Growth in New Disabled-Worker Entitlements, 1970–2008

by David Pattison and Hilary Waldron*

We find that three factors—(1) population growth, (2) the growth in the proportion of women insured for disability, and (3) the movement of the large baby boom generation into disability-prone ages—explain 90 percent of the growth in new disabled-worker entitlements over the 36-year subperiod (1972–2008). The remaining 10 percent is the part attributable to the disability "incidence rate." Looking at the two subperiods (1972–1990 and 1990–2008), unadjusted measures appear to show faster growth in the incidence rate in the later period than in the earlier one. This apparent speedup disappears once we account for the changing demographic structure of the insured population. Although the adjusted growth in the incidence rate accounts for 17 percent of the growth in disability entitlements in the earlier subperiod, it accounts for only 6 percent of the growth in the more recent half. Demographic factors explain the remaining 94 percent of growth over the 1990–2008 period.

Introduction

The size of the working-age population in the United States has increased steadily since 1970 (Chart 1). The number of workers insured for Social Security Disability Insurance (DI) benefits but not receiving benefits has grown almost as steadily. The number of workers becoming entitled to DI benefits—while much smaller (about 0.4 percent of the working-age population in 2008, or 0.6 percent of the exposed disability-insured population[1])—has also grown, increasing from 254,200 in 1970 to 897,000 in 2008. Much of this growth in newly disabled workers reflects the growth in the pool of workers insured for disability. This in turn reflects the growth in the US working-age population and the increasing proportion of women who, because of their rising labor force participation, are insured for disability. In this article, we estimate how much of the growth in newly entitled disabled workers is attributable to the growth in the size of the underlying risk pool and how much of the growth in new disabled-worker entitlements remains unexplained.

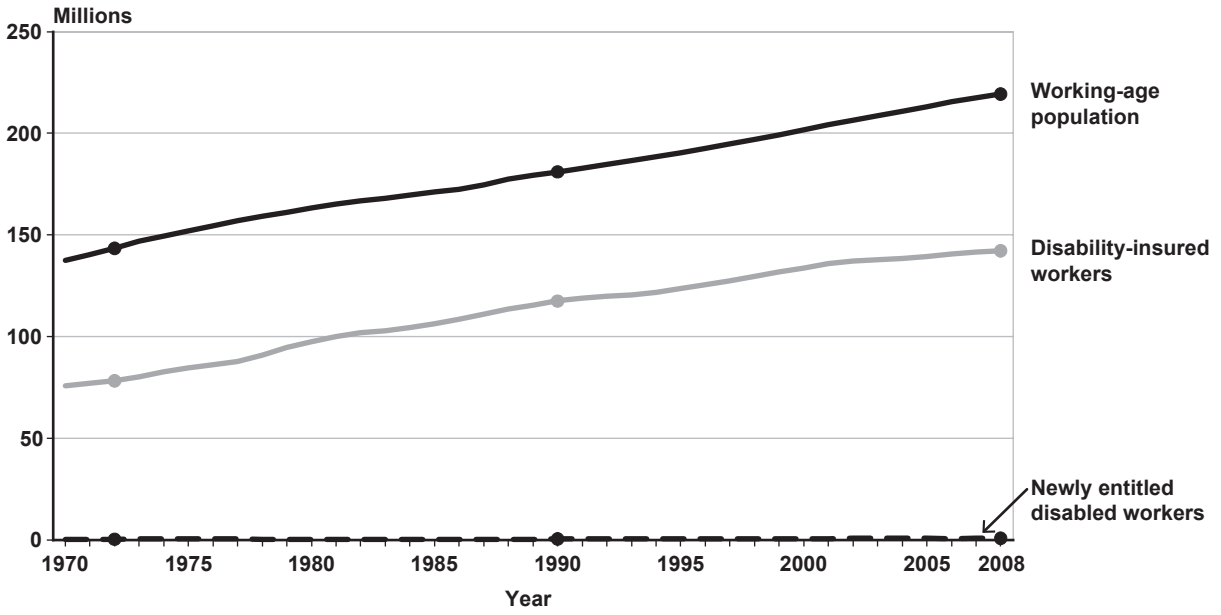
Our analysis is complicated by two factors. First, the number of newly disabled workers has not followed a smoothly growing path, but has instead shown large fluctuations—with peaks around 1975, 1991, and 2002 and troughs around 1982, 1997, and 2006 (Chart 2). Those large fluctuations remain even after subtracting the effects of population growth or growth in the number of disability-insured workers. Because of these large swings, any attempt to calculate what percentage of total growth in newly disabled workers is due to population growth or to growth in number of disability-insured workers will be quite sensitive to the period chosen. This problem is addressed in this analysis in two ways. First, the decomposition is calculated year by year, instead of over a few select periods, allowing a visual inspection of the cumulative differences. Second, for decomposing average growth over longer periods, we chose 3 reference years (1972, 1990, and 2008)—neither at the peaks nor at the

Selected Abbreviations

DI	Disability Insurance
OCACT	Office of the Chief Actuary
SSA	Social Security Administration
SSI	Supplemental Security Income

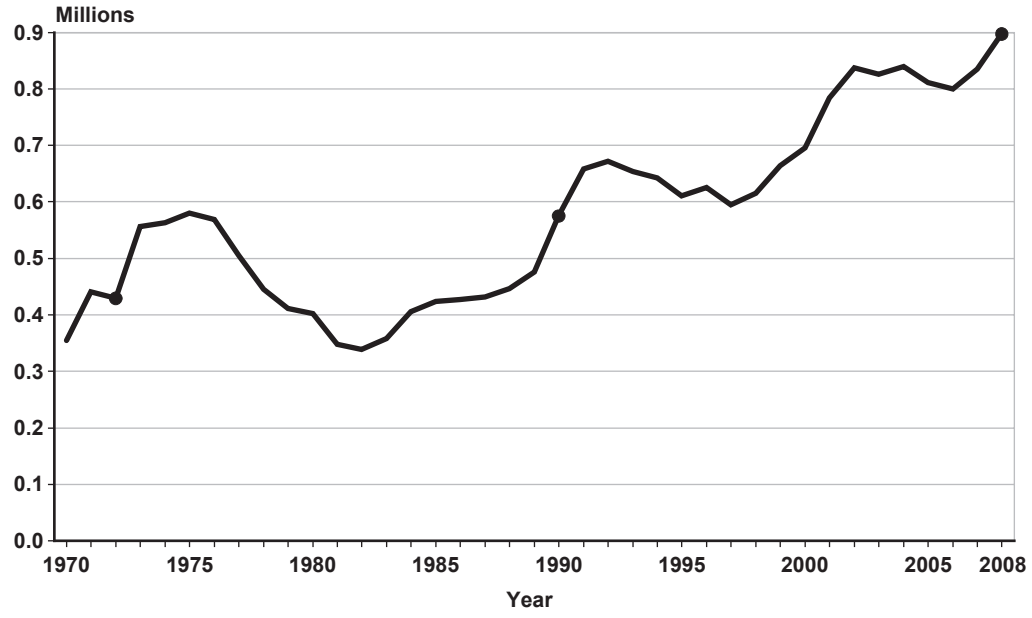
* *David Pattison and Hilary Waldron are economists with the Office of Economic Analysis and Comparative Studies, Office of Research, Evaluation, and Statistics, Office of Retirement and Disability Policy, Social Security Administration.*

Chart 1.
Size of the working-age (16–64), disability-insured, and newly entitled disabled-worker populations, 1970–2008



SOURCE: Social Security administrative data.

Chart 2.
Number of workers newly entitled to Social Security DI benefits, 1970–2008



SOURCE: Social Security administrative data.

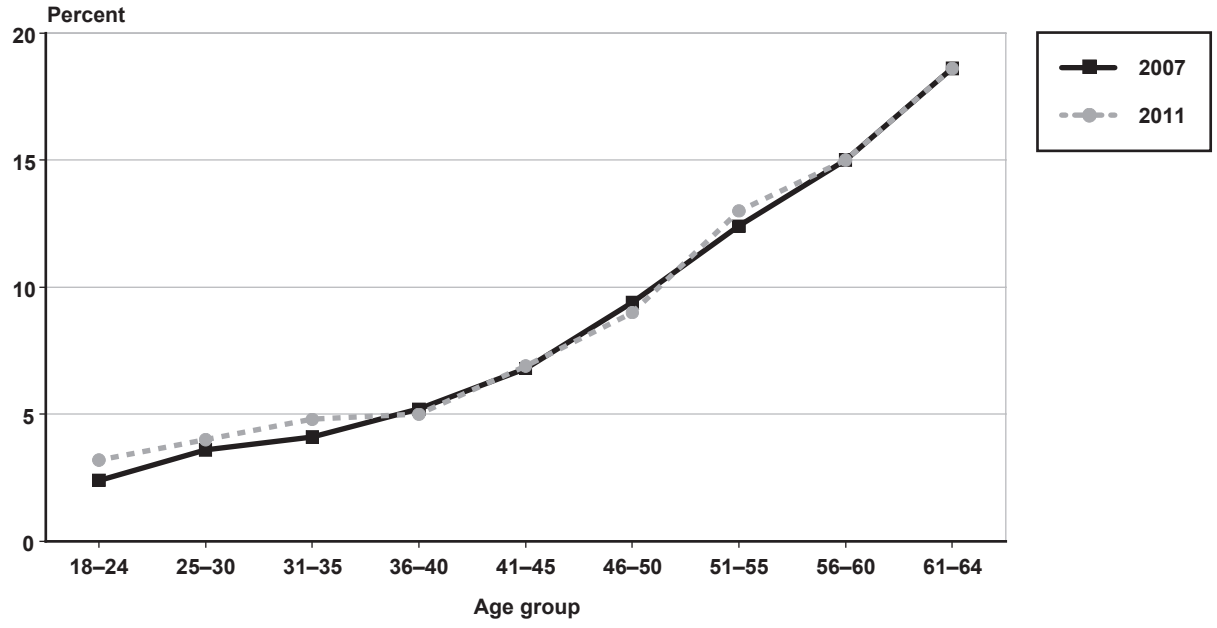
troughs—to make growth comparisons. It should be noted, however, that the choice of reference years is somewhat arbitrary, and some of the decompositions are sensitive to the choice of years.

The second complication is that the age composition of the working-age population changed substantially over the period under study (1970–2008), as the baby boom cohorts (born 1946–1964) grew older. In 1970, some of them were still too young to be working. By 2008, the older ones were beginning to retire. This aging of the working-age population can be expected to have appreciable effects on the percentage of workers who become disabled. As shown in Chart 3, work-limiting health problems increase with age.[2] As the working-age population has shifted into the more disability-prone[3] ages, the average probability of becoming entitled to DI has risen as well. Therefore, we can expect that the number of newly disabled workers has grown faster than the growth in the working-age population itself. In this article, an index-number technique is used to estimate how much of the overall growth in new disability entitlements can be attributed to this age shift in the working-age population rather than to the overall growth in that population. There will be an additional age-related effect if the proportion of the population that is disability insured has been growing faster at older ages than at younger ages. Because growth in the insured population has differed by sex, our "age adjustment" needs to take into account the shifting age composition of the insured population by sex as well as age.

The total number of new disability entitlements in any given year can be considered the product of three factors: (1) the number of people in the working-age population in that year, (2) the proportion of the working-age population that is disability insured and exposed to the risk of becoming entitled in that year, and (3) the proportion of exposed disability-insured workers who actually became entitled in that year. The index-number technique estimates how much of the growth in each of those factors is attributable to the shift in the age composition rather than to overall growth.

The third factor, the "disability incidence rate," is of special interest. It is the part of the growth in the new disabled-worker population that is not explained by the growth in the number of disability-insured workers. During periods when the baby boom cohorts were moving into the disability-prone ages, the overall (gross) disability incidence rate would have risen even if age-specific incidence rates were not changing. The age-adjusted incidence rate shows the rise in incidence that can be attributed to changes in the disability incidence rate at each age, rather than to a shift in the

Chart 3.
Percentage of CPS respondents self-reporting a health problem or disability that prevents or limits work, by age group, 2007 and 2011



SOURCE: Authors' tabulations using the 2007 and 2011 Current Population Survey (CPS).

age composition from low-incidence ages to high-incidence ages. The difference between the adjusted disability incidence rate and the unadjusted rate gives the change in the incidence rate that can be attributed to the shift in the age distribution of the insured population, rather than to changes in the incidence rate at each age.

The first two factors in the growth decomposition—working-age population growth and the proportion of the population that is disability insured—are affected by the age/sex adjustments as well. Each of those factors has an unadjusted growth rate and a growth rate adjusted for changes in the age/sex composition. The difference between the unadjusted and the adjusted growth rates is the growth in the factor attributable to the age/sex adjustment.

Instead of three factors in the growth decomposition, we can think of six: (1) the unadjusted growth in the working-age population, (2) the age adjustment to that growth, (3) the unadjusted growth in the proportion of exposed insured workers, (4) the corresponding age adjustment to the proportion exposed, (5) the unadjusted incidence rate, and (6) the corresponding age adjustment to the incidence rate. From those six components, other growth rates can be assembled. For example, the adjusted growth in the incidence rate is equal to the unadjusted growth in the incidence rate plus its age/sex adjustment. The unadjusted growth in exposed workers equals the unadjusted growth in the working-age population plus the unadjusted growth in the proportion insured. The adjusted growth in exposed workers equals the adjusted growth in the working-age population plus the adjusted growth in the proportion insured.

The adjusted incidence rate can be considered the residual growth that is unexplained after taking into account all the easily observable factors: population growth, the increase in the proportion of the population that is disability insured (driven by an increase in women's labor force participation), and the interaction of the shifting age composition of the insured population with the age pattern of disability incidence. Summarizing the results, we find that these factors account for 90 percent of the growth in new disabled-worker entitlements over the 36-year period (1972–2008) and 94 percent of the growth over the more recent half of that period (1990–2008).

The shifting age composition has much different effects in the two subperiods. Although the unadjusted measure for the disability incidence rate seems to grow faster in 1990–2008 than in 1972–1990, this apparent speedup disappears once the changing demographic structure of the insured population is taken into account. The growth in the adjusted incidence rate actually slows down across those two subperiods, and the share of incidence in total growth declines as well: Although growth in the adjusted incidence rate accounts for 17 percent of the growth from 1972 through 1990, it accounts for only 6 percent of the growth from 1990 through 2008.

This article and the estimates just summarized focus on disability *incidence*, as measured by the number of exposed workers becoming newly entitled to benefits in any given year, in contrast to disability *prevalence*, as measured by the number of exposed workers receiving disability benefits in any given year. Incidence measures the flow of workers onto the disability rolls. Prevalence, on the other hand, measures the stock of workers on the rolls—which is determined not just by the flow of workers onto the rolls but also by the flow of workers off the rolls (through death, recovery, or conversion to old-age benefits)—and by their duration on the rolls. In 2008, the number of disabled workers receiving benefits was approximately 3.4 percent of the working-age population (or 5.2 percent of the exposed disability-insured population), considerably higher than the 0.6 percent of the disability-exposed population that began receiving benefits during that year. Understanding changes in disability prevalence is the key to understanding growth in program costs over time. Disability incidence, the focus of this study, is the most important factor in the growth of disability prevalence, but it is not the only factor.

Background

This section summarizes relevant aspects of the Social Security DI program and discusses the main demographic factors behind the growth in new disabled-worker entitlements.

Although the original Social Security Act was enacted in 1935, cash disability benefits were not added to the Act until 1956. The evolution of the current legislative definition of disability actually began before that, with the introduction in 1954 of a disability freeze provision for the calculation of old-age and survivor benefits.[4] The current legislative definition of disability has been in place since 1967, with several steps taken between 1954 and 1967.

- The 1954 amendments, introducing the disability freeze provision, defined disability as "the inability to engage in any substantial gainful activity

by reason of any medically determinable physical or mental impairment which can be expected to result in death or to be of long-continued and indefinite duration." The amendments also defined the requirements for the attainment of disability-insured status, setting the outlines for the definition that is still in use today.[5]

- The 1956 amendments, which introduced cash benefits for workers aged 50–64, maintained the 1954 definition of disability.
- The 1960 amendments eliminated the age-50 requirement.
- The 1965 amendments liberalized the definition of disability to a disability that is expected to last at least 12 months (as opposed to "long-continued or indefinite duration"), while keeping the rest of the 1954 definition intact (Myers 1993, 239–241).
- The 1967 amendments tightened the definition of substantial gainful activity (SGA) by specifying that an individual be unable to engage in any SGA *that exists in the national economy* (Cohen and Ball 1968).[6]

The legislative definition of disability has not changed since 1967 (apart from changes in the dollar level associated with SGA[7]), although subsequent amendments, in 1984 in particular, have provided more detailed instructions to the Social Security Administration (SSA) on how to conduct the disability determinations. It is unclear how much the 1984 amendments represent a liberalization of the disability determination standards in place in the 1970s and how much they represent a reversal of a previous tightening of disability determination standards that occurred in the early 1980s.

These variations in the legislated disability determination process and their effects on policy implementation may have been responsible for some of the variation in disability incidence, shown in Charts 2 and 4. However, other factors may have contributed to those swings, including changing economic conditions. In economic recessions, for example, disabled workers might be more likely than nondisabled workers to lose their old jobs and less likely to be hirable for new jobs. These separate factors are difficult to quantify precisely, and we will treat all of them as a composite residual left over from what is explainable by the growth in disability-insured workers.

This article, accordingly, focuses on the role of growth in insured workers in explaining growth in new disabled-worker entitlements. Growth in insured workers can be decomposed into growth in the population as a whole and growth in the percentage of the population insured for disability.

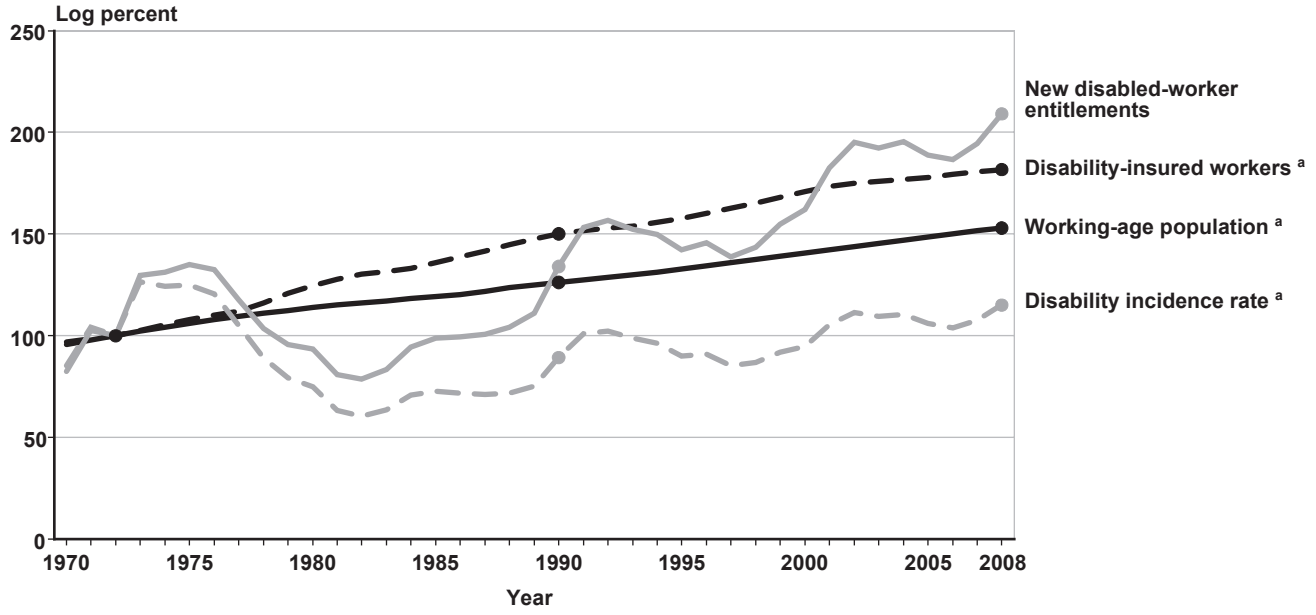
Population growth is a major driver of new disabled-worker entitlement growth. The effects of population change can be divided into two parts: overall growth and change in the age structure. Overall population growth is measured in this article by the size of the population aged 16–64. As indicated in Chart 4, that population grew by just over 50 percent over the 1972–2008 period, an average annual rate of 1.13 log percent.[8] Although the number of newly disabled workers did not always grow that fast, over the 36-year period as a whole it grew by 105 percent, or 1.99 log percent yearly, almost twice as fast as the population grew.

The population, however, does not grow at the same rate at all ages. The large cohort sizes associated with the baby boom and similar, but smaller, demographic cycles will lead to a changing age distribution as people who are a part of demographic booms or busts age through the life cycle. Because disability incidence is not constant across all ages, the changing age distribution would affect the overall disability incidence rate even if age-specific incidence rates were not changing.

As previously discussed, work-limiting disability as self-reported in the Census Bureau's Current Population Survey rises with age (shown in Chart 3). This rise in disability incidence with age is evident in DI entitlements as well.[9] Because disability onset is much more probable at older ages, a shift in the age composition toward the ages of likely disability entitlement will create an additional population effect on disability entitlement growth.

Over our study period, workers in the large baby boom birth cohorts (born from 1946 through 1964) were ages 8–24 in 1970 and ages 44–62 in 2008. During that period, therefore, we expect that this movement of the baby boom population into the more disability-prone ages will add to the effect of overall population growth. The age/sex-adjusted population growth index (calculated later) allows us to measure this additional demographic composition component of population growth. (The use of the population aged 16–64 to represent overall population growth is already in itself a crude age adjustment because that age range wholly contains the ages at which disability entitlement could have occurred, aside from a few years at the end of the study period when entitlement could have occurred after age 65.)

Chart 4.
Cumulative growth in the number of newly entitled disabled workers compared with *unadjusted* growth in the working-age population (16–64), the number of disability-insured workers, and the disability incidence rate



SOURCE: Social Security administrative data.

NOTE: The cumulative growth for the *unadjusted* components is set at 100 percent in 1972.

a. Unadjusted.

A second important driver in the growth of disabled-worker entitlements is the growth in the proportion of the population insured for disability. This is largely a story of the growth in the percentage of women insured for disability, which in turn is due to the growth in female labor force participation. For females aged 16 or older, labor force participation was about 40 percent in 1966 and about 60 percent in 2008.[10] Labor force participation of women during their prime earnings ages (25–54) was 45.2 percent in 1965 and 75.3 percent in 2005 (Mosisa and Hipple 2006, Table 1).

A worker is disability insured if he or she has had Social Security–covered employment in 5 of the preceding 10 years; this is true for all but the youngest workers. Although an increase in women's labor force participation will not necessarily translate into an increase in the proportion of women insured for disability, any persistent attachment to the labor force that increases the proportion of women with steady earnings will increase the share who have had earnings in at least 5 out of the past 10 years and who are, therefore, insured for disability.

Like population growth, the effect of growth in insured status can be divided into an overall growth level and an adjustment for the changing age/sex structure of insured workers, as the baby boom cohorts move through the disability-prone ages. Although the dramatic gains in female labor force participation at younger ages have almost leveled off (discussed later), there has been a less dramatic but continuing gain among women in their forties and fifties. At these ages, the persistent increase in their labor force participation has continued to contribute to growth in new disabled-worker entitlements.

Once we account for growth in the insured population, any remaining growth in the number of disabled-worker entitlements is classified as growth in the "incidence rate"—the ratio of new disability entitlements to exposed disability-insured workers. The incidence rate is the residual element unexplained by growth in the population or in the proportion of the population insured. It, too, can be divided into an overall growth in incidence and an adjustment for the changing age/sex composition of the population.

Many factors can contribute to the incidence rate residual. It can be affected by health and labor market trends and macroeconomic shocks that may affect disabled workers who are struggling to retain their jobs. Worker's perceptions of their probability of being awarded benefits may also influence their application rate, which can in turn affect the residual disability incidence rate.[11] The incidence rate residual may be sensitive to policy, legislative changes, and judicial rulings that influence how disability is determined. We do not attempt to measure or disentangle those other potential contributing factors.

Growth in disability incidence—the flow of newly entitled disabled workers onto the disability rolls—is the most important factor underlying growth in disability prevalence. Disability program costs, however, are even more closely related to disability *prevalence*—the number of disabled workers currently on the rolls. As discussed by Zayatz (2011), disability prevalence rates can also be affected by changes in the death and recovery rates of disabled-worker beneficiaries, as well as changes in the age at which disability benefits are converted to old-age benefits.[12]

Growth in disability prevalence can also be analyzed with techniques like those used here, but the analysis is complicated by the additional dimension of duration on the disability rolls.[13] Even if the age/sex structure of the population were not changing, trends that offset each other in the measure of incidence—such as a decrease in disability incidence at older ages offset by an increase at younger ages—can become much more important for a prevalence measure if, for example, workers who enter the disability rolls at younger ages tend to stay on the rolls longer than workers who enter at older ages. When the demographic structure is changing as well, the analysis is that much more complicated. An upsurge of age-50 disability incidence in 1990, when the baby boom cohorts were entering their disability-prone ages, will have more lasting consequences for disability prevalence than an age-50 upsurge in 1975, when the baby boom cohorts were younger. Exploring best measures for decomposing the growth in disability prevalence is a topic for additional research.

Data and Methods

Social Security administrative data allow the tabulation of the population of people with Social Security numbers (SSNs), the subset of that population that is insured for disability but not receiving benefits, and the subset of the exposed disability-insured population that becomes newly entitled to benefits. (In the Appendix, we discuss at greater length the data and methods provided in this section.)

These three numbers—population "*N*," exposed workers "*Exposed*," and new disabled workers "*DW"*—are tabulated for each sex *s*; for each age *x,* from ages 16 through 64; and for each year *t,* from 1970 through 2008. The numbers, tabulated using administrative data, are the basis for the rest of the calculations. With 49 ages and 2 sexes, there are 98 such numbers tabulated yearly for each of the three series (population, exposed workers, and new disabled workers), or 3,822 such numbers over the 39 years of data for each series.

The numbers tabulated for the age/sex composition of the working-age population can be aggregated each year to give the total working-age population,

$$N_t = \sum_x \sum_s N_{txs},$$

and, similarly, for the total exposed population $Exposed_t$ and the total new disabled workers DW_t.

The unadjusted incidence rate, r_t, is simply the ratio of the new disabled workers to the number of exposed workers,

$$r_t = \frac{DW_t}{Exposed_t}.$$

This yields a two-component decomposition of new disabled workers as the product of exposed workers and the incidence rate,

$$DW_t = Exposed_t \times r_t.$$

This two-part decomposition will be used here to explain the calculation of the age-adjusted incidence rate and the number exposed. (The extension to a three-part decomposition will be described shortly.) The year-by-year unadjusted numbers yield year-to-year growth rates in each component, unadjusted for changes in the age/sex composition. If log growth rates were used, they would add up, rather than multiply up,

$$g\left(DW_t\right) = g\left(Exposed_t\right) + g\left(r_t\right).$$

These unadjusted growth rates, however, can be misleading. If the incidence rate at each age stays the same, but the age composition of the exposed population shifts toward the disability-prone ages, the unadjusted incidence rate will grow, even with no growth in the incidence rate at each age. We would like to supplement those unadjusted growth rates with adjusted rates that indicate that some of the apparent

increase in incidence rates is really due to the shift in the exposed population toward ages with higher incidence rates. From that perspective, we want an adjusted incidence growth rate that is lower than the unadjusted rate, and an adjusted exposed population growth rate that is higher than the unadjusted rate.

The raw material for calculating adjusted growth rates are the growth rates in each age/sex cell, which are tabulated from the data,

$$g\left(DW_{txs}\right) = g\left(Exposed_{txs}\right) + g\left(r_{txs}\right).$$

The index calculated next belongs to the family of indexes in which the overall index is a weighted average of the cell indexes. The weight used for each cell is that cell's share in the total number of new disabled workers for that year,

$$w_{txs} = \frac{DW_{txs}}{DW_t}.$$

The index for growth in the exposed population—using these cell weights—is the weighted average of all the age/sex growth rates,

$$g\left(Exposed_t^*\right) = \sum_x \sum_s w_{txs} \cdot g(Exposed_{txs}),$$

where the asterisk signifies the adjusted growth rate.

Cell weights set equal to the share in the total have many desirable properties for the calculation of growth indexes. One desirable property is that the same set of cell weights can be used for all the components of the number of disabled workers. The weights used earlier to calculate the adjusted growth in the exposed population are also used to calculate the adjusted growth in the incidence rate,

$$g\left(r_t^*\right) = \sum_x \sum_s w_{txs} \cdot g\left(r_{txs}\right).$$

These are chain-weighted indexes because the weights w_{txs} change each year with the changing age/sex composition of the new disabled-worker population. As the intervals over which the growth rates are measured become shorter, the appropriate weight converges on the instantaneous disabled-worker share. Over longer periods, like the annual intervals used in this study, the weight shares will differ slightly from one year to the next. We use the Törnqvist index here, which simply averages the beginning share and the end share to represent the share for that interval's growth rates.

This decomposition of total growth into components becomes exact at the shortest time intervals, so that the adjusted component rates add up exactly to the growth in new disabled workers,

$$g\left(DW_t\right) = g\left(Exposed_t^*\right) + g\left(r_t^*\right).$$

Because the unadjusted rates also give, by their definition, an exact decomposition,

$$g\left(DW_t\right) = g\left(Exposed_t\right) + g\left(r_t\right),$$

the total growth can be considered the sum of four components: (1) the unadjusted growth in the exposed population, *g(Exposed)*; (2) the composition effect in the exposed population given by the difference between the adjusted and the unadjusted growth rate, *g(Exposed*)-g(Exposed)*; (3) the unadjusted growth in the incidence rate, *g(r)*; and (4) the composition effect for the incidence rate, *g(r*)-g(r)*.

Another advantage of this type of index is that because the same set of weights is used across components of the decomposition, the technique is easily extended to more than two components. For some of the analysis in this article, the exposed population will be factored into two components: the population (N) and the proportion of the population that is disability exposed ($p=Exposed/N$). The total growth can then be decomposed into three components, $g(DW_{txs}) = g(N_{txs}) + g(p_{txs}) + g(r_{txs})$, and the same weights as those used on the other components can be used to calculate a weighted average of the share exposed,

$$g\left(p_t^*\right) = \sum_x \sum_s w_{txs} g(p_{txs}).$$

The three components (or six, when each one is divided into two components—an unadjusted one and one that is adjusted by age and sex) are used in this article's accompanying tables. In the charts, which show cumulative changes, the focus will be on *N*, *Exposed*, and *r,* rather than on *N*, *p*, and *r*.

The index calculations yield annual growth rates, rather than levels. These annual growth rates can be averaged over longer periods, as Table 1 shows. For the charts, it is convenient to calculate cumulative growth (multiplying together the annual growth rates) and plot the cumulative growth relative to a base year, which for our purposes is 1972.

The raw numbers for the analysis—the numbers by sex and single year of age for the population, exposed workers, and new disabled workers—are tabulated from a 1 percent sample of the population with registered SSNs. The population with registered SSNs is close to representing the national population, and the populations of exposed disability-insured workers

Table 1.
Percentage decomposition of average annual growth rates, by selected reference subperiods

Component	1972–1990	1990–2008	1972–2008
	Panel 1: Growth in the working-age population (16–64)		
Unadjusted	1.30	1.06	1.18
Age/sex adjustment	-0.35	0.88	0.26
Adjusted	0.95	1.94	1.44
	Panel 2: Growth in the proportion insured		
Unadjusted	0.96	0.00	0.48
Age/sex adjustment	-0.56	0.39	-0.09
Adjusted	0.40	0.38	0.39
	Panel 3: Growth in the number of insured workers		
Unadjusted	2.26	1.06	1.66
Age/sex adjustment	-0.91	1.26	0.18
Adjusted	1.35	2.32	1.84
	Panel 4: Growth in the incidence rate		
Unadjusted	-0.63	1.41	0.39
Age/sex adjustment	0.90	-1.26	-0.18
Adjusted	0.27	0.15	0.21
	Panel 5: Total growth in disabled-worker entitlements		
Unadjusted	1.63	2.47	2.05
Age/sex adjustment	-0.01	0.00	0.00
Adjusted	1.62	2.47	2.04

SOURCE: Social Security administrative data.

and newly entitled disabled workers coincide with the actual population, at least conceptually, although there are some measurement problems discussed in the Appendix.

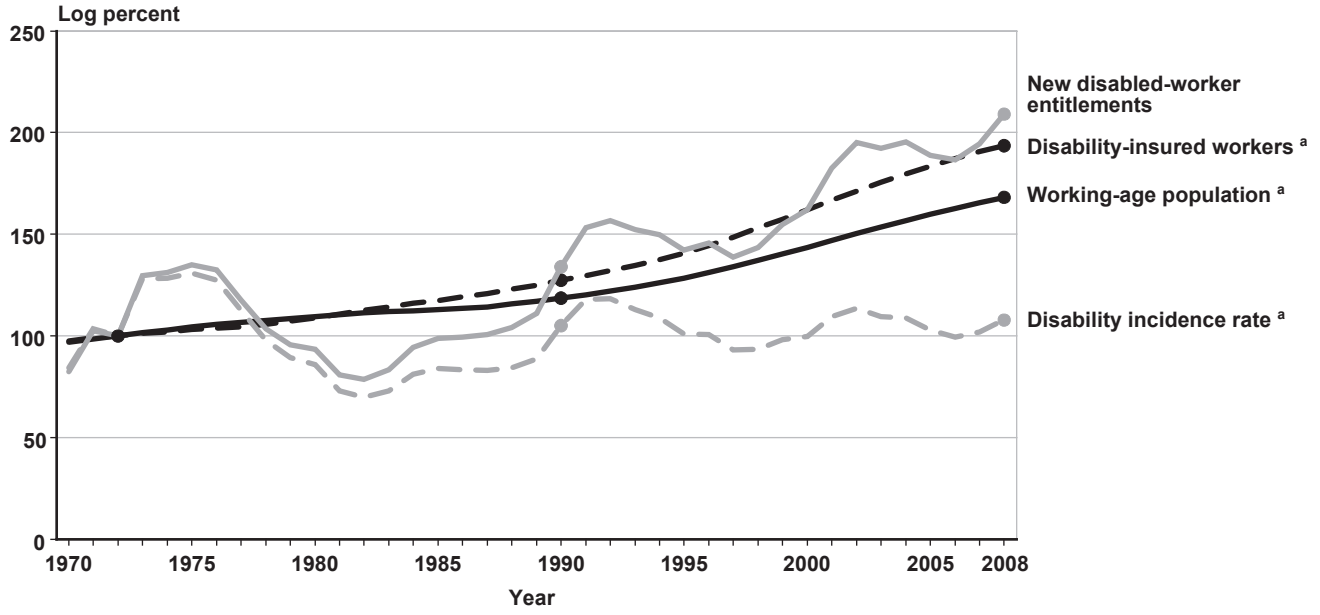
Our study period is 1970 through 2008. The earlier limit is set by data availability. (By coincidence, there were several changes to the definition of disability before 1970, as discussed in the Background section, that would have made analysis of that early period less meaningful.) The end date was chosen for data reasons as well. Although we had administrative data for several years after 2008, there were lags, not only in the disability determination process (the determination decision date can be several years after the eventually allowed date of entitlement), but also in data recording and combining earnings, disability, and death data into research files. The year 2008 was the first year for which the data were reasonably complete. Since starting the study, another year has become available, but, for our focus on the longer-term trends, we chose to avoid the large effects of the Great Recession, which was already beginning to have an impact in 2008.

Cumulative Growth

Growth rates calculated for every year in the study period can be converted into cumulative growth. In this article's charts, the cumulative growth is set to 100 percent in 1972. Cumulative growth for the unadjusted components is shown in Chart 4. Not all of the calculated unadjusted and adjusted components are presented in Chart 4 and Chart 5, respectively. The growth in the working-age population, the number of exposed workers, and the number of newly-entitled disabled workers is shown, as well as the growth in the incidence rate—the ratio of newly entitled workers to exposed workers.

The vertical scaling in both charts is such that the cumulative growth in the incidence rate from 100 percent is equal to the difference between the cumulative growth in newly disabled workers and the cumulative growth in exposed workers.[14] The growth in the proportion insured is not shown directly, but it is equal to the difference between the growth in the exposed population and the growth in the working-age population. The index-number decomposition of the growth rates is used for every year in the study period

Chart 5.
Cumulative growth in the number of newly entitled disabled workers compared with *age/sex-adjusted* growth in the working-age population (16–64), the number of disability-insured workers, and the disability incidence rate



SOURCE: Social Security administrative data.

a. Adjusted by age and sex.

(1970–2008), and the cumulative-growth indexes are presented graphically in Chart 5.

Because of the wide swings in disability incidence over time, the analysis of incidence trends is very sensitive to the beginning and endpoints used in the calculation. Measuring from a trough to a peak would give a misleadingly high incidence growth rate, and measuring from a peak to a trough would give a misleadingly low rate.

To avoid either extreme, the reference years used were selected through a semiautomatic procedure described in the Appendix. For the averages in this study, 3 years—1972, 1990, and 2008—are used, conveniently providing two equally long 18-year subperiods (1972–1990 and 1990–2008) and a combined 36-year period (1972–2008). (Although the two 18-year subperiods are the same length, they differ in that the earlier of the two periods contains only one large up-and-down cycle, but the later period contains two smaller up-and-down cycles.) The reference years are marked with points on the charts.

The year 1990 is notable because that year saw more new disabled-worker entitlements than had ever been seen before, with the exception of a near tie around 1975, but fewer than have ever been seen since, despite the wide fluctuations both before and after 1990 (Chart 2).[15] For the disability incidence rate, which is the growth in new entitlements after removing the growth in the insured population, 1990 is a middling year, whether using the unadjusted numbers (Chart 4) or the adjusted numbers (Chart 5). The apparent dramatic growth in Chart 2, in other words, is largely the effect of the growth in the insured population.

Average Annual Growth Rates

The year-to-year growth rates shown in Charts 4 and 5 are summarized as average annual growth rates in Table 1, both for the longer 36-year period and for the two 18-year subperiods. Those annual average growth rates are presented for both the unadjusted and the adjusted growth rates (Charts 4 and 5, respectively), as well as for the difference (the age/sex adjustment) between them. As we discuss in the following section, comparing unadjusted and adjusted growth rates for selected reference periods can give one an idea of the importance of the age/sex adjustment in explaining the cumulative growth in various components.

The three unshaded panels (1, 3, and 5) in Table 1 respectively show growth in the working-age population, in disability-insured workers, and in new disabled-worker entitlements. The two shaded panels (2 and 4) respectively show growth in the ratios of insured workers to the overall population (the proportion insured) and disabled-worker entitlements to insured workers (the incidence rate).

Within each panel, the age/sex adjustment is the difference between the unadjusted growth rate and the age/sex-adjusted growth rate. For example, the recent-period (1990–2008) average annual growth in the number of insured workers (panel 3, column two) was 1.06 percent without adjustment and 2.32 percent with adjustment. The difference, 1.26 percent, indicates the effect of the age/sex adjustment.

Between panels, the growth rate in the number of insured workers is the sum of the population growth rate and the proportion-insured growth rate. The growth rate in new disabled-worker entitlements is the sum of the growth rate in insured workers and the growth rate in the incidence rate; when decomposing the growth in insured workers, it is the sum of the three component growth rates: the population aged 16–64, the proportion DI insured, and the incidence rate (see the accompanying box for quick reference). These summations can be calculated with either the unadjusted rates or the adjusted rates. For the recent period (1990–2008), for example, see column two. The unadjusted rate of average annual growth in new disabled-worker entitlements (2.47 percent) is the sum of the unadjusted rates for the population, proportion insured, and incidence rate (1.06 + 0.00 + 1.41). Alternatively, the adjusted rate of growth in entitlements (2.47 percent) is the sum of the corresponding adjusted rates (1.94 + 0.38 + 0.15).

An index that decomposes the growth rates exactly would give the same total growth rate for the adjusted numbers as for those unadjusted. The two totals are shown in the bottom panel (5) of Table 1, with the age/sex adjustment showing the difference. The small differences, which are due to the calculation of the index at discrete annual intervals, rather than continuously, are negligible.

Growth in the Disabled-Worker Population and the Aging of the Baby Boom Cohorts

As discussed earlier, even if there were no changes in disability policy, worker health, or the economy, we would expect the number of disabled workers to grow in pace with the growth in the US working-age population. As shown in Chart 1, this study's working-age population grew from 143 million in 1972 to 219 million in 2008, an increase of 53 percent over 36 years, or 1.18 percent per year.

However, because of the aging of the baby boom cohorts, the age composition of the population has also changed substantially over the 1972–2008 period. In Chart 6, we show the size of the working-age population at selected ages. The size of the population at disability-prone ages first began to accelerate in the late 1980s and early 1990s. The large jump in each line, denoting specific ages in the chart, represents the 1946 birth cohort—a group that reached age 45 in 1991, age 50 in 1996, age 55 in 2001, and age 60 in 2006. The sharp increase in births in 1946, however, was only a striking jump in the middle of a longer-term growth in births that began in the mid-1930s

Decomposition Summations

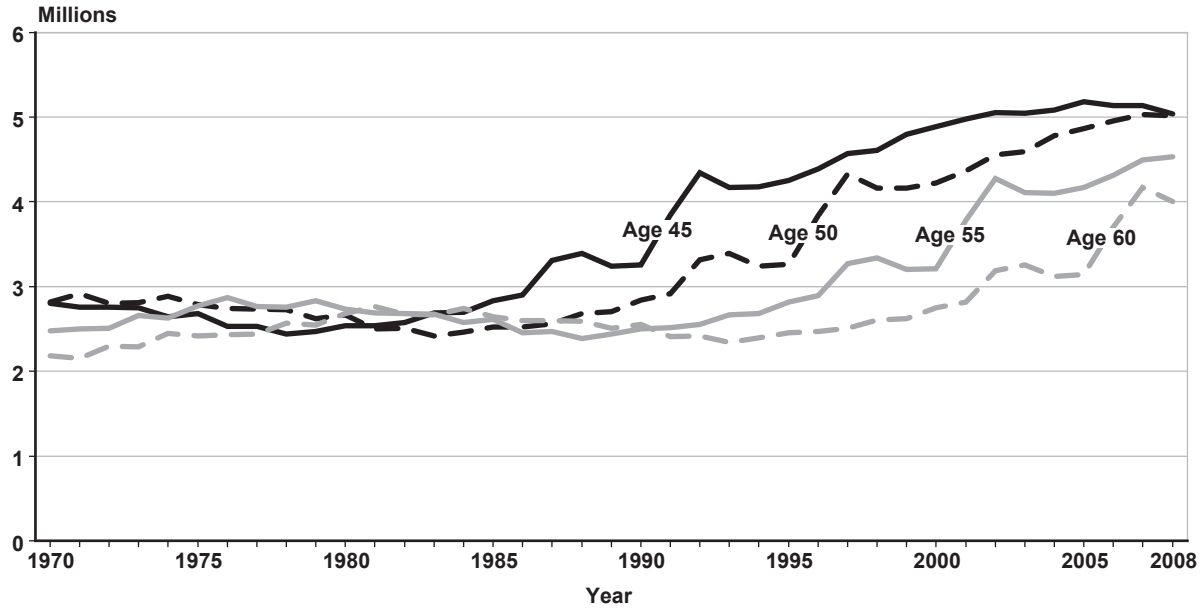
Growth in the number of DI-insured workers =
the growth in the working-age population (16–64)
+ the growth in the proportion of the population that is DI insured

Growth in the number of new disabled-worker entitlements =
the growth in the number of DI insured workers
+ the growth in the disabled-worker incidence rate

Or, when decomposing the growth in insured workers—

Growth in the number of new disabled-worker entitlements =
the growth in the working-age population (16–64)
+ the growth in the proportion of the population that is DI insured
+ the growth in the disabled-worker incidence rate

Chart 6.
Size of the working-age population (16–64), by selected ages, 1970–2008



SOURCE: Social Security administrative data.

and slowed down only much later. This movement of the baby boom cohorts into the disability-prone ages can be expected to have accelerated the growth in the number of new disabled workers during the 1990s.

The contribution of the aging of the baby boom cohorts to the growth in disability entitlements can be seen by comparing the unadjusted population growth in Chart 4 with the adjusted population growth in Chart 5. The unadjusted and adjusted growth rates between the reference years are also given in the top panel (1) of Table 1.

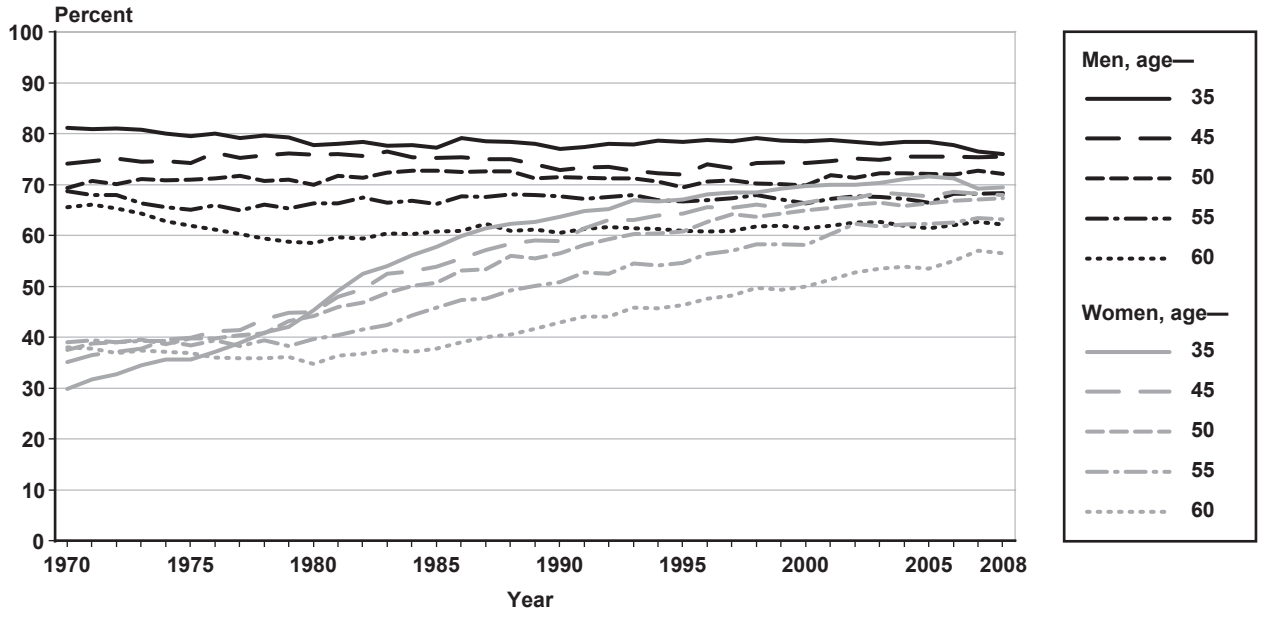
In the first half of the study period (1972–1990), the rapid population growth is concentrated at younger ages. Because much of this early growth was at ages where disability was uncommon, that growth was downweighted in the adjusted index, resulting in an adjusted growth rate for the period of 0.95 percent per year, lower than the unadjusted rate of 1.30 percent per year. In the second half of the period under study (1990–2008), in contrast, as population growth moves into the disability-prone ages, the adjusted growth rate increases, with an adjusted growth rate of 1.94 percent per year, substantially higher than the unadjusted rate of 1.06 percent per year. The differences are visually apparent in Charts 4 and 5 as well. The unadjusted population growth rate in Chart 4 is steady across both periods, but the adjusted population growth rate in Chart 5 accelerates between 1990 and about 1993 to a higher growth rate, which shows signs of slowing only toward the very end of the period.

The Growth in the Insured Population

Between 1972 and 2008, the disability-insured population in the Numident study sample grew from 78 million to 142 million, an 82 percent increase over 36 years, or an average of 1.66 percent per year. Part of this growth is due to the growth in the working-age population itself, but the proportion of the population that is insured for disability grew as well. That proportion increased from 54.6 percent in 1972 to 64.9 percent in 2008 at an average rate of 0.48 percent per year.[16]

The proportion of the working-age population insured, by sex and selected ages, is shown in Chart 7 for the overall 1970–2008 study period. As more women have spent more of their working-age years in the labor force, a higher proportion of them have accumulated enough earnings credits to be insured for disability benefits. This growth slows down at the younger ages, but still appears to be rising at ages 55 and 60. Even if there had been no baby boom, this growth in the share of workers with insured status

Chart 7.
Proportion of the working-age population (16–64) insured for Social Security DI benefits, by age and sex, 1970–2008



SOURCE: Social Security administrative data.

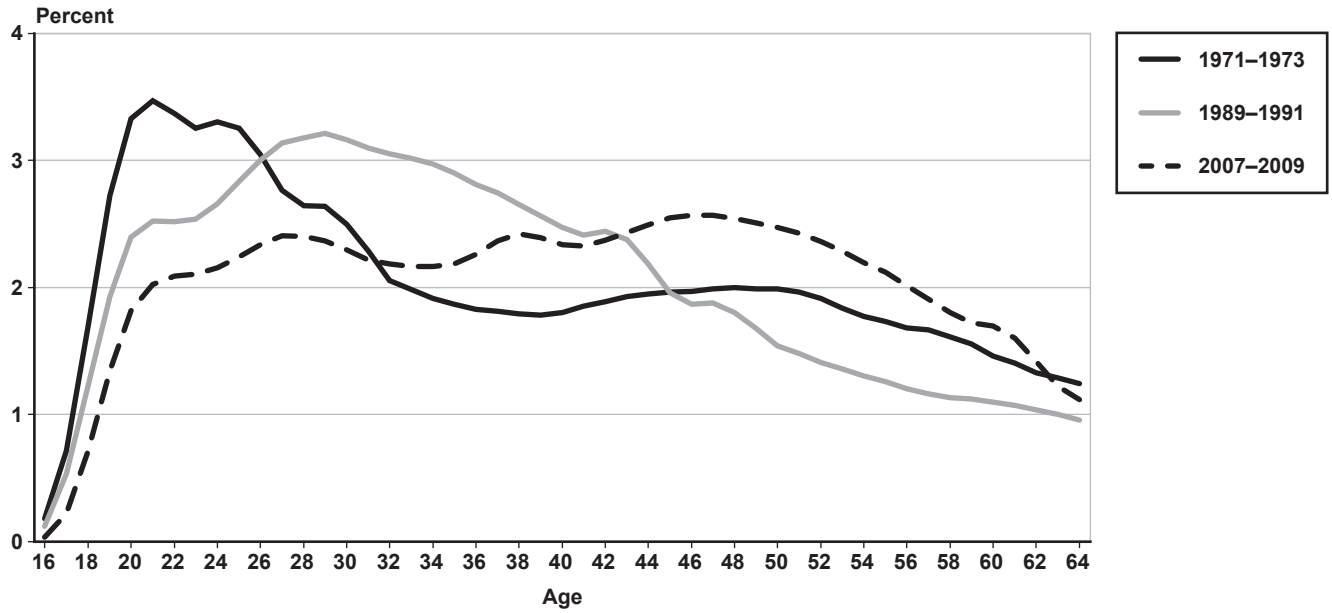
at older working ages would have contributed to an acceleration in the number of new disabled workers.

The growth in insured status in combination with the aging of the baby boom cohorts alters the age composition of the disability-insured population considerably. The age distribution of the insured population is shown for selected periods in Chart 8. (The chart shows the percentage of the population aged 16–64 insured at each age. If the population were distributed evenly over those 49 years, there would be about 2 percent insured at each age.) Note that the calculation of disability-insured status takes into account the special rules for workers younger than age 30, who have shorter recency-of-work requirements than the 20 quarters out of the last 40 required for disability onset after age 30.

In the 1971–1973 period, the baby boom bulge cohort was younger than age 25—ages that have relatively low rates of disability-insured status and disability onset. By the 2007–2009 period, the leading edge of the baby boom cohort was reaching age 62 and most of the cohort was entering the high disability-risk ages, where disability-insured status would be expected to be relatively high as well. We can expect that this movement of the baby boom cohorts by itself would contribute to a substantial increase in the number of new disabled workers.

The contribution of this growth in insured status at older ages can be seen by comparing Charts 4 and 5 and the appropriate rows of Table 1. The difference in growth between the working-age population and the growth in the number insured is the growth in the proportion insured; this is shown in Table 1, but not directly charted. In both Charts 4 and 5, however, the growth in the proportion insured is indicated by a growth in the difference between the indexes of the working-age population and the insured population. Using the unadjusted numbers (Table 1 and Chart 4), the insured population grows faster than the working-age population before 1990, but slows after 1990 to about the same rate of growth as the working-age population. This relatively rapid growth in the early period is due to the increase in insured status among younger women, where growth did not contribute much to disabled-worker entitlements. Using the adjusted numbers (Table 1 and Chart 5), in contrast, the insured population outpaced the working-age population by an almost identical rate, about 0.4 percent per year, in both of our earlier and later subperiods (1972–1990 and 1990–2008).

Chart 8.
The changing distribution of the disability-insured population, by age and selected subperiods



SOURCE: Social Security administrative data.

The Disability Incidence Rate

The incidence rate—the part of disability entitlement growth not explained by the growth in insured workers—will be of particular interest to policymakers because that factor may reflect growth that has been influenced by changes to Social Security legislation or administrative policy. It is important, therefore, to be able to calculate an incidence rate that shows the changes in disability incidence that are not due to the shifting age composition of insured workers.

The growth in the unadjusted and adjusted incidence rates is plotted in Charts 4 and 5, respectively, and is shown in Table 1.[17] Over the 1972–2008 period, growth in the unadjusted incidence rate averaged 0.39 percent per year. Over the same period, the adjusted incidence rate averaged 0.21 percent per year, a little over half of the unadjusted rate.

The striking difference in the subperiod growth rates, before and after the age/sex adjustment, illustrates how unadjusted statistics can lead to misleading analytical conclusions. For example, the unadjusted incidence rate for the first-half of the period (1972–1990) shows a decline of -0.63 percent per year, changing in the second-half of the period (1990–2008) to rapid growth of 1.41 percent per year. For the adjusted incidence rate, the earlier subperiod shows a growth averaging 0.27 percent per year, slowing in the later subperiod to 0.15 percent per year. In other words, an analyst looking at the unadjusted statistics would conclude that the 1990–2008 period had the higher growth in the disability incidence rate, when, by a more useful measure, growth in the 1972–1990 period was higher.

The incidence rate reflects a variety of factors, including both changes in the proportion of workers applying for benefits (because of either health trends, economic conditions, or expectations of being allowed) and changes in program stringency. Although some of those factors could reflect slowly moving trends, large cycles appear to dominate the incidence rate index. After about 1990, some of the variation might be associated with changes in the unemployment rate, but that is a subject for another study.

Because of the large fluctuations, the average annual rates for the disability incidence rate (adjusted or unadjusted) are sensitive to the beginning and ending points chosen for the time span, much more so than the growth rates for the working-age population or DI-insured workers. Perhaps the safest way of stating the results, a little less sensitive to the time period chosen, is that the ratio of disability incidence growth after 1990 to growth before 1990 is substantially lower after the adjustment for changes in the age/sex composition.

Percentage Decomposition of Growth in Disabled-Worker Entitlements

Because the annual growth rates are additive, the summarized annual averages from Table 1 can be used to calculate the percentage of overall growth in new disabled-worker entitlements that is explained by the various factors. Table 2 presents this set of decompositions for the two 18-year subperiods (1972–1990 and 1990–2008) and the combined 36-year (1972–2008) period. Looking at the combined period, for example, in which the total growth in disabled-worker entitlements was approximately 2.05 percent per year (Table 1), we see that, according to the unadjusted growth rates, 81 percent (1.66 percent per year out of 2.05) is attributable to growth in the number of insured workers, and 19 percent (0.39 percent per year out of 2.05) is attributable to the change in the disability incidence rate. According to the adjusted growth rates, however, the growth in insured workers explains 90 percent of the total (1.84 percent per year out of 2.04), and the growth in the incidence rate explains only 10 percent (0.21 percent per year out of 2.04).

Looking at the two 18-year subperiods, the impact of age and sex compositional changes on the decomposition is stark. In the 1972–1990 period, when the baby boom cohorts were young, the growth in the number of newly entitled disabled workers averaged 1.62 percent per year. Using the unadjusted numbers, it appears that growth in the number of insured workers would have accounted for 139 percent of that growth (meaning that the number of insured workers grew faster than the number of new disabled workers), with a shrinking incidence rate reducing growth by 39 percent. After adjustment for the age/sex differences, however, growth in insured workers explains 83 percent of the total, and growth in the incidence rate explains 17 percent.

In the second 18-year subperiod (1990–2008), growth in newly entitled disabled workers sped up, averaging 2.5 percent per year. Using the unadjusted numbers, it appears that growth in the number of insured workers accounts for 43 percent of the total, and growth in the incidence rate accounts for 57 percent. After adjustment, growth in the insured population accounts for almost all the growth in new disability entitlements, 94 percent, with only 6 percent of growth remaining unexplained (that is, attributable to growth in the incidence rate). The largest

Table 2.
Percentage decomposition of growth rates, by selected reference subperiods

Component	1972–1990	1990–2008	1972–2008
	Panel 1: Growth in the working-age population (16–64)		
Unadjusted	79.6	43.1	57.6
Age/sex adjustment	-21.4	35.5	12.9
Adjusted	58.2	78.6	70.5
	Panel 2: Growth in the proportion insured		
Unadjusted	59.0	-0.1	23.4
Age/sex adjustment	-34.5	15.6	-4.2
Adjusted	24.5	15.5	19.1
	Panel 3: Growth in the number of insured workers		
Unadjusted	138.7	43.0	80.9
Age/sex adjustment	-55.9	51.1	8.6
Adjusted	82.8	94.1	89.6
	Panel 4: Growth in the incidence rate		
Unadjusted	-38.7	57.1	19.0
Age/sex adjustment	55.5	-51.1	-8.8
Adjusted	16.9	5.9	10.2
	Panel 5: Total growth in disabled-worker entitlements		
Total	100.0	100.0	100.0

SOURCE: Social Security administrative data.

NOTE: Subtotals do not necessarily equal the sum of rounded components.

contributor to this change in the relative importance of the various components of DI entitlement growth is the growth in the population aged 16–64, which increases by 35 percentage points after the age/sex adjustment. This large adjustment reflects the baby boom cohorts moving into high disability-prone ages, as discussed earlier.

Comparison With Other Studies

As far as we know, this is the first study to decompose the growth in new disability entitlements into component parts using a chained index technique. Several other studies have used other techniques on some of the components.

SSA's Office of the Chief Actuary (OCACT) has a long history of conducting analyses that incorporate age and sex adjustments. What appears to be the first published instance of such a study is one analyzing total awards and disability incidence rates by age and sex (Myers 1965). More recently, Zayatz (2005, 2011) has presented some age-and-sex adjusted figures in his actuarial studies of worker experience in the DI program. Like us, Zayatz (2011, 9 and Table 4, 21) finds "the incidence of disability increases considerably as individuals age." This finding explains why our estimate of the growth in the disability incidence rate is sensitive to the presence or absence of an age/sex adjustment.

The indexed decomposition of new disability entitlement growth we use in this article can also be compared with OCACT's age/sex-adjusted analysis of disability incidence found in Figure V.C3 of *The 2013 Annual Report of the Board of Trustees of the Federal Old-Age and Survivors Insurance and Federal Disability Insurance Trust Funds* (Board of Trustees 2013). The age/sex-adjusted incidence rates presented in that report are obtained using a kind of index-number method, and the results are very similar to ours.[18] The unadjusted incidence rate calculated here corresponds conceptually to the gross incidence rate in the *Trustees Report* figure, and the adjusted incidence rate calculated here corresponds to the age/sex-adjusted incidence rate in the *Trustees Report*. In this study, we also go beyond the incidence rate calculation to calculate growth that is due to population and insured-status components. The technique used for the *Trustees Report* figures could also be extended in that way and would give similar results.

Other than the work of OCACT, the closest forerunners to our analysis appear to be Rupp and Stapleton (1995), drawing on Lewin-VHI (1995). These authors decompose the determinants of application and award growth over the 1988–1992 period.[19] Qualitatively, those analyses find results similar to ours. The difference in time periods studied precludes direct numerical comparisons.

For example, Rupp and Stapleton (1995, 47) find, "both the growth in the size of the working-age population and the aging of the baby boom generation have contributed to recent growth in applications and awards for SSA's disability programs." More specifically, the authors state, "based on 1988 age-specific application rates and population growth by age from 1988 to 1992, we estimate that population growth and aging together account for average annual DI application growth of 1.3 percentage points and [Supplemental Security Income] SSI application growth of 1.2 percentage points—both more than twice the average growth rate of the working-age population. Results for awards were almost identical" (48).

In addition, citing Lewin-VHI (1995), Rupp and Stapleton (1995, 48) note that the added contribution of changes in the disability-insured status of women contributed an additional 0.8 percentage points to the growth of DI awards from 1988 to 1992, for a total average annual contribution of 2.1 percentage points a year—attributed to changes in the size and age/sex composition of the disability-insured population.

Another segment of the literature focuses on prevalence rather than incidence (Autor and Duggan 2006; Duggan and Imberman 2009; and Burkhauser and Daly 2012). Those studies appear to find little role for population growth.[20] On the other hand, work by OCACT *does* find a role for population growth.

More specifically, with regard to the projected growth in the number of disabled workers in current-payment status from 2011 through 2090, the *2013 Trustees Report* states, "Of course, much of this growth results from the growth and aging of the population…" (Board of Trustees 2013, Table V.C5, 132–133). Likewise, in testimony before the House Ways and Means Committee, Goss (2013, 4) decomposes historical growth in the number of disabled workers on the rolls (prevalence) from 1980 through 2010 and finds a role for both population growth and the changing age distribution of the population.

As discussed earlier, the growth in the number of people on the rolls—the focus of the prevalence studies conducted by Autor and Duggan (2006); Duggan and Imberman (2009); Burkhauser and Daly (2012);

and Daly, Lucking, and Schwabish (2013)—will differ from the growth in the number of workers entering the rolls—the focus of our incidence study. However, the differences in apparent conclusions are not solely due to the difference between prevalence and incidence. Although the titles and tables in those studies appear to focus on the growth in the number of beneficiaries,[21] the studies actually appear to examine the growth in the *ratio* of beneficiaries to the population. Over long periods, population growth is the single largest factor contributing to growth in the number of beneficiaries, but studying the growth in the ratio of beneficiaries to the population leaves out entirely the contribution of population growth itself.[22]

Several of these studies also use 1984 as the starting point. As we have discussed, DI-growth measures are very sensitive to the choice of beginning and ending points. Chart 4 indicates that 1984 was a year reflecting relatively low DI incidence. Using it as a starting point in our analysis would have placed more weight on the growth of the incidence rate relative to the growth in the insured population, but this increased weight—the result of a low-incidence starting point—would be misleading for longer-term trends.

The period around 1984, furthermore, was a particularly unrepresentative period for SSA policy. Autor and Duggan (2006), Duggan and Imberman (2009), and Burkhauser and Daly (2012) attribute a key role in the growth in the DI rolls after 1984 to the Social Security Amendments of 1984, which introduced more detailed instructions to SSA on what criteria to use when making disability determinations (see SSA (2006, 8) for details), as if those amendments shifted disability incidence from a pre-1984 level to a higher and rising post-1984 level. However, as Kearney (2005/2006) and Puckett (2010) discuss, pre-1984 legislative and administrative efforts to reduce the disability rolls, particularly over the 1980–1983 period, prompted a backlash from the public, the press, state governors, the courts, and Congress, and, in hindsight, were unsustainable. In fact, the backlash was so swift that many challenges and corrections to SSA's policies occurred *prior* to the 1984 amendments, including, for example, an early SSA loss in the 9th Circuit Court of Appeals (*Finnegan v Matthews* in 1981),[23] discussed in Kearney (2005/2006) and the refusal of 23 state governors to conduct continuing disability reviews (Puckett 2010). Thus, given the tumult that occurred over the 1980–1983 period, using a year like 1984—several years before the restoration from temporarily depleted disabled-worker beneficiary levels had had a chance to work itself through the system—seems quite likely to give a misleading picture of the factors underlying current growth.

Conclusion

In this article, we find that although the raw or unadjusted growth in the number of workers becoming entitled to benefits under Social Security's DI program gives the appearance of an upward and accelerating trend, using such a measure may lead to misleading analytical conclusions. Once we adjust for population growth—compounded by the movement of the large baby boom generation into disability-prone ages and a continuing growth in the proportion of women at those ages who are insured for disability—we find that these factors explain 90 percent of the growth in new disabled-worker entitlements over the 36-year period (1972–2008) and 94 percent of the growth over the more recent 18-year subperiod (1990–2008). In addition, although an incidence rate measure that is unadjusted seems to indicate faster growth in disability incidence in the 1990–2008 period than in the earlier period (1972–1990), this apparent speedup disappears once the changing demographic structure of the insured population is taken into account. The growth in the adjusted incidence rate actually slows down, and the incidence rate's share of overall growth decreases. Although the adjusted growth in the incidence rate accounts for 17 percent of the growth in disability entitlements in the earlier period, it accounts for only 6 percent of the growth in the later one.

Appendix: Description of Data and Methods

As discussed in the Introduction, the method used in this study to decompose the growth in new disabled workers is an index-number technique that is similar to that used to calculate a price index. Price indexes separate growth in total expenditure into the part that is the result of price changes and the part that is the result of changes in the number of units purchased. The procedure here is the same, except that total expenditure is replaced by the number of new disability entitlements, the number of units purchased is replaced by the population in each age/sex group, and prices are replaced by the combination of the proportion of each age/sex group that is insured for disability and the proportion of the insured that becomes entitled to disabled-worker benefits.[24]

In this article, we use the Törnqvist index. The underlying data are the growth from one year to the next in each age/sex cell of the three components—population, proportion of the population insured, and proportion of the insured who become disabled. An index averages those rates of growth together. For the Törnqvist index, the weights used in calculating that average are the shares of each age/sex group in the total disability entitlements for that year, so that population growth at older disability-prone ages will count for more than the population growth at younger ages. The same age/sex share weights are used for the other components (growth in proportion insured and growth in the incidence rate), resulting in separate indexes for growth in the three components that when combined almost exactly reflect growth in total new disability entitlements.[25]

The Data

The data used in this analysis come from several internal SSA research files, all of which use the same 1 percent sample population as that used in SSA's Continuous Work History Sample (CWHS). The CWHS 1 percent sample "may be described as a stratified cluster probability sample of all possible [Social Security numbers] SSN's" (Smith 1989).

These data files allow tabulations by sex and single year of age of (1) the population of SSN holders, (2) the number of insured workers, and (3) the number of new disabled-worker entitlements. Age at tabulation is the age as of the end of the year. Timing decisions, such as whether to tabulate the insured population at the beginning of the year or at the end, and definitions, such as the exclusion of insured workers already receiving benefits, are described later.

The Population

The working-age population, as used in this study, refers to people alive at the beginning of the calendar year who are aged 16 to 64 at the end of the calendar year. The population counts are tabulated from a 1 percent sample of people with SSNs. Foreign-born people are not counted until the year after they receive an SSN. The base file for these tabulations is the Numident—although sex, year of birth, and year of death are sometimes corrected from other files.

The population figures tabulated from the Numident do not give a comprehensive count of the total population living in the United States, although the changing age distributions seen in the Numident population should closely match those from the Census Bureau. Differences are unlikely to affect our analysis of trends. The Numident population can differ because it does not include people who live in the United States but do not have an SSN, but it does include some people who have emigrated from the United States and others who have died without their death being recorded in the administrative files.[26]

Disabled-Worker Entitlements

Although the DI program pays auxiliary benefits to several types of dependents of insured workers, we limit this analysis to disabled-worker beneficiaries entitled on their own earnings history. As of December 2009, disabled-worker beneficiaries represented 87 percent of disabled beneficiaries in current-payment status (SSA 2010).[27]

The disability determination process for the Social Security DI program is also used to determine eligibility for the SSI disability program—a means-tested program paid from the general fund of the US Treasury rather than from the Social Security trust funds. (SSA administers the SSI program, but is reimbursed from the general fund for the cost of SSI administration.) Although workers can apply simultaneously for DI and SSI disability, only those workers who become entitled to DI are counted as disabled-worker entitlements in this study.

The Master Beneficiary Record (MBR) file contains records of people with a history of Social Security benefit entitlement. Those records include the dates of the beginning of entitlement; the end of entitlement (or death); and, in the case of disability benefits, conversion from disabled- to retired-worker benefits upon reaching retirement age. If there have been multiple periods of disability entitlement for a worker (such as when he or she recovers and then becomes entitled again to disabled-worker benefits or becomes entitled later to retired-worker benefits), the information on the intermediate dates has not always been retained in the data records. We expect the effects of these missing entitlements from multiple periods to be small.

Tabulations of disability entitlements include people aged 16 to 64 from 1970 through 2008. The count of entitlements in the last years of our study period might be low because there were some applications at the time of the sample extract that have been delayed by appeals and might yet be awarded a retroactive entitlement to 2008 or earlier.

Many of SSA's published statistics, such as some tables in the *Annual Statistical Report on the Social*

Security Disability Insurance Program and the *Social Security Trustees Report*, count the number of new disability *awards* by year. In contrast, this analysis focuses on the number of new disability *entitlements* by year. A disability award is reported in the year in which a payment is first made to an individual from the DI Trust Fund. Disability entitlement, on the other hand, generally refers to the month 5 months after the month in which the onset of disability was determined to have occurred—the month that follows the 5-month disability waiting period.[28] Because some DI-worker benefits are awarded on appeal by an administrative law judge, the date of the award can, in some cases, be 2 or more years after the date of the entitlement. (Workers whose month of award is later than their month of entitlement receive a retroactive payment for the months that were missed.)

The award date is the month in which payments actually begin, but the entitlement date determines the amount of benefits that actually will be paid, even if some are paid retroactively. There are arguments in support of both the entitlement date and award date for the analysis of trends. For this study, the entitlement date was used, in part because it is more closely tied to the onset of the disability[29] and to lifetime disability benefits paid, but also because it is more easily obtainable from the data available to us. Trends in new DI entitlements and trends in new DI awards tend to follow each other closely, with the average difference varying according to the average time between date of onset and the date of the decision to award. For a decomposition of the growth of DI entitlements, we expect there would be little practical difference in the qualitative analytical results if we instead decomposed the growth in DI awards.

For simplicity and consistency across time, we exclude new disability entitlements that occur at or after age 65. In our sample, the retirement age for cohorts born before 1938 is age 65, but the age for birth cohorts born from 1938 through 1944 will range from age 65 and 2 months to age 66, which means that disability-insured workers born in those years are eligible for disabled-worker benefits at ages greater than our last age of observation (64). In other words, for the last 3 years of our study period (2005–2008), we exclude any new disability entitlements that occur at or after age 65. However, because we measure our working-age population at ages 16 to 64, our exclusion is not expected to bias the growth decomposition. The unmeasured growth beyond age 65 will appear in other statistics, such as the *Trustees Report*, so our measure of disability incidence can be expected to be slightly lower than the other measures for years 2005 through 2008.

The Disability-Insured Population

The CWHS file for tax-year 2010, which contains earnings histories up through 2010, provides annual Social Security–taxable earnings data and quarters of coverage information from 1951 through 2010 and is used to calculate disability-insured status. Insured status is calculated at the end of each calendar year, taking into account earnings during that year. This definition allows workers who attained disability-insured status during the year to be counted.

The calculation of disability-insured status takes into account the special rules for workers younger than age 30, who have shorter recency-of-work requirements than the 20 quarters out of the last 40 required for disability onset after age 30.

Adjustment of the Insured Population to the Exposed Disability-Insured Population

Workers receiving disability benefits still are technically insured for disability, even if they have not worked for many years. If the rate of disability entitlements among nonbeneficiary-insured workers was constant, but the proportion of disabled beneficiaries in the population of insured workers was rising, inclusion of the number of beneficiaries in the denominator would indicate a declining trend. To avoid that possibility, the count of disability-insured workers in this article excludes those people already receiving benefits at the beginning of the year (other than those who show a new entitlement during the year).[30]

The adjusted insured population we use here is similar to the "exposed population" used by OCACT for its calculation of the incidence rate. The exposed population concept also excludes workers receiving benefits, even though they are technically entitled. OCACT's concept is more refined, with exposure averaged over the year, rather than using disability status at the beginning of the year.

Incidence Rate

The disability incidence rate for this study is calculated as the ratio of new disabled-worker entitlements in a given year to the number of insured workers at the end of that year, with the number of insured workers adjusted as described in the preceding paragraph. To be counted in the denominator, a worker must not have been receiving disability benefits at the beginning of

the year and must have either been insured for disability at the beginning of the year or become insured by the end of the year. To be counted in the numerator, a worker must have been counted in the denominator and, additionally, must have become entitled to disability benefits during the year.

Reference Years

The reference years used as intermediate years between the peaks and troughs were selected through a semi-automatic procedure designed to identify years that lie near a possible trend line, rather than at a peak or trough. Using the log age/sex-adjusted incidence rate as the dependent variable, AR(2) regressions with a linear trend were run for all possible samples of 15 years or more in the overall study period (1970–2008), and the distance of each point from the linear trend was calculated. Those distances were aggregated for each year using the regression likelihood as a weight. This procedure gives lower average distances to those years that tend not to lie far from the midline of the samples of which they were part. The low-distance years were 1971–1972, 1978, 1990, 1995–1996, 1999–2000, and 2005–2008. Although our overall study period encompasses 38 years from 1970 through 2008, for the averages in this study, 1972, 1990, and 2008 were used, conveniently providing two equally long 18-year subperiods and a larger combined 36-year subperiod.

Notes

Acknowledgments: The authors thank Stephen Goss, Bert Kestenbaum, Scott Muller, David Olson, Mary Quatroche, Kalman Rupp, and Alexi Strand for helpful comments and suggestions.

[1] As we describe later in more detail, only workers with sufficient recent covered earnings are insured for disability. Workers who become entitled to disability benefits remain insured. Exposed workers are those who are insured for disability, but not currently entitled. "Exposure" here is an insurance concept: Workers who are already disability beneficiaries do not expose the DI Trust Fund to further risk of their becoming entitled. The number of exposed workers is also a more suitable measure for assessing disability incidence trends if the proportion of workers on the rolls has been increasing. This concept of the disability-exposed population is also used by the Office of the Chief Actuary (OCACT) and the Board of Social Security Trustees in their annual report to Congress. OCACT's measure of the disability-exposed population is more refined than ours, but the differences are not expected to alter our results.

[2] Chart 3 plots the responses to a question in the March Current Population Survey Income Supplement asked of each person in each survey: "Does ... have a health problem or a disability which prevents work or which limits the kind or amount of work?" The percentages by age group responding "Yes" are graphed for both 2007 (prerecession) and 2011 (when unemployment was still high).

[3] There are many definitions of disability used in the literature and in society. The term "disability prone" as used in this study encompasses both a health-based definition of disability that alludes to the underlying natural correlation between age and health, where the risk of experiencing poor health and disabling conditions increases with age, as well as the narrower definition of disability described in the Social Security Act. The underlying relationship between age and health is expected to be one driver of the distribution of disability entitlement by age. See note 9 for more discussion of additional drivers and previous studies using the Social Security definition of disability.

[4] The disability freeze provision of 1954 protected workers from having years of no earnings averaged into their retired-worker benefit computation if those zeroes were caused by a Social Security Administration–determined disability (SSA 2010, 1).

[5] The 1954 amendments set the requirement for a worker to achieve disability-insured status at 20 quarters of coverage out of the last 40 quarters of coverage (roughly 5 years of earnings out of the last 10 years). In 1967, the disability-insured rules were made less stringent for workers younger than age 31, with a smaller further liberalization in 1983 (Myers 1993, 269–270).

[6] As Cohen and Ball (1968, 11) explain, "this means work that exists in significant numbers in the region in which he [the disability-insured worker] lives or in several regions of the country, but without regard to whether a specific job vacancy exists for him, or whether he would be hired if he had applied for work." According to Halpern (1979, 33), "court rulings made before 1967 required the Social Security Administration to show that an individual had realistic employment opportunities, thus allowing factors not strictly related to the individual's medical condition to be taken into account in the eligibility determination process." Halpern notes that the 1967 change in the definition of disability was an attempt by Congress to counter the tendency of the courts to consider local economic conditions as a factor in an individual's ability to work. Cohen and Ball (1968) note, "the clarifying language will better enable the courts to interpret the law in accordance with the intent of Congress."

[7] Beginning in 1977, blind people were subject to a separate (higher) SGA amount. In 2001, the dollar amount of earnings used to define SGA, which had originally been set at $100 in federal regulations and was updated on an ad hoc basis, was indexed (Zayatz 2011). Because the SGA amount has changed over time, denials for disabled-worker benefits because workers are earning above SGA in any given year may not be equal across years because some years will have lower levels (after adjustment for wage growth) than others.

We do not adjust for changes in the SGA level over time in our analysis.

[8] Many percentage growths in this article are expressed as log percents. For a percent *P*, the log percent is *100 * ln(1+P/100)*, where *ln* is the natural logarithm. For small changes, the log percent growth is almost identical to the percentage growth. A 5 percent growth, for example, is equivalent to a 4.9 log percent growth. For larger changes, the log percents are smaller, but have the advantage of being additive, so that a 20 log percent growth followed by a 20 log percent growth is 40 log percent (the equivalent percentage growths do not add: 22.1 percent followed by 22.1 percent gives 49.2 percent). Log percents also have common sense cancellation: a 10 log percent decrease followed by a 10 log percent increase ends up where it started (the equivalent in percentages is a 9.5 percent increase followed by a 10.5 percent increase). See Törnqvist, Vartia, and Vartia (1985).

[9] The largest share of disabled-worker awards are at ages 55 plus, with the second largest share at ages 45 through 54 (see Zayatz (2011, Figure 2, 9)). Entitlement shares by age will be similar to award shares by age, although age of entitlement may skew at younger ages than at age of award because many disabled-worker benefits are awarded on appeal. Bayo, Goss, and Weissman (1978, Table 3) show that in the 1972–1975 period, disability incidence by age of entitlement was greatest at ages 55 to the normal retirement age. In addition to the increase in disability risk with age that is related to the underlying natural correlation between age and health, the increased proneness to disability entitlement at older ages observed in SSA's administrative data may also include a component attributable to the use of age as a vocational factor in step 5 of the disability determination process (see Wixon and Strand (2013) for a description of step 5). However, note that any changes to the way SSA adjudicates claims over the course of our time series (for example, any changes in the administrative use of age as a determinant of residual capacity to work over time) will be absorbed in the residual or unexplained portion of our growth decomposition.

[10] Extracted from the Bureau of Labor Statistics' website, http://www.bls.gov/webapps/legacy/cpsatab1.htm.

[11] Rupp, Davies, and Strand (2008, 26) note that there may be interactions between changes in the Supplemental Security Income (SSI) program and incentives to apply for DI. Some DI-insured workers may also qualify for SSI payments if their countable income and assets are below the SSI means test. Zayatz (2011, 7) notes that applicants to the SSI program are required to apply for benefits from other programs, such as DI. Thus, passage of SSI in 1974 and periodic SSI outreach efforts may have drawn in workers who qualified for both DI and SSI, but who were previously unaware of the DI program.

[12] Once a disabled worker is converted to a retired worker, his or her benefits are paid out of the Old-Age and Survivors Insurance (OASI) Trust Fund rather than the DI Trust Fund.

[13] For a study of the effect of changes in the age composition of the population on disability duration, see Rupp and Scott (1996).

[14] The percentages on the vertical axis are log percentages.

[15] The same is true for disabled-worker *awards*, but for 1991 rather than 1990. Awards in 1991 were lower than awards in subsequent years and higher than awards in earlier years, except around 1975. See SSA (2013, Table 6.A1.)

[16] The 1.66 percent growth rate in the insured population is equal to the 1.18 percent growth rate in the population plus the 0.48 percent growth rate in the percentage insured.

[17] Because the Törnqvist index so exactly decomposes the overall growth in disabled-worker entitlements into population growth, growth in the proportion of the population that is insured, and growth in the incidence rate, the adjusted incidence rate is virtually identical to what would be obtained when subtracting the adjusted growth in insured workers from the growth in disabled-worker entitlements. As a check, however, the adjusted incidence rate was calculated directly, as well as by subtracting the other components from the total.

[18] The precise results will differ for several reasons: The *Trustees Report* started with insured workers and applied a fixed-weight index to decompose growth in awards, while this study starts with the working-age population and applies a chained-weight index to decompose growth in entitlements. A fixed-weight approach could be extended to include the effect of growth in insured workers relative to the working-age population, but a fixed-population approach does not decompose as readily and exactly into separate population, insured worker, and incidence rate effects, especially when the population composition changes over the study period.

[19] Stapleton and others (1998) also decompose the determinations of *initial* award growth over the 1980–1993 period. Because a measure of initial awards misses benefits awarded on appeal, we do not discuss those results here.

[20] In another study that focuses on prevalence growth, Daly, Lucking, and Schwabish (2013, 1) find some role for population growth but, despite the title "Explaining the Rapid Growth in Social Security Disability Insurance Rolls," their decomposition (Figure 2, 3) is described as a decomposition of the "factors [that] have contributed to the rise in SSDI caseloads as a share of the working age population." In other words, although they cite a nearly threefold increase in the caseload and note that much of that increase is attributable to population growth, their share calculation only focuses on the growth in excess of population growth.

[21] Examples include the following:

- Why are the Disability Rolls Growing?—a section in Autor and Duggan (2006, 8)

- Determinants of DI Growth—a section in Duggan and Imberman (2009, Table 11.9, 368)
- Why Have SSDI Caseloads Risen?—a section in Burkhauser and Daly (2012, 454)
- "Explaining the Rapid Growth in Social Security Disability Insurance Rolls," by Daly, Lucking, and Schwabish (2013)

[22] Burkhauser and Daly (2012) have less documentation of their decomposition than do Autor and Duggan (2006) and Duggan and Imberman (2009). We are assuming that Burkhauser and Daly follow Autor and Duggan's technique when they write, "Our own updates of their [Autor and Duggan's] calculations (1984 to 2010) show a slightly larger, but still relatively small impact of changes in the age structure on the SSDI increases shown in Figure 1" (456). Note that a change in the age structure does not account for overall population growth.

[23] SSA also adopted a practice called "nonacquiescence" during this time period, in which SSA did not revise its policies throughout the circuit to which an adverse ruling applied, but instead applied a reversal to only the individual claimant who had appealed a removal from the Social Security disability rolls. An 8th circuit court of appeals judge threatened Health and Human Services Secretary Margaret Heckler with contempt over this policy (Kearney 2005/2006, 16).

[24] The index computations here are in one aspect simpler than those for a price index because the units in this study never change, while price indexes have to adjust for the introduction of new items and the disappearance of old items. Most price indexes have two components: quantities of each item purchased (N) and prices (p). The index in this article has three components: (1) the population in each age/sex group, which is the underlying quantity (N); (2) the proportion of the population insured in each age/sex group (p); and (3) the proportion of the insured population in each age/sex group that becomes disabled (r). Total disability entitlements are the product of the three variables: $N*p*r$. An analogous price index might have quantities (N), pretax prices (p), and a ratio of post-sales-tax to pre-sales-tax prices (r)—with total after-tax expenditures being the product of the three.

[25] The Törnqvist index is a discrete approximation to the Divisia index, for which the decomposition of the total growth rate into component growth rates is exact. Even for the discrete approximation, the correspondence is close. The share weights in the Törnqvist index are an average of the share weights in the 2 years across which an index is being calculated. For the calculations in this article, the "Sato-Vartia" average was used, in which the average of two amounts, a and b, is $(a-b)/\log(a/b)$, with a zero when either a or b is zero and with a or b when the amounts are identical. A simple average, $(a+b)/2$, gives almost identical results. See Sato (1976), Vartia (1976), and Vartia (2010). The Törnqvist index, one of several indices often used for a price index, has also been used for the decomposition of productivity growth (for example, Chinloy (1981)). It provides an accurate approximation to the Divisia index without making assumptions about functional form (Trivedi 1981).

[26] SSA does not receive notifications of emigrations. Although SSA data on death is thought to be complete for people who are receiving benefits, the Numident may be missing some death reports for nonbeneficiaries (Aziz and Buckler 1992). Whatever the effect of the missing emigration and death information is, it will have less of an impact on the insured-population count than on the working-age-population count because insured status depends on recent covered earnings.

[27] Auxiliary benefits paid from the DI Trust Fund include a spouse's benefit, payable to the spouse of a disabled worker with a child in care younger than age 16; a child's benefit, payable to a child who is a dependent of a disabled worker; and a disabled adult child's benefit. Auxiliary benefits paid from the Old-Age and Survivors Insurance (OASI) Trust Fund include a disabled widow(er) benefit, payable to a disabled widow(er) who is older than age 50 and whose deceased spouse was an insured worker; and a disabled adult child benefit, payable to the child of a retired or deceased worker (SSA 2006, 4).

[28] Prior to January 1973, the waiting period between the month of disability onset and the first month of entitlement was 6 months.

[29] An argument could be made for using the date of disability onset; however, over the long span of data used in this analysis, we judged the data on month of entitlement to be more reliable than the data on month of disability onset.

[30] The exclusion of these workers increased the growth of the incidence rate very slightly relative to a disability-insured measure that includes those workers.

References

Autor, David H., and Mark G. Duggan. 2006. "The Growth in the Social Security Disability Rolls: A Fiscal Crisis Unfolding." *Journal of Economic Perspectives* 20(3): 71–96.

Aziz, Faye, and Warren Buckler. 1992. "The Status of Death Information in Social Security Administration Files." Paper (unpublished) prepared for presentation at the 1992 Joint Statistical Association, Boston, MA (August 9–13).

Bayo, Francisco R., Stephen C. Goss, and Samuel S. Weissman. 1978. "Experience of Disabled-Worker Benefits Under OASDI, 1972–76." Actuarial Study No. 75, HEW Pub. No. (SSA) 78-11525. Washington, DC: Department of Health, Education, and Welfare (June).

[Board of Trustees] Board of Trustees of the Federal Old-Age and Survivors Insurance and Federal Disability Insurance Trust Funds. 2013. *The 2013 Annual Report of the Board of Trustees of the Federal Old-Age and Survivors Insurance and Federal Disability Insurance Trust Funds*. Washington, DC: Government Printing Office. http://www.socialsecurity.gov/oact/TR/2013/tr2013.pdf.

Burkhauser, Richard V., and Mary C. Daly. 2012. "Social Security Disability Insurance: Time for Fundamental Change." *Journal of Policy Analysis and Management* 31(2): 454–461.

Chinloy, Peter. 1981. *Labor Productivity*. Cambridge, MA: Abt Books.

Cohen, Wilbur J., and Robert M. Ball. 1968. "Social Security Amendments of 1967: Summary and Legislative History." *Social Security Bulletin* 31(2): 3–19.

Daly, Mary C., Brian Lucking, and Jonathan Schwabish. 2013. "Explaining the Rapid Growth in Social Security Disability Insurance Rolls." Supplemental document to "This American Life" interview with public radio and television host Ira Glass and NPR Planet Money reporter Chana Joff-Walt (March 22). http://www.frbsf.org/economic-research/files/explaining-disability-growth.pdf.

Duggan, Mark, and Scott A. Imberman. 2009. "Why are the Disability Rolls Skyrocketing? The Contribution of Population Characteristics, Economic Conditions, and Program Generosity." In *Health at Older Ages: The Causes and Consequences of Declining Disability Among the Elderly* (chapter 11), edited by David M. Cutler and David A. Wise, 337–339. Chicago, IL: University of Chicago Press (January).

Goss, Stephen C. 2013. *The Financing Challenges Facing the Social Security Disability Program*. Testimony before the House Committee on Ways and Means, Subcommittee on Social Security, 1–14. http://www.socialsecurity.gov/oact/testimony/HouseWM_20130314.pdf.

Halpern, Janice D. 1979. "The Social Security Disability Insurance Program: Reasons for Its Growth and Prospects for the Future." *New England Economic Review* May/June: 30–48.

Kearney, John R. 2005/2006. "Social Security and the "D" in OASDI: The History of the Federal Program Insuring Earners Against Disability." *Social Security Bulletin* 66(3): 1–27.

Lewin-VHI. 1995. *Labor Market Conditions, Socioeconomic Factors, and the Growth of Applications and Awards for SSDI and SSI Disability Benefits*. Final report prepared under contract for the Office of the Assistant Secretary for Planning and Evaluation, Department of Health and Human Resources and the Social Security Administration, as cited in Rupp and Stapleton (1995). Fairfax, VA: Lewin-VHI, Inc.

Mosisa, Abraham, and Steven Hipple. 2006. "Trends in Labor Force Participation in the United States." *Monthly Labor Review* 129(10): 35–57.

Myers, Robert J. 1965. "Disability Incidence Rates Under OASDI System for Disability Onsets Occurring in 1956–61." Actuarial Note No. 18. Department of Health, Education, and Welfare, Social Security Administration (April).

———. 1993. *Social Security*, 4th ed. Philadelphia, PA: Pension Research Council, Wharton School, University of Pennsylvania Press.

Puckett, Carolyn. 2010. "Administering Social Security: Challenges Yesterday and Today." *Social Security Bulletin* 70(3): 27–78.

Rupp, Kalman, Paul S. Davies, and Alexander Strand. 2008. "Disability Benefit Coverage and Program Interactions in the Working-Age Population." *Social Security Bulletin* 68(1): 1–30.

Rupp, Kalman, and Charles G. Scott. 1996. "Trends in the Characteristics of DI and SSI Disability Awardees and Duration of Program Participation." *Social Security Bulletin* 59(1): 3–21.

Rupp, Kalman, and David Stapleton. 1995. "Determinants of Growth in the Social Security Administration's Disability Programs—An Overview." *Social Security Bulletin* 58(4): 43–70.

Sato, Kazuo. 1976. "The Ideal Log-Change Index Number." *The Review of Economics and Statistics* 58(2): 223–228.

Smith, Creston M. 1989. "The Social Security Administration's Continuous Work History Sample." *Social Security Bulletin* 52(10): 20–28.

[SSA] Social Security Administration. 2006. *Trends in the Social Security and Supplemental Security Income Disability Programs*. Washington, DC: Office of Policy, Office of Research, Evaluation, and Statistics (August).

———. 2010. *Annual Statistical Report on the Social Security Disability Insurance Program, 2009*. Washington, DC: Office of Retirement and Disability Policy, Office of Research, Evaluation, and Statistics (July).

——— 2013. *Annual Statistical Supplement to the Social Security Bulletin, 2012*. Washington, DC: Office of Retirement and Disability Policy, Office of Research, Evaluation, and Statistics (February).

Stapleton, David C., Kevin G. Coleman, Kimberly Dietrich, and Gina Livermore. 1998. "Empirical Analyses of DI and SSI Application and Award Growth." In *Growth in Disability Benefits: Explanations and Policy Implications* (chapter 2), edited by Kalman Rupp and David C. Stapleton, 31–107. Kalamazoo, MI: W. E. Upjohn Institute for Employment Research.

Törnqvist, Leo, Pentti Vartia, and Yrjö O. Vartia. 1985. "How Should Relative Changes Be Measured?" *The American Statistician* 39(1): 43–46.

Trivedi, Pravin K. 1981. "Some Discrete Approximations to Divisia Integral Indices." *International Economic Review* 22(1): 71–77.

Vartia, Yrjö O. 1976. "Ideal Log-Change Index Numbers." *Scandinavian Journal of Statistics* 3(3): 121–126.

———. 2010. "Principles of Defining Index Numbers and Constructing Index Series." HECER Discussion Paper No. 283. University of Helsinki, Finland (January).

Wixon, Bernard, and Alexander Strand. 2013. "Identifying SSA's Sequential Disability Determination Steps Using Administrative Data." Research and Statistics Note 2013-01. Washington, DC: Social Security Administration, Office of Retirement and Disability Policy, Office of Research, Evaluation, and Statistics (June).

Zayatz, Tim. 2005. "Social Security Disability Insurance Program Worker Experience." Actuarial Study No. 118, SSA Pub. No. 11-11543. Baltimore, MD: Social Security Administration, Office of the Chief Actuary (June).

———. 2011. "Social Security Disability Insurance Program Worker Experience." Actuarial Study No. 122, SSA Pub. No. 11-11543. Baltimore, MD: Social Security Administration, Office of the Chief Actuary (May).