Journal of Economic Perspectives—Volume 29, Number 2—Spring 2015—Pages 123–150

Corrections made May 6, 2015, in green.

Understanding the Increase in Disability Insurance Benefit Receipt in the United States[†]

Jeffrey B. Liebman

The share of working-age Americans receiving disability benefits from the federal Disability Insurance (DI) program has increased significantly in recent decades, from 2.2 percent in the late 1970s to 3.5 percent in the years immediately preceding the 2007–2009 recession and 4.4 percent in 2013.

Some experts have interpreted the increase as evidence of a need for significant reform. In this journal, Autor and Duggan (2006) describe the growth in the disability insurance rolls as "a fiscal crisis unfolding," report that "abuse [has] reached unsustainable levels," and conclude that "the DI screening process is effectively broken." In their view, changes in program rules enacted in 1984 made it easier for applicants to receive benefits for hard-to-verify impairments like back pain and depression. In conjunction with labor market developments that increased the incentive for low-wage workers to apply for benefits, these new program rules led to an increase in disability receipt.

Other experts attribute most of the increase in beneficiaries to baby boomers reaching their peak disability-claiming years and to increased labor force participation by women, which has made more women eligible to claim disability benefits (Reno 2011). Under this interpretation, disability enrollment rates and spending are unlikely to rise much further, because these demographic trends have largely run their course. Indeed, both the Social Security Administration actuaries (OASDI

■ *Jeffrey B. Liebman is Malcolm Wiener Professor of Public Policy, John F. Kennedy School of Government, Harvard University, Cambridge, Massachusetts. He is also Research Associate, National Bureau of Economic Research, Cambridge, Massachusetts. His email address is jeffrey_liebman@harvard.edu.*

[†] To access the Data Appendix, visit
http://dx.doi.org/10.1257/jep.29.2.123

doi=10.1257/jep.29.2.123

Board of Trustees 2014) and the Congressional Budget Office (CBO 2012) project that spending on Disability Insurance will fall as a share of GDP in the coming decade as baby boomers convert from DI benefits to retirement benefits and are replaced in the peak disability-receiving ages by smaller cohorts.

With the federal Disability Insurance Trust Fund currently projected to be depleted in 2016, Congressional action of some sort is likely to occur within the next several years. It is therefore a good time to sort out the competing explanations for the increase in disability benefit receipt and to review some of the ideas that economists have put forth for reforming US disability programs.

The resolution of the competing explanations is a tale of two time periods. During the 1980s, policy changes caused receipt of Disability Insurance benefits first to plummet and then to rebound. In this period, the overwhelming majority of the change in disability benefit receipt came from changes in "incidence rates" (of new awards among the insured not already receiving benefits), though increased eligibility for benefits among women also played a role. Since the early 1990s, incidence rates among men, adjusted for the population age distribution and the business cycle, have been steady, while those for women have been gradually approaching those of men. In this period, population aging and increased eligibility among women account for two-thirds of the increase in DI benefit receipt, rising incidence among women accounts for one-fifth, and declining mortality rates account for one-sixth.

While adjusted incidence rates have mostly leveled off, there has been a change in the composition of DI recipients, with more recipients claiming benefits for hard-to-verify impairments and with the program playing an increasingly important role in providing income for low-skilled workers whose economic prospects have stagnated. Thus, the case for DI reform is not primarily a fiscal one—up until the 2007–2009 recession, spending on the program as a share of GDP had increased by only 0.13 percent of GDP over 30 years. Instead, it is about re-optimizing the program in light of the changing characteristics of the beneficiary population.

The US Disability Insurance System

The Social Security Administration projects that one-quarter of today's 20 year-olds will become disabled and receive benefits from the Disability Insurance program for some period of time before reaching age 67 (Social Security Administration 2014b). Thus, disability is a major economic risk—typically combining less ability to earn income with higher health-related costs—against which people should desire insurance. In theory, one could imagine a private system in which workers voluntarily purchase disability insurance throughout their careers; in practice, many if not most workers would fail to purchase such insurance. Moreover, the challenge of regulating a private disability insurance market to minimize both adverse selection and litigation over eligibility for insurance payments would be significant (Mashaw 1983). Thus, there is a rationale for a compulsory disability insurance system based on the myopia of consumers and the problems that would

be faced by private insurance markets in this area, just as there is for Social Security retirement benefits (Feldstein and Liebman 2002).

There are two main federal disability benefit programs in the United States that assist individuals with severe impairments. Social Security Disability Insurance (DI), the focus of this paper, is a contributory social insurance program that replaces lost wages of people with significant work histories. Supplemental Security Income (SSI) is a means-tested program that provides benefits to low-income disabled, blind, or aged people regardless of work history; SSI spending on disabled individuals accounts for approximately 80 percent of all SSI benefits.[1] In addition to cash benefits, these programs confer eligibility for government-provided health insurance—Medicare in the case of SSDI and Medicaid in the case of SSI.

The Social Security Act defines "disability" as the inability to engage in substantial gainful activity because of a medically determinable physical or mental impairment that is expected to last at least 12 months or result in death. To operationalize this definition, the Social Security Administration uses a five-step sequential process. The first two steps disqualify applicants who are currently earning above the substantial gainful activity limit ($1,090 per month in 2015) or who do not have a severe impairment or combination of impairments that is expected to last 12 months or result in death. The third stage compares the applicant's impairment to a listing of impairments, for each major body system, that are considered severe enough to prevent an individual from gainful activity. For example, someone with aggressive lymphoma will meet the listing level of disability and automatically qualify for benefits. For an applicant whose impairments do not automatically meet the listings, the SSA moves to the fourth stage, which involves assessing the person's residual functional capacity and considering whether the individual's impairments prevent the person from doing his or her past work. If so, the individual then moves to the fifth stage of the process, where the SSA considers the applicant's age, education, and work experience—known as the "vocational grids"—and decides whether the person's residual functioning capacity together with his or her place in the vocational grids prevents the applicant from doing other work that exists in the economy. For example, a 50 year-old applicant who is restricted by his impairment to do no more than sedentary work, has no transferable skills to do other work, and has a high school education or less will be found to be disabled, whereas a 50 year-old with more education and with transferrable skills to do other work would not be found to be disabled.

These standards are applied in three main stages. Disability examiners at state Disability Determination Service (DDS) offices make an initial determination. An applicant who is denied can appeal to be reconsidered by another disability examiner at the same DDS office. If the applicant is denied a second time, the applicant can appeal for a hearing before an Administrative Law Judge (ALJ).

Determining whether an individual is eligible to receive disability benefits is much more complicated and requires significantly more administrative judgment

[1] There are also more narrowly targeted disability benefit programs for veterans, railroad employees, and federal civilian employees.

than the determination of eligibility for other large social insurance programs like Social Security retirement benefits, where eligibility is triggered by reaching the eligibility age, or Unemployment Insurance benefits, where eligibility is triggered by an involuntary job separation. The administrative complexity of the disability system, combined with limited agency resources, has resulted in long delays in determining eligibility and in disability allowance rates that vary significantly depending on the office, examiner, or Administrative Law Judge to which a case is assigned (Rupp 2012; Maestas, Mullen, and Strand 2013).

Approximately 65 percent of Disability Insurance applications are resolved at the initial determination stage, while 35 percent are appealed. Most of those who appeal eventually have a hearing before an Administrative Law Judge. In 2008, out of every 1,000 initial applications, 366 were allowed at the initial determination, and 283 of those who were denied did not appeal. Of the 351 applicants who appealed (a 55 percent appeal rate among those who were initially denied), 215 were ultimately allowed at the reconsideration or appeals level. Overall, 58 percent of applicants were allowed benefits, 28 percent were denied without appeal, and another 14 percent were denied after appeal (Social Security Administration 2014a).

For applications that are resolved at the initial stage, average wait times for a determination are generally between 100 and 120 days. However, for those receiving an Administrative Law Judge (ALJ) hearing, the delays are often quite long. When the backlogs were at their worst in August 2008, applicants had to wait 532 days on average for an ALJ hearing, in addition to the time spent waiting for an initial decision and a reconsideration. Management focus and additional resources for ALJs reduced the average wait times to 340 days in October 2011, but recent budget cutbacks and the surge in applications during the recession caused wait times for ALJ hearings to climb again—to 396 days at the end of 2013.

Benefit levels for Disability Insurance are determined by the same benefit formula used for Social Security benefits: that is, benefits (in 2015) replace 90 percent of the first $826 dollars of prior monthly earnings, 32 percent of monthly earnings between $826 and $4,980, and 15 percent of monthly earnings above $4,980. The calculation of prior earnings for disability benefits is based on a worker's average indexed earnings in the years before the person became disabled.[2] In addition, DI benefits are not reduced when claimed earlier in life, whereas approximately 80 percent of Social Security retirement beneficiaries claim benefits before the "full benefit age" and have their benefits reduced accordingly. The average monthly benefit for a disabled worker is $1,146 and the interquartile range on the share of pre-tax lifetime indexed earnings that is replaced by these benefits extends from approximately 45 percent to 80 percent (Muller 2008). Accounting for taxes and

[2] In calculating the average indexed earnings, only the highest y years of indexed earnings count, where y is the number of years between the year the person turned age 22 and the year the person became disabled, minus between two and five "dropout" years (those with greater elapsed time between age 22 and becoming disabled are entitled to more dropout years).

the Medicare benefits associated with DI receipt would increase these replacement rates (Autor and Duggan 2006).

Several major legislative changes in recent decades have altered disability eligibility criteria and how the criteria are administered. During the 1970s, spending on Disability Insurance benefits increased rapidly as Congress raised Social Security benefit levels and made an error in setting the inflation indexing formula that was particularly significant in that high-inflation era. During this period, the median DI replacement rate increased substantially, creating an increased incentive for workers to apply for DI benefits, and administrative cutbacks reduced the review of state disability awards (Kearney 2005/2006). Concern about program costs led to a tightening of medical eligibility standards and to the Social Security Amendments of 1980. Among other provisions, these amendments required the Social Security Administration to conduct Continuing Disability Reviews to reevaluate beneficiary eligibility every three years except for those beneficiaries whose disability was expected to be permanent.

In the early 1980s, these Continuing Disability Reviews terminated benefits for 490,000 beneficiaries, with 200,000 of the terminations reversed upon appeal (Kearney 2005/2006). These terminations brought a strong political backlash. By 1984, 17 governors had suspended the reviews in their states. One reason that the terminations were perceived as unfair is that medical standards had been tightened, and the reviews applied the new standards—causing beneficiaries to be removed from eligibility even though their medical conditions had not improved. The fact that the bulk of the terminations occurred during a deep recession added to their unpopularity.

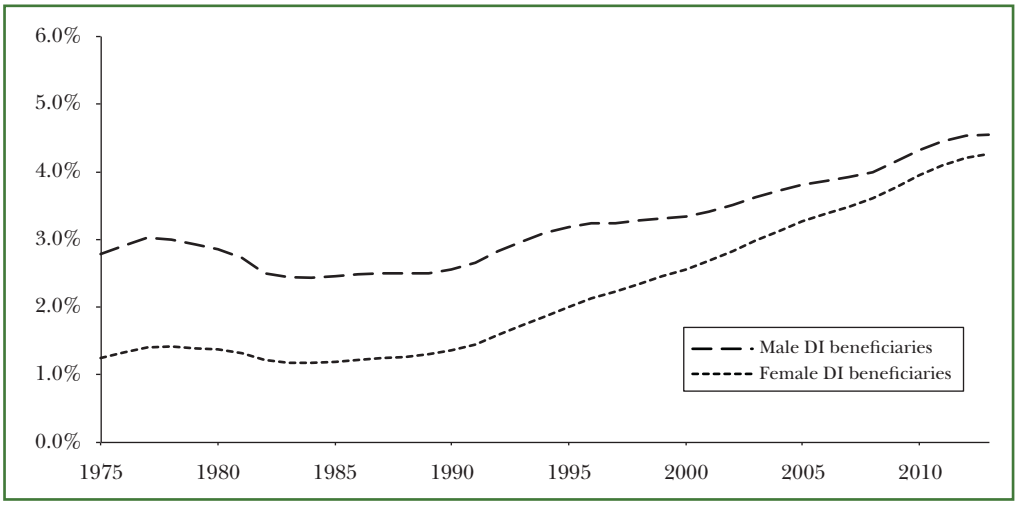
Congress reacted with the Social Security Amendments of 1984, which restricted the circumstances under which disability benefits could be terminated. Under the new law, benefits could be terminated only if the beneficiary experienced a medical improvement or if the government could demonstrate that the initial determination was in error. The Amendments also required the Social Security Administration to develop new standards for individuals with mental disorders, to evaluate pain as part of the disability determination process, to consider the effects of multiple nonsevere impairments in determining disability, and to place greater emphasis on evidence from the applicant's treating physician in the disability determination process. In the wake of these reforms, the disability rolls expanded, reversing the trend of the preceding years. Since then, the basic framework for Disability Insurance has remained much the same.[3]

The Rise and Shifting Composition of Disability Enrollment

The share of working-age Americans receiving disability benefits from the federal Disability Insurance (DI) program is shown in Figure 1 for the years 1975

[3] One other significant change occurred in 1996, when legislation was enacted that made individuals ineligible for benefits if drug addiction or alcoholism played a significant role in their disability.

Figure 1
Percent of Working-Age (20–64) Population Receiving Disability Insurance (DI) Benefits, 1975–2013



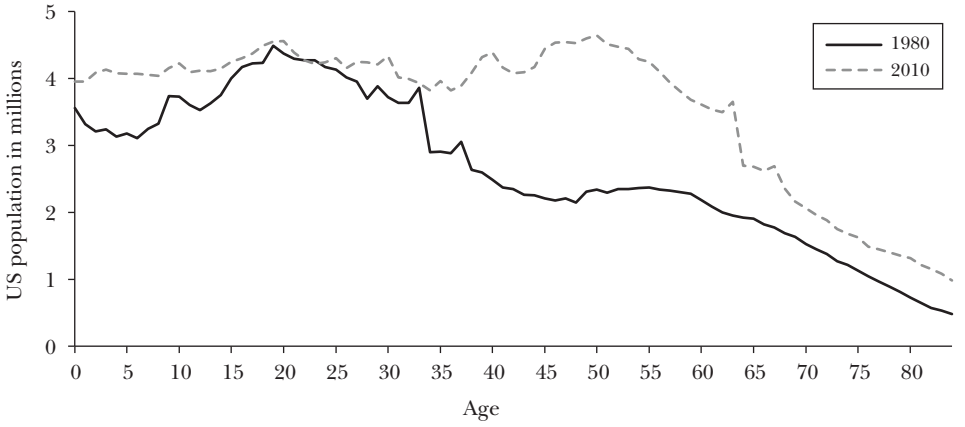
Sources: Social Security Administration, Office of the Chief Actuary; and author's calculations.

to 2013. The fraction of men receiving DI increased from 3.0 percent in the late 1970s to 3.8 percent in the years immediately preceding the 2007–2009 recession and 4.5 percent in 2013. Among women, DI receipt increased from 1.4 percent in the late 1970s to 3.5 percent in 2007 and 4.3 percent in 2013.

Over the same period during which these increases in disability enrollment rates were occurring, major demographic changes were occurring as well. As the baby boom generation born after World War II has moved through the work force, it first increased the number of young workers, who are less likely to be disabled, and then in recent years has swelled the number of workers in their late 50s and early 60s, who are the group most likely to be receiving disability benefits. Figure 2 shows the number of Americans of each age in 1980 and 2010. In 1980, there were approximately 23 million individuals between the ages of 50 and 59. By 2010, there were over 42 million. Figure 2 also shows that the cohorts behind the baby boomers are somewhat smaller, partially explaining why the Social Security Administration is predicting spending on Disability Insurance to decline over the coming decade. Americans who are between the ages of 50 and 64 are four and one-half times as likely as those between the ages of 20 and 49 to be receiving Disability Insurance benefits (that is, about 9 percent for the older age group compared to 2 percent for the younger age group). Thus, an increase in the share of the working-age population that is at the peak disability-claiming ages can result in significant changes in overall disability enrollment rates.

The other relevant demographic change occurring over this time period is the increase in the fraction of women with significant labor market experience. To be eligible for Disability Insurance benefits, a worker generally needs to have worked

Figure 2
US Population by Age, 1980 and 2010



Sources: US Census Intercensal Population Estimates (accessed via NBER.org) and author's calculations.

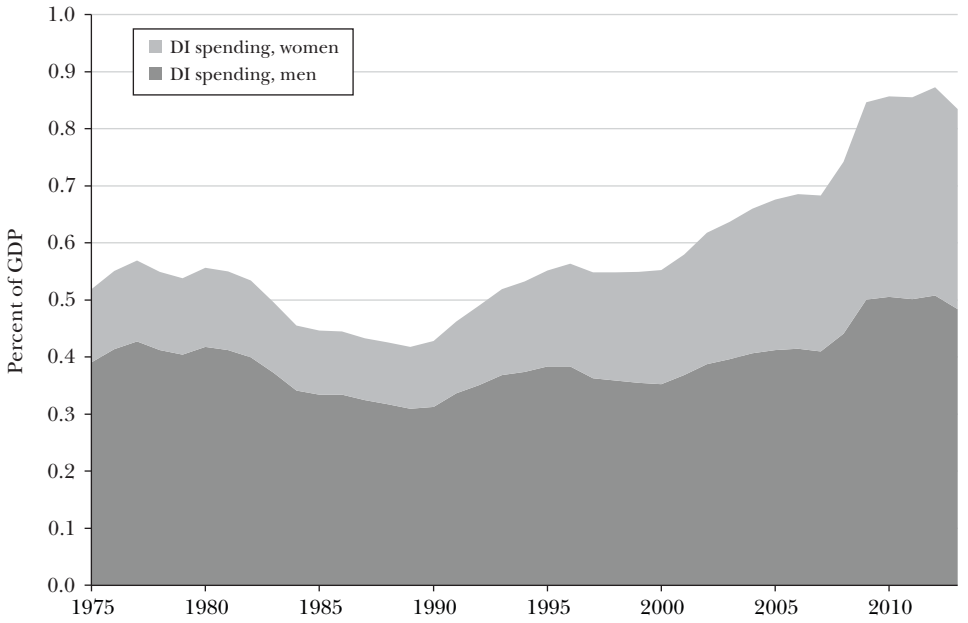
in five of the past ten years.[4] As women entered the labor force in large numbers, the fraction of women ages 50 to 64 "covered" by Disability Insurance—that is, eligible by their work history to receive disability benefits—rose from 46 percent to 72 percent between 1980 and 2007.

The increase in spending on Disability Insurance has not been as great as the increase in enrollment rates. Figure 3 shows spending on DI benefits from 1975 to 2013. DI benefits for men were 0.4 percent of GDP in the late 1970s and were also 0.4 percent of GDP in the years leading up to the 2007–2009 recession. In between, spending fluctuated with the business cycle and legislative changes. For women, spending increased from 0.14 percent of GDP in the late 1970s to 0.27 percent of GDP in 2007, with spending as a share of GDP increasing steadily from 1989 onward. Overall spending on DI benefits increased by 0.13 percent of GDP between the late 1970s and the years preceding the 2007–2009 recession: specifically, from 0.55 to 0.68 of GDP. In comparison, spending on Medicare and Medicaid increased by 3.2 percent of GDP over the same time period, increasing every year by approximately the same percent of GDP as DI spending increased over the entire 30 years.

The reason that spending relative to GDP has risen by only 22 percent when enrollment rates have risen by nearly 80 percent is that benefits have not kept up with productivity growth. Average benefits from Disability Insurance have fallen relative to per worker GDP because these benefits depend on the prior earnings levels of recipients, and there has been: 1) a decline in the worker compensation share of GDP;

[4] To be eligible for disability benefits, a worker generally needs to have earned 40 work credits, 20 of which need to be earned in the last 10 years ending with the year the worker became disabled. In 2015, workers receive one credit for each $1,220 of annual earnings with a maximum of four credits earned in any calendar year. The credit requirements are reduced for workers who become disabled at younger ages.

Figure 3
Spending on Disability Insurance (DI) Benefits, 1975–2013
(as percent of GDP)



Sources: Annual Statistical Report on the Social Security Disability Insurance Program (Social Security Administration 2011); Annual Statistical Supplement to the Social Security Bulletin (Social Security Administration 2012, Table 7.A5; 2013, Table 4.A2); 2013 Economic Report of the President; and author's calculations.
Notes: Allocation between males and females is based on December data from each year. Benefits for spouses and dependents are allocated between the sexes in proportion to worker benefits. The male–female split in DI benefits is interpolated between 1975 and 1980 and between 1980 and 1985.

2) an increase in health benefits as a share of compensation (and a decline in the earnings share); 3) a decline in the ratio of earnings "covered" by Disability Insurance to total earnings resulting from a rise in earnings inequality; and 4) a shift in the earnings distribution of the DI-claiming population toward those with lower earnings.[5]

[5] Specifically, spending relative to GDP can be decomposed into average benefits relative to per worker GDP and the enrollment rate, where the growth in per worker GDP can be thought of as analogous to productivity growth:

$$\frac{Spending_t}{GDP_t} = \frac{\overline{Benefits}_t}{GDP_t} \times Recipients_t = \frac{\overline{Benefits}_t}{GDP_t/WAPop_t} \times \frac{Recipients_t}{WAPop_t}.$$

For example, from 1977 to 2006, DI recipients as a share of the working-age population (WAP) grew by 68 percent, while average benefits relative to GDP per WAP fell by 26 percent. Spending relative to GDP rose by 24 percent ($1.68 \times 0.74 = 1.24$). See Liebman (2014) for further details.

Spending on Medicare benefits provided to recipients of Disability Insurance is about two-thirds as large as spending on cash benefits. It has also risen faster than the disability enrollment rate—from 0.12 percent of GDP in the late 1970s to 0.39 percent of GDP in the pre-recession years—because health care spending per beneficiary has historically risen faster than GDP. That said, given the expansions of Medicaid eligibility and subsidies for insurance purchase enacted as part of the Patient Protection and Affordable Care Act of 2010, many DI recipients would today be receiving free or heavily subsidized health insurance even if they were not receiving disability benefits.

Decomposing the Rise in Disability Enrollment

The rise in disability enrollment has resulted from a mixture of factors: major demographic trends, changes in program rules and implementation, and evolving economic conditions. But how much of the change in disability enrollments can be attributed to each factor?

The methodology I use to answer this question is straightforward. I model the number of people of age a who are receiving benefits—"in current payment" (ICP)—in year t. The number of people in current payment increases with new disability awards and declines with terminations. New awards are the product of the incidence rate and the number of exposed individuals (the insured population minus those already receiving benefits). Terminations come through death or recovery.[6] "Recovery" is often an involuntary removal from benefit status that occurs when the Social Security Administration performs a Continuing Disability Review and determines that benefits were awarded in error or that the individual's health status has improved. In the model, a represents single years of age from 20 to 64.

$$ICP_{at} = ICP_{(a-1,\,t-1)} + new\ awards_{at} - terminations_{at}$$

$$new\ awards_{at} = incidence_{at}((population_{at} * \%insured_{at}) - ICP_{(a-1,\,t-1)})$$

$$terminations_{at} = (death\ rate_{at} + recovery\ rate_{at}) * ICP_{(a-1,\,t-1)}\ .$$

The model can be used to examine counterfactual scenarios in which one or more parameters are held constant so as to analyze the share of the change over time that can be attributed to changes in the age distribution of the population, the insured rate, the incidence rate, the death rate, and the recovery rate.

The data for the model come from the Office of the Chief Actuary at the Social Security Administration. The raw data contain all of the elements in these three equations, aggregated to five-year age ranges. I interpolate linearly between

[6] At the Social Security full benefit age, terminations can also occur from individuals transitioning to retirement benefits. The results in this paper are limited to individuals 64 and younger. This avoids complications associated with the on-going increase in the Social Security full retirement benefit age from 65 to 67.

the midpoints of the age ranges to produce data at the level of individual years of age. The model successfully captures the evolution of the number of individuals in current payment over time.

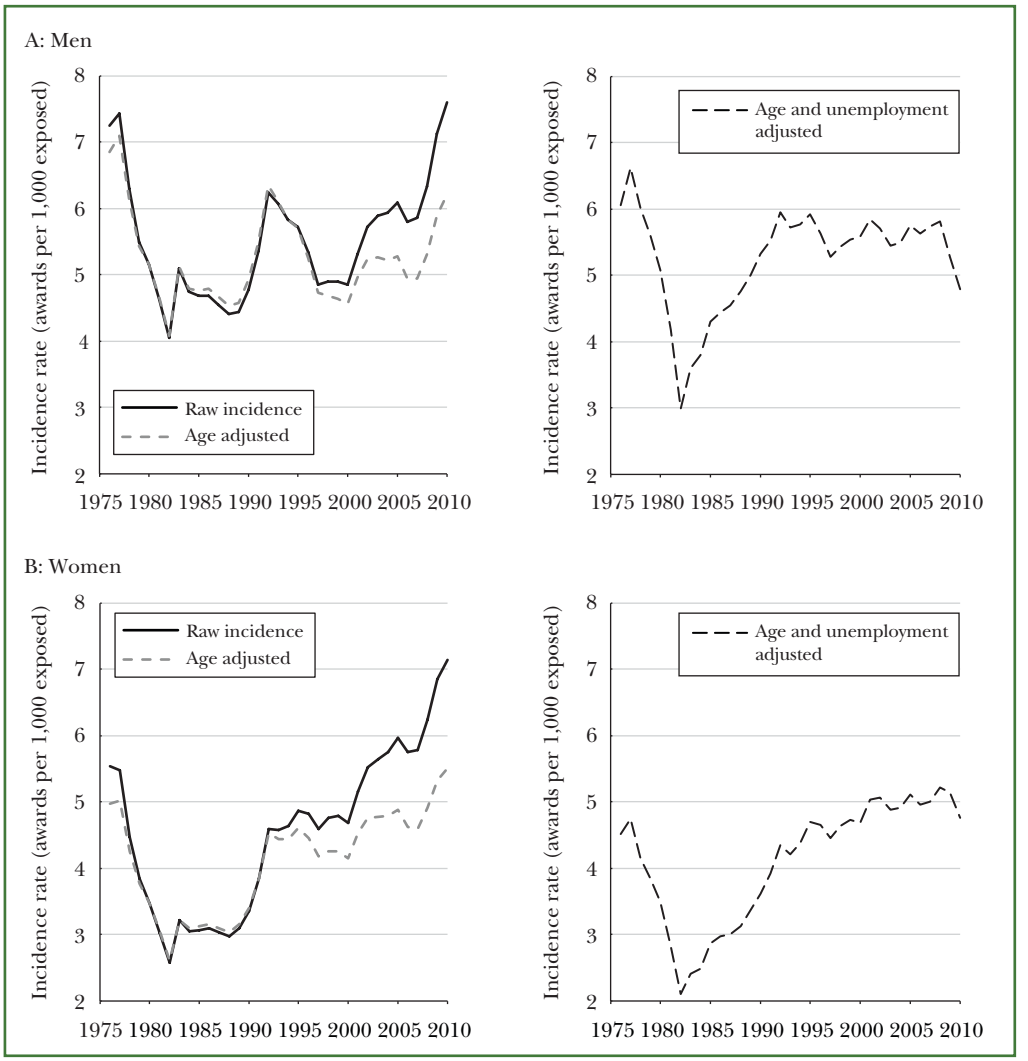
There are several decisions to make in choosing which counterfactual scenarios to analyze. First, which time period to analyze? As discussed above, Disability Insurance enrollment plummeted in the early 1980s before rebounding in the second half of the 1980s. An analysis that takes 1985 as the base year will attribute much more of the change over time in enrollment to incidence than one that takes 1980 or 1990 as the base. In this analysis, I focus primarily on the 1985–2007 period in order to inform discussions about how enrollment rates have evolved since the 1984 legislative reforms. However, I also present results for 1977–2007 and for the 1977–1985, 1985–1993, and 1993–2007 subperiods to highlight the fact that different factors are responsible for a different share of the rise in DI enrollment in different time periods. I stop the simulations in 2007 because my focus is on the long-run program trends rather than the particular impact of the deep 2007–2009 recession. The DI enrollment rate increased by about 1 percentage point during the recession. Cutler, Meara, and Richards-Shubik (2012) find that the recession-induced increase in DI claiming was similar to that in prior recessions. My own estimates described in Liebman (2014) indicate that the rise in DI claiming during the 2007–2009 recession was somewhat lower than would have been predicted by the previous relationship between unemployment and incidence. It is possible that the availability of extended unemployment insurance benefits in the recent recession prevented some DI claiming (Rutledge 2011). However, Mueller, Rothstein, and von Wachter (2013) find "no indication that expiration of UI benefits causes DI applications."

A second analytic choice is how to stack the various parameters. The impact of rising incidence on the Disability Insurance enrollment rate will be greater if demographic changes such as population aging and increased female labor force participation have resulted in more insured individuals in the age range in which disability receipt is most common. Similarly, the impact of demographic changes on the enrollment rate will be larger if incidence is higher. To address this issue, I attribute to incidence the increase in enrollment rates that would have occurred absent population aging and changing insured rates. Separately, I estimate the effect of population aging and changing insured rates under a counterfactual scenario in which incidence rates remained constant. The sum of these separate estimates is smaller than the total effect when all three factors are held constant together. I classify the difference between the separate effects and the total effect as "interaction effects." For simplicity, I stack the two quantitatively less-important factors—mortality rates and recovery rates—at the end of the analysis and do not estimate separate interaction effects for them. This results in my methodology attributing somewhat less impact to declining mortality rates than would occur if I stacked that parameter earlier in the analysis.

A final analytic choice is which year to treat as the base year for each parameter. It is not possible to choose a single year like 1985 as the base year for all of the factors, because some of them exhibited extreme values immediately after the 1984 reforms. Most of the choices are straightforward, and I describe them as I present

Figure 4

Incidence Rates for Men and Women, Ages 20–64



Sources: Social Security Administration, Office of the Chief Actuary; and author's calculations.

Notes: In Figure 4A, the graph on the left shows the actual incidence rate for men, along with an age-adjusted rate that holds the age distribution of the population constant at its 1980 level, while the graph on the right shows the predicted male age-adjusted incidence rate, under the counterfactual assumption that unemployment rates were constant at the 1976–2010 mean value of 6.3 percent for the entire period. Figure 4B presents a parallel analysis for women.

the results below. However, the choice of a base for the incidence rate requires more discussion because applications for disability benefits vary considerably over the business cycle (Autor and Duggan 2003).

The top left panel of Figure 4A shows the actual incidence rate for men, along with an age-adjusted rate that holds the age distribution of the population

constant at its 1980 level. Four patterns are evident. First, incidence rates are highly cyclical, rising sharply in response to the 1990–1991, 2001, and 2007–2009 recessions. Second, incidence plummeted after the late 1970s and early 1980s reforms that tightened eligibility and increased the number of continuing disability reviews (CDRs), before rebounding after 1982 and particularly after the 1984 legislation that altered eligibility rules and standards for CDRs. Third, since 1985 there appears to be an upward trend in the actual incidence rate. Fourth, the post-1985 upward trend is less steep in the age-adjusted incidence rate, but it is hard to isolate the trend visually given the large business-cycle-related fluctuations that are occurring throughout this period.

To isolate the underlying time pattern of incidence from business cycle fluctuations, the top right panel of Figure 4A shows the predicted male age-adjusted incidence rate, under the counterfactual assumption that unemployment rates were constant at the 1976–2010 mean value of 6.3 percent for the entire period. These predictions use coefficients obtained from separately regressing the annual incidence rate for each of nine five-year age ranges on the contemporaneous unemployment rate and a one-year lag in the unemployment rate, using a methodology similar to that of the Social Security Technical Advisory Panel (2011).[7] The unemployment-adjusted series reveals a much more pronounced increase in male incidence in the years following the 1984 legislation—a pattern that was obscured in the top left panel by the high unemployment rates of the 1980s, which inflated disability incidence rates relative to what they would have been with more typical unemployment rates. In addition, the unemployment-adjusted series indicates that there has been no increase in incidence among men since the early 1990s.

Figure 4B repeats this analysis for women. The unemployment-adjusted series similarly exhibits a steep rise in incidence after 1984. It also shows that, different from men, incidence has continued to rise for women since the early 1990s, but at a slower rate than during the 1980s. Indeed, incidence for women is now approaching the level for men.

Next we will look at some counterfactual simulations to interpret the impact of various factors on the percentage of the working-age population receiving disability insurance. The analysis of Figure 4 demonstrated that to interpret the impact of incidence correctly, one needs to adjust for the business cycle. Simply using the 1985 incidence rate as the base year for simulations would lead one to understate the contribution of rising incidence rates to the increase in the disability insurance beneficiary ratio because, as just noted, 1985 was a high unemployment year. So to begin, I first modify the actual beneficiary to working-age population ratio to provide an alternative series that projects the path that the ratio would have taken if the unemployment rate had remained steady at its average value for the entire time period analyzed for the simulation. This is done by allowing all of the parameters other than incidence to take on their actual values in each year,

[7] To fit the underlying time trend in incidence, the regressions also include two-part splines with a break point in 1992. Full details of these regressions are available in Liebman (2014).

while adjusting the incidence rate in each year using the coefficients from my regressions of incidence on the unemployment rate.[8] This modified beneficiary to working-age population series is used as the benchmark for the counterfactual simulations. In addition, when I conduct simulations holding incidence constant at the value from a base year, I hold it constant at the unemployment-adjusted value from that base year.

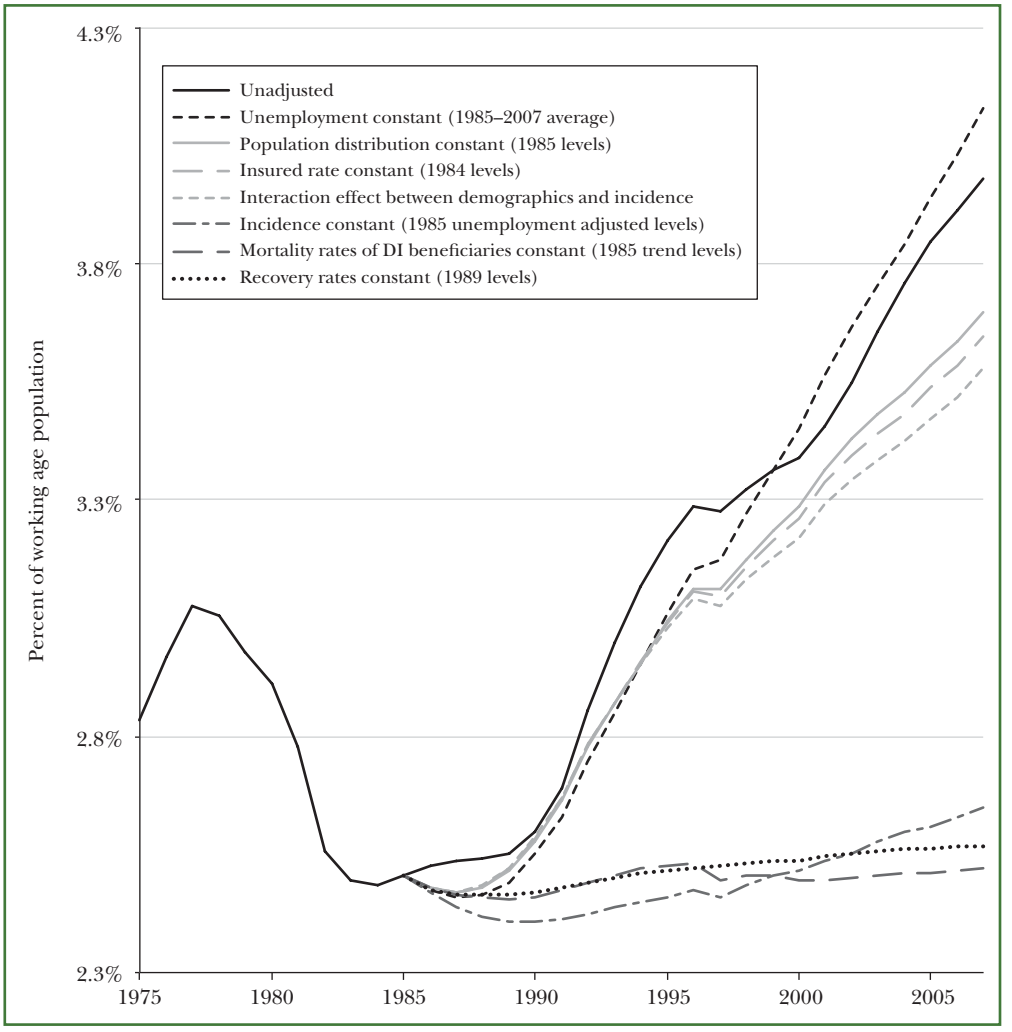
Men and women are analyzed separately, because of the very different evolution of their labor market experience in recent decades. Figure 5 shows the results of the simulations for men during the 1985–2007 period while Figure 6 will do the same for women. In Figure 5, the solid dark line shows the actual evolution of the men's DI beneficiary ratio, rising from 2.46 to 3.93 percent between 1985 and 2007. The rise in disability rates during the second half of the 1970s, the fall after the late 1970s and early 1980s policy changes, and the subsequent rise starting around 1985 all appear clearly. The next line in the key shows the beneficiary ratio with the actual incidence for each year adjusted to the value predicted if unemployment had remained steady at 5.6 percent in each year. Because the unemployment rate was relatively high for most of the late 1980s and early 1990s and low in the late 1990s and early 2000s, this unemployment-constant series is below the actual values in the early part of the analysis period and above it in the later period. The 2007 value for this adjusted series is 4.08 percent. The next line in the key holds the population age-distribution constant at its 1985 values (chosen because it is the initial year of the simulations). Absent the aging of the baby boomers, the DI beneficiary ratio in 2007 would have been 3.65 percent. The next line in the key shows that additionally holding the male "insured rate" constant at its 1984 level (chosen because it is approximately the average level in the 1985–2007 period) has little impact on the DI beneficiary level, reducing it only to 3.60 percent—because the share of males eligible for DI did not change much during most of this time period. To examine the impact of incidence, I adjust 1985 incidence to the value that my regressions predict would have occurred if unemployment had been 5.6 percent in that year; then I hold incidence constant at this unemployment-adjusted 1985 value (this is in addition to holding the age-distribution and insured rate constant). Doing so reduces the beneficiary to worker ratio in 2007 to 2.60. Compared to the insured-rate constant line, the reduction from 3.60 to 3.53 percent is attributable to the interaction effect between the demographic parameters and incidence, while the reduction from 3.53 to 2.60 percent is the direct effect of rising incidence if the population distribution and insured rate had not changed.

Holding mortality rates of DI beneficiaries constant—in addition to holding the earlier factors constant—further reduces the simulated 2007 Disability

[8] Specifically, I replace the incidence rate, I_{at}, for age a and year t, with an unemployment-adjusted incidence rate, $I^{*}_{at} = I_{at} + \beta_{gc}(\overline{U} - U_t) + \beta_{gl}\ (\overline{U} - U_{t-1})$, where β_{gc} and β_{gl} are the coefficients from the regression of incidence on contemporaneous and lagged unemployment for the 5-year age group that a belongs to. This assumes a simple additive relationship between changes in unemployment and incidence. It would be valuable to do additional research, perhaps using state-level data, into the best functional form for the relationship between unemployment and DI incidence.

Figure 5

Impact of Various Factors on the Percentage of Working Age Men (Ages 20–64) Receiving Disability Insurance, 1985–2007

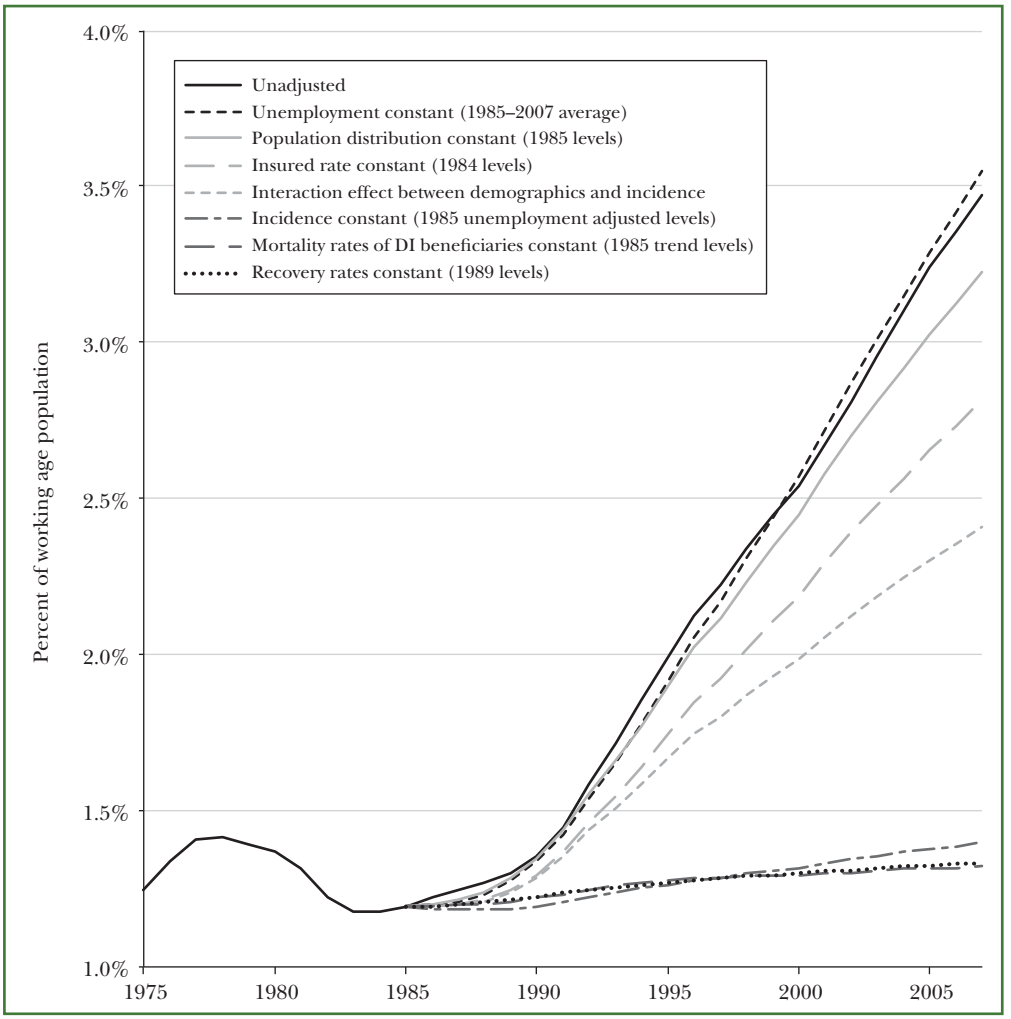


Sources: Social Security Administration, Office of the Chief Actuary; and author's calculations.

Notes: In this analysis, each factor is analyzed sequentially relative to all of the other factors that are listed before it in the key. Thus the vertical distance between a line and the line that comes before it in the key represents the additional effect of holding the factor constant on top of holding all of the earlier factors constant. I attribute to incidence the increase in enrollment rates that would have occurred absent population aging and changing insured rates. Separately, I estimate the effect of population aging and changing insured rates under a counterfactual scenario in which incidence rates remained constant. The sum of these separate estimates is smaller than the total effect when all three factors are held constant together. I classify the difference between the separate effects and the total effect as "interaction effects." I stack the two quantitatively less-important factors—mortality rates and recovery rates—at the end of the analysis and do not estimate separate interaction effects for them. Also, I first modify the actual beneficiary to working-age population ratio to provide an alternative series that projects the path that the ratio would have taken if the unemployment rate had remained steady at its average value for the entire time period analyzed for the simulation. The unemployment adjustment uses the mean unemployment and lagged (1 year) unemployment from 1985 to 2007. See text for details.

Figure 6

Impact of Various Factors on the Percentage of Working-Age Women (Ages 20–64) Receiving Disability Insurance, 1985–2007



Sources: Social Security Administration, Office of the Chief Actuary; and author's calculations.
Notes: In this analysis, each factor is analyzed sequentially relative to all of the other factors that are listed before it in the key. Thus the vertical distance between a line and the line that comes before it in the key represents the additional effect of holding the factor constant on top of holding all of the earlier factors constant. I attribute to incidence the increase in enrollment rates that would have occurred absent population aging and changing insured rates. Separately, I estimate the effect of population aging and changing insured rates under a counterfactual scenario in which incidence rates remained constant. The sum of these separate estimates is smaller than the total effect when all three factors are held constant together. I classify the difference between the separate effects and the total effect as "interaction effects." I stack the two quantitatively less-important factors—mortality rates and recovery rates—at the end of the analysis and do not estimate separate interaction effects for them. Also, I first modify the actual beneficiary to working-age population ratio to provide an alternative series that projects the path that the ratio would have taken if the unemployment rate had remained steady at its average value for the entire time period analyzed for the simulation. The unemployment adjustment uses the mean unemployment and lagged (1 year) unemployment from 1985 to 2007. See text for details.

Insurance beneficiary rate to 2.47 percent. Age-adjusted mortality rates for male DI beneficiaries fell from 4.9 percent in 1982 to 3.2 percent in 2007 a phenomenon that is discussed further below. In holding mortality rates constant, I use a base that is a weighted average of 1982 mortality rates and 1998 mortality rates, with 80 percent of the weight on the 1982 rates. Doing so provides a base level for 1985 that is on the longer-term mortality trend line, avoiding the spike in actual mortality that occurred after the removal of less-impaired individuals from the DI beneficiary rolls in the early 1980s and the spike in HIV-related mortality that begins in the 1980s and continues into the mid 1990s. In the final step, additionally holding "recovery rates"—that is, the rate at which eligibility for benefits terminates for a reason other than death, typically an improvement in health—at their 1989 level has only a small further impact on the simulated 2007 DI beneficiary rate, increasing it to 2.52 percent. 1989 was chosen because recovery rates were quite stable over the time period and it is the year with approximately the average recovery rate for the 1985–2007 period, excluding the one-year spike that occurred in 1997 when beneficiaries whose main impairment was related to drug or alcohol use were removed from the rolls.[9]

The left-most bar in Figure 7 and the first column of the top panel of Table 1 summarize the simulation results for men by showing the percentage of the distance from the 2007 unemployment-adjusted beneficiary ratio of 4.08 percent, to the simulated ratio of 2.52 percent with all of the factors held constant, that is attributable to each factor. For men over the 1985–2007 period, population aging is responsible for 28 percent of the increase in the DI beneficiary ratio. The insured rate is responsible for a negligible 3 percent. Actual incidence being above the 1985 unemployment-adjusted level is responsible for 59 percent, with the interaction between the demographic factors and incidence responsible for 4 percent. Falling death rates are responsible for 8 percent. The recovery rate being higher than the base value is responsible for −3 percent.

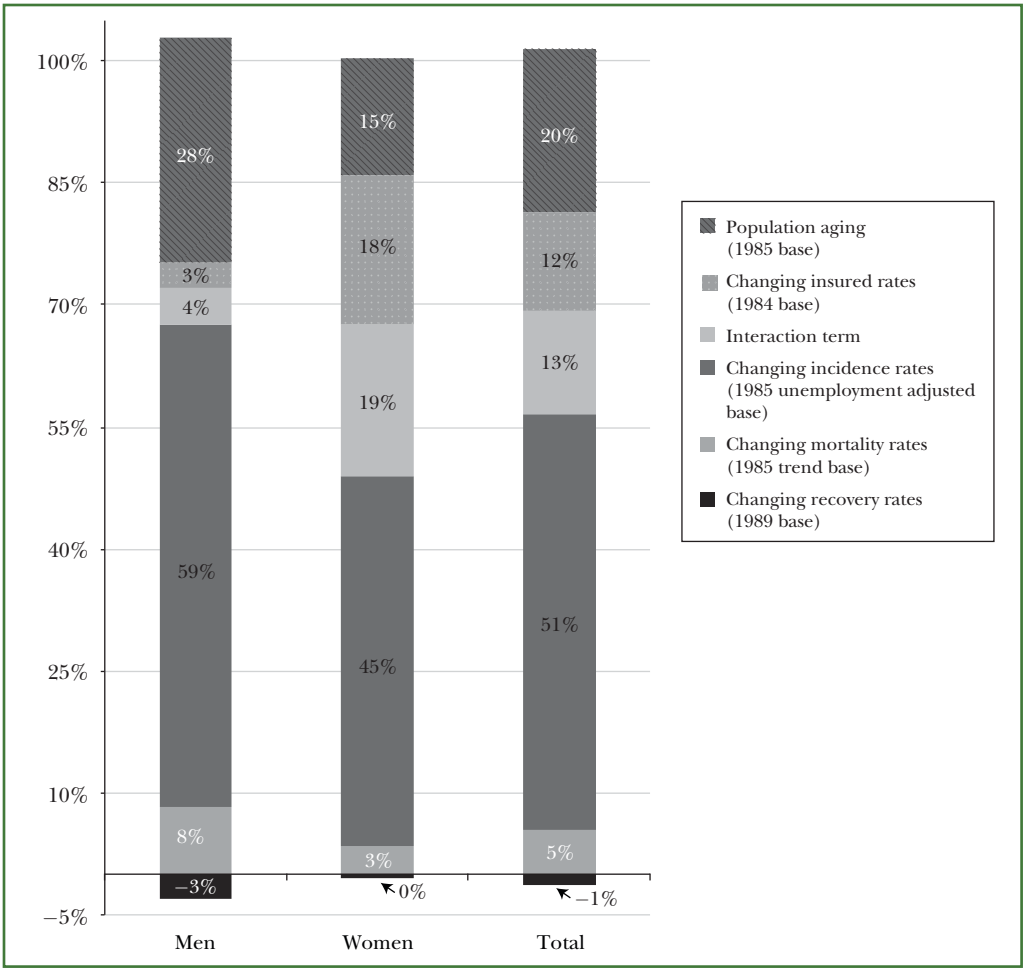
As I emphasized above, the decomposition results are highly sensitive to the incidence base year. Column 6 of the top panel of Table 1 shows that if I had begun the analysis in the high incidence year of 1977 (rather than the low incidence year of 1985) and studied the entire 1977–2007 period for men and women combined, I would have found that changing incidence reduced the DI enrollment rate and that population aging accounted for approximately 40 percent and rising insured rates accounted for just over half the rise in enrollment over the 30-year period.

There have really been three distinct subperiods, as shown in the bottom panel of Table 1. From 1977 to 1985 the male beneficiary ratio fell sharply with falling incidence rates explaining 62 percent of the decline and higher recovery rates explaining 31 percent. From 1985–1993, rising incidence is responsible for 125 percent of the increase in male benefit receipt, while population aging is responsible for only −6 percent. Mortality rates exceeded their trend level during this

[9] Liebman (2014) contains additional details on the time-path of each of these parameters.

Figure 7

Decomposition of Various Factors' Impact on the Percent of the Working-Age Population Receiving Disability Insurance, 1985–2007



Sources: Social Security Administration, Office of the Chief Actuary; and author's calculations.

period, reducing benefit receipt and accounting for −20 percent. From 1993–2007, population aging accounts for 94 percent of the increase in benefit receipt for men and falling mortality rates account for 36 percent. Incidence was on average below its 1993 level and accounted for −23 percent of the increase for men. The spike in recovery rates from eliminating eligibility for those with impairments related to drug and alcohol addiction also contributed −23 percent. Given the result presented in Figure 4 that age- and unemployment-adjusted male incidence rates fell sharply in the early 1980s, rose steeply in the second half of the 1980s, and have been steady

Table 1

Decomposition of Various Factors' Impact on the Percent of the Working Age Population Receiving Disability Insurance

	A. Full time periods with two different base years					
	1985–2007			*1977–2007*		
	Men (1)	*Women (2)*	***Total (3)***	*Men (4)*	*Women (5)*	***Total (6)***
Change in beneficiary ratio to be explained	1.6	2.2	**1.9**	0.4	1.7	**1.1**
Percent explained by:						
Population aging	28%	15%	**20%**	111%	22%	**39%**
Changing insured rates	3%	18%	**12%**	12%	61%	**52%**
Interaction term	4%	19%	**13%**	−18%	1%	**−2%**
Changing incidence rates	59%	45%	**51%**	−81%	7%	**−10%**
Changing mortality rates	8%	3%	**5%**	91%	9%	**25%**
Changing recovery rates	−3%	0%	**−1%**	−15%	−1%	**−3%**

	B. Three subperiods								
	1977–1985			*1985–1993*			*1993–2007*		
	Men (1)	*Women (2)*	***Total (3)***	*Men (4)*	*Women (5)*	***Total (6)***	*Men (7)*	*Women (8)*	***Total (9)***
Change in beneficiary ratio to be explained	−1.4	−0.6	**–1.0**	0.3	0.4	**0.4**	0.4	1.0	**0.7**
Percent explained by:									
Population aging	11%	12%	**11%**	–6%	–2%	**–4%**	94%	29%	**46%**
Changing insured rates	1%	−20%	**−5%**	−1%	28%	**15%**	11%	23%	**20%**
Interaction term	−3%	5%	**−1%**	0%	10%	**5%**	4%	6%	**5%**
Changing incidence rates	62%	71%	**64%**	125%	68%	**95%**	−23%	38%	**22%**
Changing mortality rates	−1%	1%	**0%**	−20%	−6%	**−13%**	36%	7%	**15%**
Changing recovery rates	31%	31%	**31%**	2%	1%	**2%**	−23%	−3%	**−8%**

Sources: Social Security Administration, Office of the Chief Actuary; and author's calculations.

Notes: I first modify the actual beneficiary-to-working-age population ratio to provide an alternative series that projects the path that the ratio would have taken if the unemployment rate had remained steady at its 1985–2007 mean value of 5.6 percent. I then hold factors constant, using the same sequential method as in Figures 5 and 6. Each column represents one run of the model, where the top row gives the difference in percentage points (for the final year of the simulation time period) between the alternative beneficiary ratio, which holds only the unemployment rate constant, and the last counterfactual beneficiary ratio, which holds all factors constant. The other rows represent the percent of this difference that can be attributed to each factor, including the interaction between incidence and population factors (aging and insured rates). The effect of population aging is found by holding the population age distribution constant at its distribution in the starting year for each model run (1977, 1985, or 1993). Similarly, I hold insured rates constant at their values in each of the three start years and hold incidence rates constant at their unemployment-adjusted values in each of the three start years. For mortality rates, I attempt to find values on the long-term trend line, so that my results are not distorted by the spike in actual mortality that occurred after the removal of less-impaired individuals from the DI beneficiary roles in the early 1980s and by the high rate of mortality among men with HIV in the 1980s and early 1990s. Therefore, I hold mortality constant at 1977 values in the model runs that begin in 1977; at a 1985-trend value, which reflects a weighted average of 1982 and 1998 mortality rates, in the model runs that begin in 1985; and at a 1993-trend value, which is found by averaging 1996 and 1997 mortality rates, in the model runs that begin in 1993. Recovery rates are the final factor I hold constant, and I do so at 1989 values for all three scenarios, because recovery rates have remained quite stable over time, and 1989 is the year with approximately the average recovery rate for the 1985–2007 period, excluding the one-year spike that occurred in 1997 when beneficiaries whose main impairment was related to drug or alcohol use were removed from the rolls.

(or falling slightly) since the early 1990s, this time pattern of results should not be surprising.[10]

I next perform an analogous set of counterfactual simulations that ask how the Disability Insurance beneficiary ratio would have evolved for women, holding constant the various factors for the 1985–2007 period. The base years used for each factor are the same as they were for men.

In Figure 6, the dark line shows the actual evolution of the female Disability Insurance beneficiary ratio, rising from 1.20 to 3.47 percent between 1985 and 2007. The next line in the key shows the adjusted ratio, with unemployment held constant. As with men, this results in a series that is somewhat lower in the first half of the period and somewhat higher in the second half. The 2007 value of this series is 3.55 percent. The next line in the key, additionally, holds the population age-distribution constant at its 1985 level. Absent the aging of the baby boomers, the female DI beneficiary ratio in 2007 would have been 3.23 percent. The next line in the key shows that additionally holding the female insured rate constant at its 1984 level has a fairly large impact on the beneficiary rate—lowering it to 2.82 percent. This factor is larger for women than for men because of the large-scale entry of women into the workforce starting in the 1970s that has resulted, over time, in a much larger share of women being covered by disability insurance. Additionally, holding incidence at its 1985 unemployment-adjusted average reduces the simulated beneficiary rate to 1.40 percent, with 30 percent of the reduction resulting from the interaction effect. Holding mortality rates constant at their 1982 level, on top of holding all of the earlier factors constant, has a somewhat smaller impact than for men because female mortality is lower; it reduces the simulated 2007 Disability Insurance beneficiary rate to 1.32 percent. Additionally holding recovery rates at their 1989 level has essentially no further impact on the simulated 2007 DI beneficiary rate.

Figure 7 and column 2 of the top panel of Table 1 summarize these results, showing that for women population aging and rising insured rates combine to account for one-third of the increase in the beneficiary ratio over the entire 1985 to 2007 period. Rising incidence accounts for 45 percent, and the interaction between the demographic factors and rising incidence accounts for 19 percent. The impact of changes in mortality and recovery rates was negligible.

The decomposition of results by subperiod in Table 1 shows that the time pattern of results for women is somewhat different from that of men, primarily because rising insured rates are a more significant factor for women. From 1977–1985, falling incidence rates explain 71 percent of the decline in enrollment

[10] The change in the beneficiary ratio for the 1985–2007 and 1977–2007 periods is greater than the sum of the changes in that ratio for the relevant subperiods. This occurs because it can take decades to reach a new steady state beneficiary ratio after, for example, a change in the incidence rate. Thus the increase in incidence after 1985 was still causing the beneficiary ratio to rise throughout the 1990s when compared to a 1985 incidence base, and this is reflected in the simulations for the full 1985–2007 period. But the impact of the 1980s increase in incidence is not captured in the simulations for the 1993–2007 subperiod, which use a 1993 incidence base and reflect only the impact of further changes in incidence relative to the 1993 level.

for women, rising recovery rates explain 31 percent, and rising insured rates (which increase enrollment) are responsible for -20 percent. Whereas rising incidence accounted for nearly all of the increase in the beneficiary ratio for men in the 1985–1993 time period, for women 68 percent of the increase was the result of rising incidence and 28 percent was the increase in insured rates. Whereas population aging and declining mortality rates accounted for nearly all of the increase in the male beneficiary ratio for the 1993–2007 time period, for women population aging, rising insured rates, and rising incidence all played a role. In particular, as we saw in Figure 4, incidence rates for women have continued to rise even after those for men leveled off.[11]

The impression in policy circles that disability enrollment and spending are "out of control" appears to be the result of confounding the legislatively induced bounce-back of incidence rates in the late 1980s and early 1990s with the largely demographically induced increases of the past two decades. There have been three different phenomenon, each with its own time path and economic origins. The first is a legislatively induced rise in disability incidence rates that explains the bulk of program growth between 1985 and the early 1990s. The second is rising female labor force participation, which enabled a greater share of women to qualify for SSDI benefits. The third factor, and the largest contributor to rising SSDI rolls between the early 1990s and the onset of the Great Recession, is the entry of the baby boom generation into its peak disability years. All three factors have now arguably run their course in terms of increasing the share of GDP spent on DI benefits. But changes in the characteristics of the beneficiary population in recent decades could augur future changes in the program. I turn to this subject next.

Changes in the Beneficiary Population

Much of the policy attention to the Disability Insurance program is motivated by a concern that higher enrollment rates may be the result of an expansion in benefit receipt by individuals with less-severe impairments. According to this perspective, the 1984 legislative reforms and the way in which they have been administered loosened eligibility criteria, and the impact of the altered eligibility standards was magnified by challenging labor market conditions for low-skilled workers, which increased their incentive to claim benefits.

While it is difficult to directly observe whether eligibility standards have shifted over time, we can find clues by looking at trends in the age distribution of claims, the medical impairments triggering eligibility, and the mortality rate of beneficiaries. Such clues need to be interpreted with care. One cannot assess the standards

[11] These results attribute a larger share of the increase in DI enrollment to demographic factors than do Duggan and Imberman (2009), who examine the period 1984–2003. They attribute 15 percent of the rise in enrollment among men and 4 percent of the rise among women to changes in the age structure of the population.

applied to disability benefits simply by looking at the age-adjusted rates of disability incidence, because incidence rates are affected by factors beyond how the program is administered. For example, declining relative demand for low-wage workers and stagnating real wages at the bottom of the income distribution increased the incentives for low-skill workers to apply for disability benefits during the 1980s and 1990s (Autor and Duggan 2003). These changes in incentives would be predicted to increase the rate of disability benefit claiming, which suggests that stable disability incidence rates in the post-1990 period could be indicative of tighter eligibility standards being applied. Conversely, if the overall health of the population is improving, then we would expect declining incidence of disability, and a finding of stable incidence rates could reflect looser eligibility standards. Moreover, greater take-up of disability insurance in an era of declining economic prospects for low-skilled workers could be socially optimal since the economic cost of workers foregoing labor force participation depends on the marginal product of their labor relative to their disutility of work (Diamond and Sheshinski 1995).

Some observers have cited a shift in the age composition of the disability beneficiary population toward younger ages as evidence that disability determination standards have become more lenient. Among both men and women, the mean age of new beneficiaries fell by more than three years between 1980 and 1993. However, between 1993 and 2011, the mean age of new beneficiaries increased by three years, returning to early 1980s levels. The complication in interpreting these trends is that as the baby boomers moved through their life cycle, they first swelled the number of younger workers, which mechanically increased the share of younger workers claiming disability benefits, and then later increased the share of older disability claimants. Indeed, when the ages of new recipients of disability benefits are adjusted to hold the age composition of the insured population constant, the average age fell significantly from the early 1980s to the early 1990s, but has fluctuated around a relatively stable trend since 1990. This pattern is consistent with an interpretation that eligibility standards expanded significantly in the aftermath of the 1984 legislation, but have been relatively stable since the early 1990s.

Another piece of evidence comes from examining the incidence of specific medical impairments. The stability of the overall (age- and unemployment-adjusted) disability incidence rate in the post-1990 period masks substantial changes in the incidence of individual impairments. For both males and females, the incidence of circulatory- and cancer-related benefit awards has been falling, while the incidence of musculoskeletal and, to a lesser extent, mental conditions has been rising. One possible interpretation of these trends is that overall health has been improving as reflected in the declining circulatory and cancer incidence rate, but that improving health has not produced declining incidence rates because the program has become more lenient in approving claims for musculoskeletal and mental conditions. Using my simulation model, I find that if the incidence rates for musculoskeletal and mental benefit awards had remained constant at their 1985 levels, while all other conditions followed their actual path, the beneficiary ratio would have been 21 percent lower in 2007 than it was.

However, there are other possible interpretations for the shift in the distribution of impairments. For example, it could be that standards for determining disabilities have remained constant, but that a greater number of individuals with musculoskeletal or mental health conditions have applied for benefits, either because the prevalence of the conditions has increased over time or, more likely, because labor market conditions for low-skilled workers have increased the incentives for individuals with these conditions to apply for benefits. It is also possible that some of the shift in the distribution of impairments was the result of individuals who would have been eligible for benefits under other categories (possibly a few years later) instead claiming benefits under the musculoskeletal and mental impairment categories after the 1984 reforms made such claims easier.

The fact that the relatively stable rates of (adjusted) disability incidence during the past 25 years were the result of large offsetting trends in incidence rates for different conditions suggests that there should be no presumption that rates will be stable going forward. For example, if incidence rates for musculoskeletal and mental health impairments continue to rise, but the offsetting declines in the other conditions level off, overall incidence could rise. Relatedly, while female disability incidence rates have leveled off since the mid-1990s at a rate slightly below male rates, giving the appearance that the earlier rapid rise in female incidence rates was largely a phenomenon of female rates converging to male rates as female labor market behavior became more similar to male behavior, incidence rates for particular conditions are quite different for men and women, suggesting that the appearance of convergence in the aggregate patterns may simply be a coincidence.

A final piece of evidence comes from mortality rates among Disability Insurance recipients. These rates have continued to fall, even during the period in which adjusted incidence rates have mostly stabilized. This observation is consistent with an interpretation that there has been a shift in the composition of disability beneficiaries toward impairments like musculoskeletal and mental impairments that have lower mortality rates. Although it is conceivable that medical progress has significantly reduced mortality for a wide range of conditions without improving functional capacity, it seems likely that a significant portion of the decline in mortality rates among DI recipients is the result of a change in the composition of the beneficiary population.

Priorities for Reform of Disability Insurance

By international standards, US spending on disability benefits relative to GDP remains low. The OECD provides data on total public expenditures on disability and sickness cash benefits for its member countries. In 2011, average spending in the OECD on these benefits was 1.9 percent of GDP. In the US, it was 1.3 percent of GDP. The Netherlands, a country often heralded for its aggressive disability benefit reforms, spent 2.8 percent of GDP on these benefits in 2011 (down from 6.5 percent in 1980). Despite the relatively modest US expenditures on these programs, there

is a strong case for treating the coming exhaustion of the Disability Insurance trust fund as an opportunity for improving the US Disability Insurance system.

Social insurance programs need to be designed to balance the protection they provide with the economic distortions they cause (Feldstein 1976). Disability insurance benefits provide protection against the risk of a severe medical impairment, while they also generate disincentives for labor force participation. But economic research suggests that some significant aspects of the disability insurance system are so far from the optimal policy frontier that reforms may exist that can simultaneously improve the well-being of impaired individuals and reduce the fiscal and efficiency costs of the program.

Improved Incentives for Returning to Work

The current disability benefit package essentially provides lifetime cash benefits and health insurance in exchange for a promise never to do substantial work again. That is, given that only about 1 percent of beneficiaries per year are removed from the rolls based on health improvements, so long as a beneficiary does not have significant labor earnings, the individual is unlikely to lose eligibility for benefits. A sizable portion of the disabled beneficiary population might be better off with assistance that helps them return to employment. Changes in the disability insurance programs and in low-skill labor markets, along with the decline in other forms of public assistance, have made this group a larger fraction of the Disability Insurance and Supplemental Security Income population (Autor and Duggan 2003).

The evidence that a significant number of disability beneficiaries have the capacity to work comes from a line of research that began with Bound (1989) and examines the earnings of applicants who are denied disability benefits to assess the earnings potential of marginal beneficiaries.[12] A welcome evolution in this literature uses the random assignment of disability cases to examiners or Administrative Law Judges with different propensities to approve awards to generate a causal estimate of the effect of Disability Insurance awards on labor supply (Autor, Maestas, Mullen, and Strand 2015; French and Song 2011). It also accounts for the fact that the lengthy DI application process can erode labor force participation even among applicants who are eventually denied disability benefits (Maestas, Mullen, and Strand 2015). This literature finds that applying for and receiving DI reduces employment rates by over 30 percentage points overall and by more than 50 percentage points among those with lesser impairments. Roughly one-quarter of applicants are on the margin of program entry in the sense that they receive benefits if their case is assigned to a lenient examiner, but not if they are assigned to one with a lesser propensity to award benefits (Maestas, Mullen, and Strand, 2013). However, the subsequent earnings levels of denied applicants who return to employment are generally below $20,000, suggesting that without further assistance

[12] See von Wachter, Song, and Manchester (2011) for a more recent application of the Bound (1989) methodology and Moore (2015) for an analysis of the impact of terminating DI benefits on subsequent labor supply.

the labor market prospects of individuals on the margin between receiving and not receiving benefits is quite limited.

Incentives for Employers, States, and the Social Security Administration

Several of the key actors in the disability insurance system have misaligned incentives that cause them to encourage people to apply for disability insurance (Liebman and Smalligan 2013). A number of the ideas for reform of the US Disability Insurance system seek to alter these incentives.

For example, when an employee experiences a health problem, an employer may find it easier and less expensive to push an employee toward applying for Disability Insurance benefits than to make accommodations that would allow the worker to remain employed at the firm. Similarly, it is often less expensive for private disability insurance companies to help workers sign up for public Disability Insurance benefits than to help them get back to work.

Several reform proposals target incentives for employers, in part based on the observation that intervening early, before someone becomes detached from employment, is more effective than trying to connect someone later to a new job. For example, Autor and Duggan (2010) propose that employers be required to provide private disability insurance coverage to all of their workers and that this insurance would cover the first two years of a person's disability. Eligibility for federal benefits would begin only after the two years of private benefits were exhausted. In their formulation, benefits would be 60 percent of prior earnings and would also include vocational rehabilitation and workplace accommodations. Because employers would be charged different rates by the private insurance companies depending on the benefit claims of their employees, employers would have an incentive to find ways to keep their disabled workers employed. In order to create greater incentives for firms to retain workers with health impairments, Burkhauser and Daly (2011) propose experience rating for the employer share of Disability Insurance taxes in a way that is analogous to how worker's compensation and unemployment insurance contributions are experience rated. Thus, if an employer had a larger number of its workers claiming disability, that employer would face higher Disability Insurance premiums.

Other important decision makers who affect whether workers end up receiving Disability Insurance, or not, include states and the Social Security Administration itself. States have incentives to encourage low-wage workers to sign up for Disability Insurance and Supplemental Security Income because doing so has the effect of shifting both cash assistance costs and health care costs to the federal government and away from state programs. A change in federal funding formulas could alter this incentive.

The Social Security Administration's administrative budget comes from capped discretionary spending while benefits are mandatory. As a result, the Social Security Administration often ends up underinvesting in administrative capacity—failing to do continuing disability reviews, for example—even when doing so increases total program costs. Thus, the Social Security Administration has a backlog of 1.4 million

continuing disability reviews even though its actuaries estimate that every $1 spent on continuing disability reviews saves $10 in future benefits (Social Security Administration 2013). Additional administrative capacity would lead to more timely and accurate initial disability decisions, possibly reducing the number of cases that are appealed. In Liebman and Smalligan (2013), we propose that the funding for state disability determination services be switched to the mandatory side of the budget, which would be in accord with how the administrative costs of TANF, Medicaid, and Food Stamps operate.

A Pilot Program Approach

In most cases, we lack the evidentiary base necessary to judge whether specific disability insurance reforms would do more good than harm. Are the earnings gains that can be produced from employment supports for partially disabled workers sufficient to be cost effective when compared with simply providing cash transfers? Would experience-rating of Disability Insurance benefits discourage firms from hiring either disabled workers or workers from demographic groups with higher incidence of disability? In Liebman and Smalligan (2013), we propose three federal pilot demonstrations to generate the needed learning. Because research has consistently shown that it is far less effective to intervene after a person has begun receiving disability insurance benefits, all of the pilots would be early intervention programs.

A first pilot program would test whether employer incentives can reduce Disability Insurance enrollment. Specifically, we propose a demonstration program that would provide a tax credit against firm DI payroll tax for firms that can reduce the disability incidence of their employees by at least 20 percent. A second demonstration would screen disability applicants and target those who appear likely to be determined eligible for benefits but who also have the potential for significant work activity if provided with a proper range of services. In exchange for suspending their disability insurance application, these applicants would be offered a package of benefits including targeted vocational and health interventions, a wage subsidy, and perhaps a few months of an emergency cash diversion grant. In this way, the demonstration would find out whether it is possible to improve the well-being of applicants while simultaneously achieving near-term cost neutrality and long-term savings. The third demonstration would allow several states to reorganize existing funding streams to target populations that are likely to end up receiving a lifetime of DI or Supplemental Security Income benefits in the absence of assistance. States would receive incentive funding if they demonstrate success at improving outcomes and reducing participation in DI and SSI. Similarly, Mann and Stapleton (2011) propose state-based disability insurance pilots analogous to the welfare waiver experiments of the 1980s and 1990s that informed the 1996 federal welfare reform.

As the Disability Insurance Trust Fund heads toward exhaustion in 2016, legislative action of some sort will be necessary. While it is possible to delay substantive changes to the DI program for another decade or more simply by raising the share

of the OASDI payroll tax that is directed to the DI trust fund and lowering the share that is directed to the retirement trust fund, more significant changes will ultimately be needed. It would be wise, therefore, for the upcoming legislation to authorize a series of demonstration projects that can increase the chance that when it becomes time for more significant reforms, we will know enough to make smart choices. Economic research over the past two decades has suggested a set of changes that, by addressing some of the misplaced incentives in the system, offer the possibility of saving funds in the disability insurance system while potentially making people better off. These changes include altering the disability benefit package in a way that focuses on helping a larger proportion of the disabled return to work and reforming misaligned incentives that currently lead firms and state governments to encourage too many people to apply for federally funded disability benefits. It will take additional creative economic thinking in the next few years to design and evaluate the research and pilot projects that are needed to provide the evidence to guide broader reforms.

■ *The author thanks Wayne Sandholtz and Emily Tisdale for excellent research assistance.*

References

Autor, David H., and Mark G. Duggan. 2003. "The Rise in the Disability Rolls and the Decline in Unemployment." *Quarterly Journal of Economics* 118(1): 157–206.

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

Autor, David H., and Mark G. Duggan. 2010. "Supporting Work: A Proposal for Modernizing the US Disability Insurance System." Center for American Progress and The Hamilton Project.

Autor, David H., Nicole Maestras, Kathleen J. Mullen, and Alexander Strand. 2015. "Does Decay Cause Decay? The Effect of Administrative Decision Time on the Labor Force Participation and Earnings of Disability Applicants." NBER Working Paper 20840.

Bound, John. 1989. "The Health and Earnings of Rejected Disability Insurance Applicants." *American Economic Review* 79(3): 482–503.

Burkhauser, Richard V., and Mary Daly. 2011. *The Declining Work and Welfare of People with Disabilities.* AEI Press.

Congressional Budget Office (CBO). 2012. "Policy Options for the Social Security Disability Insurance Program." Report, July 16.

Cutler, David, Angus Deaton, and Adriana Lleras-Muney. 2006. "The Determinants of Mortality." *Journal of Economic Perspectives* 20(3): 97–120.

Cutler, David M., Ellen Meara, and Seth Richards-Shubik. 2012. "Unemployment and Disability: Evidence from the Great Recession." NBER Retirement Research Center Paper NB 12-12.

Diamond, Peter, and Eytan Sheshinski. 1995. "Economic Aspects of Optimal Disability Benefits." *Journal of Public Economics* 57(1): 1–23

Duggan, Mark, and Scott A. Imberman. 2009. "Why Are the Disability Rolls Skyrocketing? The Contribution of Population Characteristics, Economic Conditions, and Program Generosity." Chap. 11 in *Health at Older Ages: The Causes and*

Consequences of Declining Disability among the Elderly, edited by David Cutler and David Wise. University of Chicago Press.

Feldstein, Martin. 1976. "Seven Principles of Social Insurance." *Challenge* 19(5): 9–11.

Feldstein, Martin S., and Jeffrey B. Liebman. 2002. "Social Security." *Handbook of Public Economics,* vol. 4, pp. 2245–324. Amsterdam: Elsevier.

French, Eric, and Jae Song. 2014. "The Effect of Disability Insurance Receipt on Labor Supply." *American Economic Journal: Economic Policy* 6(2): 291–337.

Kearney, John R. 2005/2006. "Social Security and the 'D' in OASDI: The History of a Federal Program Insuring Earners against Disability." *Social Security Bulletin* vol. 66, no. 3.

Liebman, Jeffrey B. 2014. "Understanding the Increase in Disability Insurance Spending." NBER Disability Research Center Working Paper NB 13-01.

Liebman, Jeffrey B., and Jack A. Smalligan. 2013. "An Evidence-Based Path to Disability Insurance Reform." The Hamilton Project, Brookings Institution.

Maestas, Nicole, Kathleen J. Mullen, and Alexander Strand. 2013. "Does Disability Insurance Receipt Discourage Work? Using Examiner Assignment to Estimate Causal Effects of SSDI Receipt." *American Economic Review* 103(5): 1797–1829.

Mann, David R., and David C. Stapleton. 2011. "Fiscal Austerity and the Transition to Twenty-First Century Disability Policy: A Road Map." Mathematica Policy Center for Studying Disability Policy.

Mashaw, Jerry L. 1983. *Bureaucratic Justice: Managing Social Security Disability Claims.* Yale University Press.

Meuller, Andreas I., Jesse Rothstein, Till M. von Wachter. 2013. "Unemployment and Disability Insurance in the Great Recession." NBER Working Paper 19672.

Moore, Timothy. 2015. "The Employment Effects of Terminating Disability Benefits." Melbourne Institute Working Paper No. 2/15.

Muller, L. Scott. 2008. "The Effects of Wage Indexing on Social Security Disability Benefits." *Social Security Bulletin* vol. 68, no. 3.

OASDI Board of Trustees. 2014. *The 2014 Annual Report of the Board of Trustees of the Federal Old-Age and Survivors Insurance and Federal Disability Insurance Trust Funds.*

Reno, Virginia P. 2011. "Securing the Future of the Social Security Disability Insurance Program." Testimony before the House Committee on Ways and Means, Subcommittee on Social Security. December 2. http://www.nasi.org/research/2011/testimony-virginia-p-reno-securing-future-social-security-di.

Rupp, Kalman. 2012. "Factors Affecting Initial Disability Allowance Rates for the Disability Insurance and Supplemental Security Income Programs: The Role of the Demographic and Diagnostic Composition of Applicants and Local Labor Market Conditions." *Social Security Bulletin* vol. 72, no. 4.

Rutledge, Matthew S. 2011. "The Impact of Unemployment Insurance Extensions on Disability Insurance Application and Allowance Rates." Center for Retirement Research at Boston College Working Paper 2011-17.

Social Security Administration. 1998–2013. *Annual Statistical Supplement to the Social Security Bulletin.*

Social Security Administration. 2014a. *Annual Statistical Report on the Social Security Disability Insurance Program, 2013.*

Social Security Administration. 2014b. "Social Security Basic Facts." Webpage, April 2, 2014, http://www.ssa.gov/news/press/basicfact.html.

Social Security Technical Advisory Panel. 2011. *2011 Technical Panel on Assumptions and Methods.* Report to the Social Security Advisory Board.

von Wachter, Till, Jae Song, and Joyce Manchester. 2011. "Trends in Employment and Earnings of Allowed and Rejected Applicants to the Social Security Disability Insurance Program." *American Economic Review* 101(7): 3308–29.