



2010

### Pension Incentives and Premature Retirement

Fan Fei

University of Michigan - Ann Arbor, strong.frankfei@gmail.com

Follow this and additional works at: <https://digitalcommons.iwu.edu/uer>

---

#### **Recommended Citation**

Fei, Fan (2010) "Pension Incentives and Premature Retirement," *Undergraduate Economic Review*: Vol. 6 : Iss. 1 , Article 4.

Available at: <https://digitalcommons.iwu.edu/uer/vol6/iss1/4>

This Article is protected by copyright and/or related rights. It has been brought to you by Digital Commons @ IWU with permission from the rights-holder(s). You are free to use this material in any way that is permitted by the copyright and related rights legislation that applies to your use. For other uses you need to obtain permission from the rights-holder(s) directly, unless additional rights are indicated by a Creative Commons license in the record and/ or on the work itself. This material has been accepted for inclusion by faculty at Illinois Wesleyan University. For more information, please contact [digitalcommons@iwu.edu](mailto:digitalcommons@iwu.edu).

©Copyright is owned by the author of this document.

---

## Pension Incentives and Premature Retirement

### Abstract

This is a study of people's retirement timing under defined benefit pension plans (DB plans). The actuarial structure of DB pensions generally creates strong incentive for people to stay with their employers, at least to their early retirement ages, not to retire beforehand. Upon tracking respondents covered by DB plans in the Wave I (1992 cohort) of the Health and Retirement Study (HRS) until they left their 1992 employers, we found that a significant percentage of people (about 17%) left their jobs prior to their early retirement ages. Why did people leave prematurely? Several possible hypotheses were considered and examined. Through simple tabulation analyses, we found that workers in the early-leaving group tend to have significantly smaller pension benefits and significantly poorer knowledge about their pensions. The impact of self-reported health status and early retirement windows were not evident. Logistic regressions showed that conditional on age dummies, pension size, and having basic pension knowledge was strongly negatively correlated to premature departure. Both excellent and poor health statuses correlate positively with early departure. Accepting an early-out window also had a significantly positive correlation with early departure.

### Keywords

Pension Incentives, Retirement Timing, Pension Knowledge, Self-reported Health Status, Early Retirement Window

### Cover Page Footnote

Acknowledgments: This paper is one chapter of my bachelor's honors thesis in economics. This work started in the summer of 2008 during my internship at the Survey Research Center, University of Michigan. I gratefully thank Professor Charles Brown for his helpful advice on this paper and guidance and encouragement in these two years. I also would like to thank all the HRS staff for their help and support and the symposium participants for their helpful comments. I thank Professor Robert Barsky for his helpful comments. Lastly I would like to express deep gratitude to my family and to Professor James Hines Jr. for their care and mental support. All errors are my own.

## 1. Introduction

The world is experiencing an unprecedented population aging that will be profound and enduring. This is especially prominent and serious for developed countries like the United States. As of 2007, 17.2% of U.S. population was over 60 years old. 12.4% of the population was over 70 years old. These figures will increase to 23.8% and 17.7% by 2025, and 26.4% and 20.6% by 2050.<sup>1</sup> Older workers who are retired have to rely on cash flows generated by their cumulated wealth and other members in the society (in form of Social Security, Medicare etc) for the rest of their lives. By the time of retirement, the wealth of a typical American household normally includes real estate(s), financial assets, private pensions and Social Security. How important is pension among these? There have been estimates that “the wealth equivalents of pension and Social Security together amount to almost half of the wealth held by all households. The figure is even higher-over sixty percent-of total wealth for households who are in the 45<sup>th</sup> to 55<sup>th</sup> percentile of wealth holders.”<sup>2</sup> Therefore, pension studies, as an essential part of labor economics and welfare economics, have become more and more significant.

A pension plan is a legally binding contract having an explicit retirement objective. There are two broad categories of pensions: public and private. Most developed countries have public pension plans very similar to the Social Security program in the United States. Private pension plans include IRA (Individual Retirement Accounts), Keogh plans (HR10 plans) and employer-provided pension plans. The focus of this paper is one type of “employer-provided pension plan: “defined benefit (DB) plan”.<sup>3</sup> A “traditional” defined benefit plan provides an annuity for an employee upon that employee's retirement, the size of which is determined by a formula that usually incorporates the employee's pay (typically the average salary in last few years), years of employment and age at retirement. The monthly/annual retirement benefits under DB plans are assured, which means it is the

<sup>1</sup> The figures and predictions are from *World Population Ageing 2007* by United Nations Department of Economic and Social Affairs.

<sup>2</sup> See Gustman, Mitchell, Samwick and Steinmeier (1997).

<sup>3</sup> Apart from DB plans, defined contribution (DC) plan is another important category of employer-provided pension plans, which is now the mainstream. Under a DC plan, each participant has an individual account to which the employee and the employer contribute. The employee then chooses where to invest. (Usually the employee has multiple investment options.) DC pensions are mostly portable, i.e., the retirement account can be carried with the person as he/she moves to a new job. And he/she and the new employer can go on contributing to it on top of the existed contribution. At the time of retirement, what a person has in his/her account is his/her retirement benefits. The retirement benefits depend both on the amount he/she is contributed and on the investment decisions. The employees bear the investment risks in DC plans. 401(k), 403(b), TSP (Thrift Saving Plans) are typical DC plans. Besides, there are cash balance plans and hybrid plans provided by some employers.

employers' responsibility to make investment decisions with their pension fund, bear the investment risks, and give their retirees the guaranteed benefits regularly.

Pensions, just as safety nets in other forms, will alter people's behavior. In particular, labor economists have studied how pensions influence retirement decisions. Defined-benefit pensions have two particular features of interest: first, most defined benefit pensions tend to exhibit a J-shaped benefit accruals.<sup>4</sup> Here "accrual" is the increment of present value of one's pension benefit, from one more year of service in the pension-providing employer. J-shaped benefit accruals mean that the present value of pension benefits accumulate very slowly during one's early years in the company but accelerate significantly in one's mid-ages. Second, defined benefit plans normally specify a "normal retirement age (NR)" and an "early retirement age (ER)"; both of which depend on years of employment in that firm ("tenure years"), as well as biological age per se, which differs among individuals in the same plan under most circumstances<sup>5</sup>. The "normal retirement age" is the earliest age after which you can retire and get the assured retirement benefits right away. The "early retirement age", which is normally two to five years younger than the normal retirement age<sup>6</sup>, is the earliest age you can retire from the job and get a "reduced annual benefit". For plans having both NR and ER specifications, there is usually a huge accrual spike at early retirement age, which means one's pension wealth (in present value) will greatly increase if he/she stays one more year passed that age. There will be a modest increment in pension accrual from ER to NR and another smaller accrual spike at NR. After NR, the accrual can sometimes be negative.<sup>7</sup> In theory, these features of DB pensions create strong incentives on people's retirement timing: on one hand, it "punishes" the departures prior to ER (in that case one will miss the accrual spike), deterring some retirement intentions; on the other hand, it doesn't provide any financial incentive for people to stay past NR, discouraging the labor supply of older people. Combining these two effects, one should naturally expect a "retirement peak" around ER in response to these

---

<sup>4</sup> The reasons why firms want to adopt this "J-shaped" pension design might be multi-fold: first, the J-shaped accrual pattern has actuarial advantages: the interest discounting becomes less of a matter as people get closer to retirement age. Also, by heightening the potential loss of being fired or leaving at young ages, this design can stabilize labor force and can keep employees from shirking in their jobs for most of their careers etc. See Gustman and Steinmeier (1988) for more discussion on these. What we are interested in is that this kind of structure creates incentive against premature departure, as will be mentioned later.

<sup>5</sup> There are plans in which ER and/or NR doesn't depend on when the worker started.

<sup>6</sup> ER can be 7 to 10 years before NR.

<sup>7</sup> See Table 22 in Gustman, Mitchell, Samwick and Steinmeier (1997) and Fig 2 in Samwick (1998) for reference.

structures.<sup>8</sup>

The data used in this study is Health and Retirement Study (HRS), a longitudinal dataset that has linked pension plans and the people who are covered by them. HRS combines self-reported data (HRS biennial core surveys), employer-reported data and Social Security Administration (SSA) data on pensions and collects extensive information including people's health (physical and mental), job and income history, financial status (well-being and knowledge) and also employment and retirement planning. These features make HRS a really powerful source for this study.

The study is limited to DB pension holders. Researchers can calculate DB pension benefits relatively accurately with the help of employer-provided plan descriptions. Also, because of above-mentioned structures of DB plans, we can define a benchmark for premature departure, which is the ER<sup>9</sup>, without much dispute. On the contrary, in DC plans, the employee's contribution to the account is often voluntary and therefore may vary from year to year. Also, a typical DC plan is portable; the contribution into the account can be carried over if the person changes jobs. So, to get the cumulated benefits in the account of a person nearing his/her retirement one has to track the person's entire employment history, (which is difficult to do) and the data from past jobs is of poor quality based on field experience. Moreover, it is hard to define a clear benchmark for "premature departure" from an employer for DC plan holders. It is for these reasons we leave DC plans out of the picture for this study.

We chose workers from the first HRS cohort who were covered by DB plans on their current job when first interviewed in 1992 and tracked them until they left their 1992 employers.<sup>10</sup> The reasons we used 1992 HRS cohort are two-fold. First, there was a database created by Bob Peticolas and Tom Steinmeier in which they calculated ER, NR and present value of pension benefits at multiple ages for 1992 HRS population with DB pensions. Such work is very hard to imitate given the time and resource available to the author.<sup>11</sup> To take advantage of that database, I used 1992 HRS cohort. Secondly, there was a significant time-span (14 years, from 1992 to 2006) to

---

<sup>8</sup> For DB plans without ER, NR will play the role of ER.

<sup>9</sup> For DB plans that don't specify an ER, I treat NR as ER. So for the following analyses, the ER can either mean ER for plans that specify both ER and NR, or NR for those plans without an ER.

<sup>10</sup> For the subjects haven't retired from their 1992 employers, we track them until 2006 survey, the latest one available.

<sup>11</sup> One has to get access to the restricted data—SSA Administrative data and employer-provided Summary Pension Descriptions (SPD)—to do this and it involves sophisticated estimations and imputations.

observe enough “events” within the population, which makes my analysis more accurate.<sup>12</sup>

In this study, I intended to find out how well people responded to the pension incentives and try to find possible factors that might explain departures prior to ER. One factor that came to mind was the size of the pension. It is straightforward that the size of the pension can be viewed as a proxy of its influence on people’s behavior. One should naturally hypothesize that people with larger pension plans care more about them and may be more hesitant to miss the “bonus” at ER. As this effect is expected to be stronger among workers who understand the incentive, I considered the correlation between pension size and financial knowledge.

Given the importance of pensions for people’s wellbeing after retirement, one might think that workers should be well-informed about the rules governing their employer-and government-provided pensions. But often they are not. Gustman and Steimeier (2000) investigated what workers knew about their pensions and Social Security. They compared the self-reported social security, DC and DB pension values to the government/employer reported figures. They also reported the discrepancies between self-reported and employer-reported NR and ER. They found an overall “pessimistic” pattern (people tend to underestimate their benefits) in self-reported variables. Then they reported positive effects of pension knowledge on accuracy of people’s retirement expectations (better-informed people are more likely to retire closer to the ages they said they were planning to do so.). Lusardi and Mitchell (2006) defined people’s “financial literacy” from three basic questions in 2004 HRS survey. They found people had poor financial literacy and that financial literacy was strongly correlated in positive ways with self-reported “carefulness” of retirement planning and wealth accumulation.

In line with these studies, I hypothesized pension knowledge should be negatively correlated with the behavior of premature departure: people who have better knowledge about their pensions would be more aware and respond to the incentive mechanism implied in the pension structure more sensitively. I have to emphasize here that the pension information in the PV database (pension type, NR, ER and pension value at specific ages) were employers’ records or estimations based on SSA data, people’s own reports of earning history and employers’ Summary Plan Descriptions (SPD), therefore to be reasonably objective and accurate. I treated them as “real”. People’s answers

---

<sup>12</sup> “Event”, or “failure”, is a term in survival analysis meaning “final outcome of observations”. Here “events” mean “retirement” and whether or not it happens “before ER”. Too few “events” always raise doubt about the representativeness and convincingness of the results.

to: “What type of pension do you have?”, “What is the earliest age at which you would be eligible to receive reduced/full retirement benefits?” and “What amount do you expect to have for retirement benefit?” etc. are what they “perceived” their pensions would be. I considered those to be people’s pension knowledge. The idea was to match people’s “self-reported” (i.e. “self-perceived”) pension information with the actuality and compare across the two groups (early-leaving vs. non-early-leaving) to see whether the hypothesis held. I considered two easy pension knowledge indicators in this study: whether or not one can correctly specify his/her pension type; and, what is the difference between one’s self-reported ER and/or NR and those shown in PV database.

Health is a determinant in people’s retirement decisions as it is in many other aspects of seniors’ lives. HRS collected rich information on respondents’ physical and mental health statuses, using both subjective and objective measures. Dwyer and Mitchell (1998) showed that the self-rated (subjective) health measures were not endogenous, so I chose two simple general health ratings: “How do you feel about your health?” and “How is it compared to two years ago (last survey)?” and see their influence on retirement behavior.

The fourth factor that might contribute to leaving one’s employer before ER is the “Early Retirement Window.” Early retirement windows are special incentives to stimulate retirement at a particular time. Typically, if a firm wants to downsize, it will make “Early Retirement Window” offers to targeted employees. Window offer receivers are allowed one to three months to make a decision whether to accept the offer and leave. Incentives take the forms of cash bonuses, improvement in or accelerated eligibility for pension benefits, and health insurance continuation.<sup>13</sup> It is possible that these events, occurred more often since the 1990s, and may have influenced some who would otherwise retire at or past ER to retire prior to ER because they were allured by the generosity of the window offer or they feel pessimistic about the prospect of the firm and would rather jump off the boat earlier. We hypothesized that receiving, and more importantly, accepting early retirement window offers would correlate positively to early departures.

The remainder of the paper is organized as follows. Section 2 describes the data source, sample restrictions and definitions of key variables. In Section 3 I investigate the correlation between workers’ pension size, pension knowledge, self-reported health status and early retirement window offers and their retirement behavior. Section 4 presents and discusses the results from

---

<sup>13</sup> See Charles Brown (2002) for more information on “early retirement window offers” in wave 1 to 4 of HRS.

several logistic regression models. Section 5 concludes.

## **2. Data**

### **2.1 The Health and Retirement Study (HRS)**

The data for this study came from the Health and Retirement Study (HRS) database. Initiated at the University of Michigan and mainly sponsored by the National Institute on Aging, HRS is a nationwide survey project started in 1992. In that year, a nationally representative sample of those who were born between 1931 and 1941 was interviewed. Over the next six years, younger and older birth cohorts were added and followed longitudinally.<sup>14</sup> Thus, since 1998, HRS staff interview about 22,000 Americans age 50 and older every two years. The design is to track the respondents until their deaths<sup>15</sup>, collecting longitudinal data on physical and mental health, disability, employment status and job history, housing, financial status (wealth and income), family support systems and retirement planning among other topics. In 1998 and 2004, new cohorts targeting population with more recent birth years were added.

An important innovation in HRS is that on top of the survey data, it collects information about the respondents or the households from other sources. Putting these different sources together enabled us to know more about human behavior. For instance, we could get the respondents' payroll tax records from the Social Security Administration and compute the benefits for which they would be eligible when they retired. One can then compare these calculated values with respondents' own estimates of their Social Security benefits. Similarly, one can utilize employer-provided pension descriptions to estimate respondents' pension benefits and compare them with self-reported data. To protect respondents' confidentiality, such data are available only upon requests and approvals. Fortunately, information derived from the confidential pension descriptions was made available without restriction, and this Pension Present Value Database is used in this study.

### **2.2 Variables and Sample**

I use the "employment" section and the "health" section of the HRS core datasets, HRS Cross-wave Tracker File (2006) and the 1992 HRS Pension Present Value database established by Bob Peticolas and Tom Steinmeier for this study.

#### **2.2.1 Sample Restrictions**

---

<sup>14</sup> Older cohorts include those who were born between before 1931. Younger cohorts are added every five years. The idea is to form a representative sample of Americans aging 50 and older.

<sup>15</sup> In reality, of course there are missing cases (loss of contact), and refusals in later waves.

I studied only those who were part of the original 1992 HRS cohort, for the two reasons mentioned in the Introduction. I imposed the following restrictions to all 1992 HRS population to get the sample for my analysis.

- 1) The person had to be “currently employed” when first interviewed in 1992<sup>16</sup>;
- 2) The person’s pension information—pension type, NR and/or ER—for the “current” job (in 1992) was available in the Pension Present Value database;
- 3) His/her birth year and month in the Tracker File was non-missing.

Since the event we tracked is departure from 1992 employers, we wanted to wipe out those who had been retired in 1992. The first restriction did that. The second restriction had two data-cleaning functions: first, we only included those who were shown to be under a DB plan in PV database in our sample. Also, we required the NR and/or ER information in PV database to be available. Assuming the NR/ER calculation in PV database to be “actuality”, we used that information and the birth year and birth month data in the Tracker File to determine whether one left “early” or not (see 2.2.2 for more). As the data availability for other variables discussed below varies, the sample size was not always the same for different parts of the analysis.

### **2.2.2 Retirement Timing**

Firstly we wanted to find people’s actual retirement ages, ER, NR and then decided whether one left from his/her 1992 employer prior to their ER or not. Respondents’ birth year and birth month were in HRS Cross-wave Tracker File (2006). Since we included only people who had a job in 1992 interview, in subsequent waves, there were always questions under the “employment” session “Whether you left the employer in the previous wave or not?”, “If so, when?” We could infer the month and year that the respondent left his or her 1992 employer by taking the first nontrivial figures on “when (you left your employer in the previous wave)” questions. Then we calculated the retirement age by taking the difference of retirement year and birth year, adjusting by one if the retirement month is “smaller” than birth month. For technical purposes mentioned later, we define “retirement age” to be one’s age at the 2006 interview (the latest interview to date) for those who hadn’t left their Wave 1 employer till by then. We defined “retired” dummy to be one if one had a non-missing retirement year, zero otherwise. Respondents’ NR and ER data are available in the Present Value database. By comparing actual retirement age and ER (or NR, if ER is not available), we generated “early leaving”

---

<sup>16</sup> Given that the SPDs were collected in 1993, only those who were interviewed in 1992 could have been included in the Present Value database.

dummy being one if one's "actual" retirement age is smaller than the ER (he/she left before ER), zero otherwise.

### 2.2.3 Pension Wealth

We used "Scenario 1"<sup>17</sup> calculations in the PV database to be the pension wealth of individuals at specific ages (in 1992, at ER, NR etc). CPIAUCNS (Consumer Price Index for All Urban Consumers: All Items) was used to transform the figures into 2008 dollars.

### 2.2.4 Pension Knowledge

As previously mentioned, as we had more objective and more accurate pension information in PV database, we considered the survey data in HRS cores to be one's "pension knowledge". For this study, we only looked at the two simplest questions asked under the "employment" section of the 1992 survey. One asked the respondent to identify his/her own pension type: whether "the (retirement) plan is based on a formula involving age, years of service and salary"—a DB plan—or "money is accumulated in an account for you"—a DC plan. The other question states "What is the earliest age at which you could leave this employer and start to receive pension benefits?" We treated answers to this question as people's self-perceived ER. We then compared these indicators of pension knowledge with the data in PV database. We did this for the early-leaving group and the non-early-leaving group separately.

### 2.2.5 Health Status

In every wave respondents were asked "Would you say your health is excellent, very good, good, fair or poor?" and "Compared to the last wave, would you say that your health is better, about the same or worse?"<sup>18</sup>. We tracked people's answers to those questions and adopted the answers given in the last wave before they left their 1992 jobs as "health status factor" that might influence their retirement decision. For instance, if a person reported he left his 1992 employer in July 1997, then we took down his answers to the two

<sup>17</sup> "Present values of pensions were calculated for nine scenarios, each of which is compounded using a particular combination of the interest rate, the wage growth rate, and the inflation rate. Most users will probably want to use values from the first scenario, which uses the intermediate values for all three rates."---from the codebook of the Present Value database constructed by Bob Peticolas and Tom Steinmeier.

<sup>18</sup> The self-rating health is of five-point scale, with "1" being the best/most optimistic case ("excellent") and "5" being the worst/most pessimistic case ("poor"). The self-rating change of health is a three-point categorical variable except for Wave 2. (In wave 2 this question is of five-point scale. In latter waves, first respondents were asked "better/worse/about the same". If the answer is "better", then ask whether it is "much better"; If the answer is "worse", then ask whether it is "much worse"; if the answer is "about the same", then ask whether it is "much better" or "much worse". It result in three variables on the health change. We could generate a five-pointer out of each three. But for now, we only consider the first health change question.

questions in Wave 3 interview conducted in 1996 as the “health status factors” for that observation. For the people who hadn’t left by the 2006 interview, we use their health status reported in 2006 interview. The rationale here was that though health history matters, the “recent health” may affect the retirement decisions more directly. For people in mid-ages, it is likely that a sudden decline in health forces premature retirement. For people with chronic diseases, the last wave health rating can still catch the influence of that on retirement.

### **2.2.6 Early Retirement Window**

In every wave there were specific questions about “Whether the firm offered early out window since the last wave?” and “Whether you accept it”. We regard this as an “early retirement window factor”. We wanted to observe who took these packages and whether that was related to “early leaving” behavior.

## **3. Descriptive Results**

### **3.1 Retirement Pattern and Pension Value**

Individuals in the sample of this study have birth years ranging from 1930 to 1942. They were entering the age of retirement when Wave I interview took place in 1992. As previously specified, we selected only the respondents that were still in the labor force when they were interviewed for the first time to be in the sample. The pattern of their departure from their 1992 employers since then is shown in Figure 1. In Figure 1-1 I show the distribution of departure year. Soon after 1992, the departure peak came in 1995. There were mass departures between 1995 and 1999. Then the number of departures steadily decreased. Out of a total of 1592 respondents, there were 490 cases in which the respondents “hadn’t left their 1992 employer by the last interview in 2006” or HRS lost contact with this person permanently or temporarily and couldn’t identify their departure time.

In terms of age when leaving 1992 employers, we observed that “retirements” began to sharply increase from age 55. Age 60 to 62 is the most “popular” retirement phase. The mass retirements continued until age 65 and then declined. (See Figure 1-3) This pattern can be properly interpreted using information in Figure 1-4 and the Social Security eligibility age requirement<sup>19</sup>: as one can see in Figure 1-4, one of the three peaks of ERs is age 55, the increased number of departures at age 55 are probably the response to that. The big retirement spike at age 60 responds to another ER peak. For most people in my sample, age 62 is the minimum age at which one would be eligible for reduced Social Security benefits (the “early retirement age” for

---

<sup>19</sup> See <http://www.ssa.gov/retire2/agereduction.htm> for details.

Social Security) , resulting in the largest number of “retirement”. The retirement tides continue to age 65, the “normal retirement age” for Social Security for most individuals in our sample. There are 503 observations with missing retirement age.

The distribution of DB pension wealth in the sample was highly uneven and left-skewed, as shown in Table 2. The median DB pension was about \$81,500 in 1992 (in 2008 dollars), a little more than \$100,000 by the time of ERs. The means were respectively approximately \$175,000 and \$195,000 at those times. A good number of people (more than 10%) were shown to have zero pension benefits in 1992, which meant they would have no pension benefit if they were to retire in 1992. This was probably due to a change of jobs. Their 1992 employers were probably new for them at that time and they hadn’t qualified the “tenure year” requirements set by firms. Size of pension at ERs ranged from less than \$1,000 to more than \$1.67 million.

### **3.2 Pension Wealth and Early Retirement Behavior**

The average pension benefits at ER and the increment from 1992 to ER of the two groups can be seen at Table 3. One can readily find the huge difference between the two groups: by ER the early-leaving group would get a mean of approximately 118,000 dollars; on the contrary, the control group would get approximately 203,000 dollars on average (nearly 80% above that of early-leaving group). On the other hand, the early leaving group outmatched the non-early leavers on the increment of pension size from 1992 to ER. The increment of pension from 1992 to ER is how much more one can get if he waits until ER to leave the employer instead of leaving the job right away in 1992, therefore it is a more proper measure of incentives. Then it seems a strange thing that people whose ER spike of pension accruals matter more to them don’t take it very seriously into their retirement decisions. But this is not un-understandable. The fact that they don’t respond to ER very sensitively might not an action out of financial innocence or ignorance. Actually based on this sample, one can show a positive correlation between one’s pension knowledge and one’s pension wealth. Their decisions of not taking advantage of the ER to retire might be because other things that one could get from work had more weights in their utility functions. An alternative hypothesis would be: people’s pension wealth and retirement timing might all relate to their sophistication and personality: a sophisticated, capable person with a workaholic and/or easygoing personality is more likely to hold a high position, earning handsome salary and owning more pension benefits. And the sense of achievement from work, his career ambition and his love of social and work, among other factors, may make him/her want to work for more years instead of retiring at ER in his/her fifties. A thorough test of this “capable person tend

to work past their ER” hypothesis is not easy and remains to be done.

### **3.3 Pension Knowledge and Early Retirement Behavior**

As I discussed above, I linked the pension type and ER, NR information in the Present Value database with the HRS core dataset. And I regard the self-reported pension type and ER in HRS core as “self-knowledge”. The pension type data in the PV database is from employer-provided SPDs and can be considered accurate and “real”. The ER data is estimation based on the SPDs, respondent’s earnings and service come from the respondent reports, therefore more objective and reliable than self-reported ER. So the “mismatches” of survey data to PV database data is a proxy of “poor knowledge on one’s own pension”. The results are shown in Table 4.

From Table 4-1, we observe that nearly 30% of early leavers gave incorrect answers to the pension type question, while 15% percent of non-early leavers made the same mistake. On the whole, early leavers had poorer knowledge in the most basic question about their pensions. It is no wonder that they are more prone to disregarding the structure of DB pensions they have in their retirement planning. From Table 4-2, less than 20% from each group reported an early retirement age that was exactly the same as estimated early retirement age from PV database, the percentage of “exact matches” are comparable across the groups. But the early leaver group tend to report self-believed ERs that were one to five years too young than the calculated ERs (23.6%, 10.8% for the control group in this category) whereas the non-early leavers’ misses were more on the other side. If they would act based on their self-believed ERs, this result can explain their retirement pattern to some extents. These two findings verified out hypothesis on the pension knowledge. We should notice, however, the ER data in PV database is not absolutely “real” and accurate because it is based on limited knowledge about respondents and their self-reported job and earning history. Mismatches in Table 4-2 might also be caused by a wrongly estimated ER in PV database.

### **3.4 Health and Early Retirement Behavior**

It is commonsense that health can affect the length of one’s career and retirement timing. Here we are interested whether poor health and/or sudden worsening in health forced some to leave before ER. As a starting point, we compared respondents’ self-rating health and health change variables (see Table 5). We can not see any significant results from both variables, either wave-by-wave or pooled comparison. One thing needed to mention is that we have about 300 observations in non-early-leaving group with missing values in health variables.

### **3.5 Early Retirement Window and Early Retirement Behavior**

In Table 6, we summarized the EOW offers and acceptances to two

groups wave by wave. Most EOW offers and acceptances (over 90%) happened in the non-early leaving group. The two groups showed no evident difference in being offered EOW and taking EOW. So from this perspective, we could not find evidence supporting the hypothesis that EOW had an influence on people's premature departure.

#### 4. Logistic Regressions

Logistic regression results are presented in Table 7. We investigate the influences of factors on retirement timing and premature departure behavior. First we expand the "subject" dataset to a "subject-year" dataset: one respondent will have one observation for each year he/she stayed in the dataset (starting in 1992, ending in the retirement year; if he/she hadn't retired in 2006 interview, he/she would have (2006-1992=) 15 observations). The dependent variable for specification I to III is the "retired dummy": being one for every observation of the same person if the person had left the 1992 employer by 2006 interview, being zero otherwise. The dependent variable for specification IV and V is "early-leaving dummy": being one for every observation of the same person if the person had left the 1992 employer prior to his/her ER, being zero otherwise. The age dummies equal to one if the person was at age in that year and zero otherwise. We include different age dummies for in different specifications: for specification I to III, we put in age52 to age68; for specification IV to VI, we exclude "age66", "ag67" and "age68" because technically they "predict failure perfectly". The "atER" dummy equals to one only if the person retired at his/her ER and only being one for that retirement year, being zero otherwise. The "pastER" dummy equals to one in every year after the ER. Besides "pension type knowledge", "EOW offer" and "EOW taker" dummies mentioned above, I divided the sample into four groups according to the size of their pensions and created three dummy variables for people in the second, third and the top quartile. Two health dummies are created based on answers to the "current health status" question: the "health\_good" variable is one for every observation of a same person if that person reported to have "excellent" or "very good" health in the wave just before leaving 1992 employer, zero otherwise. Similarly, the "health\_poor" variable is one if a person reported to have "fair" or "bad" health in the wave just before leaving 1992 employer, zero otherwise. Those whose answer were "good" (the choice in the middle) were the base group. All these factor variables are time-invariant. (i.e.: the value of factor variables are the same for difference observations of a same person.)

The column I to III showed results on "retirement" odds. In specification I, all age dummies have odds ratio greater than one, meaning a person is more

likely to retire than not at every age. “Age62” and “age65” dummies have significantly larger odds ratios: we expect to see more than eight times increase in the odds of retiring at age 62 and more than six times increase in the odds of retiring at age 65. Age 62 is the “early retirement age” of Social Security and age 65 is the normal retirement age of Social Security for HRS cohort. We can see their huge influence there. Specification II adds in “atER” and “pastER” dummies. We can see conditional on age dummies, being atER only modestly increase the odds of retirement.<sup>20</sup> In specification III, we can see that “EOW accept” can increase the odds of departure, which is straightforward. That both the positive rating and the negative rating of health status increase the odds of departure is interesting. Keep in mind that what “retirement” really means here is the departure from 1992 employers. One explanation of that finding may be: while poor health can force people out of the labor market, having very good health may encourage people move for new jobs in their fifties.

The column IV to VI showed results on “early retirement” odds. In specification IV, the only independent variables are age dummies. The “older ages” tend to have smaller odds ratios, which is straight-forward: as age increases, the probability of passing the ER increases and retirement before ER decreases. “Age54” and “age57” have odds ratios that wildly overmatch others. Specification V and VI add in factor variables. Conditional on age dummies, pension size correlates with early departures in the expected directions: being in the bottom quartile by pension wealth increases the odds of premature departure by nearly 40%, being in the top quartile decreases the odds of premature departure, but the coefficients are not statistically significant. Correctly identifying one’s own pension type associated with much lower odds of premature departure (odds ratio being .418), and the result is statistically significant. This verifies the strong negative correlation between one’s pension knowledge and premature departure behavior. Both “optimistic/positive” and “pessimistic/negative” self-evaluations of health statuses are correlated with increasing odds of premature retirements. The positive relation between pessimistic/negative health self-evaluation and the early leaving odds supports my hypothesis to some extents. We interpret the positive relation between optimistic health self-evaluation and the early leaving odds to be: those persons might leave not to retire, but to go to better jobs. Contrary to the finding in the previous section, where we could not see impact of early retirement window on early departure, in logistic regressions

---

<sup>20</sup> I am aware that this result may be inconsistent with the theory and some existed studies based on this dataset. I haven’t been able to interpret this result. However, I have made sure, to the best of my ability, that there was no easy mechanical mistake there.

one can clearly see that accepting EOW is strongly positively correlated with premature departure.

## 5. Conclusion

The main goal of this study was to find out how well people responded to the retirement incentives related to DB pension structures and try to identify possible factors that might explain departures prior to one's ER. Based on a sample of nearly 1,600 individuals in HRS 1992 cohort, we observed the distribution of people's retirement ages correspond well to ER and NR of Social Security and DB pensions, something consistent with the theory. The distribution of people's pension wealth is highly skewed: the median pension wealth is about 82,000 dollars (in 2008 dollars) but the average is more than 170,000 dollars.

The non-early-leaving group on average had significantly more lucrative pension benefits than the early-leaving group. But data on the increment of pension present value from 1992 to ER—a more proper measure of pension incentive for staying with the employers—and logistic regression models don't support the original hypothesis that people with larger pension plans are more likely to stay with the employers till ER for the accrual spikes. The fact that they don't respond to ER very sensitively doesn't necessarily indicate their lack of awareness of their pensions. Instead we propose a more probable alternative hypothesis: people's pension wealth and retirement timing might all relate to their capacity and personality. A person who is more capable and more passionate on his/her work is more likely to own a bigger pension package. Also, the sense of achievement from work and a busy business lifestyle might be more important in his/her utility function than the financial advantage of retiring around ER, pushing him/her to retire at a later age.

The results from comparative analysis on people's knowledge on their pension types and ERs and the logistic regressions showed that one's basic knowledge has a strong correlation with the early departure behavior: people with poor knowledge on their pensions are more prone to leave prior to ER and miss the accrual spike.

Statistics on overall health self-evaluations don't show a lot of difference across the two groups. But results in logistic regressions show that people with both excellent and poor self-perceived health have higher odds of premature departure. The latter fit the "poor health force people out" hypothesis. The story behind the former result might be: people with good health left 1992 employers not to retire, but to go to jobs they liked more. Data on early retirement windows show that the offer of early retirement windows don't seem to influence the retirement timing or whether or not people leave prior to

ER, but the acceptance of EOW increases the odds of leaving prior to ER significantly.

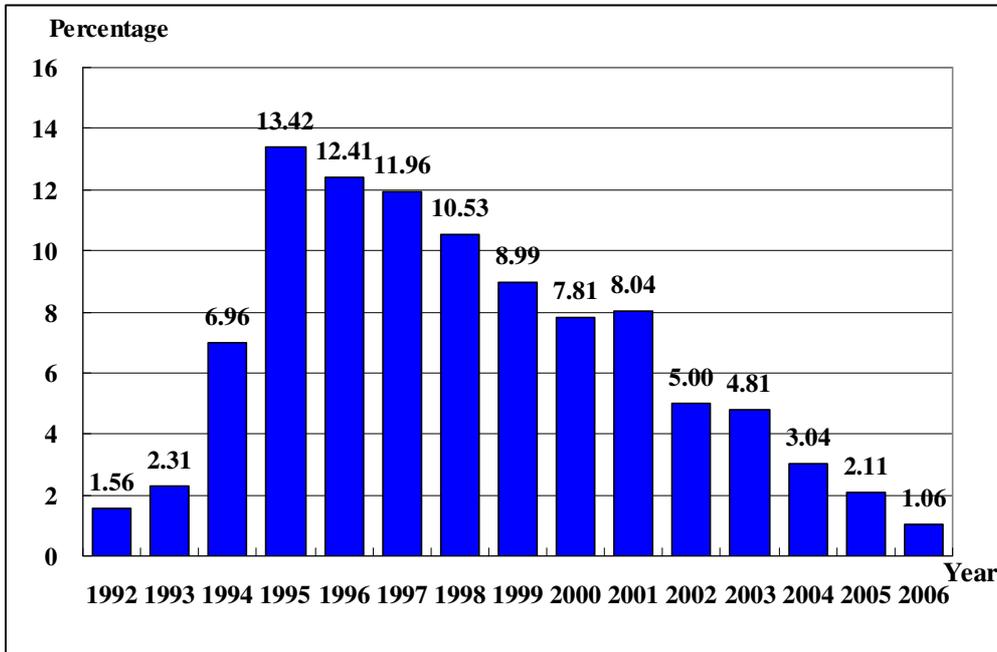
Overall, this study shed some lights on understanding retirement before ER for DB pension holders. Though the prevalence of DB pension is decreasing, the results of in this study still have implication in the design of public policy. For instance, “the-more-individual-choice-the-better” philosophy may not end up giving the less sophisticated people, often in the lower social economic status, the “seeming” benefits. Maybe more resource should be allocated to personal finance education etc. This study remains a very simple one: much work should be done to verify the actual causal chain in people’s retirement behavior.

### References:

- 1- Gustman, A.L., Mitchell, O.S., Samwick, A.A., and Steinmeir, T.L., “Pension and Social Security Wealth in the Health and Retirement Study”, February 1997, NBER Working Paper 5912;
- 2- Gustman, A.L., and Steinmeir, T.L., “What People Don’t Know about Their Pensions and Social Security?”, In: William Gale, John Shoven, and Mark Warshawsky (Eds.), *Private Pensions and Public Policies* (Brookings Institution Press, 2004);
- 3- -----, “Social Security, Pensions and Retirement Behavior Within the Family”, January 2002, NBER Working Paper W8772;
- 4- Lusardi, A., and Mitchell, O.S., “Financial Literacy and Planning: Implications for Retirement Wellbeing”, Michigan Retirement Research Center Research Paper No. WP 2005-108;
- 5- Samwick, A.A., “New Evidence on Pensions, Social Security, and the Timing of Retirement”, *Journal of Public Economics*, 70(1998): 207-236;
- 6- *World Population Ageing 2007*, United Nations Department of Economic and Social Affairs, Population Division, United Nations, New York, 2007;
- 7- *Private Pensions: OECD Classification and Glossary*, OECD Publishing, Paris, 2005;
- 8- HRS online. <http://hrsonline.isr.umich.edu/>  
(HRS dataflow <http://hrsonline.isr.umich.edu/intro/dataflow.html>,  
HRS question concordance, a glimpse of major areas in HRS survey: <http://hrsonline.isr.umich.edu/concord/index.html>;  
For issue concerning survey methodology and detailed survey contents, see [http://hrsonline.isr.umich.edu/intro/sho\\_intro.php?hfyle=uinfo](http://hrsonline.isr.umich.edu/intro/sho_intro.php?hfyle=uinfo))

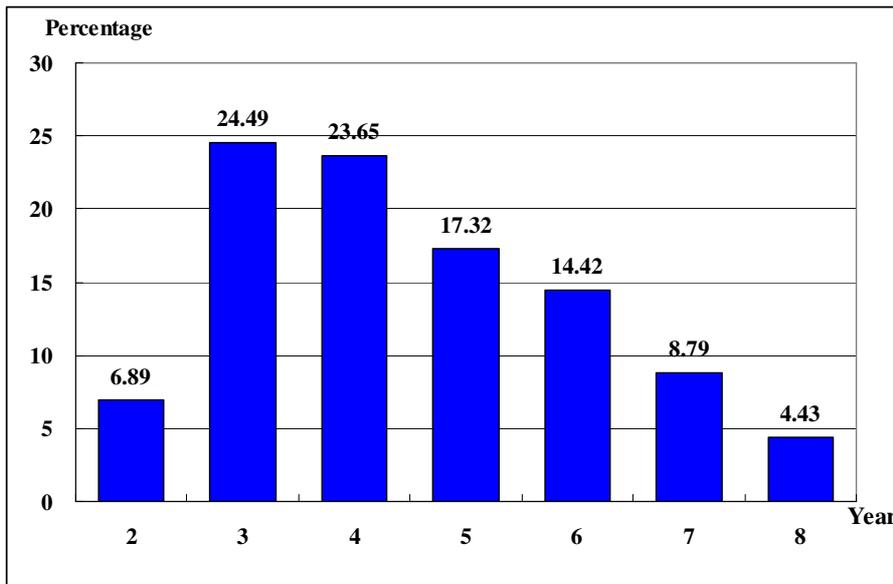
**Tables and Figures**

Figure 1: Retirement Pattern  
 Figure 1-1 Distribution of Retirement Year



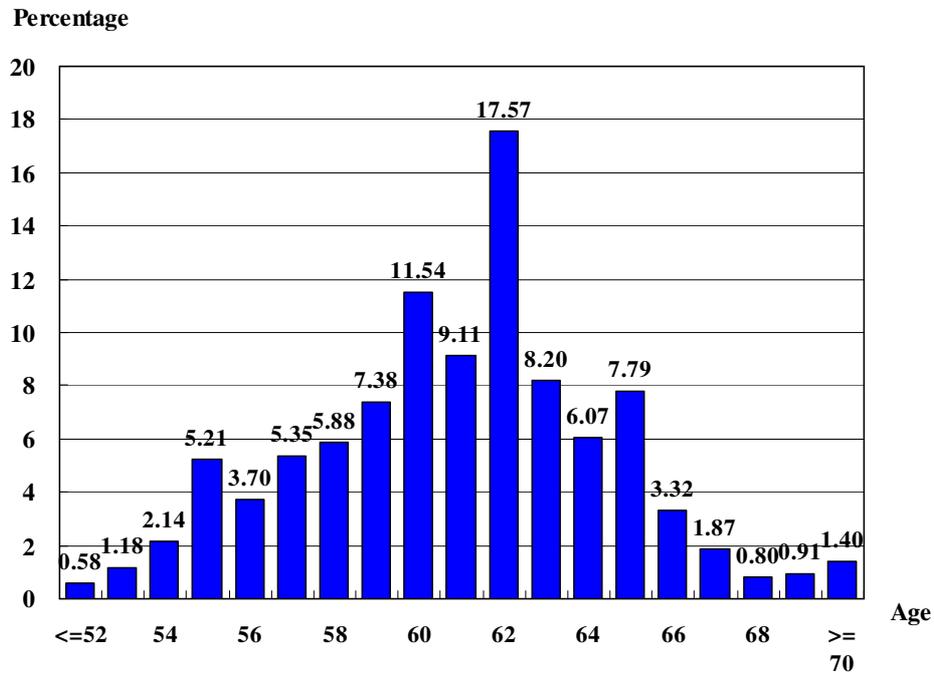
Note: 490 observations in our sample had no “Retirement Year” available or hadn’t retired by 2006. So for this graph, N = 1112. The “weight” is to take account of the diverse representativeness of different observations. The weight was specified in HRS Cross-wave Tracker File.

Figure 1-2 Distribution of Retirement Wave



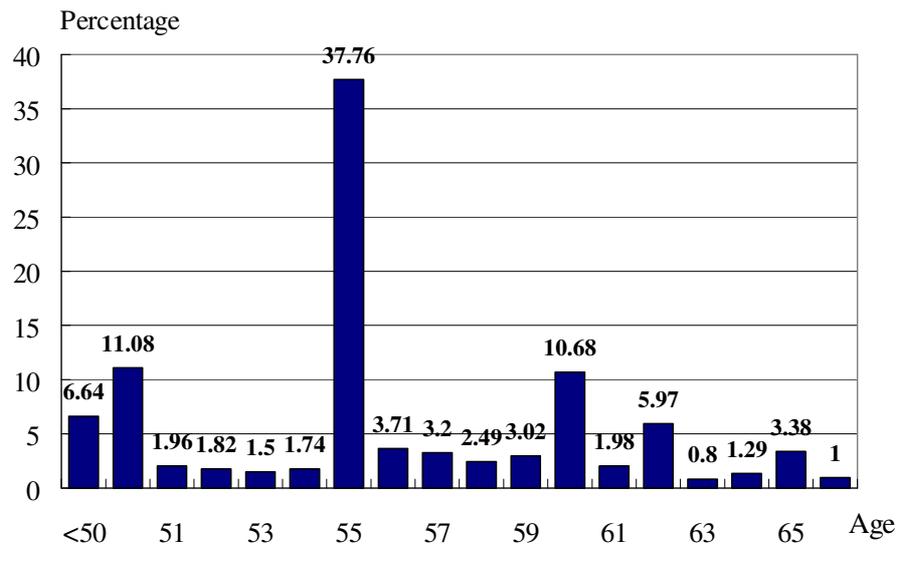
Note: N = 1112, as it was in Figure 1-1. The weights applied are the same as in Figure 1-1.

Figure 1-3 Distribution of Retirement Age (weighted percentage)



Note: 503 observations in our sample had no “Retirement Age” reported. So for this graph, N = 1111. The weights applied are the same as in Figure 1-2.

Figure 1-4 Distribution of Early Retirement Age (weighted percentage)



\* N = 1111. The weights applied are the same as in Figure 1-3.

Table 2: DB Pension Size \*

Percentile	Pension Size in 1992 (in \$, in 2008 dollars)	Pension Size at ERs (in \$, in 2008 dollars)
10%	0	19,274.86
25%	3,660.21	41,313.97
50%	81,487.77	102,341.8
75%	223,149.4	260,358.2
90%	459,604.6	485,867.3
95%	701,537.4	688,908.8
Min	0	994.83
Max	1,925,301	167,5593
Mean	175,594.1	194,534.9
s.d.	246,555.3	236,516.5
Skewness	2.600	2.400

\*: The figures are weighted average. We didn't exclude zero values, N = 1508.

Table 3: Average Pension Benefits Comparison

	Pension Value at ER (in \$, 2008 dollars)		Pension Increment from 1992 to ER (in \$, 2008 dollars)	
	Early leavers	Non-early leavers	Early leavers	Non-early leavers
Mean	117,559.6	202,862.8	77,196.2	12,638.2
Median	64,652.1	107,882.3	54,553.9	2,993.5
s.d.	122,471	244,279.5	72,433.1	104,113.4
Skewness	1.511	2.320	1.435	1.015
Sample size	151	1357	151	1357

Table 4: Pension Knowledge Comparison

Table 4-1: Pension Type Mismatching

	Early leavers	Non-early leavers
No. of people reported DC only	59.8*	204.1*
Percentage	28.2%	15.7%
Sample size	212.3*	1295.7*

\*: the figures are not integers because of weighting.

Table 4-2: ER Mismatching

	Early leavers	Non-early leavers
% of diff in [-20, -6]	8.87	2.37
% of diff in [-5, -1]	23.63	10.76
% of exact matches	17.9	19.59
% of diff in [1, 5]	15.16	22.57
% of diff in [6, 18]	3.44	22.21
% of self-reported ER missing	31	22.49
Sample size	145.7*	998.3*

\*: the figures are not integers because of weighting.

Table 5: Self-reported Health Status Comparison \*

Wave	Average health status rating (1: very good; 5: very poor)		Average health status change rating (1: better; 2: almost same; 3: worse)	
	Early Leavers	Non-Early Leavers	Early Leavers	Non-Early Leavers
2	1.56 (.74)	2.17 (.93)	2.04 (.52)	2.00 (.48)
3	2.48 (1.14)	2.32 (1.08)	2.10 (.59)	2.05 (.58)
4	2.61 (.97)	2.62 (1.03)	2.15 (.56)	2.14 (.58)
5	2.43 (1.04)	2.38 (1.02)	2.02 (.42)	2.01 (.57)
6	2.36 (1.10)	2.40 (0.98)	2.18 (.72)	2.00 (.56)
7	3 (--)	2.69 (1.02)	1 (--)	2.04 (.52)
8	---	2.44 (1.07)	---	2.00 (.59)
Not retired	---	2.54 (1.00)	---	2.07 (.50)
Total	2.35 (1.07)	2.47 (1.03)	2.05 (.55)	2.10 (.56)
Sample size	133	1037	133	1037

\* In the parentheses are the standard deviations.

Table 6: “Early Retirement Window” Comparison

Table 6-1: “EOW” Offers Comparison

Wave	No. of EOW Offers	No. of Offers to Non-Early Leavers	No. of Offers to Early Leavers	% of Offers to Early Leavers
0*	1103.92	981.96	121.96	11.05
2**	84.66	80.59	4.07	4.81
3	97.76	89.64	8.12	8.31
4	100.64	93.28	7.36	7.31
5	40.82	39.54	1.28	3.14
6	38.44	36.08	2.36	6.13
7	24.11	22.03	2.08	8.62
8	17.65	17.65	0	0.00
Total	1508	1360.78	147.22	9.76

\*: Wave 0 counts the number of people that don't get any EOW offers in any wave.

\*\*Wave 2 counts the number of people got EOW offer(s) between Wave 1 and Wave 2 interview. The figures are not integers because of weighting.

Table 6-2: “EOW” Takers Comparison

Wave	No. of EOW Offers taken	No. of Offers taken by Early Leavers	No. of Offers taken by Non-early Leavers	% of Offers taken by Early Leavers
0*	1324.17	130.12	1,194.06	9.83
2**	16.47	0	16.47	0.00
3	48.69	6.91	41.78	14.19
4	57.31	7.36	49.96	12.83
5	18.21	0	18.21	0.00
6	25.16	1.38	23.78	5.47
7	12.56	1.46	11.10	11.66
8	5.42	0	5.42	0.00
Total	1508	147.22	1360.78	9.76

\*: Wave 0 counts the number of people that don't get any EOW offers in any wave.

\*\*Wave 2 counts the number of people got EOW offer(s) between Wave 1 and Wave 2 interview. The figures are not integers because of weighting.

Table 7: Logistic regressions

	Retirement Trend			Early Leaving Factors		
	I	II	III	IV	V	VI
Age52	.49 (.28)	.58 (.33)	.41 (.23)	7.74** (7.13)	7.43** (6.91)	7.45** (6.93)
Age53	1.07 (.38)	1.24 (.45)	.87 (.31)	16.73** (13.27)	15.75** (12.78)	15.65** (12.68)
Age54	1.53 (.46)	1.77 (.53)	1.27 (.38)	30.15** (22.54)	28.71** (21.92)	28.53** (21.75)
Age55	3.31** (.85)	3.54** (.93)	2.64** (.69)	19.92** (15.21)	19.15** (14.91)	18.97** (14.76)
Age60	5.42** (1.25)	5.62** (1.28)	4.54** (1.03)	13.87** (10.56)	13.24** (10.21)	13.15** (10.11)
Age61	4.29** (1.01)	4.33** (1.02)	3.69** (.86)	10.28** (8.10)	9.98** (7.95)	9.90** (7.87)
Age62	9.98** (2.24)	9.95** (2.24)	8.96** (1.99)	11.23** (8.75)	11.00** (8.67)	10.95** (8.62)
Age63	5.35** (1.28)	5.31** (1.27)	4.79** (1.14)	9.27** (7.35)	9.11** (7.27)	9.09** (7.87)
Age64	4.45** (1.10)	4.40** (1.09)	4.12** (1.14)	9.61** (7.76)	9.50** (7.70)	9.52** (7.71)
Age65	6.64** (1.61)	6.52** (1.59)	6.36** (1.54)	.71 (.86)	.71 (.86)	.70 (.86)
AtER		1.21 (.21)	1.14 (.21)	---	---	---
PastER		1.27** (.13)	1.25** (.14)	---	---	---
Pension_q1			1.04 (.08)		1.37 (.27)	
Pension_q4			.93 (.08)			.81 (.19)
Pention Type			.95 (.08)		.42** (.08)	.41** (.08)
Health_good			2.03** (.15)		1.95** (.38)	1.91** (.37)
Health_bad			1.95** (.20)		1.64** (.45)	1.65** (.46)
EOW_offer			1.07 (.10)		.32** (.12)	.31** (.11)

EOW_accept			2.58** (.27)		3.29** (1.45)	3.25** (1.45)
Pseudo $R^2$	.050	.051	.081	.046	.081	.080

The dependent variable for specification I, II and III is the “retired” dummy in a “subject-year” dataset, being 1 if the observation is a “retired” person (has left his/her 1992 employer by 2006 interview) at the “retirement year”, being 0 otherwise.

The dependent variable for specification IV V and VI is the “early-leaving” dummy in a “subject-year” dataset, being 1 if the person is an “early leaver” at his/her “retirement year”, being 0 otherwise.

Odds ratios are reported.