Distributions of Total Job Tenure for Men and Women in Selected Industries and Occupations in the United States, February 1996

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Abstract

This paper develops and fits probability distributions for the variability in projected (total) job tenure for adult men and women in 31 industries and 22 occupations based on data reported by the US Department of Labor's Bureau of Labor Statistics (BLS). It extends the results in an earlier publication (Shaw & Burmaster, 1996) and updates those results from January 1987 to February 1996. The model provides probability distributions for the variability in projected (total) job tenures within the time range of the data, and it extrapolates the distributions beyond the time range of the data, i.e., beyond 25 years.

Key words: job tenure, distribution, variability, uncertainty, exposure assessment, Monte Carlo simulation

Introduction

From time to time, the US Bureau of the Census collects data under contract for the US Department of Labor's Bureau of Labor Statistics (BLS) to update the Current Population Survey (CPS). Upon request, the BLS will send data summaries to members of the public as a family of tables titled "Tenure with Current Employer of Wage and Salary Workers by Age, Sex, and Selected Age." BLS has released tables dated January 1987, January 1991, and, more recently, February 1996.

Data from the Bureau of Labor Statistics (BLS)

In the BLS survey conducted during one week in February 1996, the Current Population Survey included more than 50,000 households in more than 700 areas representing more than 2,000 geographic areas in the United States. The US Bureau of the Census gathered information from all persons aged 16 years and more (and, separately, all persons aged 20 years or more) in the civilian noninstitutional population of the United States. The survey included questions about occupational mobility, job training, and length of employment at a current job (i.e., job tenure). Job tenure is defined by the US Department of Labor as the length of time a person has been employed continuously with the present employer except for interruptions for vacation, temporary illness, labor-management dispute(s), short-term layoff(s) (up to 30 days), or other temporary reasons. In particular, survey participants were asked, "How long have you (or the person in question) ... been working continuously for the present employer (or as self-employed)?"

The BLS then tabulates the responses, disaggregated by gender, industry, and occupation (but with no other covariates of potential interest such as age, education, or marital status). Excerpted from the Bureau's tabulations for persons aged ≥16 yr, Table 1 lists the Industrial Categories used by the Bureau, and Table 2 lists the Occupational Categories used by the Bureau, together with the number of men and women in each group. Although the BLS treats each individual as working in a particular industry and as having a particular occupation, the total counts in Tables 1 and 2 differ for reasons known only to the Bureau. As with previous surveys, the February 1996 survey contains no data on unemployed people or on the durations of their unemployment.

To make these categories of industry and occupation less confusing, we have indexed the categories with a coding number to show the tree structure of the hierarchy in BLS's reports. In Table 1, for example, the tree first bifurcates into Industries 1 and 2, called "Agriculture" and "NonAgriculture" by the BLS. Then Industry 1 trifurcates into SubIndustries 1.1 (denoting Wage and Salary Workers), 1.2 (denoting Self-Employed), and 1.3 (denoting Unpaid Family Workers). In Table 2, for example, the tree first divides into 6 branches, indexed 11, 12, 13, 14, 15, and 16, and then these branches further divide into subcategories with appropriate indices. The tree for industries is "deep," and the tree for occupations is "wide."

As excerpted from the BLS's report, Tables 3M and 3W tabulate the number of men and women, respectively, by the length of tenure in the current job in a particular industry, while Tables 4M and 4W tabulate the number of men and women, respectively, by length of tenure in the current job in a particular occupation. These two tables simply repeat the counts reported by the Bureau for February 1996. In the column headings of these four tables, the notation "[1, 2) yr", for example, indicates the time range 1 yr $\leq$ t < 2 yr.

The data in Tables 3M, 3W, 4M, and 4W have three important features. First, different people have different job tenures in the same industry or occupation; this means that probability distributions (not point values) are the correct way to describe and analyze the variability in the population. [EndNote 1] Second, the BLS has aggregated the data to a modest degree; this makes the reports more compact but it introduces some uncertainty. Third, men and women have different job tenures in the same industry or occupation; this means that gender is an important covariate. From the data in hand, we cannot tell the extent to which other covariates may also be important.

In this analysis, we note some other limitations in the survey data. First, workers who reported job tenure with a current employer of more than 25 years are placed in one category (i.e., ≥25 yr); therefore, detailed information on the length of employment at a current job for workers at this end of the distribution is not available. Second, the US Department of Labor does not present the survey data by age group. Data for all workers over age 16 years are combined. Third, the data are presented in a way such that no distinction can be made between full-time versus part-time jobs. According to the US Department of Labor, full-time workers are persons who worked ≥35 hours during the survey week, while part-time workers are those who worked 1 to 34 hours during the survey week.

Additionally, the survey data for job tenure by detailed occupation are not grouped by class of worker (i.e., wage and salary, self-employed, and unpaid family workers). According to the US Department of Labor, wage and salary workers are workers who are employed by a single employer on a continuous basis, even though they may have worked at several different occupations for that employer. Self-employed workers are workers with continuous employment in a particular type of business or professional practice in the same locality, or on a farm. Unpaid family workers are employed on a family-operated farm or business on a continuous basis.

Distributions for Projected Job Tenure

The data in Tables 3M, 3W, 4M, and 4W as reported by the BLS come from a cross-sectional "snapshot" survey of the workforce taken during one week; the data do not come from a longitudinal survey tracking individuals over a lifetime in the workforce. While the data were collected and tabulated with great care, they do not answer a question of keen importance to many people, including exposure assessors and risk assessors: For men and for women, what are the probability distributions for projected (total) job tenures in different industries and in different occupations? If the BLS had used a longitudinal survey instead of a cross-sectional survey, one could answer the question directly from the data. Since no one can answer the question directly from the cross-sectional survey, we have developed a model, fit it to the data, and drawn inferences from it.

A cross-sectional "snapshot" of a population undercounts projected (total) tenure in two ways. First, a cross-sectional survey measures only the duration of a job to the moment of the survey, effectively censoring the future tenure in the same job. Second, a cross-sectional survey undersamples jobs with short tenures precisely because those jobs have high turnover (and hence a low probability of being sampled). For example, a large number of people may have a relatively high frequency of jobs with short tenures, but a single cross-sectional survey does not sample these situations in proportion to their occurrence; the sample under-represents short employment durations. While most people grasp this first conceptual limitation easily, few people appreciate the second conceptual limitation or its numerical implications. Together, these two limitations imply that there can be large differences between (i) a distribution for surveyed tenure (also called current tenure) and (ii) a distribution for projected (total) tenure (reflecting the underlying behavior of the population in a particular industry or occupation). The differences in the distributions for surveyed tenure and projected tenure are much more pronounced for short tenures than for long tenures.

Even though the structural design of the CPS Survey as a "snapshot" means that it does not contain direct answers to the key question on projected (total) tenure, it is possible to develop probability distributions for projected job tenure from the tabulations of surveyed job tenure. While we are interested in the projected job tenures in different industries and occupations, we can proceed indirectly from the surveyed job tenures reported by BLS.

Statistical Models and Methods

Theory

Through decades of research, statisticians have developed and applied a rich theory for the duration of states, i.e., the time between events, usually in continuous time. For example, in industry, some statisticians study the reliability (i.e., time to failure) of different pieces of equipment under different operating conditions. In the social sciences, some economists study the duration of employment, and some others study the duration of unemployment. In medicine, some biostatisticians study the life expectancy of patients in response to different treatments. All these examples and many others fit within a unified theory called reliability analysis (in engineering) or survival analysis (in the social sciences and medicine). Ansell and Phillips (1994), Cox and Oakes (1984), Crowder et al (1991), Lancaster (1990), Lawless (1982), Lee (1992), Meeker and Escobar (1998), Rao (1992), and many other authors have written excellent books on the theory and practice of reliability analysis and survival analysis.

In this paper, we have used the theory of survival analysis presented in these books, along with special techniques developed by Israeli and Nelson (1992) for data with the same characteristics as the data for job tenure. These books and the paper by Israeli and Nelson all emphasize the central importance of the shape of h(t), the hazard rate function, as discussed below.

To start the analysis, we defined the survival distribution for job tenure, S(t), for the nonnegative random variable t (i.e., job tenure measured in years), $t \geq 0$. In these analyses, "survival" means that a person continues to work in a particular job in a certain industry or occupation, while "failure" means that the person ceases to work in that job in that industry or occupation. In this paper, t does not refer to calendar time because different people start different jobs on different dates. Here, t measures time on person-specific clocks that were set to zero at the moment the person started the job in question. As presented in standard texts mentioned above, S(t) is the complementary cumulative distribution function (CCDF) for the random variable t. By definition and by construction, the CCDF S(t) declines monotonically from $S(0) = 1$ to $S(\infty) = 0$. The function S(t) can be interpreted as the fraction of the people who are still employed at time t. Everyone is still employed at time $t = 0$, so $S(0) = 1$; no one is still employed at time $t = \infty$, so $S(\infty) = 0$; and the fraction S(t) declines monotonically for all t.

Following the unified theory, we further defined (i) the cumulative distribution function (CDF) for the time of failure as $F(t) = 1 - S(t)$; (ii) the probability density function (PDF) for the time of failure as $f(t) = \frac{d}{dt} F(t)$; and the (iii) the hazard rate function (or conditional failure rate) as $h(t) = \frac{d}{dt} [- \ln[S(t)]]$. These functions have the mathematical properties required of CDFs, PDFs, and hazard rate functions for survival analysis. The function F(t) can be interpreted as the cumulative distribution for the time to failure (i.e., the duration of employment), so its derivative, f(t), is the probability density function for the time to failure.

For convenience, we also defined a function, $pS(t) = - \ln[S(t)]$. Lee (1992) calls this function the cumulative hazard function, $pS(t) = - \ln[S(t)] = H(t) = \int_0^\infty h(\tau)\, d\tau$. When this definition obtains, $h(t) = \frac{d}{dt} pS(t)$. As discussed in Lancaster (1990, p. 9), h(t) must be positive for all t, and pS(t) must tend to ∞ as t tends to ∞. The hazard rate function h(t) can be understood as the instantaneous rate of failure or death at time t, given that the individual survives until time t. In particular, $h(t)\,\Delta t$ is the approximate probability of failure or death in the interval $[t, t+\Delta t)$, given survival to time t. The hazard rate function has other names, including the (age-specific) failure rate and the force of mortality.

We also calculated the expected time of survival (equal to the expected time to failure) using standard definitions and integration by parts (Israeli & Nelson, 1992).

$$\bar{t} \quad = \quad E[\text{survival}] \quad = \quad E[\text{time to failure}] \qquad \text{Eqn 1}$$

$$= \int_0^\infty t \bullet f(t)\, dt \qquad \text{Eqn 2}$$

$$= \int_0^\infty S(t)\, dt \qquad \text{Eqn 3}$$

As mentioned earlier, the BLS data for job tenure come from a cross-sectional survey of the population. All of the people in the BLS survey were still employed at the time of the survey, meaning that all of the people then continued in their current jobs for unknown durations. All the observations in the BLS survey were censored in the sense that not even a single person was followed through a complete employment cycle (from start to finish of a job).

In a survival analysis, a statistician must use some special assumptions and techniques when <u>all</u> the data are censored. Most survival analyses rely on longitudinal data, i.e., the researchers follow the individuals through time until they fail (e.g., terminate the job voluntarily or involuntarily). With data from a longitudinal survey, a statistician can fit a distribution for the total job tenure directly to the data precisely because the data pertain to total job tenure. However, with censored data from a cross-sectional survey, a statistician cannot obtain a distribution for the total job tenure directly from the censored data. Instead, the statistician must proceed indirectly by first fitting a model to the survey (censored) data and then making inferences about the projected (total) job tenure. Here, we also assume stationarity in the underlying statistical processes, a not unreasonable assumption without evidence to the contrary.

When analyzing the survey data for job tenure, we attached a prefix of "surv" (for survey) to each of the functions used in the analysis. For example, surv.F(t) = 1 - surv.S(t). The third column in Table 5 presents the definitions and relationships among the functions used in the analysis of the survey data. When estimating projected (total) job tenure, we attached a prefix of "proj" (for projected) to each of the functions used in the analysis. For example, proj.F(t) = 1 - proj.S(t). The fourth column of Table 5 presents the definitions and relationships among the functions used in calculating the underlying behavior for projected (total) job tenure.

Using a key result from Israeli & Nelson (1992), we inferred the CCDF for the projected (total) survival distribution from the (fitted) model for surveyed job tenure as follows:

$$\text{proj.S}(t) = \frac{\text{surv.f}(t)}{\text{surv.f}(0)} \qquad \text{Eqn 4}$$

As shown in Israeli & Nelson (1992), proj.S(t) has all the properties required of a CCDF, including the property that proj.S(t) declines monotonically from proj.S(0) = 1 to proj.S(∞) = 0.

An Extended Gompertz Model

After trying and discarding a number of polynomial and/or algebraic models, we chose an extended Gompertz model, an equation which others have used to develop distributions for household residence time (Israeli & Nelson, 1992) and for job tenure (Shaw & Burmaster, 1996). We returned to this extended Gompertz model -- Eqn 5 (next) and the equations derived from it using the definitions and relationships in Table 5 -- as the preferred model for these data sets for four reasons: (i) precedence in theory, (ii) precedence in application, (iii) superiority of the curvature and fit within the range of reported data, and (iv) acceptability of properties beyond the range of reported data.

The extended Gompertz model is:

$$\text{surv.pS}(t) = a \bullet (1 - \exp[-b \bullet t]) + c \bullet t + d \bullet (\exp[e \bullet t] - 1) \qquad \text{Eqn 5}$$

for variable $t \geq 0$. In this model, only certain combinations of values for the five parameters (a, b, c, d, and e) are admissible because S(t) must decline monotonically as t increases. The extended Gompertz model in Eqn 5 has the correct mathematical properties and curvatures when:

(i) parameters a, b, c, d, and e are each positive constants, XOR

(ii) parameters a, b, and c are each positive constants AND parameters d and e are each negative constants, XOR

(iii) parameters a, b, and c are each positive constants AND parameters d and e are each zero, XOR

(iv) parameters a, b, c, d, and e take values that satisfy two fundamental conditions discussed in Lancaster (1990, p. 9), i.e., h(t) must be positive for all t and pS(t) must tend to ∞ as t tends to ∞.

Here, AND and XOR, respectively, indicate the logical functions "and" and "exclusive or" from Boolean algebra. For condition (i) above, the hazard function h(t) has a bathtub shape, a property that models a phenomenon strongly present in the data (see discussion on page 12 in Lee, 1992).

Since $h(t) = \frac{d}{dt} pS(t)$, Eqn 5 controls the shape of the hazard rate function, h(t). For this discussion, let us say that Eqn 5 has three terms and let us examine case (i) above. In this case, the first term in Eqn 5 -- a • (1 - exp[- b • t]) -- controls the shape of the hazard rate function for small t (i.e., it controls the presence and shape of the left end of the bathtub); this term also contributes to the constant positive offset of the hazard rate function for intermediate and large t (especially visible in the floor of the bathtub). The second term in Eqn 5 -- c • t -- contributes to the constant positive offset to the hazard rate function for all t (and it allows an independent degree of freedom to setting the floor of the bathtub). The third term in Eqn 5 -- d • (exp[e • t] - 1) -- controls the shape of the hazard rate function for large t (i.e., it controls the presence and shape of the right end of the bathtub). Thus, the three terms in Eqn 5 allow for independent control of the left end, the floor, and the right end of a bathtub-shaped hazard rate function.

Basically, the function in Eqn 5 will honor the data if their hazard rate function has a bathtub shape (when a, b, c, d and e are all positive constants). However, the function in Eqn 5 will also honor the data if their hazard rate function does not have a bathtub shape. For example, when c is a positive constant and a = b = d = e = 0, Eqn 5 reduces to the simplest of all survival models, the model with a constant hazard rate (i.e., simple radioactive decay, also called exponential decay). For other choices of the values for parameters a, b, c, d, and e, Eqn 5 can honor the data if their hazard rate function decreases monotonically or if it increases monotonically. Eqn 5 allows the hazard rate function to have a variety of different shapes, including a bathtub shape, but it does not force the hazard rate function to have a bathtub shape. Eqn 5 follows the data.

Central Importance of the Hazard Rate Function

The hazard rate function plays a critical role in every survival analysis.

Long ago, statisticians realized that the durations between events in a Poisson process followed an Exponential distribution, a distribution completely characterized by a constant hazard rate function, $h(t) = c > 0$. This simple model found widespread application in science and engineering (e.g., as a model for radioactive decay) before statisticians realized that many statistical processes in physics, chemistry, biology, and the social sciences do not have a constant hazard rate function.

Next, statisticians developed and applied the Weibull model in survival analysis. The Weibull model has a monotonic hazard rate function. For the Weibull model, h(t) will decrease monotonically for certain values of its two parameters and will increase monotonically for other values of its two parameters. Also, the Exponential model can be considered a special case of the Weibull model.

For decades, the Exponential model and the Weibull model held dominant positions in survival analysis for two reasons. First, the two simple models are (reasonably) accurate descriptions of many statistical processes, especially those for the survival or reliability of inanimate objects such as wheel bearings. Second, the two simple models have mathematical properties that make them easy to manipulate and fit to data. So for many years, the Exponential and Weibull models dominated the field.

Statisticians have known for many years that the Exponential model, the Weibull model, and various alternative two-parameter models in common usage do not fit the complicated survival characteristics found in more complex systems such as integrated circuits or people in society. Many authors have observed that one- and two-parameter models simply cannot capture the more complicated reality in which the hazard function (while always nonnegative) starts at a high positive value at time zero, declines to a minimum value over some intermediate time range, and then increases for large times. Statisticians have given this widespread phenomenon a colorful name -- they call it a "bathtub-shaped" hazard rate function. Statisticians say that a population with a bathtub-shaped hazard rate function exhibits three different behaviors over time: (i) for small t, the population experiences a high but declining failure rate, i.e., the population has high infant mortality that decreases as t increases; (ii) for intermediate t, the population experiences a lower and approximately constant failure rate; and (iii) for large t, the population experiences an increasing failure rate. Statisticians have observed these three behaviors in sequence in many systems. However, neither the Exponential nor the Weibull model can capture all three phases in such statistical process because the hazard rate function for each cannot decrease, remain constant, and then increase over time.

For years, many statisticians have wanted to use bathtub-shaped hazard rate functions in applied studies but have not done so because no models had emerged with acceptable algebraic and computational properties. Bluntly, the computational burdens of models with bathtub-shaped hazard rate functions often blocked their use.

Glaser (1980), Hjorth (1980), Lee (1992), Meeker and Escobar (1998), and many other authors have discussed the desirability of using models with bathtub-shaped hazard rate functions and the obstacles that have prevented their use.

Several software companies now sell computer programs that can do symbolic and numerical calculations. Mathematica® is one such program that can manipulate equations symbolically and compute results numerically. With the software now available, statisticians can build and fit more complicated models -- models that explicitly capture the bathtub-shaped hazard rate function.

These ideas apply to the analysis of job tenure. From common knowledge, we know that (i) some people leave some jobs soon after starting them; (ii) some people stay with some jobs for many years; and (iii) all people eventually leave their jobs through termination, resignation, re-location, retirement, or death. From everyday experience, we anticipate that the hazard rate function for job tenure has a bathtub-shape.

All the BLS data sets for the different jobs and different occupations show the first two behaviors and most show all three behaviors -- first, a declining hazard rate function for early job tenures; second, an approximately steady hazard rate function for intermediate job tenures; and third, a rising hazard rate function for long job tenures. Since the BLS data group all answers exceeding 25 years, they do not always show the rising limb of the bathtub-shaped hazard function for a jobs or occupations with long tenures.

To recount, one- and two-parameter models (a class that includes the Exponential model and the Weibull model) cannot capture the proper curvatures in the hazard rate function for job tenures. We then investigated a number of three-, four-, and five-parameter models to capture the correct curvatures in the hazard rate function. After trying and discarding a number of alternatives, we decided that a five-parameter model similar to the one used by Israeli and Nelson at the US EPA (1992) has the properties to fit the data reported by BLS.

By way of personal philosophy in statistics, we are outspoken practitioners of "parsimony" in model design and selection. Albert Einstein captured the philosophy (in physics) when he said, "Make a model as simple as possible, but no simpler." Parsimony embodies the principle in Occam's Razor, a bedrock of western science since the Early Middle Ages. Shaw and Burmaster originally adopted a five-parameter model with great reservations, only after convincing themselves that no simpler model could do the job.

Of course, a different analyst could force a simple model to fit the data. It is always possible to force either an Exponential model or a Weibull model to fit any data set collected for any survival analysis. However, neither of these simple models can represent a phenomenon with a bathtub-shaped hazard function.

Formulae for Expected Durations

Using Mathematica® V3.0 (Wolfram, 1996), we derived closed-form algebraic expressions for all the equations in Table 5 using the extended Gompertz model. In particular, we showed that the CDF proj.F(t) is stochastically dominated by the CDF surv.F(t) (see discussion of "stochastic domination" in Morgan & Henrion, 1990; Clemen, 1991). As discussed by Israeli & Nelson (1992), this implies a well known result:

$$\overline{\text{proj.t}} \quad < \quad \overline{\text{surv.t}} \quad . \qquad \text{Eqn 6}$$

For the extended Gompertz model in Eqn 5, no one has been able to find a closed-form expression for $\overline{\text{surv.t}} = \int_0^\infty \text{surv.S(t) dt}$, so we computed $\overline{\text{surv.t}}$ by numerical quadrature using Mathematica®. For the extended Gompertz model in Eqn 5, Adamchik (1995) has found a closed-form expression for $\overline{\text{proj.t}} = \int_0^\infty \text{proj.S(t) dt}$ using Mathematica®:

$$\overline{\text{proj.t}} \quad = \quad \frac{1}{a \bullet b + c + d \bullet e} \qquad \text{Eqn 7}$$

<u>Fitting the Extended Gompertz Model to the Data</u>

From the data in Tables 3M, 3W, 4M, and 4W, we estimated the fraction of US workers that the survey reported working in their current job for t_i years or more. So, for a particular group of workers,

$$S(t_i) \quad = \quad \frac{\text{Total N Workers - } \sum \text{ \# Workers with } \leq t_i \text{ yr}}{\text{Total N of Workers}} \qquad \text{Eqn 8}$$

We then used the symbolic and numerical features of Mathematica® V3.0 (Wolfram, 1996) to fit the extended Gompertz model (Eqn 5) to the data. In particular, we used Mathematica's NonlinearRegress function to minimize the sum of the squares of the differences between the model and the data, here the pairs { t_i, -ln[S(t_i)] } for i = 0, 0.5, 1, 2, 3, 4, 5, 6, 7, 10, 15, 20, and 25 years.

<u>Results</u>

For men and women in the Durable Goods Industry (Index = 2.1231), Figures 1M and 1W, respectively, illustrate the six graphs made and inspected for men and women in each industry and in each occupation. In the panels, the solid lines denote the surveyed job tenures and the dashed lines denote the projected job tenures. In Figures 1M and 1W, the graph:

- in the upper left panel plots the data points from the BLS survey connected by straight line segments;
- in the upper right panel shows the two CCDFs, surv.S(t) and proj.S(t);
- in the center left panel repeats the data points and shows the best-fit cumulative hazard function surv.pS(t) and proj.pS(t);
- in the center right panel shows the two best-fit CDFs, surv.F(t) and proj.F(t);
- in the lower left panel shows the two best-fit PDFs, surv.f(t) and proj.f(t); and
- in the lower right panel shows the two best-fit hazard functions, surv.h(t) and proj.h(t).

Overall, the center left panels in Figures 1M and 1W show that the extended Gompertz model provides a good visual fit to the data. Mathematica's NonlinearRegress function calculates some goodness-of-fit (GoF) statistics in the form of an ANOVA table for the analysis of variance. For Figure 1M, Mathematica® reports that the Model has 5 DF (degrees of freedom) and an associated SumOfSq (sum of squares) equal to 14.6269 and that the Error has 8 DF and SumOfSq equal to 0.0027238. These GoF statistics indicate a good fit. For Figure 1W, Mathematica® reports that the Model has 5 DF with

SumOfSq equal to 21.935 and that the Error has 8 DF and SumOfSq equal to 0.00765271. These GoF statistics also indicate a good. In the interest of brevity, we do not report the GoF statistics for all the fitted distributions, but these examples are not atypical.

Table 6 shows the five best-fit parameters, $\hat{a}$, $\hat{b}$, $\hat{c}$, $\hat{d}$, and $\hat{e}$, for men and women in various industries and occupations in the US in February 1996. Mathematica® also reports the uncertainties in $\hat{a}$, $\hat{b}$, $\hat{c}$, $\hat{d}$, and $\hat{e}$ in the form of asymptotic standard errors. For example, for the men in Figure 1M, Mathematica® reports the asymptotic standard errors for $\hat{a}$, $\hat{b}$, $\hat{c}$, $\hat{d}$, and $\hat{e}$ as 0.0303, 0.3076, 0.0069, 0.0099, and 0.1790, respectively. For men, each of the five estimated parameters differs from zero by more than 1 standard error, and each except $\hat{e}$ differs from zero by more than 2 standard errors. For the women in Figure 1W, Mathematica® reports the asymptotic standard errors for $\hat{a}$, $\hat{b}$, $\hat{c}$, $\hat{d}$, and $\hat{e}$ as 0.0515, 0.7914, 0.0232, 0.1389, and 0.0663, respectively. For women, all five estimated parameters differ from zero by more than 1 standard error, and all except $\hat{d}$ and $\hat{e}$ differ from zero by more than 2 standard errors. In the interest of brevity, we do not report the asymptotic standard errors for all the coefficients for all the fitted distributions, but these examples are not atypical. For men and women, $\hat{a}$, $\hat{b}$, and $\hat{c}$ all differ from zero by more than two standard errors, thereby confirming the falling portions and the floors of the bathtub-shaped hazard rate functions for men and women for small and intermediate t -- but not confirming the rising portions of the hazard rate functions for men and women for large t. (We have not done a joint statistical test for all five parameters.)

When Eqn 5 is fitted to a dataset, the uncertainty distributions for $\hat{a}$, $\hat{b}$, $\hat{c}$, $\hat{d}$, and $\hat{e}$ are correlated, strongly so in most cases. For example, Mathematica® reports the upper half of the (symmetric) asymptotic correlation matrix for $\hat{a}$, $\hat{b}$, $\hat{c}$, $\hat{d}$, and $\hat{e}$ for the men in

Figure 1M as:

1.	-0.817	-0.938	0.842	-0.825
	1.	0.712	-0.615	0.600
		1.	-0.965	0.954
			1.	-0.999
				1.

In the interest of brevity, we do not report the asymptotic correlation matrix for all the coefficients for all the fitted distributions, but this example is not atypical.

In Table 6, the notation "$\hat{d}$ = 0" and "$\hat{e}$ = 0" signifies that we constrained the extended Gompertz model (Eqn 5) to give S(t) and h(t) suitable curvatures and asymptotic behaviors for large t. The notation "na" indicates that the extended Gompertz model does not provide an adequate fit to a data set. For example, there were so few women in the Stone, Clay, and Glass Products Industry (Index = 2.12313) that the extended Gompertz model does not provide an adequate fit to the data, a manifestation of the "small sample size" phenomenon.

For men and women, Tables 7M and 7W, respectively, present the best-fit distributions for projected (total) job tenure in different industries and occupations by showing the arithmetic mean (denoted AMean) and selected percentiles for the distributions (denoted 10p for the 10th percentile, etc.). The percentiles for the distributions for projected (total) job tenure in Tables 7M and 7W come from the numerical solution of the proj.F(t) function for the appropriate industry, occupation, and gender. For each distribution in Tables 7M and 7W, the minimum value equals zero and the maximum value is unknown (but surely finite since the length of a human life is finite).

Several commercial software packages have features that allow a risk assessor to use the results in Tables 7M and 7W to generate random numbers for Monte Carlo simulations. For example, a risk assessor could draw random variates from the distribution of projected (total) job tenure for the population of men in Figure 1M by using the results in Table 7M along with a commercial software program such as Crystal Ball®.

Comparing the results within and between Tables 7M and 7W, some interesting patterns emerge. Here are some observations about selected statistics for selected distributions (but remember to focus on the full distribution, not just these point values):

- For men, the arithmetic means for projected (total) job tenures range: (i) for different industries, from 1.41 yr (for Index = 2.12311, Lumber and Wood Products) to 7.48 yr (for Index = 2.12319, Professional and Photographic Equipment and Watches), and (ii) for different occupations, from 1.73 yr (Index = 12.2, Sales Occupations) to 6.38 yr (Index = 11.27, Teachers, except College and University).

- With some notable exceptions for jobs in certain industries or occupations, women tend to have shorter arithmetic mean job tenures than do men.

- Some industries / occupations have high turnover among the workers and correspondingly short job tenures. For example, the 90th percentile of projected job tenure in the Handlers, Equipment Cleaners, Helpers, and Laborers Occupation (Index = 15.3) equals 3.45 yr for men and 3.62 yr for women.

- Conversely, some industries / occupations have low turnover among workers and correspondingly long job tenures. For example, the 90th percentile of job tenure in the Petroleum and Coal Products Industry (Index = 2.12327) equals 30.53 yr for men and 11.01 yr for women.

Many other patterns, too numerous to discuss in this report, emerge from the results in Tables 7M and 7W.

Discussion and Conclusions

Extending an earlier publication (Shaw & Burmaster, 1996) and updating the results to February, 1996, this analysis of data from the Department of Labor's Bureau of Labor Statistics again shows that the extended Gompertz model (Eqn 5) can and does give probability distributions for the projected (total) job tenures of men and women in different industries and occupations in the United States. The extended Gompertz model provides probability distributions for the variability in projected job tenures within the time range of the data, and it extrapolates the distributions beyond the time range of the data, i.e., beyond 25 years. When evaluating worker exposures in certain industries and exposures, and when site-specific information on exposure duration is not available, exposure assessors and risk assessors may use the results here from this large cross-sectional survey as the best that can be accomplished until or unless results from large longitudinal surveys become available.

Given that the Bureau of Labor Statistics uses large sample sizes in its surveys and reports, and given that the extended Gompertz model fits the data so well, the distributions for projected job tenures in Tables 7M and 7W faithfully capture the large variability in the projected job tenures.

We have some suggestions for future research. First, if the Bureau of Labor Statistics were to publish the data for (anonymous) individuals on a compact disk, we risk assessors would have much more information available to us, especially in the time range beyond 25 years. Second, if the Bureau of Labor Statistics were to also include the age of each respondent on such a data disk, we could develop and fit a whole new class of models that include age-dependency. For surveys of residential duration, Canada has already implemented these two ideas. Third, if the BLS had the resources to conduct more complete surveys, including longitudinal surveys, we risk assessors would have the access to datasets with a fundamentally different structure, i.e., we would have time-series data, perhaps with important covariates beyond gender. Since the BLS only conducts snapshot surveys, we must use the theorem in Eqn 4 to move from the survey results to project the distributions for underlying job tenures.

We draw several conclusions from this research. First, survival analysis and probability distributions provide a correct and powerful framework for understanding job tenure. Second, people in different industries and in different occupations have different probability distributions for projected (total) job tenure. Third, men and women in the same industry or in the same occupation have different probability distributions for projected (total) job tenure. For these reasons, we conclude that the assumption often dictated by federal and state environmental agencies that all people work in all jobs for 30 years to be false and misleading.

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EndNotes

1. In this paper, variability represents true heterogeneity in the population or statistical sample which cannot be reduced through further measurement or study (although such heterogeneity may be disaggregated into different components associated with different subgroups in the population). Variability is a fundamental property of Nature and of the population. Variability in a population is best analyzed and modeled in terms of a probability distribution, often a first-order parametric distribution with constant parameters.

   As distinguished from variability, uncertainty represents ignorance -- or lack of perfect knowledge -- about a phenomenon for a population as a whole which may sometimes be reduced through further measurement or study. Uncertainty is a property of the analyst performing the assessment. Uncertainty about the variability in a population can be analyzed and modeled in terms of a probability distribution, usually a second-order parametric distribution with nonconstant (distributional) parameters.

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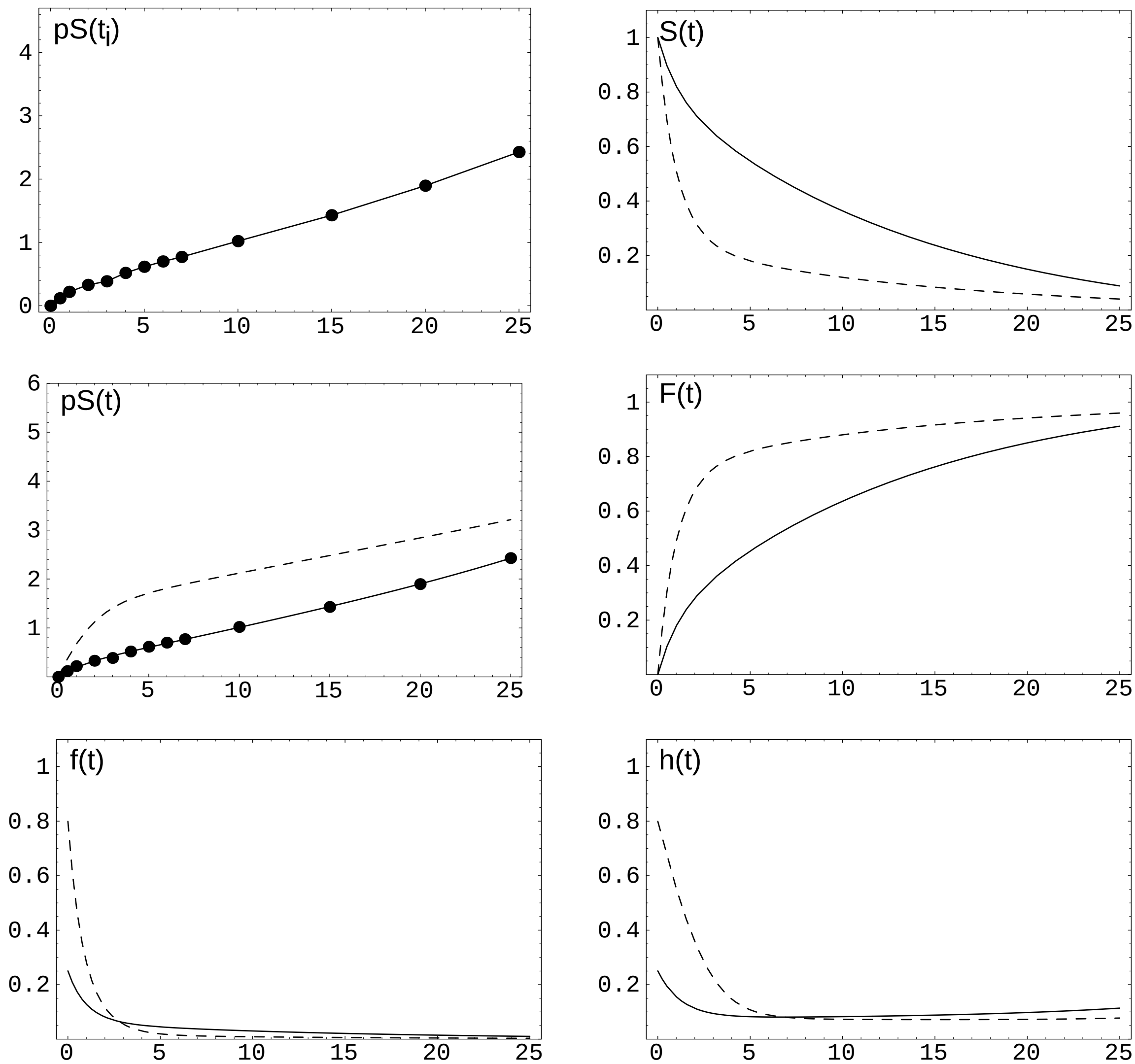

Figure 1M
Men in the Durable Goods Industry (Index = 2.1231)
Plots of $pS(t_j)$, S(t), pS(t), F(t), f(t), and h(t) for $t \in [0, 25]$ yr
with solid lines for Survey and dashed lines for Projection

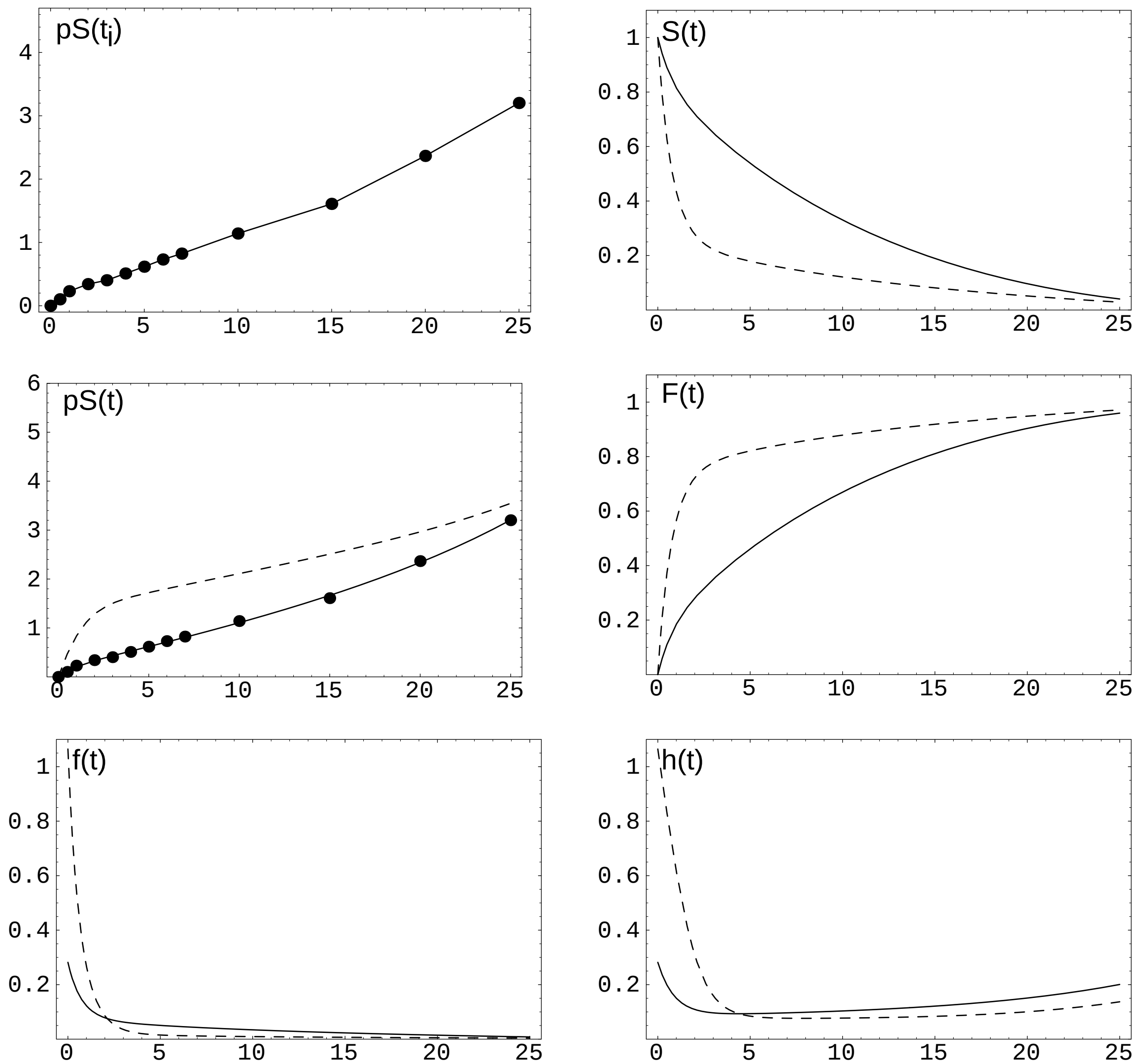

Figure 1W
Women in the Durable Goods Industry (Index = 2.1231)
Plots of pS(t_i), S(t), pS(t), F(t), f(t), and h(t) for $t \in [\ 0, 25\ ]$ yr
with solid lines for Survey and dashed lines for Projection

Table 1
Industrial Categories by Gender, February 1996
Age ≥16 yr, Numbers in Thousands

Industrial Index	Industry and Class of Worker	Men	Women
•••••	•••••	•••••	•••••
1	Agriculture	2,190	802
1.1	• Wage and salary workers	1,081	373
1.2	• Self-employed	1,099	413
1.21	• Incorporated	108	27
1.22	• Unincorporated	991	385
1.3	• Unpaid family workers	9	17
2	Nonagricultural industries	64,312	56,862
2.1	• Wage and salary workers	56,211	52,616
2.11	• Government	8,307	10,691
2.111	• Federal	1,852	1,508
2.112	• State	2,602	2,956
2.113	• Local	3,853	6,227
2.12	• Private industries	47,904	41,925
2.121	• Mining	488	71
2.122	• Construction	4,364	548
2.123	• Manufacturing	13,501	6,275
2.1231	• Durable goods	8,545	3,048
2.12311	• Lumber and wood products	589	124
2.12312	• Furniture and fixtures	430	158
2.12313	• Stone, clay, and glass products	490	134
2.12314	• Primary metal industries	676	130
2.12315	• Fabricated metal products	875	247
2.12316	• Machinery and computing equipment	1,852	620
2.12317	• Electrical machinery, equipment, and supplies	1,161	610
2.12318	• Transportation equipment	1,705	465
2.123181	• Motor vehicles and equipment	989	277
2.123182	• Aircraft and parts	302	100
2.12319	• Professional and photographic equipment and watches	462	302
2.1231*	• Toys, amusements, and sporting goods	66	55
2.1232	• Nondurable goods	4,956	3,227
2.12321	• Food and kindred products	1,244	552
2.12322	• Textile mill products	355	318
2.12323	• Apparel and other finished textile products	249	589
2.12324	• Paper and allied products	437	161
2.12325	• Printing and publishing	914	796
2.12326	• Chemical and allied products	896	429
2.12327	• Petroleum and coal products	162	38
2.12328	• Rubber and miscellaneous plastic products	582	253
2.124	• Transportation and public utilities	4,530	1,984
2.1241	• Transportation	2,799	1,080
2.1242	• Communication and other public utilities	1,731	903
2.125	• Wholesale trade	2,958	1,293
2.126	• Retail trade	8,799	9,377
2.127	• Finance, insurance, and real estate	2,534	4,225
2.1271	• Banking and other finance	1,132	2,103
2.1272	• Insurance and real estate	1,402	2,122
2.128	• Services, private households	66	742
2.129	• Services, except private households	10,664	17,411
2.1291	• Business services	2,358	1,993
2.1292	• Automobile and repair services	1,421	289
2.1293	• Personal services, except private households	976	1,508
2.1294	• Entertainment and recreation services	823	720
2.1295	• Hospitals	876	3,268
2.1296	• Health services, except hospitals	748	4,092
2.1297	• Educational services	893	1,559
2.1298	• Social services	463	1,648
2.1299	• Other professional services	2,076	2,326
2.2	• Self-employed	8,064	4,180
2.21	• Incorporated	2,717	770
2.22	• Unincorporated	5,347	3,410
2.3	• Unpaid family workers	37	66
	Total	66,501	57,665

2 <0.05 percent
Note: Data for 1996 may not be strictly comparable with data for ≤1991

Table 2
Occupational Categories by Gender, February 1996
Age ≥16 yr, Numbers in Thousands

Occupational Index	Occupation and Class of Worker	Men	Women
•••••	•••••	•••••	•••••
11	Managerial & professional specialty occupations	14,945	16,529
11.1	• Executive, administrative, & managerial occ	7,360	6,730
11.11	• Officials & adminstrators, public admin	333	300
11.12	• Other executive, administrative, and managerial	5,451	4,046
11.13	• Management related occupations	1,576	2,385
11.2	• Professional specialty	7,585	9,799
11.21	• Engineers	1,741	181
11.22	• Mathematical & computer scientists	888	381
11.23	• Natural scientists	397	140
11.24	• Health diagnosing occupations	347	178
11.25	• Health assessment & treating occ	350	2,402
11.26	• Teachers, college and university	588	474
11.27	• Teachers, except college and university	1,189	3,664
11.28	• Lawyers and judges	343	207
11.29	• Other professional specialty occupations	1,741	2,173
12	Technical, sales and administrative support	11,384	22,281
12.1	• Technicians and related support	1,730	2,005
12.11	• Health technologists and technicians	324	1,249
12.12	• Engineering and science technicians	811	264
12.13	• Technicians, except health, engineering & science	595	492
12.2	• Sales occupations	5,943	6,260
12.21	• Supervisors and proprietors	1,823	1,179
12.22	• Sales representatives, finance and business services	863	834
12.23	• Sales representatives, commodities, except retail	1,064	300
12.24	• Sales workers, retail and personal services	2,178	3,872
12.25	• Sales-related occupations	15	75
12.3	• Adminstrative support, including clerical	3,711	14,016
12.31	• Supervisors	271	369
12.32	• Computer equipment operators	160	262
12.33	• Secretaries, stenographers and typists	95	3,684
12.34	• Financial records processing	201	1,847
12.35	• Mail & message distributing	593	381
12.36	• Other administrative support, including clerical	2,390	7,473
13	Service occupations	6,361	8,802
13.1	• Private household	33	687
13.2	• Protective service	1,820	386
13.3	• Service, except private household and protective	4,509	7,728
13.31	• Food service	2,183	3,037
13.32	• Health service	276	2,005
13.33	• Cleaning and building service	1,654	1,304
13.34	• Personal service	396	1,382
14	Precision production, craft and repair	10,588	935
14.1	• Mechanics & repairers	4,028	138
14.2	• Construction trades	3,623	72
14.3	• Other precision production, craft and repair	2,936	725
15	Operators, fabricators and laborers	12,613	4,190
15.1	• Machine operators, assemblers and inspectors	4,741	2,816
15.2	• Transportation and material moving occupations	4,236	472
15.21	• Motor vehicle operators	3,000	423
15.22	• Other transportation and material moving occupations	1,236	49
15.3	• Handlers, equipment cleaners, helpers, and laborers	3,636	902
15.31	• Construction laborers	543	22
15.32	• Other handlers, equipment cleaners, helpers and laborers	3,093	879
16	Farming, forestry and fishing	1,400	252
16.1	• Farm operators & managers	109	21
16.2	• Other farming, forestry and fishing occupations	1,291	231
2 <0.05 percent	Total	57,291	52,989

Note: Data for 1996 may not be strictly comparable with data for ≤1991

Table 3M
Tenure with Current Employer by Industry, February 1996
Men, Age ≥16 yr

Industrial Index	[0, 6) mon	[6, 12) mon	[12, 24) mon	[1, 2) yr	[2, 3) yr	[3, 4) yr	[4, 5) yr	[5, 6) yr	[7, 10) yr	[10, 15) yr	[15, 20) yr	[20, 24) yr	≥25 yr
1	201	113	106	85	154	175	164	81	173	207	195	162	374
1.1	162	89	78	53	120	131	82	43	100	70	57	38	57
1.2	39	24	27	32	35	45	77	38	72	137	137	122	314
1.21	6	0	0	5	8	2	6	3	2	20	18	14	25
1.22	33	24	27	27	27	43	71	35	71	117	120	108	289
1.3	0	0	0	0	0	0	4	0	0	0	0	2	4
2	9,254	5,862	4,915	2,955	5,494	4,030	3,622	2,776	6,057	6,925	4,687	3,414	4,319
2.1	8,662	5,451	4,523	2,623	4,896	3,509	3,101	2,412	5,225	5,684	3,922	2,791	3,414
2.11	678	328	500	227	502	470	479	411	1,025	1,205	896	771	817
2.111	75	49	70	49	60	86	101	80	249	355	241	188	249
2.112	288	116	213	77	180	130	140	126	317	364	235	199	216
2.113	315	163	217	101	262	254	238	205	459	485	420	383	352
2.12	7,984	5,123	4,022	2,395	4,391	3,039	2,623	2,001	4,201	4,480	3,026	2,021	2,598
2.121	53	42	27	15	50	26	25	18	57	53	54	37	33
2.122	925	541	321	245	452	330	270	190	323	357	164	106	139
2.123	1,426	1,103	1,052	543	1,089	780	621	501	1,399	1,634	1,207	927	1,218
2.1231	954	735	711	339	720	472	370	293	873	1,033	763	529	754
2.12311	87	59	46	25	81	26	40	8	44	56	54	34	29
2.12312	54	45	36	19	47	27	16	8	42	57	43	25	10
2.12313	65	34	67	11	38	32	19	25	55	50	30	32	33
2.12314	48	41	42	20	58	25	38	10	56	87	72	60	119
2.12315	66	72	95	30	67	66	57	41	78	108	79	52	65
2.12316	241	166	124	87	150	105	58	73	204	205	181	94	165
2.12317	155	95	145	54	64	65	45	58	127	159	90	34	71
2.12318	159	127	108	63	133	67	53	43	187	239	157	155	213
2.123181	95	83	68	35	85	36	30	25	75	115	86	111	146
2.123182	19	22	6	9	13	5	10	8	63	59	38	25	27
2.12319	44	51	34	16	44	28	28	9	49	40	43	32	46
2.1231*	3	6	5	4	16	8	3	4	9	6	2	0	0
2.1232	472	368	340	203	369	308	251	208	526	602	444	399	465
2.12321	130	106	102	61	95	71	68	44	111	164	122	96	76
2.12322	49	17	16	16	39	17	11	21	34	36	22	38	36
2.12323	26	25	23	10	26	28	13	6	25	40	14	6	6
2.12324	22	28	20	9	17	25	21	26	44	54	48	39	84
2.12325	105	85	72	41	77	65	52	31	106	88	64	48	79
2.12326	60	37	59	25	44	55	50	56	112	98	99	96	103
2.12327	6	8	7	10	15	1	8	4	13	23	29	18	20
2.12328	69	47	39	29	41	43	24	15	72	88	36	41	37
2.124	543	379	295	219	336	222	254	219	403	499	457	281	425
2.1241	389	292	203	131	249	141	164	159	272	258	205	139	198
2.1242	154	87	91	88	87	81	90	60	131	241	253	142	227
2.125	333	301	255	124	343	167	205	159	292	326	221	85	147
2.126	2,328	1,308	787	513	799	538	432	252	619	563	274	184	204
2.127	304	229	257	111	266	194	194	150	248	229	155	73	125
2.1271	126	114	110	44	135	97	80	64	130	91	58	26	58
2.1272	178	115	148	67	131	97	114	86	118	138	96	46	67
2.128	24	4	3	3	7	3	3	0	9	3	0	2	5
2.129	2,047	1,216	1,027	624	1,049	780	619	512	851	817	494	326	301
2.1291	620	353	198	151	203	191	107	89	172	126	83	44	20
2.1292	316	126	133	80	184	73	85	51	102	123	68	55	25
2.1293	230	138	89	63	93	69	50	38	79	49	38	13	28
2.1294	200	128	67	68	58	53	56	29	47	51	26	29	11
2.1295	117	59	68	64	77	59	60	87	89	80	53	39	23
2.1296	106	102	86	33	63	64	63	42	58	56	47	8	20
2.1297	159	73	88	36	84	63	43	41	78	82	61	22	64
2.1298	69	43	63	27	73	32	43	24	31	14	14	21	7
2.1299	219	193	234	101	214	175	110	108	189	229	103	96	104
2.2	589	411	388	324	599	518	513	365	832	1,236	765	623	902
2.21	143	120	112	107	185	182	133	106	311	408	325	235	349
2.22	446	292	275	217	413	335	380	258	521	828	441	388	553
2.3	3	0	5	8	2	3	7	0	0	5	0	0	3

2 <0.05 percent
Note: Data for 1996 may not be strictly comparable with data for ≤1991

Table 3W
Tenure with Current Employer by Industry, February 1996
Women, Age ≥16 yr, Numbers in Thousands

Industrial Index	[0, 6) mon	[6, 12) mon	[12, 24) mon	[1, 2) yr	[2, 3) yr	[3, 4) yr	[4, 5) yr	[5, 6) yr	[7, 10) yr	[10, 15) yr	[15, 20) yr	[20, 24) yr	≥25 yr
1	89	42	76	38	68	33	44	38	62	81	72	40	120
1.1	81	30	47	30	50	16	24	11	25	16	22	7	16
1.2	8	12	29	8	15	16	17	23	37	63	48	31	105
1.21	0	0	2	*2*	0	0	0	0	4	9	3	8	1
1.22	8	12	27	8	15	16	17	23	33	54	46	23	104
1.3	0	0	0	0	3	0	3	4	0	2	2	3	0
2	9,364	5,594	4,996	2,816	5,085	3,644	3,702	2,627	5,425	5,835	3,776	2,065	1,934
2.1	8,857	5,323	4,707	2,587	4,753	3,334	3,398	2,434	4,947	5,227	3,465	1,895	1,688
2.11	1,189	559	651	376	889	613	684	570	1,257	1,523	1,031	750	600
2.111	124	77	63	11	93	80	107	63	255	263	173	96	103
2.112	385	209	215	132	250	154	177	143	312	407	253	194	124
2.113	680	273	373	233	546	378	400	364	689	852	606	460	374
2.12	7,668	4,764	4,057	2,211	3,864	2,721	2,715	1,864	3,691	3,704	2,434	1,145	1,088
2.121	2	0	9	4	11	3	0	6	18	5	0	6	6
2.122	118	52	53	18	55	56	22	30	55	45	27	2	15
2.123	724	610	501	280	519	399	393	284	673	754	580	289	268
2.1231	296	330	257	128	207	186	177	130	364	364	324	162	124
2.12311	28	20	11	3	11	4	1	5	14	13	5	7	2
2.12312	12	17	13	15	10	10	14	6	22	22	8	5	5
2.12313	13	13	12	0	13	0	6	6	5	15	32	13	6
2.12314	10	10	9	5	8	11	2	7	30	8	16	4	9
2.12315	23	31	19	10	19	21	13	7	29	23	29	15	10
2.12316	57	69	56	24	51	42	38	28	72	65	50	33	34
2.12317	66	64	50	29	37	33	40	26	75	77	73	11	28
2.12318	24	39	30	17	24	24	5	13	47	88	84	52	19
2.123181	18	29	19	9	21	16	3	7	22	47	47	31	8
2.123182	6	0	7	6	3	2	2	2	8	28	23	2	10
2.12319	23	32	22	15	12	21	38	16	54	29	17	17	7
2.1231*	9	7	22	0	5	3	1	1	*2*	0	3	2	2
2.1232	428	280	244	152	312	213	216	154	310	390	257	127	145
2.12321	92	41	45	19	45	34	35	28	51	84	31	21	27
2.12322	30	24	29	12	46	13	17	18	25	33	27	19	25
2.12323	118	48	27	32	67	36	40	30	40	63	35	33	19
2.12324	21	5	13	3	9	12	5	17	14	23	23	10	5
2.12325	90	95	73	43	80	46	56	32	83	78	73	21	26
2.12326	36	37	23	29	33	34	35	21	48	57	35	15	27
2.12327	0	6	7	4	0	0	5	0	3	1	9	0	3
2.12328	38	17	28	6	26	24	14	8	31	38	15	5	3
2.124	290	185	158	88	154	107	122	69	199	191	166	118	135
2.1241	174	116	100	65	102	65	69	39	131	113	45	34	27
2.1242	116	69	58	24	52	42	53	30	67	78	121	84	108
2.125	192	126	149	66	119	103	106	46	105	136	54	36	54
2.126	2,420	1,436	1,086	553	859	528	472	308	566	571	314	154	110
2.127	614	407	376	168	398	261	318	209	475	481	283	113	123
2.1271	289	190	206	89	229	124	129	97	245	208	158	73	66
2.1272	324	217	170	79	169	137	188	111	230	273	125	40	57
2.128	201	89	53	53	44	57	55	24	72	41	22	13	18
2.129	3,107	1,859	1,671	981	1,704	1,207	1,228	887	1,528	1,477	988	414	360
2.1291	550	265	206	146	195	130	119	98	119	81	54	10	21
2.1292	45	25	37	13	18	17	25	10	31	34	10	8	16
2.1293	355	189	139	104	148	88	108	66	106	117	54	18	17
2.1294	173	132	86	43	91	36	28	18	37	39	20	11	6
2.1295	290	200	236	142	273	247	287	189	364	389	354	191	107
2.1296	715	513	405	264	399	301	276	217	322	343	202	70	64
2.1297	240	138	156	58	146	114	115	85	142	140	132	49	45
2.1298	366	178	171	80	144	122	107	75	182	132	49	19	24
2.1299	375	220	235	131	289	151	162	127	223	203	111	38	60
2.2	500	270	282	229	322	307	296	189	466	597	311	168	243
2.21	77	31	52	30	62	69	54	33	109	115	54	42	42
2.22	423	239	230	200	259	238	242	157	357	481	256	126	201
2.3	7	*2*	6	0	10	3	7	4	12	12	0	2	3

2 <0.05 percent
Note: Data for 1996 may not be strictly comparable with data for ≤1991

Table 4M
Tenure with Current Employer by Occupation, February 1996
Men, Age ≥16 yr

Occupational Index	[0, 6) mon	[6, 12) mon	[12, 24) mon	[1, 2) yr	[2, 3) yr	[3, 4) yr	[4, 5) yr	[5, 6) yr	[7, 10) yr	[10, 15) yr	[15, 20) yr	[20, 24) yr	≥25 yr
•••••	•••••	•••••	•••••	•••••	•••••	•••••	•••••	•••••	•••••	•••••	•••••	•••••	•••••
11	1,483	1,077	1,222	638	1,146	1,015	860	766	1,633	1,751	1,301	836	1,217
11.1	647	527	545	285	553	507	390	328	866	947	708	420	638
11.11	2	8	21	12	29	23	9	10	40	60	41	21	56
11.12	487	371	396	208	405	399	278	246	593	708	545	330	486
11.13	159	148	128	65	118	84	102	71	233	179	122	69	96
11.2	836	551	677	353	593	507	470	438	767	804	593	416	579
11.21	133	142	120	56	125	98	87	83	194	265	184	89	165
11.22	145	71	72	43	81	52	48	44	93	105	70	34	31
11.23	41	30	27	25	42	31	22	29	27	41	35	27	20
11.24	15	40	46	33	32	38	19	24	34	25	19	5	19
11.25	43	13	50	21	22	7	45	34	39	43	17	12	5
11.26	88	24	75	8	31	28	23	30	60	52	36	38	95
11.27	105	59	72	45	85	84	81	76	114	100	101	123	145
11.28	25	15	45	10	47	35	9	22	34	26	36	22	16
11.29	241	158	170	112	128	136	137	96	172	145	95	67	84
12	1,896	1,177	974	509	1,108	707	687	506	1,035	1,139	691	410	545
12.1	215	144	117	70	115	131	114	95	213	196	134	91	95
12.11	45	20	29	11	18	35	22	24	51	30	15	12	10
12.12	98	82	59	28	42	35	57	36	101	98	73	49	54
12.13	73	42	29	31	55	61	35	35	61	67	46	29	31
12.2	1,081	731	544	300	681	329	369	254	463	539	259	181	212
12.21	132	203	116	70	207	111	138	88	195	269	109	86	100
12.22	116	78	90	54	115	43	43	67	76	63	58	25	35
12.23	101	113	111	53	122	57	90	42	107	122	65	33	48
12.24	730	336	226	120	235	119	92	57	85	85	27	37	28
12.25	2	1	0	4	2	0	5	0	0	0	0	0	0
12.3	599	302	313	139	312	247	204	157	359	404	298	139	238
12.31	4	14	9	12	21	15	9	8	27	50	48	19	36
12.32	12	19	12	6	13	6	14	7	15	22	11	8	14
12.33	27	10	7	5	14	4	1	5	9	5	2	5	3
12.34	37	6	35	7	13	21	11	11	16	6	11	9	17
12.35	52	39	29	29	51	20	31	14	84	114	69	36	26
12.36	467	213	222	79	200	182	138	112	208	207	157	62	141
13	1,450	793	484	387	575	470	346	195	489	459	329	222	162
13.1	13	3	3	0	5	0	0	0	4	3	0	2	1
13.2	220	147	104	69	145	128	139	69	190	230	177	109	93
13.3	1,217	643	377	319	424	342	207	126	296	226	152	111	68
13.31	783	380	200	149	145	142	67	52	134	52	46	14	17
13.32	59	37	19	21	43	33	12	5	9	7	8	15	7
13.33	296	168	125	101	184	151	111	59	140	150	67	64	39
13.34	79	57	33	48	52	15	18	11	12	16	32	16	5
14	1,475	899	700	420	887	644	604	471	1,014	1,197	797	693	786
14.1	470	310	304	135	338	225	270	189	379	408	359	290	349
14.2	676	416	246	163	307	271	217	137	330	391	159	164	147
14.3	329	173	150	121	243	148	117	144	306	398	279	240	290
15	2,305	1,469	1,119	673	1,149	644	578	472	1,018	1,098	789	610	688
15.1	667	507	418	175	434	265	195	157	418	497	346	324	339
15.2	656	398	366	248	384	227	233	221	381	393	291	187	250
15.21	505	317	272	170	300	152	171	168	277	259	179	110	121
15.22	151	82	94	78	84	75	62	52	104	134	112	77	130
15.3	982	564	336	251	331	152	149	94	219	208	152	99	99
15.31	154	74	36	31	73	31	33	17	20	33	19	23	0
15.32	828	490	300	219	258	122	116	78	199	175	133	77	99
16	216	125	101	48	147	160	109	45	137	111	72	57	73
16.1	8	7	3	10	12	6	8	8	10	13	5	6	14
16.2	208	118	99	38	135	154	101	37	127	98	67	51	59

2 <0.05 percent
Note: Data for 1996 may not be strictly comparable with data for ≤1991

Table 4W
Tenure with Current Employer by Occupation, February 1996
Women, Age ≥16 yr

Occupational Index	[0, 6) mon	[6, 12) mon	[12, 24) mon	[1, 2) yr	[2, 3) yr	[3, 4) yr	[4, 5) yr	[5, 6) yr	[7, 10) yr	[10, 15) yr	[15, 20) yr	[20, 24) yr	≥25 yr
•••••	•••••	•••••	•••••	•••••	•••••	•••••	•••••	•••••	•••••	•••••	•••••	•••••	•••••
11	1,868	1,231	1,374	742	1,500	1,173	1,131	875	1,731	1,964	1,384	842	714
11.1	669	565	552	261	592	441	506	349	742	864	607	303	280
11.11	7	7	14	5	20	11	25	7	25	61	58	29	32
11.12	430	330	353	144	326	253	304	210	437	517	387	179	174
11.13	231	229	185	113	246	177	177	132	279	286	162	95	74
11.2	1,199	666	821	481	907	732	625	527	990	1,100	778	539	434
11.21	16	12	16	13	19	5	13	17	40	16	8	1	4
11.22	48	21	40	16	25	21	12	16	47	42	58	14	20
11.23	14	16	7	10	14	16	12	3	21	20	5	1	*2*
11.24	19	26	24	16	25	26	0	6	10	20	7	1	0
11.25	266	172	159	132	222	188	171	140	248	289	213	147	54
11.26	91	32	65	15	45	32	21	22	48	38	31	22	12
11.27	456	161	261	141	339	245	225	195	330	463	316	262	272
11.28	21	25	17	14	20	12	15	19	29	24	8	4	0
11.29	269	201	232	124	199	188	155	109	217	188	132	88	72
12	4,017	2,427	2,079	1,076	1,977	1,366	1,438	1,005	2,173	2,132	1,338	626	628
12.1	277	205	161	84	163	129	171	110	254	207	134	61	47
12.11	165	123	97	48	109	90	120	66	154	128	90	33	27
12.12	42	31	22	7	20	3	14	20	37	15	23	18	11
12.13	70	51	43	30	35	35	36	25	64	64	21	10	8
12.2	1,532	932	667	371	545	352	339	237	414	454	212	114	90
12.21	115	88	121	74	123	78	83	92	113	157	61	43	30
12.22	158	94	55	47	83	69	52	24	92	81	49	11	19
12.23	31	46	49	8	22	17	13	20	44	31	8	6	4
12.24	1,206	689	433	241	311	182	188	95	158	185	94	54	36
12.25	22	15	9	1	5	5	4	5	8	0	0	0	0
12.3	2,208	1,290	1,251	620	1,268	885	928	658	1,504	1,470	992	451	491
12.31	15	6	17	12	40	13	29	19	54	66	40	35	26
12.32	46	21	18	7	26	16	17	8	*37*	21	27	11	6
12.33	515	337	274	143	341	235	248	181	375	430	301	142	161
12.34	192	172	180	85	182	155	143	127	189	191	126	49	56
12.35	21	25	36	6	47	27	17	6	75	51	35	12	23
12.36	1,419	730	725	366	633	439	475	317	774	711	463	202	220
13	2,124	1,199	832	552	826	482	529	356	613	555	336	243	154
13.1	196	74	51	53	41	52	54	20	60	38	18	13	18
13.2	41	30	20	24	27	24	35	35	37	59	28	19	8
13.3	1,887	1,095	761	475	759	406	441	301	516	457	290	211	129
13.31	939	500	322	153	310	139	121	84	171	110	99	55	34
13.32	346	258	189	132	208	113	155	108	133	142	86	89	46
13.33	269	152	109	111	92	83	78	58	100	117	71	38	28
13.34	333	186	141	79	149	70	86	51	113	89	34	30	21
14	109	84	77	44	76	76	65	31	90	119	76	45	42
14.1	12	12	12	5	7	14	13	1	7	13	17	17	10
14.2	20	2	3	0	14	7	2	0	4	13	3	0	3
14.3	77	70	62	39	56	55	50	31	79	93	56	28	29
15	764	383	378	184	387	241	241	168	352	460	335	145	151
15.1	439	265	233	116	239	178	179	115	249	344	240	115	103
15.2	78	29	37	22	41	25	37	20	45	61	45	16	17
15.21	74	26	25	22	38	25	35	20	41	52	40	14	13
15.22	4	3	12	0	4	0	2	0	4	9	5	2	5
15.3	247	90	108	46	106	39	25	34	58	54	50	14	31
15.31	7	0	0	*2*	3	6	0	0	0	0	0	0	6
15.32	240	90	108	46	103	33	25	34	58	54	50	14	25
16	56	29	14	20	37	13	18	8	12	13	18	1	15
16.1	0	0	2	1	0	0	0	4	2	8	4	0	0
16.2	56	29	12	19	37	13	18	4	10	5	14	1	15

2 <0.05 percent
Note: Data for 1996 may not be strictly comparable with data for ≤1991

Table 5
Selected Relationships Among Distributions, Densities, and Rates

Object	Type	For Survey	For Projection	Properties
Cumulative Hazard Rate	Cumulative Hazard	surv.pS(t) = - ln [surv.S(t)]	proj.pS(t) = - ln [proj.S(t)]	$0 \leq pS(t)$
Survival Distribution	CCDF	surv.S(t) = exp [- surv.pS(t)]	proj.S(t) = exp [- proj.pS(t)]	$S(0) = 1$ $S(\infty) = 0$
Failure Distribution	CDF	surv.F(t) = 1 - surv.S(t)	proj.F(t) = 1 - proj.S(t)	$F(0) = 0$ $F(\infty) = 1$
Failure Density	PDF	surv.f(t) = $\frac{d}{dt}$ [surv.F(t)]	proj.f(t) = $\frac{d}{dt}$ [proj.F(t)]	$0 \leq f(t)$
Hazard Rate	Hazard	surv.h(t) = $\frac{d}{dt}$ [surv.pS(t)]	proj.h(t) = $\frac{d}{dt}$ [proj.pS(t)]	$0 \leq h(t)$

Table 6
Best-Fit Parameters for the Model
Men and Women, Age ≥16 yr

Index	Men ahat	Men bhat	Men chat	Men dhat	Men ehat	Women ahat	Women bhat	Women chat	Women dhat	Women ehat
•••••	•••••	•••••	•••••	•••••	•••••	•••••	•••••	•••••	•••••	•••••
1	0.419202	0.191094	0.044018	0.011546	0.124143	0.290051	0.418046	0.063713	0.024627	0.043327
2	0.276827	0.636515	0.088101	0.006051	0.141658	0.250129	0.939037	0.109666	0.031985	0.102665
2.1	0.324377	0.595668	0.087389	0.019919	0.109015	0.277470	0.833819	0.108514	0.032321	0.107403
2.11	0.043861	4.447840	0.066164	0.034488	0.116661	0.084748	1.998720	0.079273	0.049409	0.113656
2.12	0.376776	0.560886	0.095216	0.006467	0.125682	0.305568	0.889310	0.124447	0.016039	0.108697
2.121	0.266007	0.440153	0.059270	0.049900	0.119457	na	na	na	na	na
2.122	0.619802	0.316139	0.113767	0	0	na	na	na	na	na
2.123	0.218908	0.639735	0.070536	0.025915	0.113364	0.165084	1.180180	0.894126	0.080540	0.093754
2.1231	0.217723	0.795202	0.074323	0.027342	0.104906	0.172193	1.134510	0.077220	0.090201	0.103338
2.12311	0.703595	0.292431	0.037842	0.094684	0.109322	0.484502	1.276570	0.090410	0.009665	0.195417
2.12312	0.442433	0.446531	0.048698	0.094918	0.126138	na	na	na	na	na
2.12313	0.331985	0.478387	0.079221	0.012449	0.135122	na	na	na	na	na
2.12314	0.211487	0.426237	0.042315	0.043329	0.098804	na	na	na	na	na
2.12315	0.305045	0.283089	0.068666	0.051614	0.100251	0.042340	0.337166	0.050972	0.090718	0.115184
2.12316	0.190225	1.423860	0.078746	0.058652	0.069841	0.256405	0.418044	0.085046	0.036736	0.108118
2.12319	0.437759	0.311856	0.052559	0.032979	0.115056	0.291735	0.091786	0.105820	0.005725	0.196204
2.1232	0.239093	0.406003	0.062184	0.030773	0.117871	0.154679	1.253990	0.102931	0.065609	0.077305
2.12324	0.034313	3.827230	0.059107	0.004754	0.132538	0.103834	4.426440	0.059719	0.116548	0.113845
2.12325	0.277978	0.410244	0.086231	0	0	0.193979	0.872272	0.102877	0.170145	0.065019
2.12326	0.205720	0.186532	0.050535	0.021722	0.138134	na	na	na	na	na
2.12327	0.183646	0.364492	0.024314	0.095531	0.107580	0.300737	0.667658	0.050978	0.420603	0.051267
2.12328	0.137624	1.603420	0.086914	0.020875	0.121328	na	na	na	na	na
2.124	0.221365	0.772908	0.070834	0.028881	0.105481	0.329332	0.596134	0.073246	0.033507	0.111826
2.1241	0.293933	0.570748	0.088556	0.009141	0.110165	0.161230	2.326760	0.140084	0	0
2.1242	0.134604	1.000010	0.043780	0.103979	0.087083	0.307734	0.641931	0.040900	0.032339	0.129211
2.125	0.191978	0.477752	0.114120	0	0	0.594524	0.208356	0.104231	0	0
2.126	0.686284	0.572179	0.123599	0	0	0.681922	0.610875	0.134084	0.025673	0.112077
2.127	0.527144	0.164232	0.100653	0	0	0.089009	6.816970	0.128726	0.093723	0.053857
2.128	1.295070	0.233755	0.053094	0	0	0.810059	0.273417	0.118508	0	0
2.129	0.584570	0.341631	0.105553	0.018520	0.117279	0.293144	0.674511	0.129111	0.041251	0.091111
2.2	0.061269	0.545935	0.072760	0.023196	0.106036	na	na	na	na	na
11	0.144620	0.643702	0.089052	0.003626	0.143063	0.237985	0.354797	0.085267	0.057832	0.106301
11.1	0.081507	1.898100	0.086164	0.029616	0.084825	0.090135	1.845090	0.097762	0.072307	0.092090
11.2	0.267571	0.336301	0.083732	0.009666	0.123318	0.364519	0.263208	0.075769	0.051253	0.114430
11.26	0.293974	0.711679	0.061388	0	0	0.571581	0.372480	0.076594	0.041432	0.134687
11.27	0.559036	0.156492	0.037178	0.009264	0.166059	0.291940	0.296596	0.065798	0.037949	0.115824
11.29	0.451227	0.238284	0.102254	0	0	0.606325	0.199448	0.083772	0.040757	0.115645
12	0.272493	0.853623	0.111454	-0.000484	-0.045460	0.221261	1.831870	0.129324	0.007070	0.111332
12.2	0.455172	0.458969	0.114890	0	0	0.507992	0.852684	0.144299	0.004807	0.125210
12.32	0.149697	0.749919	0.091861	0	0	0.224502	1.345190	0.087786	0.070834	0.120185
12.33	0.639075	0.590780	0.107070	0	0	0.135582	2.546560	0.106453	0.051664	0.081436
12.34	0.886810	0.227332	0.061266	0	0	0.106414	0.398197	0.130483	0.072914	0.046581
13	0.675693	0.423656	0.088817	0.034967	0.124480	0.762832	0.400657	0.104252	0.020945	0.137961
13.1	na	na	na	na	na	0.986396	0.238712	0.107569	0	0
13.2	0.181367	0.669919	0.077356	0.061984	0.107677	0.063469	1.231460	0.100505	0.059102	0.124819
13.3	1.104890	0.304667	0.088928	0.024065	0.142853	0.868639	0.367684	0.097337	0.024073	0.138998
14	0.279239	0.558619	0.075014	0.025963	0.114403	0.223937	0.540390	0.088422	0.057144	0.101559
14.3	0.143486	1.005570	0.065968	0.034233	0.110677	0.105632	1.903790	0.107439	0.076411	0.076300
15	0.507188	0.543843	0.077502	0.030788	0.110010	0.275246	1.256350	0.094402	0.121412	0.076511
15.1	0.425876	0.498555	0.062988	0.029014	0.124010	0.221526	1.376720	0.090525	0.099981	0.089260
15.22	0.301423	0.459073	0.064813	0.025700	0.105030	0.231294	1.026380	0.059603	0.256588	0.049700
15.3	0.846919	0.564065	0.092873	0.027092	0.112328	0.643426	0.683693	0.113643	0.020241	0.001135
16	0.733369	0.171129	0.081649	0.005862	0.136995	1.096180	0.222654	0.073336	0	0

Table 7M
Arithmetic Mean and Selected Percentiles for Projected Tenure for Selected Industries and Occupations
Men, Age ≥ 16 yr

	AMean	10p	20p	30p	40p	50p	60p	70p	80p	90p	95p	97.5p	99p
Index	yr	yr	yr	yr	yr	yr	yr	yr	yr	yr	yr	yr	yr
•••••	•••••	•••••	•••••	•••••	•••••	•••••	•••••	•••••	•••••	•••••	•••••	•••••	•••••
1	7.96	0.44	0.95	1.56	2.32	3.30	4.64	6.71	10.70	26.77	38.96	42.95	46.05
2	3.77	0.16	0.34	0.56	0.84	1.20	1.71	2.53	4.31	10.76	18.93	27.34	36.16
2.1	3.54	0.16	0.34	0.56	0.83	1.18	1.67	2.44	3.99	9.65	17.60	25.47	34.35
2.11	3.77	0.03	0.07	0.11	0.16	0.24	0.34	0.57	3.75	15.23	25.74	31.98	36.59
2.12	3.25	0.16	0.34	0.55	0.82	1.17	1.64	2.36	3.73	8.30	15.40	22.82	32.45
2.121	5.49	0.23	0.51	0.85	1.27	1.83	2.63	3.99	7.37	19.57	27.48	31.53	34.86
2.122	3.23	0.21	0.45	0.74	1.10	1.54	2.13	2.98	4.39	7.70	12.48	18.24	26.23
2.123	4.68	0.17	0.37	0.62	0.93	1.33	1.93	2.95	5.57	15.12	25.36	32.85	38.52
2.1231	3.99	0.13	0.29	0.49	0.72	1.04	1.49	2.24	4.14	12.52	22.12	30.64	38.18
2.12311	3.94	0.22	0.48	0.78	1.14	1.61	2.22	3.10	4.61	8.99	21.98	28.11	32.20
2.12312	3.87	0.18	0.39	0.64	0.95	1.34	1.88	2.69	4.24	12.76	21.89	25.62	28.62
2.12313	4.17	0.19	0.42	0.69	1.03	1.47	2.08	3.04	4.97	11.63	21.03	29.67	36.18
2.12314	7.31	0.26	0.57	0.94	1.42	2.05	2.98	4.66	9.90	28.90	37.04	41.20	44.77
2.12315	6.24	0.35	0.76	1.26	1.89	2.71	3.88	5.75	9.40	18.52	27.26	32.21	38.21
2.12316	2.83	0.07	0.16	0.26	0.39	0.56	0.79	1.15	1.98	8.29	16.86	25.13	35.09
2.12319	5.18	0.26	0.57	0.93	1.38	1.95	2.74	3.92	6.17	14.70	28.34	34.49	38.73
2.1232	6.14	0.27	0.59	0.98	1.47	2.13	3.10	4.77	8.80	20.76	30.02	34.82	38.59
2.12324	5.23	0.04	0.08	0.14	0.21	0.31	0.48	0.98	7.13	19.82	34.55	42.69	47.26
2.12325	4.99	0.25	0.54	0.90	1.35	1.94	2.77	4.11	6.78	13.77	21.75	29.78	40.41
2.12326	10.88	0.66	1.45	2.43	3.71	5.46	8.15	13.14	23.81	31.31	34.49	36.56	38.54
2.12327	9.85	0.33	0.72	1.20	1.83	2.72	4.21	10.74	25.63	30.53	33.36	35.41	37.49
2.12328	3.22	0.07	0.16	0.27	0.40	0.58	0.83	1.29	2.93	10.80	19.03	26.73	34.00
2.124	4.08	0.14	0.30	0.49	0.74	1.06	1.51	2.27	4.14	12.87	23.04	31.59	38.62
2.1241	3.89	0.17	0.37	0.62	0.92	1.13	1.87	2.75	4.61	10.86	18.72	26.64	36.53
2.1242	5.34	0.12	0.26	0.43	0.64	0.93	1.35	2.11	5.81	22.47	31.11	35.93	40.11
2.125	4.86	0.26	0.57	0.95	1.44	2.10	3.06	4.62	7.49	13.34	19.40	25.47	33.50
2.126	1.94	0.11	0.24	0.40	0.55	0.82	1.13	1.58	2.32	4.14	7.53	12.75	20.14
2.127	5.34	0.41	0.88	1.43	2.10	2.94	4.04	5.59	8.04	13.04	18.96	25.46	34.40
2.128	2.81	0.19	0.41	0.67	0.98	1.37	1.87	2.56	3.66	5.93	9.03	13.93	26.77
2.129	3.25	0.20	0.44	0.72	1.06	1.49	2.07	2.91	4.34	7.84	13.18	19.50	27.66
2.2	9.20	0.41	0.93	1.65	2.69	4.33	6.98	10.92	16.70	26.44	34.35	39.61	44.10
11	5.47	0.21	0.47	0.79	1.22	1.81	2.76	4.59	8.56	16.45	24.63	32.85	40.61
11.1	4.11	0.07	0.16	0.28	0.42	0.62	0.97	1.88	6.00	14.00	21.90	29.50	38.41
11.2	5.72	0.31	0.68	1.13	1.69	2.44	3.49	5.17	8.39	16.02	24.60	32.71	40.06
11.26	3.70	0.13	0.28	0.46	0.69	0.97	1.36	1.94	3.07	8.68	19.85	31.14	46.06
11.27	7.92	0.46	1.00	1.64	2.43	3.43	4.79	6.85	10.85	30.19	33.62	35.52	37.25
11.29	4.77	0.32	0.70	1.15	1.70	2.39	3.33	4.68	6.94	11.92	18.05	24.68	33.60
12	2.91	0.12	0.25	0.42	0.63	0.89	1.27	1.88	3.19	8.12	14.32	20.54	28.76
12.2	3.09	0.17	0.38	0.62	0.91	1.29	1.81	2.57	3.94	7.64	13.14	19.13	27.10
12.32	4.90	0.18	0.39	0.65	0.99	1.47	2.22	3.69	7.26	14.74	22.29	29.84	39.81
12.33	2.06	0.11	0.24	0.40	0.59	0.83	1.14	1.59	2.35	4.26	8.21	14.39	22.94
12.34	3.80	0.24	0.53	0.86	1.26	1.76	2.42	3.35	4.86	8.24	13.59	22.38	36.94
13	2.64	0.15	0.33	0.54	0.80	1.12	1.55	2.16	3.20	5.80	10.96	18.53	26.91
13.1	na	na	na	na	na	na	na	na	na	na	na	na	na
13.2	4.87	0.18	0.40	0.66	1.01	1.47	2.19	3.55	7.26	16.19	23.85	29.17	33.76
13.3	2.33	0.16	0.34	0.56	0.82	1.15	1.57	2.16	3.10	5.13	8.13	13.21	22.76
14	4.27	0.18	0.39	0.64	0.96	1.37	1.95	2.89	4.96	12.79	22.43	30.42	36.82
14.3	4.67	0.12	0.27	0.44	0.66	0.96	1.41	2.26	5.59	16.84	27.12	33.53	38.40
15	2.80	0.14	0.30	0.49	0.72	1.01	1.41	1.98	2.98	5.96	13.36	22.43	31.91
15.1	3.59	0.16	0.35	0.58	0.86	1.21	1.68	2.39	3.69	8.48	20.44	29.40	34.88
15.22	4.86	0.21	0.46	0.75	1.12	1.60	2.28	3.35	5.64	14.35	25.67	34.49	41.10
15.3	1.74	0.10	0.22	0.36	0.53	0.74	1.01	1.40	2.03	3.45	5.93	11.53	21.26
16	4.81	0.34	0.74	1.21	1.78	2.49	3.42	4.74	6.88	11.57	17.99	26.21	36.46

Note: In simulations, use values to one decimal place

Table 7W

Arithmetic Mean and Selected Percentiles for Projected Tenure for Selected Industries and Occupations

Women, Age ≥ 16 yr

Index	AMean yr	10p yr	20p yr	30p yr	40p yr	50p yr	60p yr	70p yr	80p yr	90p yr	95p yr	97.5p yr	99p yr
•••••	•••••	•••••	•••••	•••••	•••••	•••••	•••••	•••••	•••••	•••••	•••••	•••••	•••••
1	5.38	0.24	0.51	0.85	1.26	1.80	2.57	3.79	6.36	14.98	25.64	36.27	50.06
2	2.87	0.11	0.24	0.40	0.59	0.85	1.21	1.80	3.16	8.42	14.64	20.72	28.16
2.1	2.91	0.12	0.26	0.43	0.64	0.91	1.30	1.92	3.27	8.33	14.62	20.75	28.11
2.11	3.93	0.07	0.15	0.25	0.38	0.56	0.84	1.52	5.56	14.61	22.73	28.50	33.32
2.12	2.51	0.11	0.23	0.38	0.57	0.81	1.15	1.69	2.78	6.84	12.33	17.83	24.94
2.121	na	na	na	na	na	na	na	na	na	na	na	na	na
2.122	na	na	na	na	na	na	na	na	na	na	na	na	na
2.123	3.43	0.10	0.22	0.36	0.55	0.79	1.15	1.82	4.02	11.41	18.59	24.82	31.16
2.1231	3.55	0.10	0.22	0.37	0.55	0.79	1.14	1.77	3.81	12.45	20.31	26.00	30.97
2.12311	1.41	0.06	0.13	0.21	0.30	0.42	0.58	0.81	1.17	2.10	5.49	14.23	24.20
2.12312	na	na	na	na	na	na	na	na	na	na	na	na	na
2.12313	na	na	na	na	na	na	na	na	na	na	na	na	na
2.12314	na	na	na	na	na	na	na	na	na	na	na	na	na
2.12315	4.90	0.25	0.54	0.89	1.32	1.87	2.64	3.83	6.26	16.57	24.45	28.35	31.58
2.12316	5.10	0.26	0.56	0.93	1.40	2.02	2.92	4.39	7.43	15.00	22.87	29.42	35.39
2.12319	7.48	0.71	1.51	2.45	3.55	4.89	6.59	8.88	12.31	18.81	24.91	28.47	31.11
2.1232	3.31	0.10	0.21	0.36	0.54	0.78	1.15	1.86	4.17	10.63	17.04	23.21	30.70
2.12324	1.88	0.02	0.05	0.09	0.13	0.17	0.24	0.34	0.51	4.10	16.11	22.60	27.22
2.12325	3.53	0.14	0.30	0.49	0.74	1.08	1.59	2.52	4.87	10.87	16.82	22.38	29.00
2.12326	na	na	na	na	na	na	na	na	na	na	na	na	na
2.12327	3.66	0.14	0.31	0.51	0.75	1.07	1.51	2.19	3.65	11.01	20.28	27.60	34.98
2.12328	na	na	na	na	na	na	na	na	na	na	na	na	na
2.124	3.66	0.15	0.33	0.55	0.81	1.16	1.63	2.36	3.83	10.10	19.94	28.34	35.12
2.1241	1.94	0.05	0.11	0.17	0.26	0.37	0.53	0.80	1.56	5.99	10.94	15.89	22.43
2.1242	4.12	0.14	0.30	0.50	0.73	1.03	1.43	2.03	3.15	11.91	29.48	33.41	36.40
2.125	4.38	0.31	0.68	1.11	1.63	2.28	3.15	4.37	6.37	10.66	16.11	22.34	30.99
2.126	1.81	0.11	0.23	0.37	0.55	0.77	1.06	1.48	2.19	3.92	7.14	11.92	18.53
2.127	1.35	0.02	0.04	0.06	0.09	0.12	0.17	0.25	0.41	3.80	9.01	14.17	20.86
2.128	2.94	0.21	0.45	0.73	1.07	1.49	2.04	2.83	4.10	6.87	10.72	15.70	23.17
2.129	3.02	0.15	0.32	0.53	0.79	1.14	1.62	2.40	3.98	8.43	13.61	18.73	25.22
2.2	na	na	na	na	na	na	na	na	na	na	na	na	na
11	5.69	0.32	0.69	1.15	1.74	2.52	3.66	5.50	9.03	16.59	23.63	28.97	33.82
11.1	3.69	0.08	0.17	0.29	0.44	0.66	1.03	2.03	5.73	12.60	19.15	25.04	31.38
11.2	5.63	0.34	0.74	1.23	1.83	2.61	3.69	5.36	8.47	16.22	24.06	29.34	33.71
11.26	3.39	0.19	0.41	0.68	1.00	1.41	1.96	2.76	4.17	8.19	16.36	23.75	28.91
11.27	6.38	0.34	0.74	1.23	1.85	2.66	3.83	5.73	9.64	19.99	28.52	33.33	37.20
11.29	4.78	0.33	0.72	1.18	1.74	2.44	3.37	4.72	6.97	12.12	19.00	25.76	31.91
12	1.87	0.06	0.12	0.20	0.30	0.42	0.59	0.86	1.45	5.15	10.50	15.83	22.85
12.2	1.73	0.09	0.19	0.31	0.46	0.65	0.90	1.27	1.92	3.77	7.68	12.44	18.76
12.32	2.51	0.08	0.16	0.27	0.40	0.57	0.80	1.17	1.99	7.71	15.48	21.67	27.00
12.33	2.19	0.05	0.10	0.16	0.24	0.34	0.48	0.72	1.39	6.95	13.29	19.49	27.25
12.34	5.67	0.40	0.88	1.48	2.23	3.20	4.53	6.42	9.29	14.38	19.49	24.56	31.15
13	2.42	0.15	0.33	0.53	0.78	1.10	1.51	2.10	3.08	5.39	9.36	15.45	23.81
13.1	2.92	0.21	0.45	0.74	1.08	1.51	2.06	2.84	4.08	6.71	10.29	15.12	22.98
13.2	5.38	0.16	0.36	0.63	1.04	1.74	3.24	6.01	10.06	16.64	22.04	25.99	29.62
13.3	2.38	0.15	0.33	0.54	0.79	1.11	1.52	2.11	3.06	5.24	8.83	14.86	23.69
14	4.65	0.21	0.46	0.77	1.15	1.68	2.45	3.78	6.77	14.14	21.40	27.47	33.29
14.3	3.18	0.07	0.16	0.26	0.39	0.58	0.88	1.56	4.40	10.64	16.72	22.56	29.67
15	2.22	0.08	0.16	0.27	0.40	0.57	0.79	1.14	1.84	5.77	12.63	19.11	26.69
15.1	2.47	0.07	0.16	0.27	0.39	0.56	0.79	1.16	1.98	7.35	14.57	21.12	28.15
15.22	3.23	0.10	0.21	0.35	0.52	0.73	1.03	1.50	2.51	9.46	19.26	27.84	37.14
15.3	1.81	0.10	0.21	0.34	0.51	0.71	0.98	1.37	2.01	3.62	7.08	12.87	20.93
16	3.15	0.22	0.47	0.77	1.12	1.56	2.14	2.94	4.22	6.95	10.83	16.77	27.99

Note: In simulations, use values to one decimal place