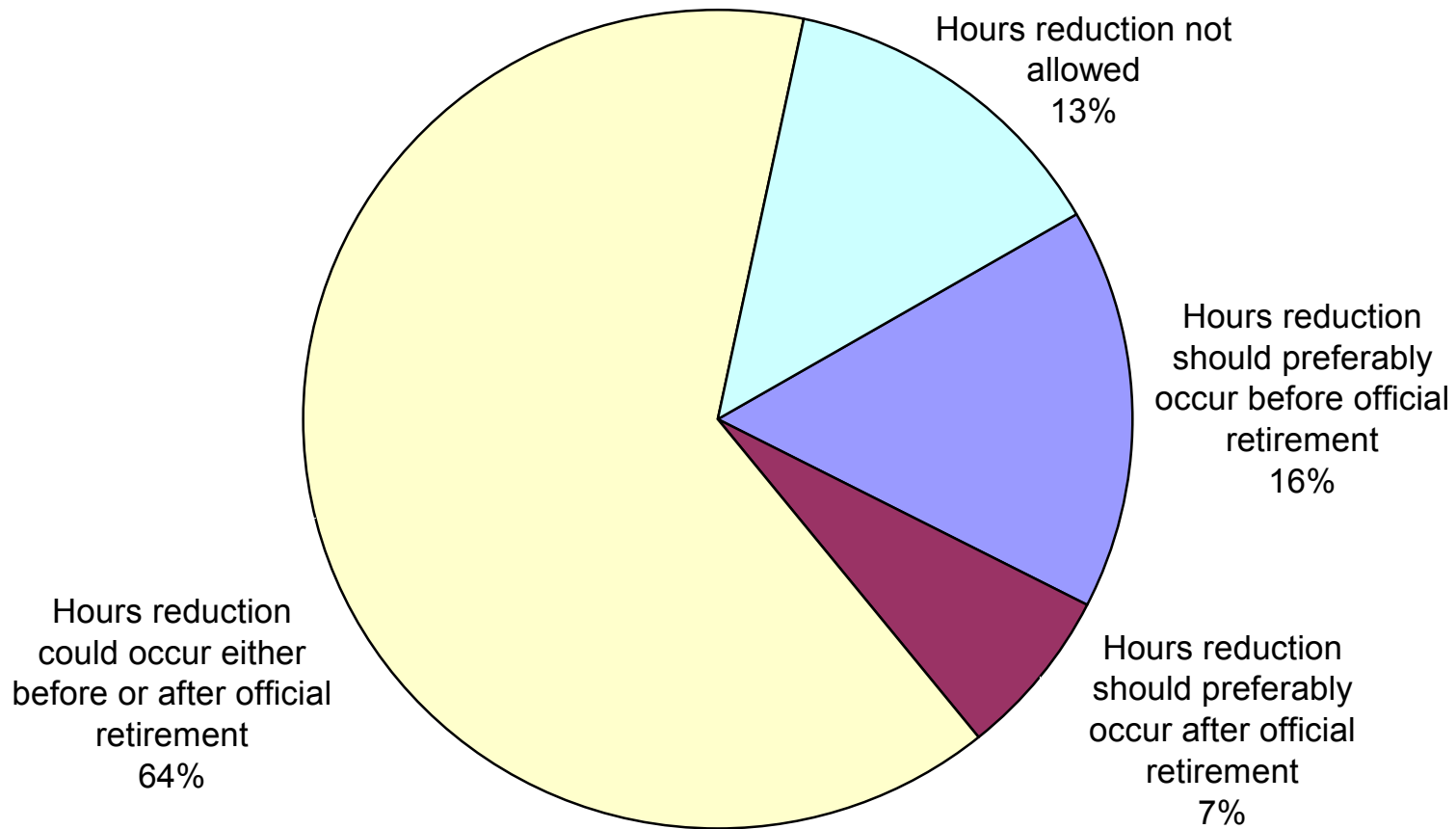


Figure 3: Formal vs. Informal Policies  
When Phased Retirement is Possible

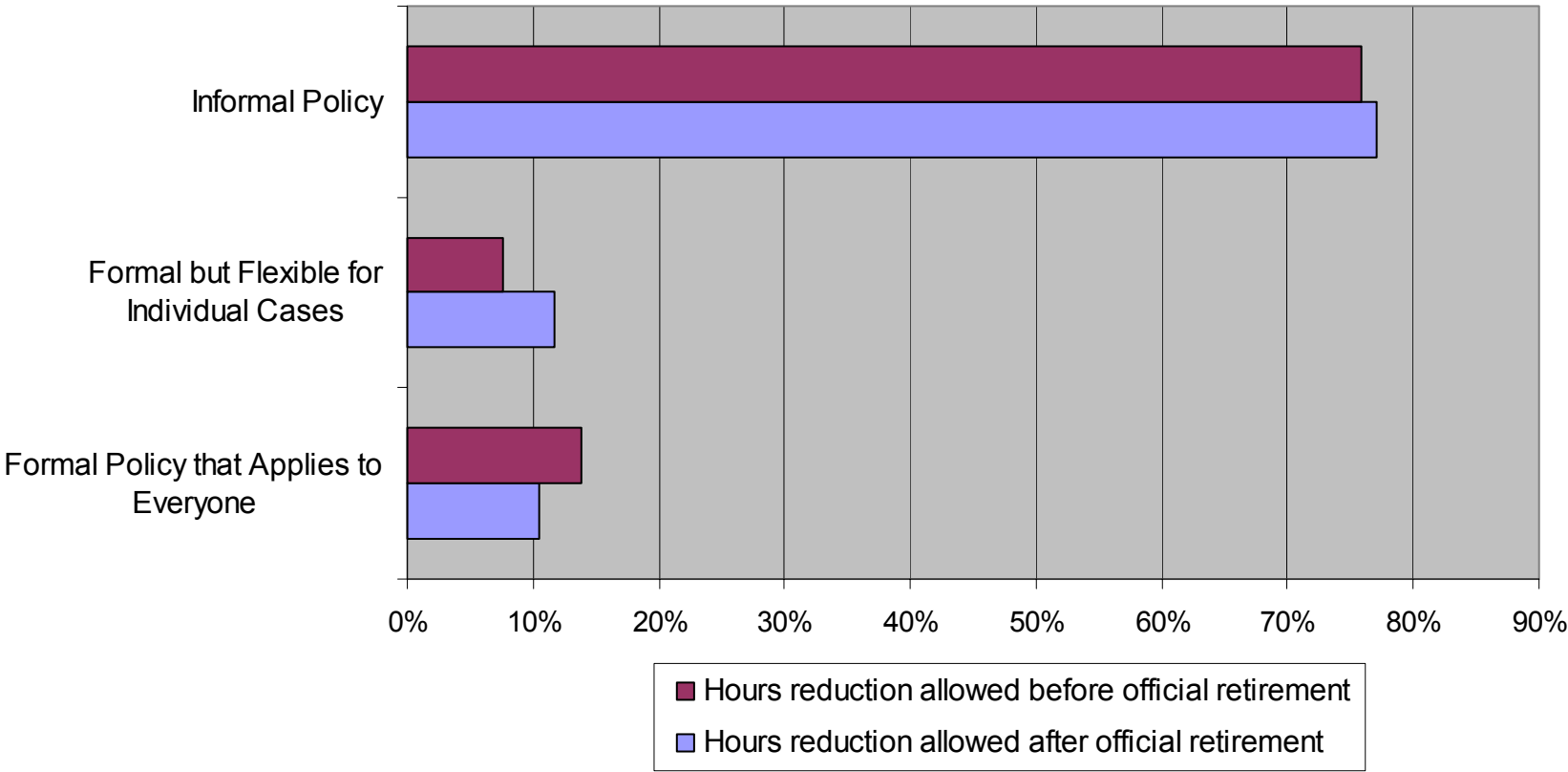


Table 2: Regression Coefficients from Establishment Survey

| Variables                                       | Model 1     |                    | Model 2     |                    | Model 3     |                    | Model 4     |                    |
|---|-------------|--------------------|-------------|--------------------|-------------|--------------------|-------------|--------------------|
|   | Coefficient | Standard Deviation | Coefficient | Standard Deviation | Coefficient | Standard Deviation | Coefficient | Standard Deviation |
| <b>Industry</b>                                 |             |                    |             |                    |             |                    |             |                    |
| Construction*                                   | 0.0000      | 0.0000             | 0.0000      | 0.0000             | 0.0000      | 0.0000             | 0.0000      | 0.0000             |
| Manufacturing                                   | -0.2691     | 0.1392             | -0.0826     | 0.1026             | -0.1807     | 0.1236             | -0.0602     | 0.0807             |
| Transportation,<br>Communications and Utilities | -0.3871     | 0.1545             | -0.1912     | 0.1138             | -0.2405     | 0.1372             | -0.0742     | 0.0896             |
| Wholesale and Retail Trade                      | -0.2286     | 0.1429             | -0.0952     | 0.1053             | -0.1405     | 0.1270             | -0.0694     | 0.0829             |
| Finance   | -0.2274     | 0.1527             | -0.1162     | 0.1125             | -0.2319     | 0.1356             | -0.0321     | 0.0886             |
| Other Services                                  | -0.2245     | 0.1409             | -0.0305     | 0.1038             | -0.0842     | 0.1252             | 0.0159      | 0.0817             |
| Health, Education, and Social<br>Services       | -0.1610     | 0.1374             | 0.0204      | 0.1012             | -0.1522     | 0.1220             | -0.0299     | 0.0797             |
| Public Administration                           | -0.3822     | 0.1461             | -0.2255     | 0.1077             | -0.2211     | 0.1298             | -0.0553     | 0.0848             |
| <b>Establishment Size</b>                       |             |                    |             |                    |             |                    |             |                    |
| Less than 49 employees*                         | 0.0000      | 0.0000             | 0.0000      | 0.0000             | 0.0000      | 0.0000             | 0.0000      | 0.0000             |
| 50 - 99 employees                               | -0.0315     | 0.0554             | 0.0074      | 0.0408             | -0.0122     | 0.0492             | 0.0540      | 0.0321             |
| 100 - 249 employees                             | -0.0296     | 0.0490             | -0.0687     | 0.0361             | -0.0363     | 0.0436             | 0.0155      | 0.0284             |
| 250 - 999 employees                             | -0.0016     | 0.0551             | 0.0044      | 0.0406             | -0.0246     | 0.0489             | 0.0369      | 0.0320             |
| more than 1000 employees                        | 0.0742      | 0.0860             | 0.0768      | 0.0634             | -0.0684     | 0.0764             | 0.0452      | 0.0499             |
| <b>Years of Education</b>                       |             |                    |             |                    |             |                    |             |                    |
| Years of Education                              | -0.0085     | 0.0110             | 0.0018      | 0.0081             | 0.0064      | 0.0098             | 0.0007      | 0.0064             |
| <b>Occupation</b>                               |             |                    |             |                    |             |                    |             |                    |
| Sales*  | 0.0000      | 0.0000             | 0.0000      | 0.0000             | 0.0000      | 0.0000             | 0.0000      | 0.0000             |
| Professional                                    | 0.0665      | 0.0915             | 0.0569      | 0.0674             | 0.0144      | 0.0813             | -0.0299     | 0.0531             |
| Manager   | -0.0147     | 0.0894             | 0.0746      | 0.0659             | -0.1391     | 0.0794             | -0.0637     | 0.0519             |
| Clerical  | 0.0743      | 0.0986             | 0.1013      | 0.0727             | 0.0725      | 0.0876             | 0.0144      | 0.0572             |
| <b>Age</b>                                      |             |                    |             |                    |             |                    |             |                    |
| Age   | 0.0131      | 0.0047             | 0.0036      | 0.0035             | 0.0157      | 0.0042             | 0.0071      | 0.0027             |

Table 2: Continued.....

| Variables                    | Model 1     |                    | Model 2     |                    | Model 3     |                    | Model 4     |                    |
|------------------------------|-------------|--------------------|-------------|--------------------|-------------|--------------------|-------------|--------------------|
|                              | Coefficient | Standard Deviation | Coefficient | Standard Deviation | Coefficient | Standard Deviation | Coefficient | Standard Deviation |
| Female*                      | 0.0000      | 0.0000             | 0.0000      | 0.0000             | 0.0000      | 0.0000             | 0.0000      | 0.0000             |
| Male                         | 0.0094      | 0.0377             | -0.0118     | 0.0278             | 0.0121      | 0.0335             | -0.0022     | 0.0219             |
| <b>Region</b>                |             |                    |             |                    |             |                    |             |                    |
| Northeast                    | 0.0000      | 0.0000             | 0.0000      | 0.0000             | 0.0000      | 0.0000             | 0.0000      | 0.0000             |
| Midwest                      | -0.0036     | 0.0539             | 0.0840      | 0.0397             | -0.0451     | 0.0479             | -0.0601     | 0.0312             |
| South                        | 0.0033      | 0.0538             | -0.0384     | 0.0397             | -0.0326     | 0.0478             | -0.0142     | 0.0312             |
| West                         | 0.0587      | 0.0571             | 0.0753      | 0.0421             | 0.0756      | 0.0507             | 0.0109      | 0.0331             |
| <b>Pension Type</b>          |             |                    |             |                    |             |                    |             |                    |
| DC*                          | 0.0000      | 0.0000             | 0.0000      | 0.0000             | 0.0000      | 0.0000             | 0.0000      | 0.0000             |
| DB                           | -0.1273     | 0.0469             | -0.0561     | 0.0346             | -0.0271     | 0.0417             | 0.0325      | 0.0272             |
| Both                         | -0.1722     | 0.0567             | -0.0842     | 0.0418             | -0.1131     | 0.0504             | -0.0520     | 0.0329             |
| Uncertain About Pension Type | -0.1138     | 0.0904             | -0.1751     | 0.0666             | -0.0728     | 0.0803             | -0.0897     | 0.0524             |
| None                         | 0.0268      | 0.0652             | 0.0244      | 0.0480             | 0.0442      | 0.0579             | -0.0516     | 0.0378             |
| <b>Union Status</b>          |             |                    |             |                    |             |                    |             |                    |
| No*                          | 0.0000      | 0.0000             | 0.0000      | 0.0000             | 0.0000      | 0.0000             | 0.0000      | 0.0000             |
| Yes                          | -0.1443     | 0.0582             | -0.1527     | 0.0429             | -0.2197     | 0.0517             | -0.0969     | 0.0338             |
| <b>Years of Job Tenure</b>   |             |                    |             |                    |             |                    |             |                    |
| Years of Job Tenure          | 0.0026      | 0.0020             | 0.0007      | 0.0015             | 0.0028      | 0.0018             | 0.0003      | 0.0012             |
| <b>Constant</b>              | -0.0123     | 0.3186             | 0.6350      | 0.2348             | -0.4408     | 0.2830             | -0.2498     | 0.1848             |
| <b>R-square</b>              | 0.0824      | .                  | 0.1092      | .                  | 0.1074      | .                  | 0.0564      | .                  |

Note: \* are the excluded categories. Also, Model 1 is the predicted fraction of the HRS sample that is working in an establishment where the employer's response to Q1 is yes or in some cases, Model 2 is the predicted fraction of the HRS sample that is not only working in an establishment that permits phased retirement, but in the eyes of their employer would be a good candidate for phased retirement (4 or 5 on Q2), Model 3 is the prediction fraction of the HRS sample who would be likely to obtain phased retirement if asked, would not have to officially retire, and could remain in same job, and Model 4 is the predicted fraction of the HRS sample who would be likely to obtain phased retirement if asked, would not have to retire first, could remain in same job, and have same health insurance as when working full-time.

**Table 3: Composition of the Establishment Survey and HRS Sample**

| <b>Variables</b>                             | <b>HRS</b> | <b>Establishment Survey</b> |
|--|------------|-----------------------------|
| <b>Industry</b>                              |            |                             |
| Construction                                 | 2.7%       | 1.8%                        |
| Manufacturing                                | 18.4%      | 13.8%                       |
| Transportation, Communications and Utilities | 7.9%       | 4.6%                        |
| Wholesale and Retail Trade                   | 12.0%      | 12.6%                       |
| Finance                                      | 7.1%       | 6.1%                        |
| Other Services                               | 6.1%       | 16.4%                       |
| Health, Education, and Social Services       | 37.4%      | 36.3%                       |
| Public Administration                        | 8.6%       | 8.5%                        |
| <b>Establishment Size</b>                    |            |                             |
| Less than 49 employees                       | 24.8%      | 41.1%                       |
| 50 - 99 employees                            | 19.4%      | 24.5%                       |
| 100 - 249 employees                          | 19.7%      | 20.1%                       |
| 250 - 999 employees                          | 18.1%      | 10.2%                       |
| more than 1000 employees                     | 18.0%      | 4.2%                        |
| <b>Years of Education</b>                    |            |                             |
| less than 12 years                           | 4.3%       | 2.4%                        |
| 12 years                                     | 30.2%      | 24.1%                       |
| 13-15 years                                  | 23.7%      | 7.9%                        |
| 16 years                                     | 15.4%      | 32.2%                       |
| more than 16 years                           | 26.4%      | 25.1%                       |
| <b>Occupation</b>                            |            |                             |
| Manager                                      | 29.4%      | 36.3%                       |
| Professional                                 | 33.0%      | 40.5%                       |
| Sales  | 9.1%       | 5.8%                        |
| Clerical                                     | 28.5%      | 17.3%                       |
| <b>Age</b>                                   |            |                             |
| 55-60 Years                                  | 74.6%      | 79.8%                       |
| 61-65 Years                                  | 25.3%      | 14.9%                       |
| 65 or more Years                             | 0.1%       | 5.2%                        |
| <b>Gender</b>                                |            |                             |
| Female                                       | 49.4%      | 52.1%                       |
| Male   | 50.6%      | 47.9%                       |
| <b>Region</b>                                |            |                             |
| Northeast                                    | 21.3%      | 17.0%                       |
| Midwest                                      | 26.5%      | 29.3%                       |
| South  | 32.5%      | 32.0%                       |
| West   | 19.7%      | 21.7%                       |



Table 3: Continued.....

| <b>Variables</b>           | HRS   | Establishment Survey |
|----------------------------|-------|----------------------|
| <b>Pension Type</b>        |       |                      |
| None                       | 15.8% | 11.9%                |
| DB                         | 45.8% | 25.1%                |
| DC                         | 30.9% | 51.9%                |
| Both                       | 7.6%  | 11.1%                |
| <b>Union Status</b>        |       |                      |
| No                         | 77.8% | 86.1%                |
| Yes                        | 22.2% | 13.9%                |
| <b>Years of Job Tenure</b> |       |                      |
| less than 5 years          | 20.7% | 18.7%                |
| 5 - 10 years               | 18.1% | 20.5%                |
| 11 - 15 years              | 14.6% | 20.2%                |
| 16 - 25 years              | 20.9% | 24.6%                |
| more than 25 years         | 25.8% | 14.9%                |

**Table 4:  
Predicted Fraction of the Older White-Collar  
Population with an Opportunity for Phased  
Retirement**

| Characteristics                              | Model 1 | Model 2 | Model 3 | Model 4 |
|--|---------|---------|---------|---------|
| <b>Overall</b>                               | 83.1%   | 48.8%   | 27.6%   | 9.9%    |
| <b>Industry</b>                              |         |         |         |         |
| Construction                                 | 91.7%   | 76.3%   | 43.2%   | 12.2%   |
| Manufacturing                                | 85.0%   | 49.0%   | 27.9%   | 8.7%    |
| Transportation, Communications and Utilities | 68.8%   | 32.0%   | 18.6%   | 6.8%    |
| Wholesale and Retail Trade                   | 78.6%   | 51.6%   | 33.4%   | 7.6%    |
| Finance                                      | 80.4%   | 49.8%   | 22.7%   | 12.0%   |
| Other Services                               | 92.9%   | 54.4%   | 38.2%   | 15.5%   |
| Health, Education, and Social Services       | 89.3%   | 53.1%   | 28.1%   | 10.7%   |
| Public Administration                        | 63.7%   | 28.1%   | 16.4%   | 9.1%    |
| <b>Establishment Size</b>                    |         |         |         |         |
| Less than 49 employees                       | 84.2%   | 50.9%   | 30.7%   | 6.7%    |
| 50 - 99 employees                            | 82.9%   | 45.9%   | 28.9%   | 12.5%   |
| 100 - 249 employees                          | 75.2%   | 44.8%   | 25.5%   | 8.4%    |
| 250 - 999 employees                          | 82.3%   | 46.7%   | 27.2%   | 10.9%   |
| more than 1000 employees                     | 91.0%   | 55.3%   | 24.3%   | 12.4%   |
| <b>Years of Education</b>                    |         |         |         |         |
| less than 12 years                           | 81.5%   | 46.0%   | 26.7%   | 10.3%   |
| 12 years                                     | 81.5%   | 56.4%   | 28.9%   | 7.8%    |
| 13-15 years                                  | 82.6%   | 50.6%   | 28.3%   | 10.3%   |
| 16 years                                     | 83.5%   | 49.3%   | 28.6%   | 9.9%    |
| more than 16 years                           | 84.4%   | 46.6%   | 26.0%   | 9.8%    |
| <b>Occupation</b>                            |         |         |         |         |
| Manager                                      | 83.7%   | 44.8%   | 18.9%   | 7.4%    |
| Professional                                 | 83.4%   | 50.2%   | 28.9%   | 9.7%    |
| Sales  | 75.0%   | 48.5%   | 33.0%   | 9.4%    |
| Clerical                                     | 84.6%   | 51.4%   | 33.4%   | 13.0%   |
| <b>Age</b>                                   |         |         |         |         |
| 55-60 Years                                  | 82.7%   | 47.1%   | 25.5%   | 9.0%    |
| 61-65 Years                                  | 83.7%   | 53.2%   | 33.1%   | 12.7%   |
| 65 or more Years                             | 86.3%   | 57.7%   | 36.9%   | 12.9%   |
| <b>Gender</b>                                |         |         |         |         |
| Female                                       | 85.0%   | 50.2%   | 29.0%   | 11.1%   |
| Male   | 81.0%   | 47.3%   | 26.2%   | 8.8%    |
| <b>Region</b>                                |         |         |         |         |
| Northeast                                    | 77.9%   | 45.1%   | 25.1%   | 10.5%   |
| Midwest                                      | 89.7%   | 48.7%   | 25.1%   | 6.1%    |
| South  | 77.8%   | 49.2%   | 27.5%   | 11.4%   |

Table 4: Continued.....

| <b>Characteristics</b>     | <b>Model 1</b> | <b>Model 2</b> | <b>Model 3</b> | <b>Model 4</b> |
|----------------------------|----------------|----------------|----------------|----------------|
| West                       | 88.4%          | 52.1%          | 33.6%          | 12.0%          |
| <b>Pension Type</b>        |                |                |                |                |
| None                       | 89.4%          | 58.7%          | 43.6%          | 7.4%           |
| DB                         | 78.7%          | 41.3%          | 23.9%          | 11.8%          |
| DC                         | 87.8%          | 57.3%          | 31.0%          | 10.7%          |
| Both                       | 77.7%          | 39.3%          | 18.0%          | 4.8%           |
| <b>Union Status</b>        |                |                |                |                |
| No                         | 86.5%          | 52.5%          | 31.6%          | 11.4%          |
| Yes                        | 70.9%          | 35.7%          | 13.3%          | 4.7%           |
| <b>Years of Job Tenure</b> |                |                |                |                |
| less than 5 years          | 85.5%          | 51.2%          | 30.3%          | 8.9%           |
| 5 - 10 years               | 82.5%          | 48.1%          | 26.4%          | 9.6%           |
| 11 - 15 years              | 83.9%          | 47.7%          | 26.4%          | 11.0%          |
| 16 - 25 years              | 82.2%          | 47.3%          | 26.3%          | 10.5%          |
| more than 25 years         | 81.8%          | 49.2%          | 28.0%          | 10.0%          |

Note: Model 1 is the predicted fraction of the HRS sample that is working in an establishment where the employer's response to Q1 is yes or in some cases, Model 2 is the predicted fraction of the HRS sample that is not only working in an establishment that permits phased retirement, but in the eyes of their employer would be a good candidate for phased retirement (4 or 5 on Q2), Model 3 is the prediction fraction of the HRS sample who would be likely to obtain phased retirement if asked, would not have to officially retire, and could remain in same job, and Model 4 is the predicted fraction of the HRS sample who would be likely to obtain phased retirement if asked, would not have to retire first, could remain in same job, and have same health insurance as when working full-time.

## Endnotes

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<sup>1</sup> General Accounting Office (2001), p. 27.

<sup>2</sup> See Quinn, Burkhauser, and Meyers (1990) and Ruhm (1990).

<sup>3</sup> See Chen (2003).

<sup>4</sup> Blue collar and white collar workers often have different work arrangements and pensions. A thorough treatment of both blue and white collar workers would have required a longer survey and resulted in lower response rates.

<sup>5</sup> The 1999 Census Bureau County Business Patterns indicates that excluding government, railroads, and the self-employed, approximately 15 percent of all establishments have 20 or more employees, and 75 percent of all employees work in establishments with 20 or more employees.

<sup>6</sup> The response rate was 64% in the Educational Quality of the Workforce National Employers Survey, which was administered by the U.S. Bureau of the Census as a telephone survey in August and September 1994 to a nationally representative sample of private establishments with more than 20 employees (Lynch and Black, 1998). The response rate was 65.5 percent in Osterman's 1992 telephone survey of establishments with more than 50 employees (Osterman, January 1994). Holzer and Neumark (1999) report a response rate of 67% for establishments that were successfully screened in a telephone survey undertaken between June 1992 and May 1994.

<sup>7</sup> What is meant by "part-time?" Prior to this question, the interviewer clarified part-time with the US government's definition, i.e., less than 35 hours per week. To make sure that we understood the respondent, however, this question was followed by a question that asked whether the respondent was referring to a part-week schedule, a part-year schedule, either schedule or something else.

<sup>8</sup> There were 96 establishments where information was missing or the respondent said "don't know." Since there is no way to know the establishment's policy toward phased retirement, these cases were excluded from this and subsequent tables.

<sup>9</sup> One would expect this percentage to be higher for large establishments. Small establishments may employ only a handful of people over 55. If none were interested in phased retirement, then regardless of the opportunity, the right answer to our question would be "no." That is less likely in large establishments with their larger numbers of people over 55. It turns out that the percentage is in fact higher in large establishments. For establishments with 500 or more employees, the comparable percentage is 67%. The same thing applies to hours reductions after official retirement. In establishments that reported that phased retirement could be worked out by employees who officially retire and then return as rehires, 22% reported that in the past three years they had rehired a retiree as a part-time or contract worker. In establishments with more than 500 employees that number jumps to 71%.

<sup>10</sup> In some organizations official retirement involves the bureaucratic process of submitting a letter declaring retirement and filling out appropriate forms. In others it involves a break in service. While respondents may have given the phrase different meanings, they had no problem understanding how "official retirement" applied to their establishment

<sup>11</sup> This is consistent with other studies of phased retirement. For example, in a survey of over 200 of its clients, the William M. Mercer consulting firm found that only ten percent had a formal plan for reduced hours or schedules. However, another 45 percent of the respondents indicated that they prefer to handle such situations with individual arrangements.

<sup>12</sup> For example, see Graig and Paganelli (2000).

<sup>13</sup> Of course, if the respondent did not know of three older men (women) in the establishment, then we accepted the other gender.

<sup>14</sup> For reasons of exposition, this simplifies matters. In reality we asked two questions: one regarding shifting to a part-time work schedule before official retirement and the other regarding a part-time work schedule after official retirement.

<sup>15</sup> Consider a typical omitted variable bias case as follows:

$$y = X_1\beta_1 + X_2\beta_2 + \varepsilon,$$

where the observed variables are in  $X_1$  ( $N \times K_1$ ) and the unobserved variables are in  $X_2$  ( $N \times K_2$ ).  $N$  is the number of observations,  $K_1$  is the number of observed variables, and  $K_2$  is the number of unobserved

variables. Also, assume that the relationship between  $X_1$  and  $X_2$  is linear for simplicity (i.e. let  $X_2 = X_1\alpha + e$ , where  $\alpha$  is a matrix of coefficients ( $K_1 \times K_2$ ) and  $e$  is a vector of disturbances with the usual properties). The expected  $y$  given  $X_1$  is equal to

$$\begin{aligned} E(y|X_1) &= E(X_1\beta_1 + X_2\beta_2 + \varepsilon | X_1) \\ &= X_1\beta_1 + E(X_1\alpha + e | X_1)\beta_2 + E(\varepsilon|X_1) \\ &= X_1\beta_1 + X_1\alpha \beta_2, \end{aligned}$$

where it is assumed that  $E(\varepsilon|X_1) = 0$ . Now, suppose the Ordinary Least Squares method is used to estimate the above model (i.e. regress  $y$  on  $X_1$ ), and obtain the following estimator for  $\beta_1$ :

$$\begin{aligned} b_1 &= (X_1'X_1)^{-1}X_1'y \\ &= (X_1'X_1)^{-1}X_1'(X_1\beta_1 + X_2\beta_2 + \varepsilon) \\ &= \beta_1 + (X_1'X_1)^{-1}X_1'X_2\beta_2 + (X_1'X_1)^{-1}X_1'\varepsilon. \end{aligned}$$

Note that the last term in the sum is zero by construction, and consequently drops out of what follows. When  $b_1$  is used to predict  $y$ , the predictor of  $y$  is equal to

$$\begin{aligned} \hat{y} &= X_1b_1 \\ &= X_1[\beta_1 + (X_1'X_1)^{-1}X_1'X_2\beta_2] \\ &= X_1\beta_1 + X_1(X_1'X_1)^{-1}X_1'X_2\beta_2 \end{aligned}$$

Thus, the expectation of the  $\hat{y}$  given  $X_1$  is equal to:

$$\begin{aligned} E(\hat{y} | X_1) &= E(X_1\beta_1 + X_1(X_1'X_1)^{-1}X_1'X_2\beta_2 | X_1) \\ &= X_1\beta_1 + X_1(X_1'X_1)^{-1}X_1' E(X_2 | X_1)\beta_2 \\ &= X_1\beta_1 + X_1(X_1'X_1)^{-1}X_1' (X_1\alpha) \beta_2 \\ &= X_1\beta_1 + X_1\alpha \beta_2 \\ &= E(y|X_1) \end{aligned}$$

So,  $\hat{y}$  is an unbiased estimator for  $y$  given  $X_1$ . For our purposes, assuming that  $E(X_2|X_1)$  is the same in the two samples, parameters estimated in the establishment survey yield unbiased predictions in the HRS.

<sup>16</sup> See Penner, Perun, and Steuerle (2002) and Fields and Hutchens (2002).