Briefing Paper No. 2019-01

Trends in Social Security Disability Insurance

Overview

After a period of growth, disability incidence and prevalence rates under the Social Security Disability Insurance (DI) program have been in decline. The cause of the recent decline is unclear. This paper discusses recent disability incidence and prevalence rate trends and projections, describes the factors that might drive them, and summarizes disability research that might improve our understanding of the trends.

The first section reviews the historical and projected numbers of disabled-worker awards and beneficiaries. The second section describes factors that might explain recent trends. The third section summarizes our knowledge of the aggregate factors behind the growth in disabled-worker beneficiaries. The fourth section summarizes more narrowly focused research into specific factors that might affect the growth of the DI program. A fifth section gives a sample of the data and work available from agency data sources.

Summary Findings

- A sharp fall in the disability incidence rate—a measure of the flow of disability insured workers onto the DI rolls—since 2010 offsets the sharp rise in the disability incidence rate from 2007–2010. These changes have been difficult to anticipate.
- A rising disability incidence rate has been the largest contributor to the increase in the disability prevalence rate—the number of workers on the disability insurance rolls—in the early 1990s and during the early years of the recession, but the disability incidence rate has declined sharply in recent years. Two other factors contributing to the rise in the disability prevalence rate in recent decades—the aging of baby boomers into the disability-prone years and the growth in the proportion of women insured for disability—may have run their course. Declining mortality among disabled workers continues to put upward pressure on the disability prevalence rate, but recently that pressure has been more than offset by the declining disability incidence rate.
- A number of external studies have found that the disability incidence rate is tied to economic trends. Our own, still preliminary, research finds that fluctuations in the disability incidence rate are only partly explainable by economic cycles, however. For example, the 3.9 percent unemployment rate in 2018—below the 5.5 percent steady-state rate assumed in the OASDI Trustees Report (Board of Trustees 2019)—explains a bit more than a third of the difference between the observed disability incidence rate and the long-run rate consistent with steady-state unemployment. It is not clear yet how much the economic recovery explains the decline in the disability incidence rate since 2010.
- Specifically, in terms of recessions and unemployment, the recent empirical economics literature addresses the relationship between the business cycle and DI awards focusing on the unemployment rate. In more recent years, research has usually found significant effects of the unemployment rate on both applications and awards.
- The availability of health insurance may have played a significant role, with earlier studies finding a clear indication of a cross-sectional correlation between the costs that Medicare might cover and the probability of application for disability benefits. With

more options for health insurance that are not tied to employment available now, however, this may have changed. Early results on the effect of recently expanded health insurance coverage on disability claiming do not find large effects.

- There is some evidence that a shift in industrial composition toward jobs requiring less physical labor may contribute to the decrease in the disability incidence rate.
- By contrast, increasing earnings inequality and health inequality and rises in the full retirement age (FRA) might increase disability claims and awards.
- Changes in the processing of claims, including more training for administrative law judges (ALJs) and improved case assignment and monitoring, may be contributing to the reduction in the number of appellate allowances and the number of outlier ALJs—judges with allowance or denial rates far from the average.
- Recent research on the presence or lack of program information for insured workers finds evidence of effects on disability claiming.

Disabled-Worker Beneficiaries and Awards: History and Projection

In the last few decades, the number of disabled workers newly awarded benefits rose until about 2010 (Figure 1). Much of the rise is explainable by the growth in the labor force and in the percentage of the labor force insured for disability (Pattison and Waldron 2013; Liebman 2015). Contributing factors have been the aging of the baby boom cohorts into the disability-prone ages and the more lenient eligibility standards at older ages.[1]

The *disability incidence rate* divides the number of disabled-worker awards by the number of workers insured for disability, and shows the rise in disability incidence after removing the effects of overall growth in the population and the increase in the participation of women. The *age-sex adjusted incidence rate* (Figure 2) removes the effects of the changing age-sex composition. The historical series of these disability incidence rates helps inform both the range over which the incidence rate might fluctuate in the future and the intermediate level it might be fluctuating around. Figure 2 includes projections from the Trustees Reports for 2008 and 2019.

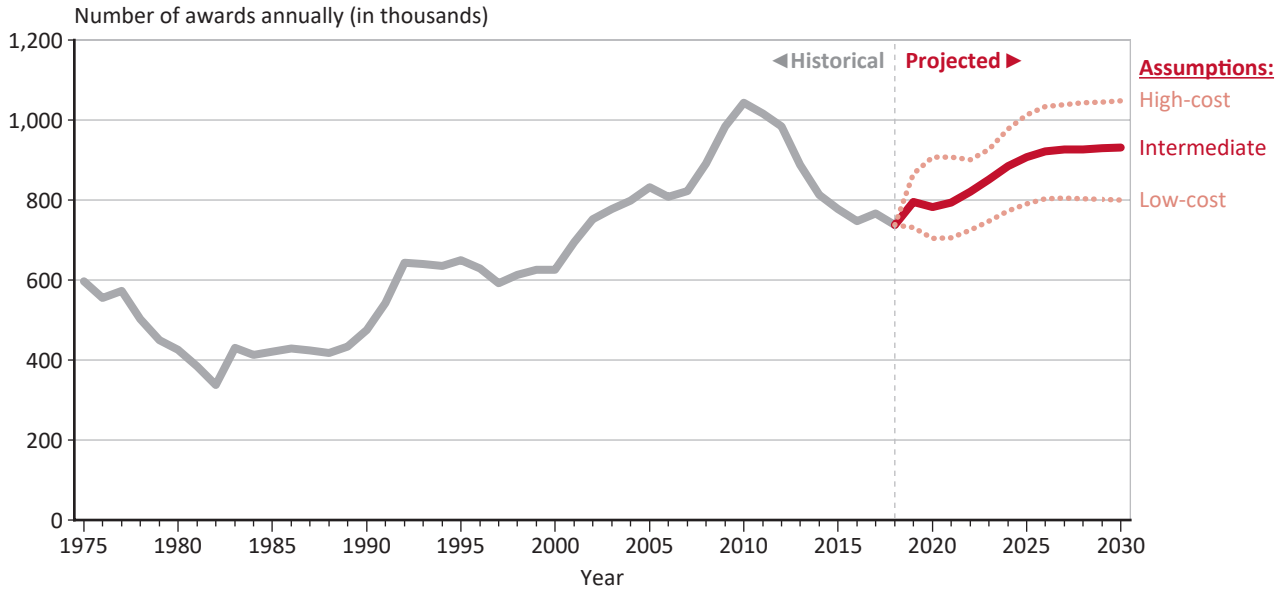
The fluctuations in the incidence rate, even when one accounts for changes in age and sex composition, indicate why it is difficult to precisely project the number of disabled workers. To some extent, business cycle fluctuations explain the fluctuations in Figure 2. The large rise in 2008–2010 is associated with the recession, and at least part of the decline since then is associated with the recovery, but, as explained later in this paper, econometric analyses indicate that the decline in the disability incidence rate has been more than the portion that can be attributed to the economic recovery.

The disability incidence rate is based on the number of new disabled-worker awards. The *disability prevalence rate* is based on the total number of disabled workers, including new awardees and those already on the rolls who have not yet recovered, died, or converted to old-age benefits. Figure 3 shows historical age-sex adjusted prevalence rates from 1970 to 2018 and projected rates up to 2030. The prevalence rate rose steadily from the 1980s until its post-recession peak in 2013. Part of this reflects an apparent upward shift in the disability incidence rate around 1990; such changes in the incidence rate take many years to be fully reflected in the prevalence rate. Also contributing to the rise has been an increase in the average number of years on the disability rolls as mortality rates among disabled-worker beneficiaries declined faster than in the general population.

The large fluctuations in the disability incidence rate in the 1970s and the upward shift around 1990 are reminders that economic cycles are not the only important factors driving the disability incidence rate. Getting a

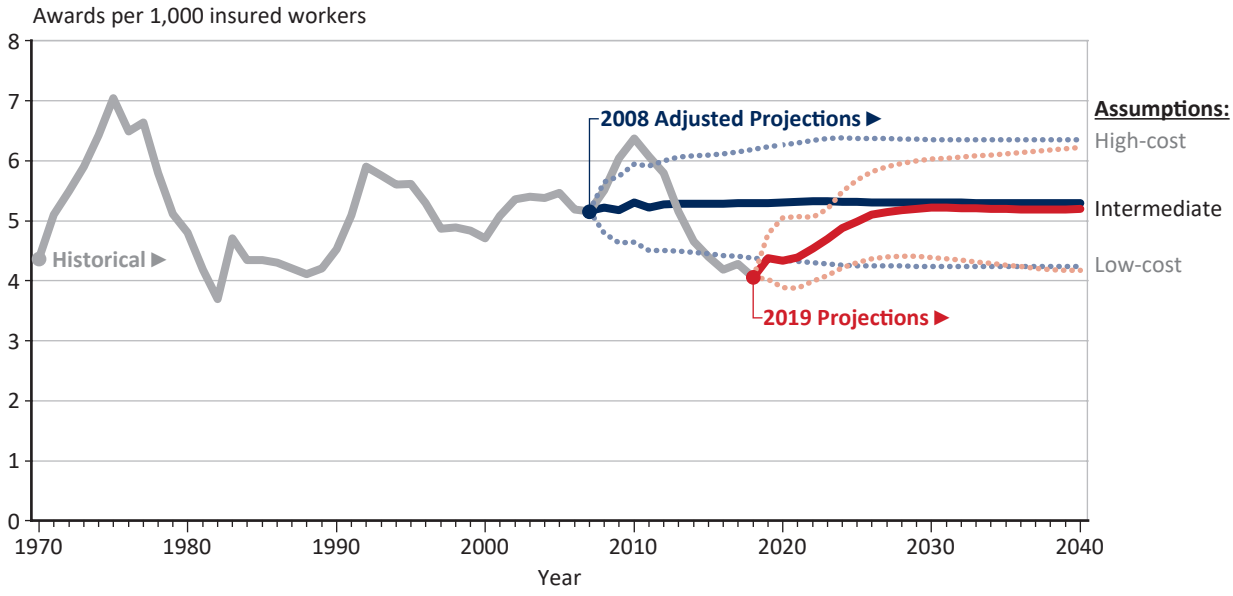
[1] If an impairment is too severe for an applicant's previous occupation, the law requires Social Security to assess whether the applicant can move to a new occupation, taking into account the applicant's age, education, and work experience. This statutory requirement has been implemented as a set of rules called the "vocational grid" that allow older workers with little education and few skills to qualify with impairments that would not be ruled disabling for younger or more educated or more skilled workers. Moreover, at older ages, even skilled workers are regarded in the rules as having restrictions on the transferability of their skills to new jobs.

Figure 1 — Disabled-worker awards, 1975–2018 and projected to 2030



Source: Board of Trustees (2019), Table V.C5 and Figures V.C3 and V.C6.

Figure 2 — Disabled-worker incidence rate (age-sex adjusted), 1970–2018, with 2008 and 2019 Trustees Reports' projections to 2040

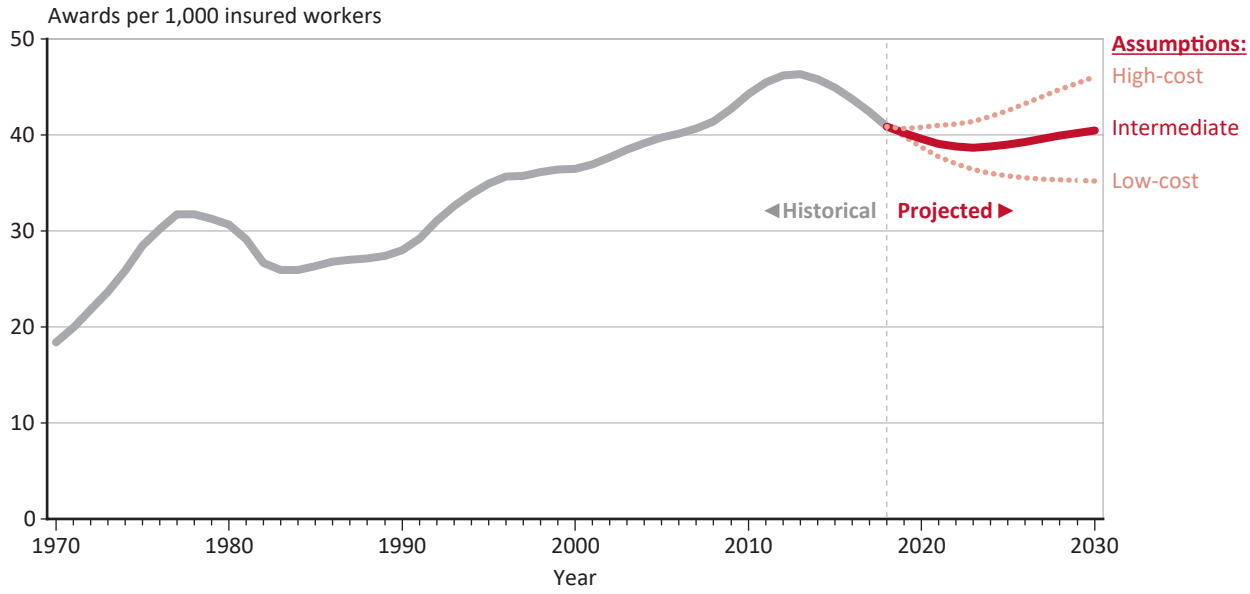


Source: Board of Trustees (2008 and 2019), Figure V.C3.

Notes: Incidence rates are per thousand disability-insured workers (not including those already receiving benefits) and are age-sex adjusted to the 2000 disability-insured population.

The 2008 ultimate assumption values (reached in 2027) were 4.2, 5.2, and 6.2 disabled workers per thousand exposed. (The 2008 report projections have been adjusted slightly to be consistent with a change introduced in the 2009 report. The adjusted intermediate ultimate rate is approximately 5.3 rather than 5.2.) The 2019 values were 4.2 (reached in 2038), 5.2 (reached in 2028), and 6.2 (reached in 2038).

Figure 3 — Disabled-worker prevalence rate (age-sex adjusted), 1970–2018 and projected to 2030



Source: Board of Trustees (2019), Figure V.C6.

Note: Prevalence rates are per thousand disability-insured workers, age-sex adjusted to the 2000 disability-insured population.

better understanding of the other important factors, like changes in program rules, and more detailed exploration of the possible changing roles of all economic variables will help pin down more precisely any underlying trends in disability incidence.

Factors That Might Affect Disability Trends

Here, we briefly discuss factors that might noticeably affect the disability filing, incidence, and prevalence rates. Subsequent sections discuss the empirical literature and some empirical analysis addressing these issues. Longer-term trends like declining mortality or changes in the health of the population will also affect disability, but trends in the rate of self-reported health in the population over the last three decades have been stable relative to the changes that have been seen in the disability rates (Burkhauser and Daly 2011). The focus here is on the factors that might explain the shorter-term fluctuations.

Recession-induced disability incidence

A sharp recession will sweep some marginally disabled workers out of employment and onto the disability rolls who might have been able to continue their employment for a few more months or years under more favorable economic conditions. A subset of this group who are already near retirement age would have made it to retirement age without claiming disability benefits if there had been no recession. These near-retirement workers will cause a temporary rise in the disability incidence and prevalence rates that fall back to normal as they reach retirement. The remaining rise in the incidence rate represents workers who would, in the absence of the recession, have been awarded benefits somewhat later, and the initial rise in the incidence rate for these workers will be matched later by a fall in the incidence rate below the level that would have been seen in the absence of the recession.

Recession-induced loss of insured status

During a prolonged recession, some unemployed workers will lose their disability-insured status because of the recency-of-work requirement for disability insurance. If they become disabled before regaining their insured status, they will not be eligible for DI benefits. For those whose medical disability is such that they will never regain insured status, the result will be a prolonged

reduction in the disability incidence rate below what it would have been in the absence of the recession. This reduction, although it has not been measured, is probably small. Furthermore, any reduction would be partly offset by a rise in Supplemental Security Income (SSI) disability applications, which do not require insured status, and SSI applications have also been falling in recent years.

The determination backlog

The wave of applicants entering the disability determination system created a wave of delayed decision times, first in the Disability Determination Services (DDS) offices, and subsequently at the appeals level. If measured by the timing of the retroactive award rather than by the month of entitlement, the backlog-induced delay can temporarily reduce the incidence rate.[2] If these backlog effects are large enough, they could confound estimation of the effects of economic cycles on disability awards. Among the factors affecting the timing of the decisions (and the probability of award or denial) are the changing mix of applicants during the recession, and other possible administrative issues.[3]

Disability determination policy

Some large shifts in the disability incidence rate in the past have been attributed to legislated or administrative changes in disability determination policy. There has been speculation that new policies and procedures at the appeals level have reduced the incidence rate in recent years. The new procedures include the development of statistical tools that allow hearing offices and ALJs to compare their performance with other staffs and judges as well as allow for the identification of judges whose decision statistics fall outside the range of comparable judges. Additionally, there has been a greater emphasis on training for ALJs. Finally, the composition of the judges has changed because of the hiring of new judges and the retirements of older judges. These innovations, although challenging to quantify, might explain why it has been difficult to explain the recent decline in the disability incidence rate through economic factors alone.

Discouraged applicants

Ever since Bound (1989), there has been speculation that more stringent procedures in the determination process will discourage applications. Although plausible, modeling such a mechanism is more problematic. Any reduction in the disability incidence rate would depend not only on how many workers are discouraged from applying, but also on how low the allowance rate of those workers would have been relative to the allowance rate of the remaining applicants. The larger the difference between the allowance rate of the remaining applicants and the relatively low allowance rate that would have been seen among those discouraged from applying, the smaller the reduction in the incidence rate will be (and the higher the rise in the allowance rate among the remaining applicants).

Decomposition of the Growth in Disabled Workers

This section reviews and adds to the limited literature that has attempted to decompose changes in the stock and flow of disabled-worker beneficiaries into contributing factors including overall population growth.

Several factors contribute to growth in the number of disabled workers coming on the disability rolls or remaining on the rolls, including:

- The increase in the percentage of women insured for disability as a result of the rise in women's labor force participation;
- The shift in the age composition of the workforce toward the disability-prone ages;
- Business cycle effects;

[2] A worker who became disabled early in 2009, for example, might have had the award made before the end of 2009 if there had been no backlog, but might find the month of award, but not the month of entitlement, delayed into 2010 because of the backlog, reducing the incidence rate in 2009 as measured by the month of award, but not as measured by month of entitlement. When a backlog is brought down, there can be a corresponding increase in the incidence rate as measured by the month of award.

[3] Hu and others (2001) examine how the backlog affects the determination process. They conclude: "hence, we see almost no evidence that workload pressures led to more lenient decisions."

- Policy effects on disability determination or continuing disability reviews;
- Growth in the fraction of workers at younger ages who come onto the disability rolls; and
- Changes in duration on the disability rolls, whether from workers coming on at younger ages or from a decline in termination rates.

Several studies have sought to decompose the overall growth into these component factors. The studies are difficult to compare because they vary with regard to the period studied, the source of the data, and the decomposition methods. Our review summarizes studies that have done year-by-year decompositions of growth rates. The Social Security Administration's Office of the Chief Actuary (OCACT) has for many years presented both the gross disability incidence rate and an age-sex adjusted rate that factors out the changing composition of insured workers (Goss 2011, 2013, 2014). Pattison and Waldron (2013) further factored the growth in insured workers into an overall growth in the working-age population and a component attributable to increased disability insurance rates (primarily women) in that population. Liebman (2015) presented incidence rates free of both age-composition effects and cyclical effects. For disability prevalence rates, in addition to OCACT's standard gross and age-sex-adjusted presentations, both Daly, Lucking, and Schwabish (2013) and Liebman (2015) extracted some further components like changing mortality rates among disabled workers.

Despite these differences in approach, there is some broad qualitative agreement. The disability incidence rate for both sexes rose sharply in the late 1980s and early 1990s. The male incidence rate then fell back to around its 1990 level and remained roughly steady until the 2008 recession, when it rose rapidly. The female incidence rate stayed high after 1990, and the historical gap between men's and women's rates has now been almost eliminated.

The disability incidence rate tends to move in concert with the unemployment rate. Figure 4 shows the incidence rate for men and women aged 50–64 and the unemployment rate. Clearly, much of the large variations in incidence correspond to the unemployment cycles.

Figure 4 — Disability incidence rates for insured workers aged 50–64, by gender, and unemployment rate, 1990–2017

Source: OCACT (incidence rates) and Bureau of Labor Statistics (n.d.) (unemployment rate).

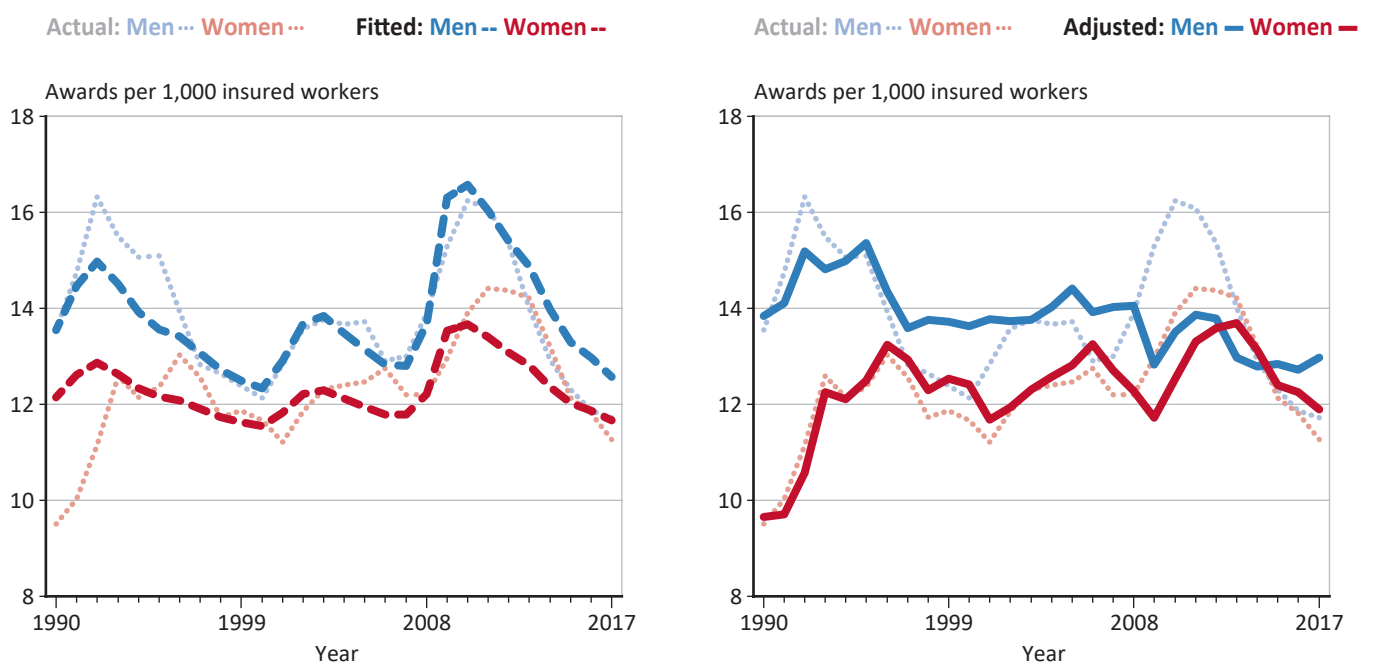
To understand the underlying trend in disability incidence, it is useful to remove these cyclical effects. We have followed Liebman (2015) by modeling incidence as a function of unemployment and then subtracting the estimated unemployment effect to derive an adjusted incidence rate. Liebman's analysis covered the years 1975 through 2009. We have replicated his analysis, extended it through 2017, and performed some sensitivity analyses. The presentation here focuses on the years from 1990 on to avoid the confounding effects of large program changes in the 1980s.

The disability incidence rates for insured workers aged 50–64 and aged 30–49 are given in Figures 5A and 5B, respectively, along with the regression-fitted incidence rates and adjusted incidence rates that subtract the estimated unemployment effects. In each pair of figures, the actual incidence rate is shown with pale blue (men) and pale red (women) dotted lines in both the left and right panels. The left panel in each figure overlays the actual incidence rates with dashed lines showing the regression fitted rates estimating the effect of unemployment. It can be seen that the rise and fall in the fitted lines, because of the estimated unemployment effects, correspond to much of the rise and fall in the incidence rates. In the right panel in each figure the actual incidence rates are overlaid with incidence rates adjusted to remove the estimated unemployment effects. These adjusted rates indicate that incidence rates for men, approximately steady in the early 2000s, may have been declining but steadied most recently, and that incidence rates for women, which had been rising both absolutely and relatively to men, are also now declining.[4]

Many separate regressions for both sexes and all insured workers aged 20–64 are combined in Figure 6 to give the corresponding age-sex adjusted fitted incidence rates and the rate adjusted for unemployment.

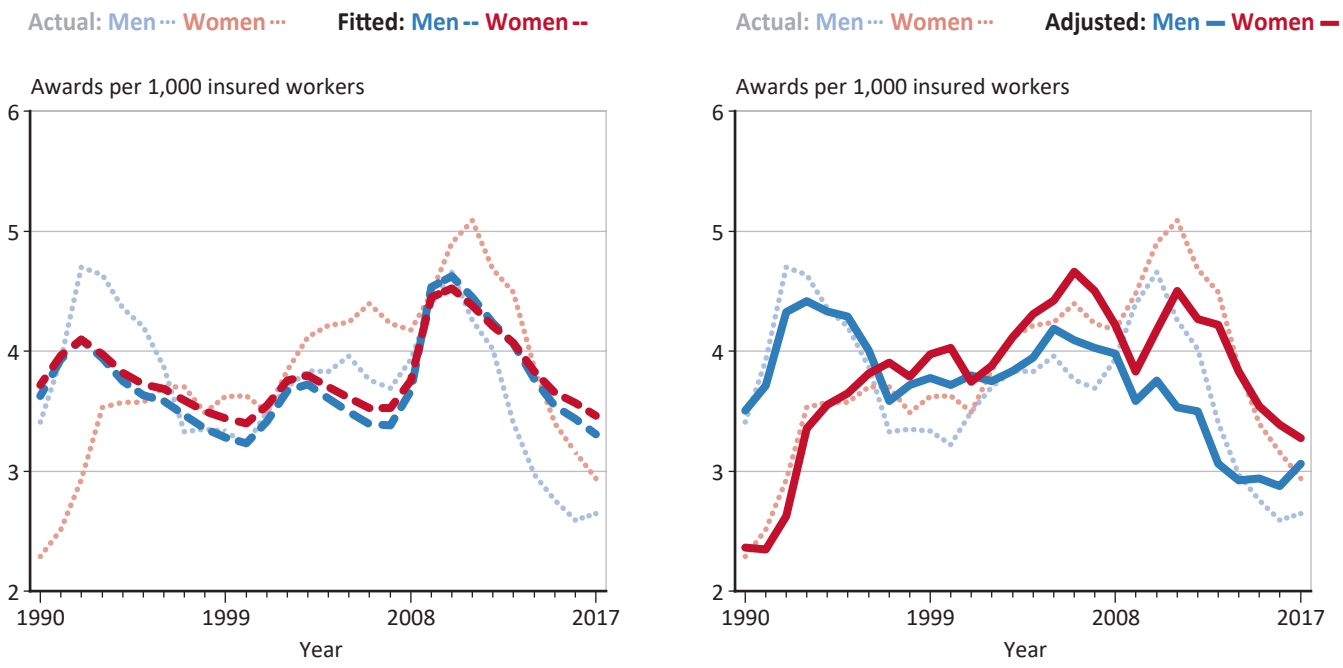
[4] For statistical reasons (the "Frisch-Waugh-Lovell" theorem), the calculation of an adjusted incidence rate is problematic when there are trends in either the unemployment rate or the incidence rate. We have followed Liebman in allocating any trend to the incidence rate.

Figure 5A — Actual, fitted, and adjusted disability incidence rates for insured workers aged 50–64, by gender, 1990–2017



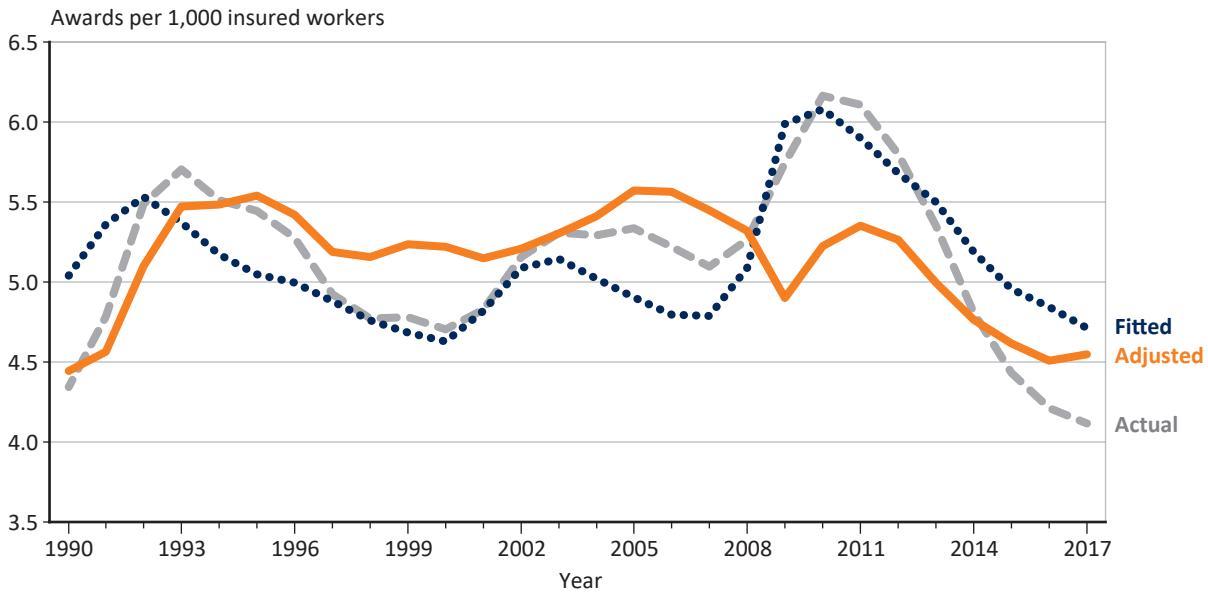
Source: OCACT (incidence rates) and Bureau of Labor Statistics (n.d.) (unemployment data).

Figure 5B — Actual, fitted, and adjusted disability incidence rates for insured workers aged 30–49, by gender, 1990–2017



Source: OCACT (incidence rates) and Bureau of Labor Statistics (n.d.) (unemployment data).

Figure 6 — Actual, fitted, and adjusted incidence rates for all insured workers aged 20–64, 1990–2017



Source: OCACT (incidence rates) and Bureau of Labor Statistics (n.d.) (unemployment data).

Here the gray dashed line is the actual age-sex adjusted rate, the dark blue dotted line is the regression fit, and the orange solid line is the incidence rate adjusted to remove the estimated unemployment effect. The adjusted incidence rate rose sharply just after 1990 but fell over the last decade.[5]

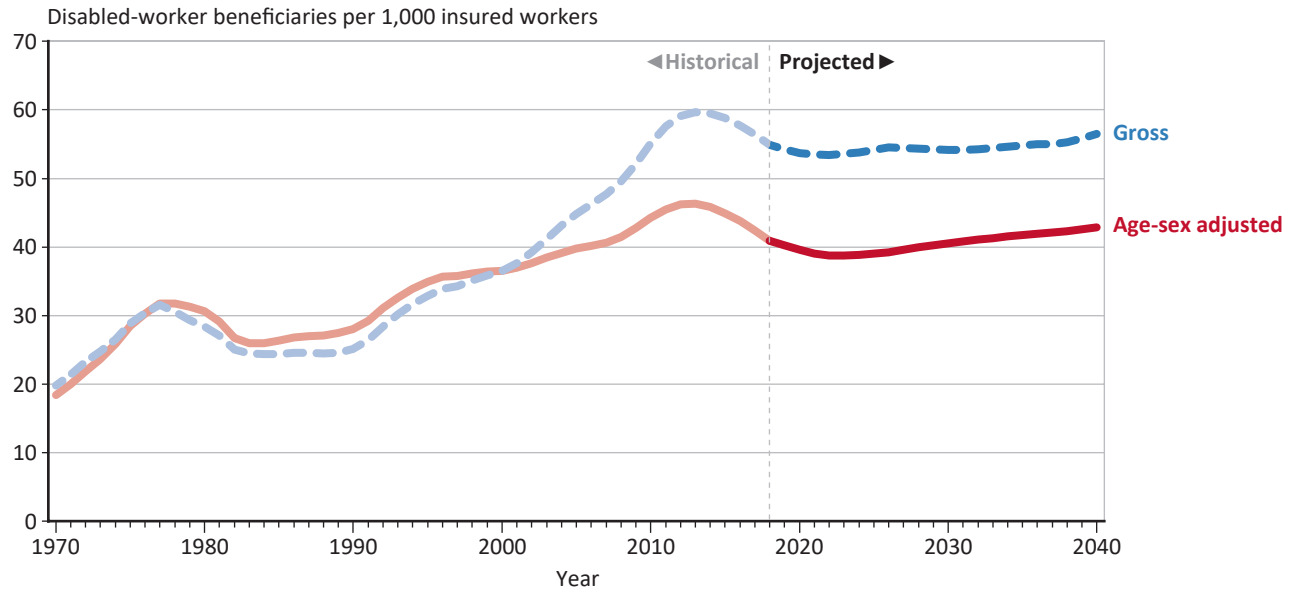
Under the regression specification used in Figures 5A/B and 6, the 2018 unemployment rate of 3.9 percent would have been associated with a predicted disability incidence rate of 4.7 per thousand, higher than the actual 2018 incidence rate of 4.1 per thousand. The ultimate unemployment rate in the 2019 Trustees Report of 5.5 percent would be associated with an incidence rate of 5.14 percent, close to the Report's assumed ultimate incidence rate of 5.2 percent. The regression specification underlying Figures 5A/B and 6 is only one of several possible specifications, many of them equally supported statistically, but most of the ones that have been tested give results similar to those presented here.

We shift now from the incidence rate, measuring workers coming onto the disability rolls, to the prevalence rate, measuring total workers on the rolls, including those who came on the rolls in earlier years and have not yet died, recovered, or converted to old-age benefits. Figure 7 shows the number of disabled beneficiaries per thousand insured workers. Some of the rise in prevalence is because of the aging of the baby boomers. But even when the numbers are age-sex adjusted to the 2000 insured-worker population, there has been a large rise, from 1.8 percent (18 per thousand) in 1970 to 4.6 percent (46 per thousand) in 2012. Despite this rapid rise of the past decades, the Trustees forecast a stabilization of the DI program with small incremental increases in prevalence because of increases in the time spent on disability.

Large changes in the disability incidence rate have cumulative effects on the prevalence rate that take many years to "reach steady state" (Liebman 2015). This gradual approach to a stable growth in the prevalence

[5] Small timing differences between the actual incidence rate and the regression-fitted incidence rate can lead to year-to-year fluctuations in the adjusted incidence rate, such as the drop in 2009 when the fitted rate rose more rapidly than the adjusted rate.

Figure 7 — Gross and age-sex-adjusted disability prevalence rates: Observed (1970–2018) and projected (2019–2040)



Source: Board of Trustees (2019), Table V.C6.

rate after large changes in the incidence rate can be analyzed demographically, and underlay the projection of an end to the rapid rise in the prevalence rate even before the decline in the incidence and prevalence rates of recent years (Board of Trustees 2008; Liebman 2015).

Three of the factors driving the disability incidence rate relative to population also drive the growth in the disability prevalence rate, including:

- population aging (the changing age composition as the baby boomers age),
- the rising proportion of workers insured for DI benefits, and
- rising rates of workers claiming DI benefits.

Factors that determine time on the disability rolls also affect the prevalence rate, including:

- declining mortality rates among disabled workers;
- increasing rates of recovery (e.g., returning to work); and
- the shift in the FRA from 65 to 67, postponing for some disabled workers the conversion to retired workers, so that more time is spent on disability.

We discuss a final factor, momentum, below.

Liebman (2015) and Miller, Pattison, and Ayala (forthcoming) have decomposed the overall growth in the prevalence rate into the component factors by analyzing a series of counterfactual scenarios.[6] These analyses first assume that the age distribution at the start of the analysis period (1985 or 1990) remains fixed throughout the subsequent history, and calculate the percentage reduction in beneficiaries that would have been seen over the study period. A series of similar counterfactual simulations then holds other factors constant at their initially observed values by age and sex (percentage of workers insured; percentage of insured workers awarded benefits; and percentage of beneficiaries dying, recovering or converting at the FRA). Over this period, the change since 1985 or 1990 in almost all of these factors tended to increase the number of beneficiaries, and the counterfactual technique gives an estimate of the percentage increase attributable to each such factor. (The single exception is the rates of recovery from disability, which have improved slightly and have tended to reduce the number of beneficiaries on the disability rolls. For the graphical analysis, this decrease in beneficiaries from the improved rates of recovery has been subtracted from the much larger increase in beneficiaries from declining mortality.) The percentage increases in beneficiaries attributable to each factor under this analysis are combined in Figure 8, expressed as a percentage of the working-age population.

Over this period, the percentage of workers on disability increased from about 1.7 percent in 1990 to a peak of over 4.0 percent, declining in recent years. The age-sex distribution (red band) accounted for about 18 percent of the 1990–2018 increase. Declining mortality offset by improving recovery (blue band) accounted for around 14 percent of the increase (declining mortality accounted for 15.9 percent of the increase, improving recovery accounted for a 2.4 percent decline). Growth in insured workers contributed to 6 percent of the growth (green band). The increase in the FRA accounted for 9 percent (purple band). The rise in the incidence rate (orange band) has been the most variable factor, generating a sharp rise in the prevalence rate in the early 1990s, after which it rose more slowly until the onset of the recession, when the large rise in awards and the more recent decline led to a large bulge in the disability prevalence rate.

The final factor in the analysis is momentum, which refers to the change in the number of disabled-worker beneficiaries if the factors determining the disability incidence and prevalence rates—the percentage insured, the claiming rates, and the retirement and death rates—in a year are frozen in place for some time. Many of the disabled workers on the rolls in a given year entered the program 10 or 20 years earlier, reflecting the incidence rate of 10 or 20 years earlier. If, as in 1990, the disability incidence rate had recently been rising, the full

[6] Both the Liebman analysis and the Miller, Pattison, and Ayala analysis would show slightly different results in the decomposition if the ordering of the counterfactual simulations were changed. Also, neither analysis fully accounts for changes in disabled-worker mortality and other factors as the duration distribution changes.

effect of the rise on the disability numbers would not resolve for another 10 or 20 years. In Figure 8, the effect of the 1990 momentum is indicated by the gray band between the bottom, flat, line that holds prevalence at its 1990 value and the colored bands that give the estimated effects from the other factors listed above. The analysis indicates that, holding all of these other factors constant, the DI prevalence rate would still have risen from its 1990 value of 1.7 percent to a value, eventually, of around 2.5 percent. This increase attributable to momentum is about one-fourth of the total increase in the prevalence rate from 1990–2018.

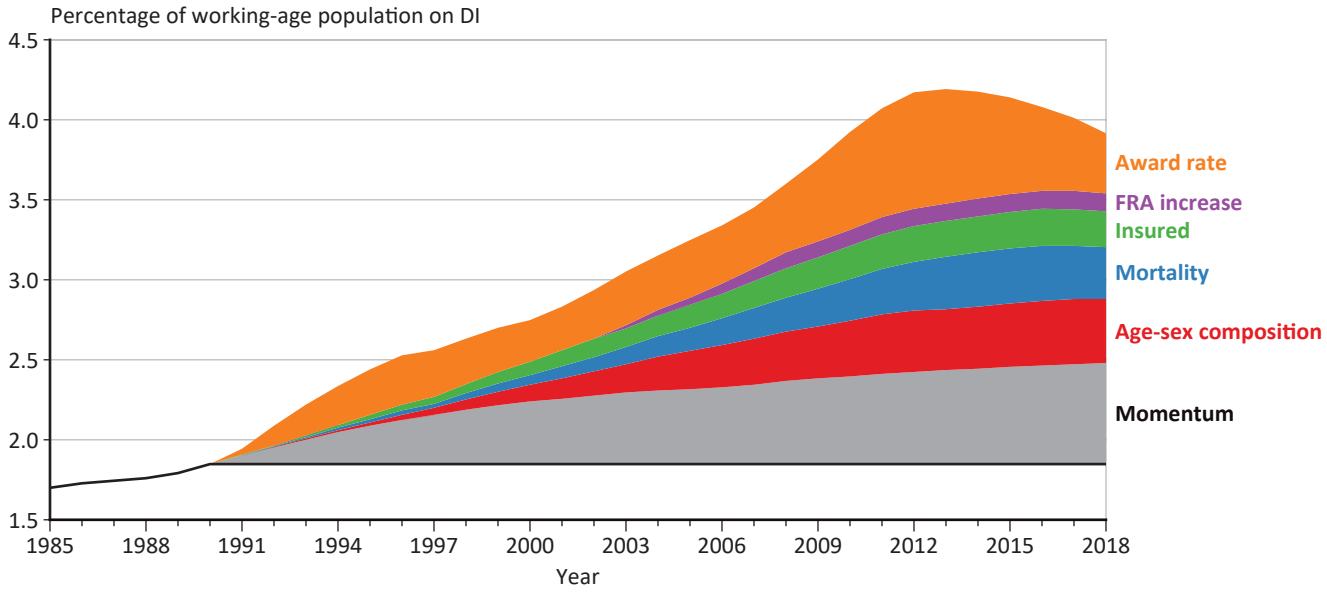
The analysis suggests that several of the factors that contributed to the growth in the disability prevalence rate from 1990–2018 will not contribute much to growth past 2018. The age composition effect from the movement of the baby boomers through the disability prone ages, the growth in female insured workers, and the increase in the FRA have all leveled off. The momentum from pre-1990 changes has been disappearing, and recent declines in the disability incidence rate will contribute a negative momentum to post-2018 growth. This kind of decomposition supports the view that the DI program has transitioned from a rapid growth to a slow growth program, with smaller factors like decreasing mortality among disabled workers contributing to the continuing slower growth. Although future business cycles may continue to contribute large fluctuations above and below the long-term trend, it is not clear yet where the long-term contribution of the award rate will settle.

The Miller, Pattison, and Ayala analysis derived from that of Liebman (2015). Although the studies differ in the study period and in the implementation details, leading to differences in the percentage estimates, Liebman reached a similar conclusion about the shift from a rapid-growth to a slow-growth program.

Research on Specific Factors Affecting the Disability Program

A large literature has explored various factors that might influence disability awards and duration on the disability rolls. Many of these are econometric studies searching for effects on specific subpopulations of workers or beneficiaries.

Figure 8 — Decomposition of disability prevalence rate growth, 1990–2018



Source: Miller, Pattison, and Ayala (forthcoming).

We group these studies as follows:

- Benefit generosity and the inducement to apply for disability,
- Recessions and unemployment,
- Medicare, Medicaid, and health insurance availability,
- Informational effects and transaction costs,
- Health trends,
- Industry composition changes, and
- Changes in the processing and nature of claims.

Benefit generosity and the inducement to apply for disability

Some disabled workers with less severe impairments or with slow-onset disabilities have a degree of choice among applying for disability benefits, continuing to work, or, for those at or near age 62, applying for a retired-worker benefit. The size of the monthly disability benefit relative to earnings or to the potential retired-worker benefit might then be a factor in the decision. Several studies have explored this possibility.

The replacement rate effect from the change in earnings inequality

Autor and Duggan (2003) highlighted the possible effect on disability incentives if the earnings in the upper end of the earnings distribution rise faster than those in the lower portion, as they have over parts of recent decades. Benefits are indexed to the average of all wages. With that index rising faster than wages in the lower part of the distribution, lower-wage workers should see a rise in the disability benefit they would receive relative to the earnings they are receiving. This would increase the incentive to apply for disability benefits for those workers that have a choice.

Autor and Duggan estimated the rise in replacement rates between 1979 and 1999 using earnings histories synthesized from Census earnings percentiles, and found large rises at all ages in the lower percentiles of earnings. Muller (2008), using actual administrative earnings histories to calculate potential replacement rates for the insured population, confirmed that replacement rates at most ages have tended to rise over time, especially among the lower earners. (Muller also tabulated the replacement rates for the small subgroup of insured workers who had become entitled to disability benefits. For this group the replacement rates actually fell or held steady at most ages.)

Estimating whether this rise in replacement rates has led to a rise in disability prevalence has been more difficult. Autor and Duggan, using state-level estimates of low-earner replacement rates, found correlations between the state-level 1978 replacement rates and the state-level changes in DI beneficiaries in 1978–1984 and in 1984–1998: states with relatively high replacement rates in 1978 showed faster declines in DI beneficiaries in 1978–1984 (when prevalence rates were declining nationally) and faster rises in 1984–1998 (when national rates were rising).[7]

The FRA effect

The increase in the FRA from 65 to 66 for workers turning 62 in 2000 through 2005 reduced the old-age benefit a worker would receive at age 62 relative to the disabled-worker benefit the same worker might receive. For workers at or near retirement age who have a chance of successfully applying for disability benefits, this will increase their incentive to apply for disability. (A similar increase in the FRA from 66 to 67 is currently underway for workers reaching age 62 in 2017–2022.) Duggan, Singleton, and Song (2007), using population and DI enrollment data by age and sex, estimated that

[7] Autor and Duggan's goal was to estimate the association between DI prevalence and labor force participation. Direct regression of changes in participation on changes in DI prevalence indicate that rises in state-level DI prevalence were associated with declines in state-level labor force participation, but such regressions are problematic for interpreting causality. The introduction of initial state-level replacement rates as an instrument for the change in DI prevalence was an attempt to surmount the causality problem, using the *level* of DI disability replacement rates in 1978 as an instrument for the *change* in DI disability prevalence in 1978–1984 and in 1984–1998. Autor and Duggan noted that their technique could not distinguish the effects of changes in the replacement rate from changes in program stringency. They also noted that the results could be confounded by the large drop in the percentage of high school dropouts over the period, from 26 percent in 1979 to 12 percent in 1998, a change in composition for which they could only partly control.

for men 45–64 years old, the increase in the disability prevalence rate from this effect had reached about 0.6 percentage points by 2005 and would eventually reach about 1 percentage point. Coe and Haverstick (2010), using survey and matched administrative data, found an effect on applications, but a reverse effect on allowances among those who applied. They found no significant effect on the chance of ultimate receipt, but noted that their standard errors were large enough that they could not rule out an effect of the size estimated by Duggan, Singleton, and Song.[8]

Potential earnings of denied applicants

An underlying assumption of the studies mentioned above is that a significant group of disabled-worker beneficiaries would have continued to work if benefits had not been easily available. Bound (1989) suggested that the subsequent earnings of claimants who have been denied might provide some indication of an upper bound of what the presumably lower earnings of allowed applicants would have been if they had been denied. Many studies since then followed up on Bound's suggestion and have established that many denied applicants do subsequently work, although not, on average, as much as they had before the disability onset (Lahiri, Song, and Wixon 2008; von Wachter, Song, and Manchester 2011; French and Song 2014a, 2014b; Maestas, Mullen, and Strand 2013).

Still unknown is how many of the *allowed* applicants would have been able to work if they had been denied. A recently growing literature has used the random assignment of examiners (at the DDS level) or judges (at the ALJ level) as a statistical instrument for exploring the differences in earnings between allowed and denied applicants (French and Song 2014a, 2014b; Maestas, Mullen, and Strand 2013). This instrument estimates the average increment in earnings if denied among the subset of applicants whose determination is likely to depend on the assignment to an examiner or judge.

Estimates from these studies of the earnings increase for the assignment-sensitive subgroup are comparable in magnitude to the difference in earnings between those denied benefits and those allowed benefits. The French and Song study, for example, found that although earnings 3 years later for those denied benefits average about $4,200 higher than the very low earnings seen among those allowed benefits, the estimated difference for the assignment-sensitive subgroup of allowed applicants was only slightly smaller—about $4,000. The Maestas, Mullen, and Strand study had a larger difference: $7,000 between earnings of denied applicants and earnings of allowed applicants, but a smaller estimated difference, just over $3,000, for the assignment-sensitive subgroup. Although these findings cannot be extended to the wider group of allowed applicants, the statistical technique shows some promise for looking at other characteristics of the assignment-sensitive applicants like types of impairment or outcomes like mortality. We provide more discussion of this group of articles in the Appendix.

Recessions and unemployment

As already discussed, the number of disability awards tends to rise in periods of high unemployment, presumably at least in part because disability benefits become relatively more attractive than earnings in times of falling employment and earnings. With less work available, more marginally disabled workers will apply for benefits. Two strands of the empirical economics literature address the relationship between the business cycle and DI awards. The first directly models the relationship between awards and the unemployment rate. The second uses dramatic movements in the prices of natural resources to examine the effects of changing local economic conditions on disability benefit payments.

An early example from the first strand is Stapleton and others (1998). They modeled the relationship between claiming and unemployment while absorbing state- and time-specific trends through fixed effects in data through 1994. They found a significant positive relationship between the unemployment rate and the number of initial claims and awards, that is, an increase in the

[8] Both of these studies looked only at applications or receipt through 2005. Although the first rise in the FRA ended with workers turning 62 in 2005, extension of this type of analysis through more recent data would improve the statistical precision of the estimates. Subsequent extension over the next few years would allow incorporating the effects of the second rise in the FRA now underway.

unemployment rate was associated with increases in claims and awards. The state and period fixed effects panel regressions first used by Stapleton and others in this context have since been applied to later data. Maestas, Mullen, and Strand (2015), estimating over the 1992–2012 period, found a significant *negative* coefficient for the regression of initial allowances on unemployment. Maestas, Mullen, and Strand (2017), with a different specification and a shorter period (2006–2012), but with data that included final decisions rather than initial allowances, found a significant *positive* coefficient.[9] Liebman (2014), using data through 2010, and Cutler, Meara, and Richards-Shubik (2012), using data through 2011, both found that higher unemployment rates were associated with higher incidence rates.[10]

Regional economic fluctuations not necessarily tied to national economic cycles might also lead to changes in local disability rates. At least three published or forthcoming studies use the effect of changes in natural resource prices in select resource-rich local economies to study the effect of changes in aggregate local earnings on changes in aggregate local DI payments.[11] The various studies express their estimates in terms of the DI effect associated with a 1 percent increase in county-level earnings: Black, Daniel, and Sanders (2002) estimated a 0.35 percent decrease in DI benefit payments; Charles, Li, and Stephens (2018) estimated a 0.3 percent decrease; and Vachon (2015) estimated a 1 percent decrease. Vachon also estimated that the number of DI participants decreases by 0.7 percent. These studies express some caveats about generalizing to the national economy. Black, Daniel, and Sanders noted that there is a disproportionate representation of low-skilled workers in the coal industry: in 1990, 30 percent of the workers did not have a high school diploma. Charles, Li, and Stephens note that the oil industry captured in their study is quite different from the coal industry and suggest that oil workers are more representative of the national economy. Vachon notes that states included in his study are much more rural than the coal states.

Medicare, Medicaid, and health insurance availability

Disabled workers are entitled to free Medicare Part A coverage (hospital insurance) after a 2-year waiting period. As a result, the need to cover medical expenses could be a significant inducement to apply for DI benefits. Supporting this hypothesis, Lahiri, Song, and Wixon (2008), using Medicare data mapped to survey data, found a clear indication of a cross-sectional correlation between the costs that Medicare might cover and the probability of application for disability benefits.

More recently, the expansion of health insurance coverage through the Affordable Care Act (ACA) could have affected both short- and long-term application behavior. In addition to providing subsidized health insurance coverage through state marketplaces, the ACA also expanded access to Medicaid for low-income adults. By providing access to health care separate from that provided by Social Security Disability Insurance, this expansion could have reduced applications for DI benefits. On the other hand, by making health insurance available during the jobless period of the DI application process, the health insurance expansion could have made some workers more willing to forego employment to apply.

Although not directly relevant to DI claiming, there is a literature on the effects of Medicaid expansion on SSI applications. In some circumstances, the literature finds no effect (Baicker and others [2014] is the most prominent example) and, in other circumstances, it finds

[9] An exploratory replication (Pattison, forthcoming) indicates that this difference is not merely because of the use of final decisions: re-estimating the initial allowance data with the new specification and the shorter period also gives a positive coefficient. The analysis also indicates that there are significant within-state trends, so that estimates based on an assumption of fixed state differences might be biased.

[10] As reported in the previous section, extending Liebman's analysis through 2017 yields similar results.

[11] All three use essentially the same strategy. Black, Daniel, and Sanders (2002) use four Appalachian coal states during 1970–1993; Charles, Li, and Stephens (2018) use 11 oil and gas states in a band from Louisiana to Montana during 1970–2011; and Vachon (2015) uses three oil-producing states, Montana and the two Dakotas, during 2000–2009. In each study, the influence of the relevant natural resource price on county-level earnings is estimated, and the correlation is estimated between changes in this effect on earnings and changes in county-level DI payments. In all studies, state-year dummies are included, so that the estimates are estimates of the correlation between changes in county earnings relative to the average change in earnings in the state and changes in county DI payments relative to the average change in DI payments in the state.

a strong negative effect (Burns and Dague [2017] is the first published study).

The literature on the effects of the ACA expansion on DI program applications is less developed. The Massachusetts health insurance reform that preceded the ACA provides a preview of the possible effects on DI applications. Maestas, Mullen, and Strand (2014) studied that expansion using a difference-in-differences analysis of the short-term changes in DI claiming in response to increases in health insurance coverage. They found that DI claiming decreased in counties with the lowest levels of pre-reform insurance coverage, but that decrease was more than offset by increases in counties with the highest pre-reform levels, so that the estimated net effect for the state was a slight increase in claiming. The estimate of the net effect was slightly positive. However, the United States has a much larger proportion of counties that are similar to low-coverage counties in Massachusetts, which would indicate an overall decline in claiming if the Massachusetts estimates can be extrapolated to the whole country.

Most of the remaining work on effects on DI claiming is still in the working paper stage. Chatterji and Li (2017) find that their estimates are not robust to different estimation methods and that the assumptions required for their difference-in-differences methodology are not met in some instances. Within these limitations, their results indicate that, if there is any effect, it is in the direction of expansion in health insurance leading to reductions in DI claiming.

Informational effects and transaction costs

Research on DI indicates that there is a substantial population on the margin of claiming, an idea often attributed to Autor and Duggan (2003). Supporting this, Armour (2018) found that people with work-limiting conditions who received their Social Security statement claimed DI at twice the rate of a comparable group who did not receive the statement. Armour found furthermore that the group apparently induced by the statement to apply had allowance rates similar to those who had not received a statement, implying that the provision of information induced workers onto the DI program rolls who would not otherwise have been there.[12]

Analyzing another change in the provision of information, Foote, Grosz, and Rennane (2019) found that the introduction of iClaims (an online application tool) in 2009 led to a small increase in filing. Their study compares counties with differential rates of high-speed Internet access. Contrary to the Armour results, the counties that increased their filing rates also had lower allowance rates, indicating that the change induced more marginal applicants. The introduction of iClaims coincided with a period of high unemployment, however, which may explain the difference.

Deshpande and Li (2017) analyzed the change in information accompanying the closing of field offices. Limiting their study to areas that had experienced field office closings at various times over a wide range of years, they compared claims in areas around an office that had closed with a control group of areas around offices that had not yet closed and would not for at least 2 years. They found that areas that experienced a field office closing had application declines of 11 percent compared to areas that had not yet experienced a field office closing. The corresponding number of beneficiaries declined by 13 percent. Further, they found that the majority of the declines are because of congestion at remaining field offices. It is noteworthy that field office closings peaked in 2012, which coincides with rapid declines in filing rates.[13]

Burkhauser, Butler, and Weathers (2001/2002) examined a different type of information effect. They found evidence that workers in states with high allowance rates tended to have a shorter period between when they were first bothered by a disability and when they applied. On the other hand, Lahiri, Song, and Wixon (2008), looking at whether workers applied and not at

[12] The magnitude of Armour's estimated effect is enough to justify further exploration of this approach, which other researchers have not yet attempted to replicate. The estimates might be sensitive to issues like the selection of a technique to control for cohort trends.

[13] ORDP plans to field a disability perceptions survey in 2020 to better understand the extent of knowledge, expectations, and sources of information about DI among the working population.

how long they waited, found, in estimating a model of individual disability application behavior, that state-level allowance rates had statistically too small an effect to include in the model.

Health trends

Steady improvements in health over many decades might be associated with declining rates of disability in the general population and contribute to a long-term decline in DI program disability awards. Labor force participation among the elderly and reported disability among the elderly do appear to be increasing and decreasing, respectively, as mortality among the elderly has declined. Crimmins, Zhang, and Saito (2016), using the National Health Interview Survey, found that self-reported disability has declined since 1980 at ages 65–84.

It is not clear, however, whether these same trends are reflected in the working-age population. Crimmins, Zhang, and Saito, in the same study, found that disability actually increased at ages 25–64. Burkhauser and Daly (2011), using the same survey, find that the proportion of workers reporting themselves in only fair or poor health has remained stable in the past two decades.

Trends in health or disability, furthermore, might not be evenly distributed over the working population. Most DI claimants were in the lower half of the earnings distribution before onset of their impairments and claiming (Strand and Trenkamp 2015). There is accumulating evidence, summarized in Bor, Cohen, and Galeo (2017), that life expectancy among lower incomes has not increased in pace with the increases at higher incomes. The differential trends in mortality have been linked to position in the earnings distribution while working (Waldron 2007; Chetty and others 2016). These studies, however, are primarily focused on deaths after the DI claiming ages: the Waldron study, for example, uses deaths at ages 60 to 89, most of which occur after age 65. Differential mortality rates at younger ages are currently an active area of research.

A final question that will have to be answered is the extent to which these trends in mortality, health, or broadly defined disability align with the narrower scope of disability used by the DI program

Industry composition changes

Changes in disability incidence might be associated with shifts in industry composition if industries differ in their ability to accommodate disabled workers. Figure 9 gives the percentage of the DI and SSI population by industry of pre-disability employment for selected years between 1996 and 2013. The sharpest decline is in manufacturing, but there are also substantial proportional declines in construction and wholesale trade. Several sectors increased, including business services, health services, and retail trade, although some of the increases abated after the recession. It is plausible that a shift from manufacturing to services has been a factor tending to decrease disability incidence.

Changes in the processing and nature of claims

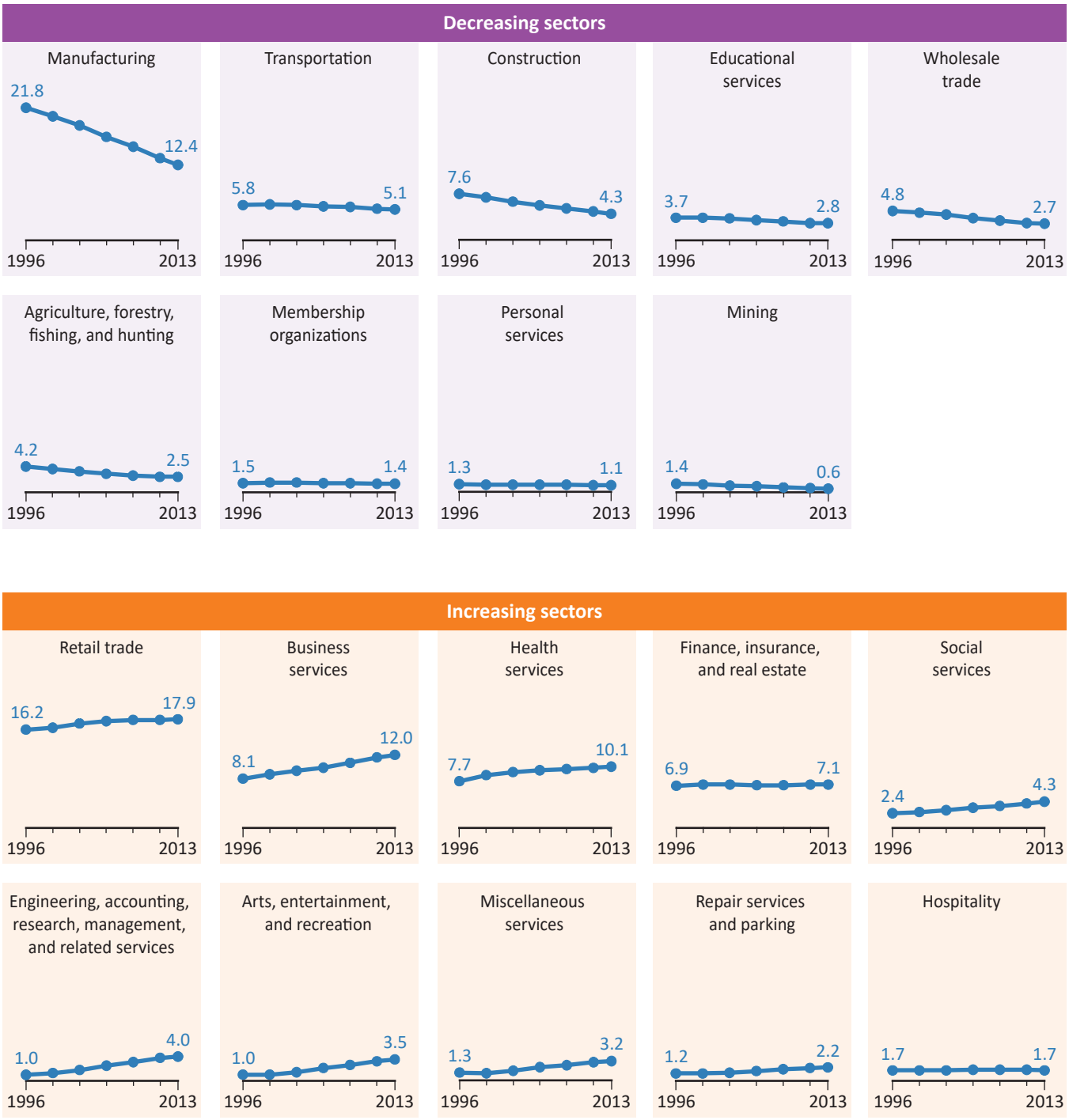
Beginning in fiscal year 2009, SSA implemented a number of changes in ALJ training, claims assignment, and monitoring. New developments included (SSA 2014):

- Using pre-effectuation reviews of favorable ALJ decisions to assess decision quality and develop appropriate training for the errors identified,
- Monitoring and focused review of outlier ALJs—judges with allowance or denial rates far from the average,
- Using a "How MI Doing?" tool that allows hearing office staff and ALJs to track their performance and compare it with others, and
- Restricting the number of cases assigned annually to ALJs.

After these developments, the number of outlier ALJs decreased (SSA 2014; Ray and Lubbers 2015) and appellate allowance rates decreased (Ray 2015). Between 2010 and 2012, appellate allowance rates decreased by more than 10 percentage points (Ray 2015). Preliminary analysis by Maestas, Mullen, and Strand (2017) indicated that this decline was largely because of the administrative changes rather than business cycle effects.

There was also a decline in on-the-record (OTR) allowances during part of this period. (An OTR allowance can occur when a review indicates that a case can be allowed without a hearing, such as when a case was denied at the DDS level because it need not meet the

Figure 9 — Percentage of beneficiaries by industry of last employment, 1996–2013



Source: 2014 Disability Analysis File and 2012 Continuous Work History Sample.

Notes: "Industry of last employment" reflects the most recent job (within 10 years) prior to the date of current eligibility for disabled-worker benefits. If a beneficiary worked more than one job in the most recent year, the highest-paying of those jobs determines the industry.

12-month duration requirement but the lapse of time on appeal has made that requirement no longer relevant. The agency's use of this mechanism has varied over the years.) A preliminary analysis by Meseguer and others (2017) found that a 9-percentage-point decline in the hearing allowance rate in 2012–2016 period was largely driven by a decline in OTR allowances; the share of cases receiving a non-OTR favorable decision remained steady throughout.[14]

Warshawsky and Marchand (2015), building on Warshawsky (2012), analyzed the variability in ALJ approval rates. The 2015 study examined approval rates in 2005–2014, using single-year fixed effects to control for the overall changes in approval rates over that period. Among ALJs with at least 3 years' experience, the regression analysis indicated that high approval rates tended to be associated with both low year-to-year variation in approval rates and with high annual decision counts. The latter result, that judges with high decision volumes tend to have high approval rates, confirmed other studies cited in their literature review, including internal SSA memos. Warshawsky and Marchand also cite evidence that long-tenure judges tend to have higher allowance rates. Such studies support the possibility that changes in the ALJ process may have played a role in the decline in allowance rates in recent years.

SSA Administrative and Survey Data

The agency has administrative and survey data that can provide further insights into the trends. Some of these data go back many decades and are a valuable supplement to management information that focuses only on recent years. This section provides a sampling of work that has been carried out using these files.

Simple tabulations from the survey or administrative data can give more detail on current trends. Table 1 gives the composition of disabled-worker beneficiaries in 2005 and 2015. The beneficiaries have gotten older (as the baby boomers age), and the percentage of women has grown slightly (in part because the percentage of women insured for disability has grown). The percentage with less than high school education has been falling, and the percentage with some college rising. These changes in the educational composition are probably because of changes in education in the overall population, but there could also be interactions with the disability determination provisions that offset or augment the population change.

Table 1 — Beneficiary characteristics by year: 2005 and 2015

Characteristic	2005	2015
Age	100.0	100.0
Less than 25	0.7	0.2
25–29	2.2	1.9
30–34	3.5	3.7
35–39	5.9	5.2
40–44	10.0	6.7
45–54	29.6	27.8
55–59	22.2	24.0
60 or older	26.1	30.6
Sex	100.0	100.0
Men	53.9	52.3
Women	46.1	47.7
Education	100.0	100.0
Did not complete high school or GED	27.2	22.1
High school diploma or GED	40.5	41.0
Some college	22.7	26.8
4 or more years of college	9.6	10.1

Source: National Beneficiary Survey (2005 and 2015): all disabled-worker beneficiaries (Title 2, including concurrent).

Administrative data from the last decade allow for much more finely grained analyses than are possible with the less detailed data from earlier years. Table 2, as an example, follows two cohorts of applicants who were initially denied (in the first column, those initially denied in 2008 and, in the second column, those initially denied in 2012) to see how many had been allowed (whether on appeal or from a subsequent application) by 2012 and 2016, respectively. Overall, 35 percent of the 2008 initial denials were receiving benefits by 2012, but there are some notable differences among the subcategories. Of the initial denials claiming a musculoskeletal impairment, 42 percent were subsequently on the disability rolls. There is a strong age gradient, with higher

[14] Although hearing allowances remained steady and OTR allowances declined, it is possible that this reflects a shift in allowances from the OTR mechanism to hearing allowances, and that total allowances would have declined even without the shift.

Table 2 — Percentage of claimants denied and subsequently allowed, by year and claimant characteristics

Characteristic	Denied 2008, allowed by 2012	Denied 2012, allowed by 2016
All	35	33
Primary impairment at initial denial		
Intellectual	17	23
Sensory/communication	28	29
Psychiatric	29	26
Other nervous system	37	36
Musculoskeletal	42	41
Age at application		
Less than 25	13	14
25–29	17	16
30–34	22	19
35–39	27	24
40–44	31	29
45–54 (2008) or 45–49 (2012)	45	39
50–54	. . .	52
55 or older (2008) or 55–59 (2012)	49	54
60–64	. . .	35
Education status		
Less than high school diploma	30	29
High school diploma or GED	36	34
Some college	38	35
4 or more years of college	43	39
Regulation basis code		
Step 1	27	32
Step 2	30	27
Step 4	43	46
Step 5	39	36
English competency		
Cannot read English	38	36
Cannot write English	39	36
Cannot speak English	41	37

Source: Structured Data Repository data combined with the 2012 and 2016 Disability Analysis Files. Applicants with earlier eligibility periods are excluded.

Notes: Both DI and SSI are included. "Denied 2008, allowed by 2012" gives the percentage of those initially denied in 2008 who had been awarded benefits by 2012. The "Denied 2012, allowed by 2016" cohort is defined similarly.

. . . = not applicable.

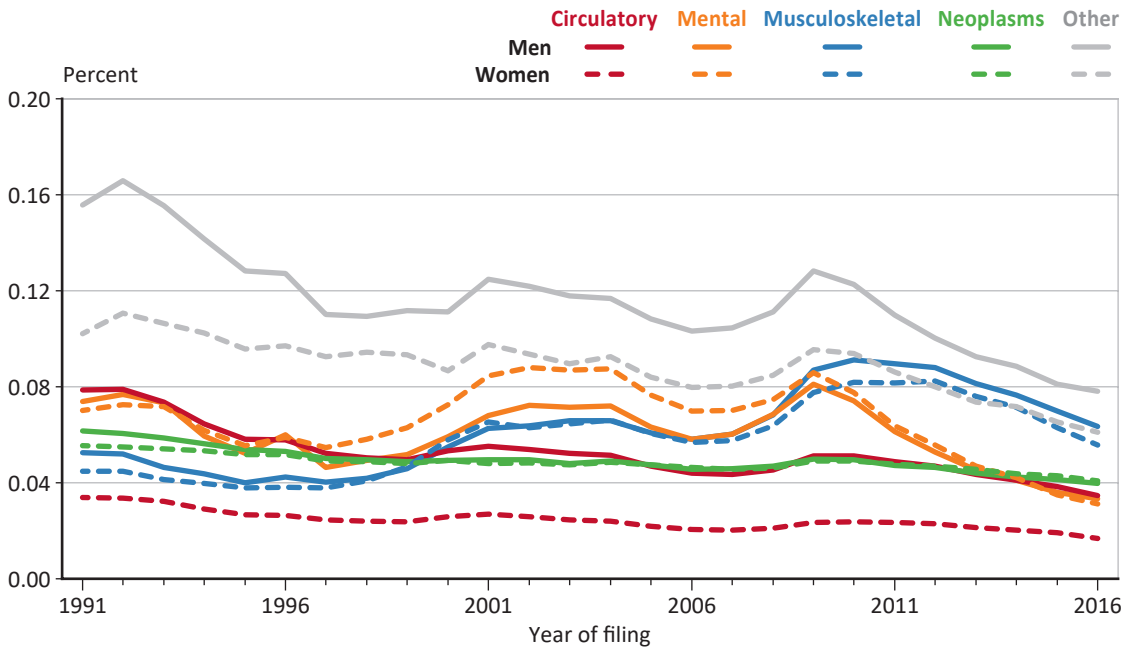
likelihoods of subsequent allowance for older applicants. Allowance is also more likely for college-educated applicants. Denials at step 1 (earnings above substantial gainful activity [SGA] level) are much less likely to be subsequently allowed, and denials at step 4 (has residual capacity to do previous work) are much more likely to be subsequently allowed. Subsequent allowance is slightly more common than average for initially denied applicants who cannot read, write, or speak English. The 2012 initial denial cohort overall had slightly lower subsequent allowances than the earlier cohort (33 percent rather than 35 percent), and the subcategories accordingly tended to have slightly lower subsequent allowances too, but some categories rose, including intellectual impairments and step 1 decisions.

Although the administrative data retained for research before about 2006 was less detailed than what is now available, there is still much in the earlier data to understand disability trends. The Disability Research File (DRF) has information on applicants back to 1991 with results from both the initial level and any appeals. This file can support the study of trends since 1991 in the impairment mix of disability applicants. Lindner, Burdick, and Meseguer (2017), for example, used the DRF to study the changing mix over business cycles.

Using the DRF, Figure 10 shows the composition by diagnostic group of initial allowances per insured worker for both men (solid) and women (dashed); Figure 11 shows tabulations for allowances on appeal. The tabulations are age adjusted by sex. Allowances on appeal are shown only through 2014 because many of the appealed cases were still pending when the most recent DRF was created.

- Neoplasms (green) have trended downward slightly but fairly steadily over the period.
- Almost as steady has been the decline in circulatory impairments (red).
- Mental impairments (orange) were lower by the end of the period than they had been at the beginning, but they showed a substantial rise in between, with elevated levels in 2001–2009.
- Musculoskeletal impairments (blue) had generally been rising over the interval for both men and women, with the faster increases around 1999–2002 and 2008–2009. They have been falling since 2010, although levels for initial allowances are still higher than they were before 2000.

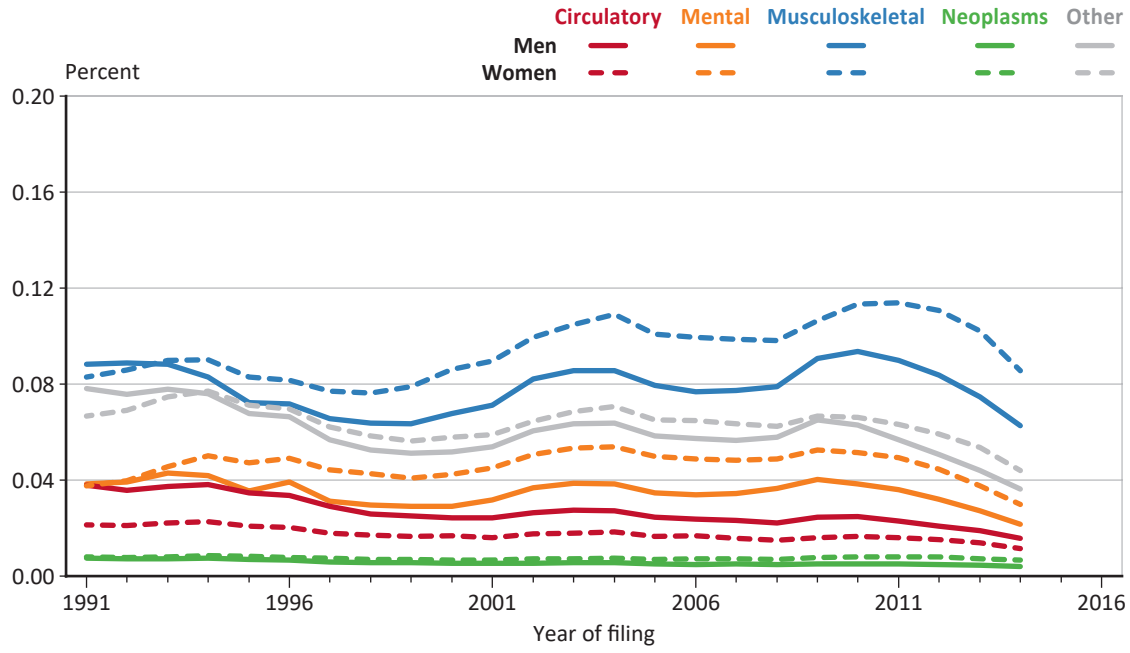
Figure 10 — Initial allowances per insured worker, by diagnostic group, sex, and year of filing



Source: 1991–2016 DRFs.

Note: Each sex is age adjusted to the 2010 disability-insured population to remove the effects of the changing age composition.

Figure 11 — Allowances on appeal per insured worker, by diagnostic group, sex, and year of filing



Source: 1991–2014 DRFs.

Notes: Allowances on appeal are shown only through 2014 because many of the appealed cases were still pending when the most recent DRF was created. Each sex is age adjusted to the 2010 disability-insured population to remove the effects of the changing age composition.

- The many other impairments are shown as a single category (gray). Each of the many impairments in this miscellaneous category is smaller than any of the four main impairments shown in the figure, but together they add up to a large group. This miscellaneous combined group has tended to decline over time.

The DRF files only go back to applications in 1991. Other administrative data go farther back, allowing the study of trends in disabled-worker earnings, impairments, allowances, recoveries, and deaths back through the large rise in incidence in the 1980s. The 831 File has a record for each DDS determination since 1979, and the Continuous Work History Sample has disability benefit status for a large sample of Social Security numbers back to 1957. Raut (2017) used these files for hazard rate modeling of disabled-worker terminations by age, sex, and impairment code and compared hazard rates in the 1980s with those in the 1990s. Death rates by age and impairment tended to decline or hold steady between those two periods, but there were some exceptions (death rates at ages 41–50 for cardiovascular impairments rose). Recovery rates showed no consistent pattern of change. For the youngest workers, for example, recovery rates from neoplasms rose dramatically, but recovery rates from musculoskeletal impairments fell slightly. The article finds that women beneficiaries and beneficiaries with musculoskeletal or mental impairments had lower probabilities of exiting the program because of either death or recovery. These longer durations partly explain women's increasing disability prevalence rate even after their respective incidence rate leveled off.

Appendix: The Econometric Literature on Pre- and Post-Application Employment

Incentives to apply for disability benefits, if strong enough, can reduce labor force participation. By the 1980s, labor economists were speculating that much of the observed decline in male labor force participation might be attributable to workers going onto disability rolls. In this context, an article by Bound (1989) examined the pre- and post-application employment and earnings of disabled-worker applicants, comparing denied applicants with allowed applicants. Bound's basic finding was that less than half of denied applicants had any employment at the time of the survey a year and a half or more after the disability application. Although this was not a new result, Bound suggested that the low rate of work among denied applicants implied that the allowed applicants, presumably even less healthy, would have had an even lower employment rate if they too had been denied. This, Bound argued, suggested an upper bound for the employment and earnings effects that could be attributed to the disability program, and implied that only a fraction of the decline in male labor force participation could be attributed to disability.[15]

Bound in his article set the stage for later research by discussing two reasons why his suggestion might be wrong:

- The application process might depress the employment prospects of those who apply, including those denied benefits. Bound, however, thought that the delay "by a few months" for the typical applicant[16] would not reduce their employment prospects to such an extent.
- Although denied applicants might be less healthy than the general workforce, which would explain their reduced employment, there could be other factors at play, like poor motivation to work, which would also explain low earnings. Bound looked at

[15] Bound has revisited the issue at least twice. Bound and Waidman (2002), focusing on people who report a work limitation, found that the DI program could explain much of the decline in employment among the group. But, more recently, Bound, Lindner, and Waidman (2014), using data through 2004 and a new decomposition, found that it would take extreme assumptions for the DI program to explain the decline in employment during the early 1990s, and that from the mid-1990s to mid-2000s the steady decline in employment among work-impaired survey respondents was not accompanied by an increase in the fraction of DI beneficiaries. "It therefore seems likely that factors other than the DI program itself have contributed to employment decline from 1990 to 2004."

[16] Bound (1989) cited evidence that between 1968 and 1978 the average filing delay was 7.7 months.

the pre-application earnings histories and found that although the denied applicants did have slightly lower earnings than the allowed applicants did, "it seems unlikely, at least to me, that these relatively small differences can swamp the rather large differences in health between the two groups."

Later researchers have replicated and extended the Bound results, with different and larger data sets, larger and more detailed snapshots of the earnings trajectories before and after application, and alternative criteria for defining disabled workers and classifying them as allowed or denied.[17] The general results still hold: allowed applicants had lower earnings than the general workforce for many years prior to disability onset, and denied applicants still lower, with the differences accelerating just before onset. After the decision, the employment or earnings of denied applicants rebounds somewhat (on average) but not back to pre-onset levels, at least for older workers. For younger workers aged 30–44, von Wachter, Song, and Manchester (2011) found that both the denied and the allowed applicants showed a rebound in average earnings among those employed, indicative of greater probabilities of recovery among younger workers.

Exploiting random assignment

With some exceptions, DDS offices randomly assign disability applications to examiners within the office. Similarly, ALJ offices randomly assign appeals to judges. Two projects, developed independently,[18] have used these random assignments to estimate the difference in outcomes between denial and allowance for a subpopulation of applicants for whom the disability determination is likely to depend on their assignment to an examiner or judge. There is evidence that most DDS offices follow a random assignment protocol, especially the largest ones. Although there is anecdotal evidence that assignment is not always strictly random in all offices, the studies have not uncovered any evidence of non-random assignment.

The studies demonstrate that there is variation among the examiners and judges in their rate of denial, and that higher probabilities of denial are associated with more frequent subsequent labor force participation and higher earnings among those who are employed. The conditions are therefore satisfied for LATE (local average treatment effects) estimates of the causal effect of denial among those whose probabilities of denial increase the most over the spectrum of examiners or judges.

The estimates are "local" in the sense that they do not cover the whole applicant population. The estimates are not affected by applicants who would either be allowed by all examiners in their administrative unit or denied by all examiners, and they are most strongly affected by the responses of the applicants whose disability determination is most sensitive to the selection of an examiner. Interpretation of the estimates also relies on a "monotonicity" assumption that an applicant denied by one examiner would be also be denied by all more stringent examiners and, similarly, that an applicant allowed by one examiner would also be allowed by all more lenient examiners.[19]

The first study, French and Song (2014a), looked at all appeals arriving at the ALJ level in 1990–2000, using the ALJ denial probabilities as the random instrument. Among the outcomes measured 3 years after the assignment to an ALJ were the percentage with earnings greater than the SGA level and the average earnings (with zero earnings included). The instrumental variables estimate was that denied applicants had SGA employment rates 16.3 percentage points higher

[17] For this paragraph, we review Lahiri, Song, and Wixon (2008); von Wachter, Song, and Manchester (2011); Giertz and Kubik (2011); and Singleton (2012).

[18] Both derive the technique from articles by Joseph Doyle (2007, 2008) estimating the effects of placement into foster care.

[19] The monotonicity assumption implies that each examiner will make the same determination in each case that would be made by all the other examiners at the same level of stringency.

than allowed applicants and average earnings about $4,000 higher.[20]

The instrumental variables technique is not limited to labor market outcomes at a single point. Other work by French and Song looks at outcomes over several years.[21]

The second project in this group is that of Maestas, Mullen, and Strand (2013), which uses the random assignment to examiners at the DDS level as the instrument. The study population is applicants received at DDS offices in 2005–2006; the main outcome studied is labor force participation and earnings 3 years after the DDS decision. The instrumental variables estimates were that denied applicants had SGA employment 16.6 percentage points higher than allowed applicants, with average earnings, including zeroes, $3,007 higher.[22]

The Autor and others (2017) paper expands on the earlier Maestas, Mullen, and Strand work, adding a second instrument: the average time for each DDS examiner to make the initial decision. They measure the same labor supply outcomes, including percentage with SGA employment 3 years after the decision and the average earnings. In this case, however, the authors estimate the additional effect of time out of the labor force on these outcomes.

For the subsample of initially allowed applicants (for whom the examiner's decision time drives the total waiting time from application to award), they found that a month longer decision time is associated with 0.2 percentage points fewer with SGA employment and $126 lower earnings (zero earnings included), although the statistical significance was not strong. Because of the required 5-month delay between onset and award, part of the waiting time is built-in. Looking only at the part after the 5-month delay, the effect on employment was stronger and statistically significant.

Looking at the full population of applicants, including those initially denied (some of whom were allowed on appeal), additional waiting time again reduced the percentage with SGA employment by about 0.2 percentage points per month, with a reduction in average earnings of $61, with even weaker statistical significance. The percentage with earnings greater than $1,000, rather than earnings greater than SGA level, showed a statistically significant reduction with the longer waiting time.[23]

[20] A feature of this study is that the instrumental variables estimates are almost the same as the ordinary least squares estimates: 21.1 percent of denied applicants and 4.7 percent of allowed applicants had earnings greater than the SGA level, a difference of 16.4 percentage points, compared to the instrumental variables estimated difference of 16.3. Average earnings were $5,345 for denied applicants and $1,442 for allowed, a difference of $3,903, compared to $4,059.

[21] French and Song (2014b). The French project has also branched into a study, still underway, looking at mortality as an outcome, using as an instrument the same ALJ assignment variable (Black and others 2017). Mortality is a more difficult outcome to measure, because applicants are already dying during the determination process. The preliminary indications are that except for certain conditions like cancer, denial actually reduces mortality, but the estimates are imprecise and the study is still preliminary.

[22] The Maestas, Mullen, and Strand (2013) paper also includes an estimate of the percentage of applicants "on the margin of program entry," meaning the proportion that are sensitive to which examiner they are assigned to. That estimate was derived by multiplying the first stage coefficient estimating the effect of examiner denial probabilities on the probability of ultimate denial (0.23, less than 1 because many examiner denials are appealed) by the range of examiner denial probabilities (very close to 1.0), giving an estimate of 23 percent of applicants. That estimate is an upper bound because it represents an estimate of the fraction of applicants whose determination would change if they were assigned the most lenient examiner in their relevant DDS (who allows everyone), compared with the most stringent examiner in the DDS (who denies everyone, but taking into account the appeals-level reversal rate on those denials). Maestas, Mullen, and Strand add an alternative estimate, 2 percent, for the percentage of applicants who would have had a different decision if assigned to the average examiner in their DDS office.

[23] Another paper using causal econometric techniques is Chen and van der Klaauw (2008), which investigates a regression discontinuity at the vocational grid ages under the assumption that applicants are not aware that the disability criteria become more lenient at each of the grid ages.

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