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Why are the Disability Rolls Skyrocketing? The Contribution of Population Characteristics, Economic Conditions, and Program Generosity

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Abstract
This chapter, which addresses three categories of explanation—the characteristics of individuals insured by the Disability Insurance (DI) program, the state of the economy, and the generosity of program benefits—argues that the growth in DI rolls is likely to continue and perhaps accelerate going forward. The data indicate that the recessions of 1991 and 2001 can explain 24 percent of the growth in DI receipt among men and 12 percent of the growth among women. Changes in health during the past two decades have slowed rather than added to the growth of the DI rolls. DI awards for certain conditions were much more affected by the liberalized medical eligibility criteria than others. The aging of the Baby Boom population will result in significant increases in DI receipt during the next fifteen years. The incentive to apply for DI will increase with the rising value of health insurance through Medicare.

Keywords
economy, Disability Insurance, program benefits, recessions, health, medical eligibility, baby boom, health insurance

Disciplines
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Why are the Disability Rolls Skyrocketing?
The Contribution of Population Characteristics, Economic Conditions, and Program Generosity

Mark Duggan and Scott A. Imberman

11.1 Introduction

During the last two decades, the fraction of nonelderly adults in the United States receiving Social Security Disability Insurance (hereafter DI) benefits increased by 76 percent, with 6.20 million disabled workers on the program in December of 2004.[1] Recent work has suggested that the growth during this period was to some extent driven by an increase in the financial incentive to apply for DI and by a liberalization of the program's medical eligibility criteria (Autor and Duggan 2003). These changes alone, however, were not the only ones influencing the increase in DI receipt. In this chapter, we estimate the contribution of several factors to the growth in the DI rolls during the past two decades. We divide our determinants into three distinct categories—the characteristics of individuals insured by the DI program, the state of the economy, and the generosity of program benefits.

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1. This does not include an additional 2.7 million nonelderly adults who received disability benefits from the means-tested Supplemental Security Income program but not from DI. Nor does it include the 1.60 million children of disabled workers receiving benefits or the 0.15 million spouses. It does include the 1.3 million nonelderly adults who received disability benefits from both DI and SSI.

We begin with an examination of the changing age structure in the United States (section 11.2). These changes could be important given that DI receipt is so strongly related to age. For example, the probability that a fifty to sixty-four-year-old man receives DI benefits is more than five times greater than the same probability for his counterpart between the ages of twenty and forty-nine. With individuals from the Baby Boom generation now between the ages of forty and fifty-eight (versus twenty and thirty-eight two decades ago), one would expect a large increase in DI receipt. According to our results, the changing age structure of the nonelderly adult population in the United States can explain 15 percent of the increase in DI receipt among men, but just 4 percent for women. This disparity is partly because the growth in DI receipt has been almost twice as large for women as for men during the past two decades, and thus there is less to explain for the latter group.

One explanation for the differential increase in DI receipt among women is the growth in the fraction of women insured by DI. Given that an individual must have twenty quarters of work history during the past ten years to be insured for DI benefits, the substantial increases in female labor force participation in recent decades have increased the fraction of women insured by the program. Our findings suggest that this effect is substantial, as it can explain 24 percent of the growth in DI receipt among women, but just 3 percent among men.

We next turn to the contribution of changes in the health status of nonelderly adults to the growth in DI receipt (section 11.3). On the most widely used measure—mortality—nonelderly adults have become significantly healthier over time. For example, the probability that a male born in 1921 survived to the age of sixty was just 68 percent, whereas a male born twenty years later had a 78 percent chance of surviving to this age. The reductions in mortality were similarly large among women. But this fall in mortality could have a perverse effect on the health of individuals who are alive because marginal survivors may be in poor health. Using data from the National Health Interview Survey covering the years 1984–2001, our findings suggest that near-elderly adults are on average getting healthier whereas health among younger adults has remained roughly constant. Though the measures of health in the NHIS are far from perfect, our findings suggest that changes in health reduced the growth of DI receipt below what it otherwise would have been.

Recent studies have suggested that economic conditions have an important effect on the fraction of individuals receiving DI benefits (Black, Daniel, and Sanders 2002; Autor and Duggan 2003). An examination of the change in DI application rates during the two most recent recessions supports this hypothesis. For example, from 1989 to 1993 the number of applications to DI increased by 45 percent and from 1999 to 2003 by an even larger 58 percent. It is therefore plausible that adverse economic shocks increase the number of individuals applying for and ultimately awarded ben-

efits. Our findings in section 11.4 suggest that the recessions of 1991 and 2001 can explain 24 percent of the growth in DI receipt among men and 12 percent of the growth among women.

Another line of research has emphasized the importance of DI benefit generosity as a determinant of DI application propensities (Parsons, 1980; Bound, 1989; Gruber, 2000). Though the formula used by the Social Security Administration (SSA) to calculate individuals' DI benefits did not change during our study period, individuals' incentives to apply for DI has changed, as shown in section 11.5. Because of the interaction between rising income inequality and the progressive benefit formula used by SSA, low-skilled individuals can now replace a much larger fraction of their earnings with DI benefits than they could have two decades ago. Our findings suggest that rising replacement rates can explain 28 percent of the growth in DI receipt among women and 24 percent of the growth for men.

In section 11.6, the last factor that we consider turns out to be the most important. Because of federal legislation enacted in 1984, the Social Security Administration was required to use a more liberal definition of disability when deciding whether to accept or reject a DI application. For example, the SSA had to use less strict criteria for mental disorders and place greater weight on pain—a condition that might be difficult to verify. These changes differentially increased the probability that individuals with mental disorders or musculoskeletal conditions (e.g., back pain, arthritis) were awarded DI benefits, with the fraction of DI awards to these two conditions increasing from 28 percent in 1983 to 52 percent twenty years later. Our findings suggest that the liberalized eligibility criteria can explain 38 percent of the growth in DI receipt among women and 53 percent for men.

We conclude the chapter (section 11.7) with a forecast of the changes in disability recipiency that will occur during the upcoming years. For at least four reasons, it is likely that the growth in the DI rolls will continue and perhaps accelerate. First, given the average number of awards at present and the average duration of individuals awarded benefits, it is clear that the program is far below its equilibrium size. To reach this equilibrium, the number of recipients would need to increase by 62 percent (to more than 9.8 million). Second, as the Baby Boom generation reaches its sixties, the importance of the age structure effect mentioned previously will increase substantially, with more individuals in these peak disability years. Third, because of reductions in the generosity of Social Security retirement benefits but no corresponding reduction for DI, the program will become relatively more attractive and thus more individuals are likely to apply. And finally, the rising cost of health insurance and the increase in the number who are uninsured suggests that the demand for the Medicare coverage resulting from DI receipt will increase. For all of these reasons, it is likely that the DI rolls will grow substantially above their current level in the absence of any changes to the program.

11.2 Previous Research

A substantial body of previous research has examined the causes and the consequences of the growth in the disability rolls. The vast majority of these works have focused attention on the effect of DI on the labor force participation (LFP) of men. For example Parsons (1980, 1984) argued that virtually all of the fall in male labor force participation during the post-World War II era was caused by the growing generosity of the DI program. However, Haveman and Wolfe (1984) argued that Parsons' model is incorrectly specified and when they redid his analysis, they found little contribution to the drop in male (LFP) from DI. In addition, Bound (1989) later challenged Parsons' estimates after finding that more than one-half of rejected DI applicants in a sample of awardees from the 1970s remained out of the labor force even after their rejections. This study did not claim that DI had no effect on labor market outcomes, but instead that the relationship between DI receipt and labor force exit was much less than one-for-one.

Subsequent studies supported the hypothesis that changes in the generosity of DI benefits and in the medical eligibility criteria influenced labor force participation, with the magnitude varying to some extent across studies and virtually all of these studies focusing exclusively on men (Parsons 1991a, 1991b; Bound 1991; Bound and Waidmann 1992; Gruber and Kubik 1997; Stapleton et al. 1998; Kreider 1999; Bound and Waidmann 2002). These studies had the limitation that because DI is a federal program, there was no obvious control group that could be used to disentangle the effect of changes in DI from other factors. To surmount this obstacle, Gruber (2000) used a substantial change in disability benefits in the Canadian province of Quebec to estimate the effect of DI benefit generosity. In this study, the author uses the other Canadian provinces as a control group and finds that the elasticity of labor force exit to DI benefit generosity is approximately 0.3.

One recent study has emphasized the role of changes in the financial incentive to apply for DI resulting from the interaction of the growth in income inequality and the progressive formula used to determine DI benefits (Autor and Duggan 2003). The authors argue that rising replacement rates (the fraction of one's income that can be replaced with DI benefits) and the more liberal definition of disability used following federal legislation enacted in 1984 increased the likelihood that low-skilled individuals would exit the labor force to apply for DI. The authors stress that both of these factors increased the sensitivity of DI recipiency to economic conditions.

Other studies have examined the contribution of business cycle effects to the growth in DI receipt. For example, Rupp and Stapleton (1995) summarize a series of early papers on the effect of the unemployment rate on DI receipt which find that a 1 percentage point increase in the unemployment rate is associated with up to a 7 percent increase in DI awards (Lewin-

VHI 1995; Stapleton, Coleman, and Dietrich 1995; Hambor 1992, 1975; Levy and Krute 1983; Muller 1982; Lando 1979). A more recent analysis by Black, Daniel, and Sanders (2002) uses plausibly exogenous shocks to the coal mining industry to estimate the effect of economic conditions on DI receipt. Their findings, though not strictly comparable to the studies described in Rupp and Stapleton, suggest an elasticity of DI payments with respect to local earnings of 0.4.

Changing health and population dynamics have also been suggested as possible explanations for the DI increase. Indeed, the aging of the Baby Boom generation has become an important issue for the DI program, since adults who are near retirement age are more likely to apply for and enroll in DI than others. Stapleton et al. (1998) suggest that population growth and aging accounted for a 1.3 percent annual DI growth rate from 1988 to 1992. However, the effects of aging may have been tempered by improvements in health. In particular, improvements in cardiovascular mortality have been dramatic. Cutler and Meara (2001) suggest that 98 percent of mortality reductions since 1960 have been from changes in cardiovascular mortality. Other evidence has shown that overall health amongst nonelderly adults has been improving (Cutler and Richardson 1997).

Whether the prevalence of disabilities has increased or fallen has been an issue of much debate. Crimmins, Saito, and Ingegneri (1989) find that although prevalence of long-term disability has increased, improvements in life expectancy and health care have caused disability-free life expectancy to increase as well. Lakdawalla, Bhattacharya, and Goldman (2004) find disability prevalence to be increasing amongst thirty to fifty-nine-year-olds and remaining stable amongst sixty to sixty-nine-year-olds. Considering that over the time period of their analysis, 1984–1996, all of the Baby Boom generation fell into the thirty to fifty-nine age at some point, the implications of rising disability in this age group for the DI program are enormous. One important limitation to both of these studies is that their measures of health status are based on self-reports and thus may not accurately capture true changes in morbidity over time.[2]

Taken together, past studies suggest that three sets of changes—in the characteristics of individuals insured by DI, in economic conditions, and in the financial incentive to apply for DI—have played an important role in the growth of DI receipt from 1984 to the present. In this study, we

2. There are at least three reasons that self-reporting of disabilities can create biased prevalence estimates. First, increased awareness of conditions could affect people's responses to questions about activity-limiting conditions. For example, it is possible that additional exposure to information about treatments for conditions may make people more aware of whether they are affected by them. Second, the responses to questions on activity limitations are dependent on people's choices regarding which activities they perform and their employment (Lakdawalla, Bhattacharya, and Goldman 2004). Finally, there is the possibility that for some people, whether they say they are work-limited or activity-limited may be causally determined by whether they receive disability benefits.

estimate the contribution of each one of these factors while also forecasting the likely changes in the disability rolls in the years ahead.

11.3 The Impact of Changes in the Age Structure, DI Insured Status, and Health

From December of 1984 to December of 2004, the number of individuals receiving disabled worker benefits from the federal Disability Insurance program increased by 139 percent (from 2.60 million to 6.20 million). Part of this increase was attributable to population growth, with the number of nonelderly adults rising by 29 percent during that same period. But this leaves a substantial portion of the growth unexplained, as evidenced by the increase from 1.91 percent to 3.38 percent in the fraction of twenty to sixty-four-year-old adults on DI during the same period (fig. 11.1). In this section, we explore the contribution of changes in the age distribution, in the fraction of nonelderly adults insured by DI, and in the health of the adult population to the growth in the disability rolls during the past two decades.

11.3.1 Changes in the Age Distribution

Each year, the Social Security Administration publishes data on the number of DI recipients by gender and age category. Combining this information with population data from the Census Bureau, one can investigate how DI receipt varies by gender and age in each year. The first column of table 11.1 provides DI recipiency rates for men and women, respectively, in 1984. As is clear from both panels, the probability that an individual

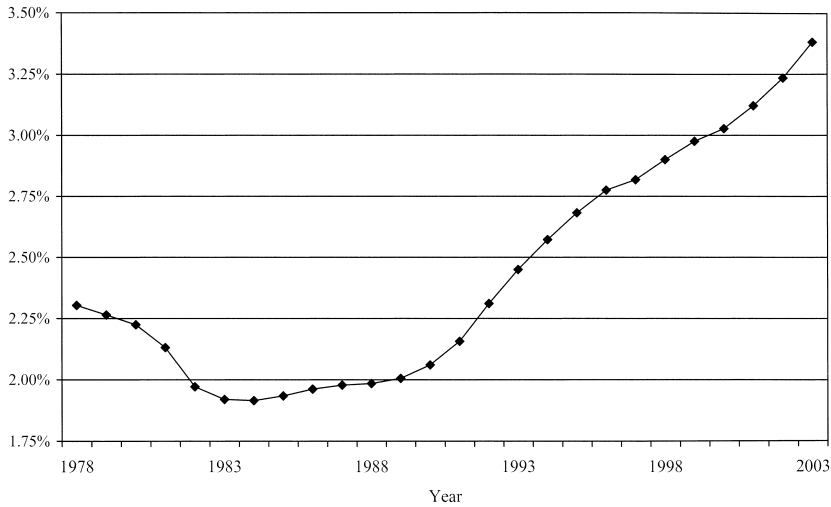

Fig. 11.1 Fraction of population aged 20–64 on DI: 1978–2003
Sources: SSA Office of the Chief Actuary; U.S. Census Bureau.

Table 11.1 **Percent of growth in DI recipiency among males and females explained by changes in age structure**

	1984 DI recipiency		1984 population		2003 population		Predicted Δ DI 1984–2003			Actual Δ DI 1984–2003		
	% on DI	# on DI	# people	% of pop	# people	% of pop	% on DI 2003	# on DI 2003	Δ in % on DI 1984–2003	% on DI 2003	# on DI 2003	Δ in % on DI 1984–2003
						A. Males						
<30[a]	0.38	77	20,370	30.72	20,437	23.6	0.38	77	0.00	0.50	103	0.12
30–39	1.10	198	17,983	27.12	21,176	24.5	1.10	233	0.00	1.51	319	0.41
40–44	1.78	119	6,690	10.09	11,407	13.2	1.78	203	0.00	2.94	335	1.16
45–49	2.60	145	5,582	8.42	10,731	12.4	2.60	279	0.00	4.17	448	1.57
50–54	4.23	224	5,293	7.98	9,313	10.8	4.23	394	0.00	5.91	551	1.68
55–59	7.23	388	5,368	8.10	7,661	8.9	7.23	554	0.00	9.00	689	1.77
60–64	11.93	598	5,014	7.56	5,764	6.7	11.93	687	0.00	13.47	776	1.54
Overall	2.64	1749	66,300	100.00	86,488	100.0	2.81	2,427	0.17	3.73	3,225	1.09
% explained by Δ in pop dist:		15.4%										
						B. Females						
<30[a]	0.15	31	20,267	29.4	19,459	22.3	0.15	30	0.00	0.41	79	0.26
30–39	0.47	87	18,388	26.7	20,936	24.0	0.47	99	0.00	1.29	270	0.82
40–44	0.76	53	6,945	10.1	11,555	13.3	0.76	88	0.00	2.41	278	1.65
45–49	1.13	66	5,846	8.5	11,030	12.7	1.13	125	0.00	3.41	376	2.28
50–54	1.92	109	5,664	8.2	9,731	11.2	1.92	187	0.00	4.79	466	2.87
55–59	3.29	197	5,984	8.7	8,133	9.3	3.29	268	0.00	7.03	572	3.74
60–64	5.29	306	5,788	8.4	6,342	7.3	5.29	335	0.00	9.60	609	4.31
Overall	1.23	849	68,882	100.0	87,187	100.0	1.30	1,132	0.07	3.04	2,649	1.81
% explained by Δ in pop dist:		3.6%										

Sources: U.S. Census Bureau Population Estimates, 2003; Decennial Census, 1980–1990; Annual Report of the Social Security Disability Program, 2003; Annual Statistical Supplement of the Social Security Bulletin, 1986.

[a] Population numbers for <30 reflects the twenty to twenty-nine population. All numbers are in thousands.

received DI benefits two decades ago was a steeply increasing function of his or her age. For example, a male in his early sixties was 10.8 times more likely than a male in his thirties to receive DI benefits. This ratio was even larger for women at 11.3. This positive relationship between age and DI receipt is perhaps not surprising given that measures of health such as the probability of survival from one year to the next, likelihood of not having an activity-limiting disability, and self-reported health decline with age (Lakdawalla, Bhattacharya, and Goldman 2004; Case and Deaton 2003; Cutler and Meara 2001).

The first column in this two table also demonstrates the substantial difference between men and women in the probability of DI receipt, with women in each of the six age categories listed less than half as likely as their male counterparts to receive disability benefits. For example, while nearly 12 percent of men in their early sixties were receiving DI benefits in this base year, just 5.3 percent of women in this same age group were on the program.

The third column of this table lists the U.S. population by age group in 1984.[3] The number of individuals in their twenties and thirties in 1984 was substantially greater than the number in either their forties or their fifties for both men and women and accounted for more than 57 percent of all adults aged twenty to sixty-four. This difference was largely driven by the surge in birth rates that occurred in the years following World War II. Almost all of the Baby Boom generation—defined by the U.S. Census Bureau as individuals born between 1946 and 1964—were between the ages of twenty and thirty-nine in 1984.

As previously noted and shown in the first column of table 11.1, DI recipiency rates in 1984 were especially low among young adults. Just 0.4 percent of men in their twenties and 1.1 percent of men in their thirties were receiving DI benefits two decades ago. Because of the positive relationship between DI receipt and age, one would have expected the DI rolls to grow as these individuals reached their forties and fifties. And as the next two columns of the table show, the aging of the Baby Boom generation was associated with a substantial change in age structure, with the fraction of both men and women in their forties and fifties increasing from 35 percent to 46 percent from 1984 to 2003.

In the next three columns we investigate how much of the growth in DI receipt can be explained by the change in population in each age-gender cell from 1984 to 2003. To do this, we take the product of the cell-specific DI recipiency rate in 1984, and the population in that same cell in 2003, and then sum up these predictions across the twelve age-gender groups as specified in the following equation:

3. Only individuals between the ages of twenty and sixty-four are listed here given that DI recipients switch to Social Security retirement benefits when they reach sixty-five and because very few people under the age of twenty have sufficient work history to be eligible for DI.

$$\Delta DI_{Sim} = \sum_{a=1}^{6}(\theta_{af,1984} \cdot N_{af,2003}) + \sum_{a=1}^{6}(\theta_{am,1984} \cdot N_{am,2003})$$

with $\theta_{am,1984}$ and $\theta_{af,1984}$ equaling the fraction of men and women, respectively, in age group a who were receiving DI benefits in 1984. The population in each of the six age cells in 2003 is equal to $N_{af,2003}$ for women and $N_{am,2003}$ for men. Using this algorithm, we estimate that the number of men receiving DI would have increased from 1.75 million to 2.43 million from 1984 to 2003 if the rate of DI receipt within each age group had remained the same. The actual number receiving DI in 2003 was 3.22 million, and thus this projection explains 46 percent of the increase in the number of men receiving DI since 1984.

But much of this projection simply captures the fact that the number of men between the ages of twenty and sixty-four is increasing during this period. If one instead only asks how much of the increase in the proportion of men receiving DI can be explained by changes in the age structure, this prediction can explain much less of the increase. Given the changes in age structure from 1984 to 2003, the algorithm described above predicts an increase from 2.64 percent to 2.81 percent in the fraction of men receiving DI. Given the true increase to 3.72 percent, this factor can explain just 15.5 percent of the growth in the likelihood that a nonelderly adult male receives DI benefits.

Among women the contribution of changes in the age structure to the growth in DI receipt has been even smaller, with just 3.6 percent of the increase in DI recipiency rates explained by this factor. This is primarily because the growth has been much more rapid among women than men during this period, with the number of women receiving DI increasing by 212 percent from 1984 to 2003, while the corresponding increase for men was just 84 percent. While it is true that women started from a much lower rate of DI receipt in 1984, this difference remains even if one compares the increase in the fraction of women receiving DI, which grew by 1.81 percentage points versus just 1.08 percentage points for men. One possible reason for the difference is the greater increase among women in the likelihood of being insured by DI, which was itself caused by the rise in female labor force participation. We examine this in the next section.

11.3.2 Changes in DI Eligibility

In order to be insured for DI benefits, an individual between the ages of thirty and sixty-four must have worked in at least five of the ten years before the onset of his or her disability.[4] This standard is relaxed for younger indi-

4. More specifically, a person must have at least 20 quarters of coverage during the preceding ten years. The amount of earnings needed to receive 1 quarter of coverage increases from one year to the next. For example, in 1984 a person who earned more than $1,560 during the year would have received credit for 4 quarters, while by 2003 the amount needed had increased to $3,480.

viduals, who must instead have worked in at least half of the years since the age of twenty-one. Part of the reason that men were two times more likely than women to receive DI in 1984 was that they were much more likely to have sufficient work history to be insured. For example, 86 percent of males in their fifties were eligible to receive DI benefits if they developed a disability in 1984, compared to just 53 percent of females in this same age group.

During the subsequent two decades, there was a steady convergence between the fraction of men and women insured by DI as a result of the increase in female labor force participation during this period. This trend is illustrated in figure 11.2, which shows that from 1984 to 2003 eligibility amongst women twenty to sixty-four rose from 62.8 percent to 75.2 percent. In comparison, male eligibility fell slightly from 89.9 percent to 86.2 percent. Given this trend, it is perhaps not surprising that the growth in DI receipt was substantially greater for women than for men during this period.

In table 11.2 we investigate the contribution of the growth in DI insured status for both men and women to the increase in DI receipt from 1984 to 2003. Our method here is similar to the one used in the preceding section. Specifically, we estimate the change in DI receipt that would have occurred from 1984 to 2003 if the fraction of insured individuals in each age cell actually receiving DI benefits remained at its 1984 level.

The first two columns of table 11.2 reveal that the difference between men and women in DI receipt in our base year of 1984 was much smaller if one denominated by the number insured by DI rather than by the total

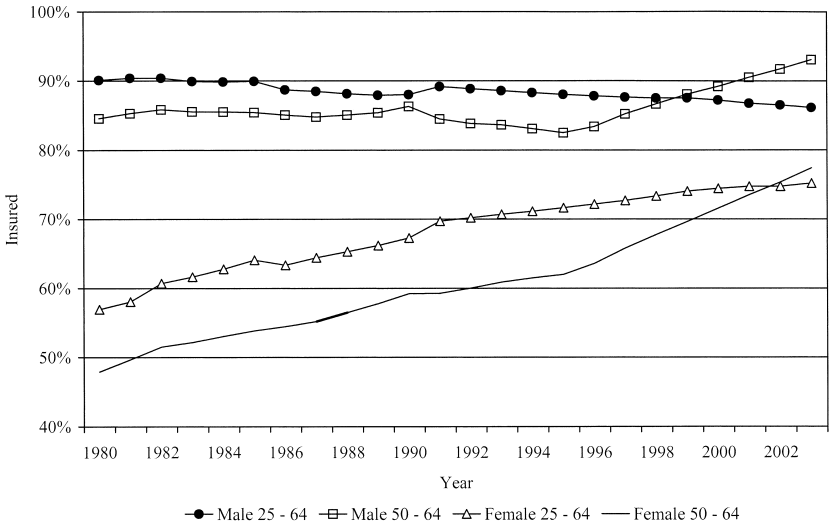

Fig. 11.2 Percent of population DI insured

Sources: SSA Office of the Chief Actuary; U.S. Census Bureau; Annual Statistical Supplement of the Social Security Bulletin.

Table 11.2 Percent of growth in DI recipiency among males and females explained by changes in insured status

	1984 DI recipiency			1984 population			2003 population			Predicted Δ DI 2003		Actual Δ DI 2003	
	% pop on DI	% ins on DI	# on DI	# people	# insured	% insured	# people	# insured	% insured	% on DI 2003	# on DI 2003	% on DI 2003	# on DI 2003
							A. Males						
<30[a]	0.38	0.41	77	20,370	18,582	91.2	20437	15,935	78.0	0.32	66	0.50	103
30–39	1.12	1.19	198	17,635	16,617	94.2	21176	18,277	86.3	1.03	218	1.51	319
40–44	1.72	1.93	119	6,902	6,156	89.2	11407	10,308	90.4	1.75	199	2.94	335
45–49	2.43	2.89	145	5,957	5,025	84.4	10731	9,806	91.4	2.64	283	4.17	448
50–54	4.02	4.92	224	5,578	4,557	81.7	9313	8,432	90.5	4.45	414	5.91	551
55–59	7.32	8.44	388	5,303	4,598	86.7	7661	6,850	89.4	7.55	578	9.00	689
60–64	12.51	14.10	598	4,781	4,241	88.7	5764	4,903	85.1	12.00	691	13.47	776
Overall	2.63	2.93	1,749	66,525	59,776	89.9	86488	74,511	86.2	2.83	2,450	3.72	3,221
% explained	By Δ in pop dist:				15.4%								
	By Δ in insured:				3.2%								
	By Δ in pop dist and insured%				18.6%								
							B. Females						
<30[a]	0.15	0.21	31	20,267	15,056	74.3	19,459	14,613	75.1	0.15	30	0.41	79
30–39	0.48	0.76	87	18,011	11,509	63.9	20,936	15,718	75.1	0.57	119	1.29	270
40–44	0.74	1.28	53	7,146	4,128	57.8	11,555	8,824	76.4	0.98	113	2.41	278
45–49	1.06	1.91	66	6,246	3,453	55.3	11,030	8,599	78.0	1.49	164	3.41	376
50–54	1.82	3.42	109	5,988	3,188	53.2	9,731	7,621	78.3	2.68	261	4.79	466
55–59	3.35	6.21	197	5,879	3,171	53.9	8,133	5,985	73.6	4.57	372	7.03	572
60–64	5.55	10.70	306	5,518	2,861	51.8	6,342	4,190	66.1	7.07	448	9.60	609
Overall	1.23	1.96	849	69,056	43,366	62.8	87,187	65,550	75.2	1.73	1,507	3.04	2,650
% explained	By Δ in pop dist:				3.6%								
	By Δ in insured:				24.0%								
	By Δ in pop dist and insured:				27.6%								

[a] Population numbers for <30 reflects the twenty to twenty-nine population and insured status. Insured status numbers for 1984 are not available for twenty to twenty-nine, so they reflect the total number of insured under age thirty in 1984 less the number of insured under twenty in 1985.

Sources: U.S. Census Bureau Population Estimates, 2003; Decennial Census, 1980–1990; Annual Report of the Social Security Disability Program, 2003; Annual Statistical Supplement of the Social Security Bulletin, 1999; SSA Office of the Actuary.

population in the age cell. For example, men between the ages of fifty-five and fifty-nine were 2.19 times more likely than women in this same age group to be receiving DI benefits. But this male-female ratio fell to just 1.36 among individuals insured by the program.

The next several columns summarize the change in insurance rates by age and gender from 1984 to 2003. Among men there was very little change in the fraction of individuals eligible for DI during this period, with the patterns differing to some extent across age groups. For example, the fraction of men in their thirties insured by DI fell from 94 percent to 86 percent during this nineteen-year period, while the corresponding shares for men in their fifties increased from 84 percent to 90 percent.[5] Given these offsetting changes, it is not surprising that the change in the fraction of men insured by DI accounted for just 3.1 percent of their total increase in DI receipt during our nineteen-year study period.

For women these changes were much more important. As shown in table 11.2, the fraction of women eligible for DI increased in all age groups during our study period. The increase was especially large for older women. For example, in 1984 less than 54 percent of women in their fifties were eligible for DI, whereas in 2003 this share had increased to 76 percent. Summing up the predicted increases across the different age groups and subtracting out the portion attributable to changes in the age structure, our findings suggest that 24 percent of the increase in the fraction of women on DI can be explained by the growth in their insured status.

11.3.3 Changes in Health Status

In order to qualify for DI, a person must have a medically determinable ailment that is expected to last for at least twelve months or result in death and that prevents him or her from engaging in substantial gainful activity. To the extent that the health of DI-insured individuals has changed over time, this would influence program enrollment even if all other factors remained constant. In this section, we explore the contribution of changes in health status to the rise in the disability rolls during the past two decades. As previous researchers have noted, there is no perfect way to capture changes in health over time. A commonly used measure is mortality, though this has the obvious limitation that it does not capture the incidence of nonlethal but debilitating conditions. Despite this, it has a clear advantage because it is consistently defined over time.

According to this measure, the health of nonelderly adults has improved

5. The one outlier group is twenty to twenty-nine-year-olds, whose fraction insured fell substantially from 91 percent to 78 percent. Some of this change is likely due to the considerable increase in college attendance amongst males over this time period (U.S. Department of Education). Since very few people in this age group received DI in 1984, this fall in the fraction of twenty to twenty-nine-year-olds insured likely had only a negligible effect on the total number of DI beneficiaries.

Table 11.3 **Leading causes of death for people aged 50–64, deaths per 100,000 persons**

		1981	1991	2001	Change 1981–2001	% change 1981–2002
A. Male	Circulatory	681.5	470.9	333.8	–347.7	–51
	Cancer	424.3	404.1	313.3	–111.0	–26
	Respiratory	77.1	69.3	54.9	–22.2	–29
	Diabetes	21.8	27.8	34.5	12.8	59
	Suicide	24.3	24.3	22.1	–2.2	–9
	Other	249.7	212.6	221.8	–27.9	–11
	Total	1478.7	1209.0	980.5	–498.2	–34
B. Female	Circulatory	273.3	204.4	156.3	–116.9	–43
	Cancer	311.0	242.7	252.2	–58.8	–19
	Respiratory	39.1	48.6	44.9	5.8	15
	Diabetes	20.3	25.3	25.8	5.5	27
	Suicide	9.5	6.5	6.4	–3.1	–32
	Other	128.7	107.2	127.4	–1.3	–1
	Total	781.8	698.8	613.0	–168.8	–22

Source: Authors' calculations from NCHS Multiple Cause of Death Files and the Decennial Census 1980–2000. Figures do not include U.S. territories, commonwealths, or other outlying areas.

dramatically during the past two decades.[6] The data summarized in table 11.3 list annual mortality rates for both men and women between the ages of fifty and sixty-four in 1981, 1991, and 2001. During the twenty years from 1981 to 2001, annual mortality rates for men and women fell by 34 percent and 22 percent, respectively. Both changes were driven by a substantial decline in the death rate from circulatory disease, which fell by 51 percent for near-elderly males and by 43 percent for females, and accounted for 70 percent and 69 percent of the total drop in mortality rates for men and women, respectively.

As figure 11.3 demonstrates, these reductions in mortality were not limited to the fifty to sixty-four year age group. In this figure, we plot annual mortality rates by age for men and women born in 1921 and 1941. Across the age distribution, mortality has been declining. For example, a forty-year-old male born in 1941 was 20 percent less likely than his counterpart born in 1921 to die during the year, while the corresponding decline for a fifty-year-old male was 35 percent. As a result of these changes, individuals have become more likely to survive to a certain age over time. Just 68 percent of males born in 1921 survived to the age of sixty, while 78 percent of their counterparts born in 1941 did (fig. 11.4).[7] These improvements were

6. See Cutler and Meara (2001) for a detailed analysis of changes in mortality throughout the twentieth century across all age groups.

7. At the time the life tables used in this graph were created (1998), values for ages fifty-nine to sixty-five for the 1941 cohort were projections rather than estimates.

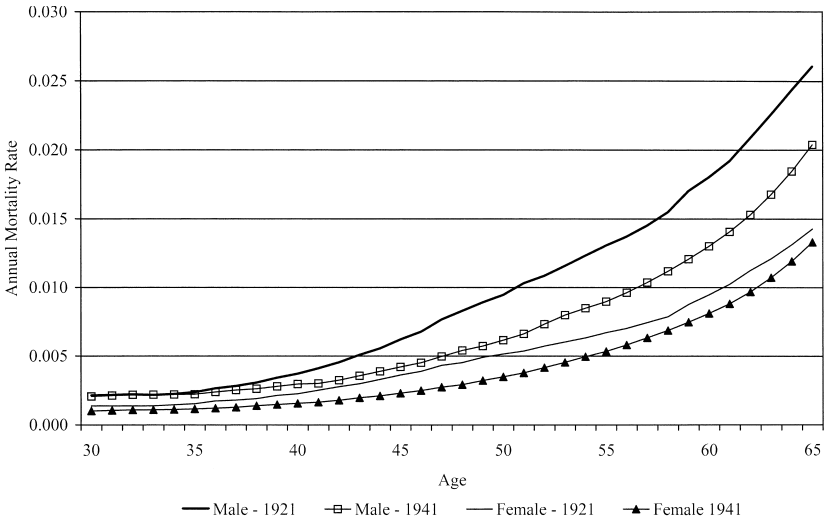

Fig. 11.3 Age-specific mortality by year of birth and gender cohort
Source: SSA Life Tables via Berkeley Mortality Database, 1998.

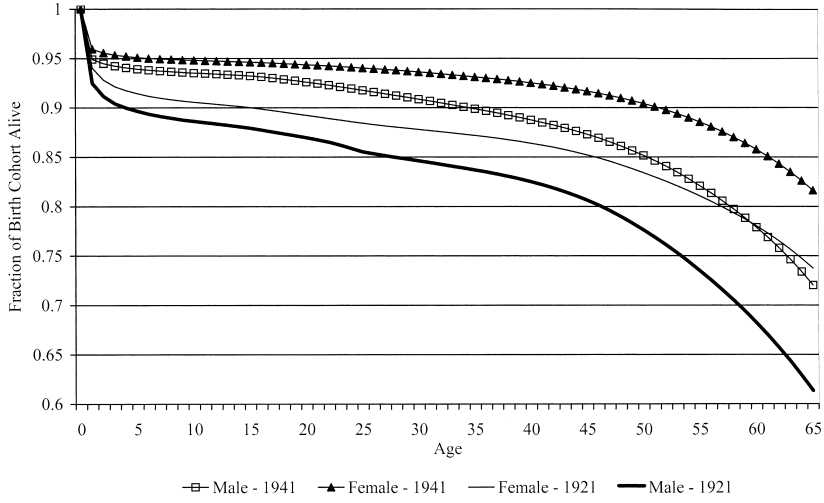

Fig. 11.4 Survival of birth and gender cohorts
Source: SSA Life Tables via Berkeley Mortality Database, 1998.

similarly dramatic for women, with survival rates to this age increasing from 78 percent for the 1921 cohort to 86 percent for women born in 1941.

Thus according to this measure, health among nonelderly adults has improved dramatically in recent years. But these declines in mortality could actually have produced a perverse effect on average health by changing the

composition of the nonelderly adult population. Put simply, those individuals surviving to a certain age from the 1941 cohort who would not have survived if born in the 1921 cohort may be less healthy than the average nonelderly adult. Similarly, other factors could have led to changes in health among the nonelderly adult population. For example, the well-documented rise in obesity may have been associated with declines in certain measures of health (Lakdawalla, Bhattacharya, and Goldman 2004).

We therefore turn to an alternative measure—self-reported activity limiting conditions (ALCs)—to estimate changes in health among the nonelderly adult population since 1984. To do this, we utilize data from the annual National Health Interview Survey (NHIS), which includes several questions on activity-limiting conditions. Before describing the results, we must address the benefits and drawbacks of using this data source. The main advantage of using questions about ALCs from the NHIS is that they have been asked in a consistent manner over a long period of time from 1984 to 1996. After the 1996 survey there were major changes in the survey design of the NHIS that altered how some of the limitation questions were asked and how information was recorded.[8] Nonetheless, the questions have remained largely unchanged since then. Thus, we consider these two time periods separately. Despite this consistency in the wording of ALC questions in the NHIS, researchers have raised questions concerning their validity—and the validity of self-reported ALC questions in general—in analyzing condition prevalence and the ability to work (Lakdawalla, Bhattacharya, and Goldman 2004; Burkhauser, Houtenville, and Wittenburg 2003). Thus, even though these are some of the best measures of health status that are publicly available, we must interpret trends in them with some caution.

In table 11.4 panel a, we summarize changes from 1984 to 1996 in four different measures for males and females in three different age groups (thirty to thirty-nine, forty to forty-nine, and fifty to sixty-four). The first column of this table summarizes changes for men and women between the ages of fifty and sixty-four. In all eight cases, the changes from 1984 to 1996 suggest improvements in health for this age group (though just five of the changes are statistically significant at the 10 percent level). For example, the fraction of near-elderly men reporting a work limitation falls from 21.2 percent to 19.6 percent, with a similar decline for women from 21.3 percent to 19.7 percent.

8. For example, in the 1984–1996 NHIS, persons were asked whether they were limited in their ability to conduct their major activity and then asked whether they were limited in their ability to conduct any activity. In the 1997–2002 NHIS, people were asked separately whether problems with cognitive functions affect their ability to conduct activities and if any mental, physical, or emotional problem created limitations. The changed working of these questions could have motivated different responses. Similar changes were made in other questions as well.

Table 11.4 **Prevalence of Limitations**

	A. 1984–1996							
	Male				Female			
	1984–1985 (%)	1995–1996 (%)	Change (%)	Observations	1984–1985 (%)	1995–1996 (%)	Change (%)	Observations
				Age 50–64				
Any activity limitation	25.44	24.30	–1.14*	23,366	26.86	26.06	–0.80	26,214
Any work limitation	21.20	19.62	–1.58***	23,366	21.30	19.71	–1.59***	26,214
Unable to work	13.14	13.15	0.01	23,366	14.11	13.27	–0.84*	26,214
No limitations	74.56	75.70	1.14 *	23,366	73.14	73.94	0.80	26,214
				Age 40–49				
Any activity limitation	12.64	14.81	2.17***	21,672	14.42	15.90	1.48***	23,717
Any work limitation	9.34	11.12	1.78***	21,672	10.88	11.41	0.53	23,717
Unable to work	4.36	6.16	1.80***	21,672	5.86	6.17	0.31	23,717
No limitations	87.36	85.19	–2.17***	21,672	85.58	84.10	–1.48***	23,717
				Age 30–39				
Any activity limitation	10.54	10.47	–0.07	27,278	9.61	10.49	0.88**	30,185
Any work limitation	7.42	6.90	–0.52	27,278	6.77	7.56	0.79**	30,185
Unable to work	2.91	4.26	1.35***	27,278	2.99	3.96	0.97***	30,185
No limitations	89.46	89.53	0.07	27,278	90.39	89.51	–0.88**	30,185

B. 1997–2002

	Male				Female			
	1997–1998 (%)	2001–2002 (%)	Change (%)	Observations	1997–1998 (%)	2001–2002 (%)	Change (%)	Observations
				Age 50–64				
Any activity limitation	19.05	18.52	–0.53	26,999	20.54	19.37	–1.17**	29,675
Any work limitation	16.03	15.33	–0.70	26,999	17.26	16.00	–1.26***	29,675
Unable to work	10.68	10.27	–0.41	26,999	11.19	10.58	–0.61	29,675
No limitations	80.95	81.48	0.53	26,999	79.46	80.63	1.17**	29,675
				Age 40–49				
Any activity limitation	11.08	9.88	–1.20***	28,147	12.16	11.65	–0.51	30,777
Any work limitation	9.21	8.08	–1.13***	28,147	10.01	9.73	–0.28	30,777
Unable to work	5.48	5.14	–0.34	28,147	5.73	6.28	0.55*	30,777
No limitations	88.92	90.11	1.19***	28,147	87.84	88.35	0.51	30,777
				Age 30–39				
Any activity limitation	7.03	6.66	–0.37	28,886	7.77	7.13	–0.64**	31,965
Any work limitation	5.72	5.14	–0.58**	28,886	6.44	5.90	–0.54*	31,965
Unable to work	3.22	2.98	–0.24	28,886	3.55	3.58	–0.03	31,965
No limitations	92.97	93.33	–0.36	28,886	92.23	92.87	0.64**	31,965

Source: Authors' calculations from NHIS 1997–2002.

*** Significant at the 1 percent level.

** Significant at the 5 percent level.

* Significant at the 10 percent level.

The patterns are quite different for individuals in their forties. For this group, men are significantly more likely to report a work limitation and to report that they are unable to work. For women, reporting of such limitations increase, but not significantly. Work limitations and the complete inability to work seem to have fallen for people in their thirties regardless of gender, with the exception of work limitations for men. If these self-reported measures are accurately capturing true changes in health, this suggests that health is improving for near-elderly adults while it is declining for younger adults.

In panel b of table 11.4, we summarize data from the 1997 to 2002 NHIS to measure the corresponding changes during this six-year period. In contrast to the changes from 1984 to 1996, the changes from 1997 to 2002 are consistent across the age distribution and suggest that health has been improving. For example, individuals in all six age-gender groups are less likely to report a work limitation and more likely to report that they have neither a work limitation nor an activity limitation. Because of the short time frame analyzed here, however, we must be especially cautious about drawing conclusions regarding trends in ALC prevalence.

Nonetheless, the analyses of both periods show that self-reported ALC prevalence has fallen for the near-elderly, suggesting that health among the near-elderly has improved substantially during the past two decades. The evidence for younger adults is somewhat more mixed, with the net change from 1984 to 2002 suggesting little change during this eighteen-year period. But given that approximately 62 percent of DI recipients are between the ages of fifty and sixty-four, changes for this age group will contribute more to the change in DI receipt. It therefore appears that changes in health during the past two decades have slowed rather than added to the growth of the DI rolls. Absent these improvements, the growth in DI enrollment from 1984 to the present would probably have been even greater.

11.4 Economic Conditions

An alternative factor that could influence the number of individuals applying for and ultimately being awarded DI benefits is the business cycle. As economic conditions decline, the value of searching for a new job or continuing in one's current job declines. Theoretically, one would expect this effect to induce some individuals to leave the labor force and apply for DI benefits.[9] Recent research has documented the importance of these business cycle effects, with DI application, award, and enrollment rates increasing substantially in response to adverse economic shocks (Rupp and

9. See Autor and Duggan (2003) for a theoretical model of how job losses affect DI applications.

Stapleton 1995; Stapleton et al. 1998; Black, Daniel, and Sanders 2002; Autor and Duggan 2003).

Nonetheless, little previous work has estimated the contribution of business cycle effects to the recent substantial increase in the disability rolls.[10] A simple examination of changes in DI application rates before and after the two most recent recessions suggests that business cycle effects could be substantial. For example, from 1989 to 1993 the number of DI applications per nonelderly adult increased by 37 percent, while from 1999 to 2003 this increase was even greater at 49 percent. As figure 11.5 demonstrates, the one exception to this occurred during the early 1980s recession, which coincided with a tightening of the medical eligibility criteria for the DI program.

To probe this phenomenon more formally, we next explore the relationship between business cycle conditions and DI application, award, and recipiency rates for the 1984–2003 period by estimating specifications of the following type:

$$\Delta Log(DI\ Applications_t) = \alpha + \beta\, \Delta UnempRate_t + \varepsilon_t.$$

In this regression, the dependent variable is equal to the number of DI applications in the United States in year *t* divided by the number of individuals aged twenty-five to sixty-four, while the explanatory variable of interest is equal to the unemployment rate for adults ages twenty-five and up.

According to the results summarized in the first column of table 11.5, the business cycle has a significant effect on applications to the DI program. Specifically, a 1 percentage point increase in the unemployment rate is associated with an eight percent increase in the DI application rate. Given the average size of the labor force and of disability applications during our study period, this suggests that for every one-hundred individuals newly unemployed, there are approximately seven new DI applicants. As the second column shows, the coefficient estimate increases slightly if one instead uses the previous period's change in the unemployment rate as the explanatory variable.

In the next two columns we explore this same relationship for the DI award rate. If those who apply for DI because of deteriorating economic conditions are healthier than the average DI applicant, then one would expect DI awards to be somewhat less responsive to the business cycle than DI applications. Unfortunately, the DI award data are not linked to the year of application but instead reflect the year in which the award was made, and thus it is not possible to rigorously test this hypothesis. But given that the estimates for the DI award rate are similar to the ones for the

10. To our knowledge, the most recent study to estimate the contribution of economic conditions to overall growth in DI recipiency was Stapleton et al. (1998), which only considers data through 1992. Since that year, the DI rolls have grown by 75 percent.

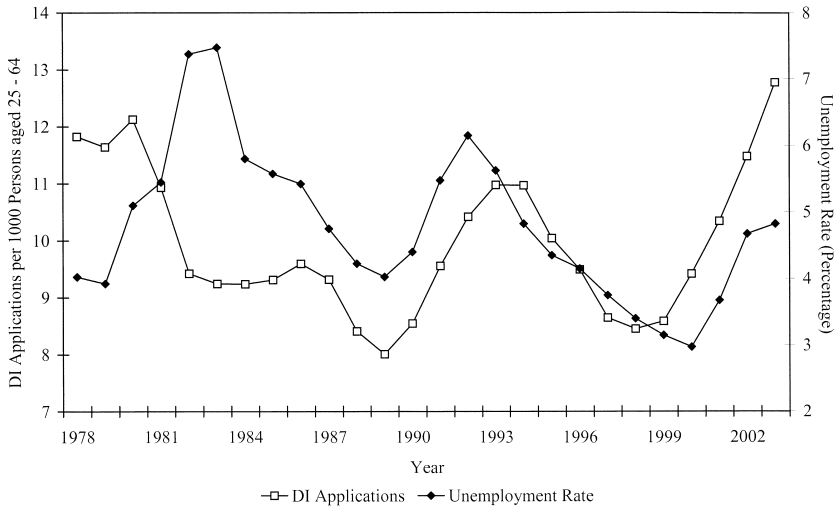

Fig. 11.5 DI applications and unemployment rate
Sources: SSA Office of the Chief Actuary; US Census Bureau; Bureau of Labor Statistics.

Table 11.5 Annual time series regressions of Log DI on unemployment rate 1984–2003

	Δ log applications		Δ log awards		Δ log recipients	
Dependent variable:	(1)	(2)	(3)	(4)	(5)	(6)
Δ unemp (t)	7.93***		8.11***		0.59	
	(1.83)		(1.78)		(0.74)	
Δ unemp ($t-1$)		9.04***		5.71**		1.50*
		(1.77)		(2.05)		(0.82)
Const	0.020	0.022	0.029***	0.028**	0.028***	0.030***
	(0.013)	(0.013)	(0.009)	(0.013)	(0.004)	(0.004)
R-Squared	0.38	0.49	0.58	0.29	0.03	0.22
Obs	19	18	19	18	19	18

Notes: Robust standard errors in parentheses. Application, awards, and beneficiaries are per 1,000 persons twenty-five to sixty-four. Unemployment rate is for persons twenty-five and older.

*** Significant at the 1 percent level.

** Significant at the 5 percent level.

* Significant at the 10 percent level.

DI application rate, it appears that the marginal applicants do not have much lower acceptance probabilities than the average DI applicant and thus may be in similarly poor health.

In the final two columns of this table we summarize the results for changes in the DI recipiency rate. Unlike the previous two flow measures,

this dependent variable is a stock, and thus one would expect a smaller responsiveness to the unemployment rate in percentage terms; an examination of the coefficient estimates confirms this prediction. The coefficient estimate of interest in the final column suggests that a 1 percentage point increase in the unemployment rate in year *t* leads to a 1.5 percent increase in DI enrollment in the next year.

Given this finding that the business cycle has a significant effect on DI entry, it is natural to ask how much lower the DI rolls would have been by the end of 2003 if there had been no recession in 1991, or ten years later in 2001. To estimate this, we take the award rate in two years when economic conditions were favorable, linearly interpolate between those two years to estimate the award rate that would have occurred in the absence of business cycle effects, and calculate the difference between this estimate and the actual number of awards in that year. We then combine this with data from the Social Security Administration on the fraction of DI awardees from year *t* who were still receiving benefits at the end of 2003 to estimate what fraction of these marginal awardees would have still been on the program at the end of our study period.[11] For our base year we choose 1984, a year in which economic growth was strong and the unemployment rate was falling, while for our second year we select 1999, the height of the 1990s expansion. We perform this simulation separately for both men and women given the different trends in DI award rates for the two groups during our study period.

The results of our simulation are summarized in table 11.6. According to this table, male award rates were more affected by the 1991 recession than by the one ten years later, while for women the effects of the two recessions were similar. But for both groups, it is this latter difference that contributes more to the increase in DI enrollment from 1984 to 2003. This is because many of those awarded benefits from 1991 to 1993 were no longer eligible by the end of our study period. As the final rows of this table demonstrate, the changes in the business cycle from 1984 to 2003 have contributed to the growth in the DI rolls, though perhaps not as much as one would have expected. For men, economic conditions can explain 23 percent of the increase in the DI enrollment rate, while for women it can explain just 12 percent.

These estimates are subject to two possible sources of bias. First, many of those who applied for DI in 1992 because of the recession may have applied a few years later in the absence of business cycle effects. This type of effect would lead us to overstate the contribution of economic conditions

11. The Social Security Administration publishes data on the fraction of people entitled to receive DI in year *t* who are still receiving benefits in December of 2003, but publishes no similar data for the year of award. The year of entitlement is typically earlier than the year of award, and we therefore assume that individuals entitled in year *t* received their award in year $t + 1$ when estimating the fraction of DI awardees in year *t* still eligible in 2003.

Table 11.6 Simulated business cycle effects

	Male					Female				
Year	Actual	Interpolated	Excess	% On DI in 2003	Excess in 2003	Actual	Interpolated	Excess	% On DI in 2003	Excess in 2003
1984	247,833	247,833	0	0.14	0	114,165	114,165	0	0.16	0
1985	274,400	253,904	20,496	0.15	3,155	134,500	124,347	10,153	0.17	1,759
1986	273,700	259,975	13,725	0.17	2,367	135,700	134,530	1,170	0.19	225
1987	265,900	266,046	–146	0.19	–29	143,700	144,712	–1,012	0.22	–227
1988	265,700	272,118	–6,418	0.21	–1,335	147,000	154,894	–7,894	0.25	–1,953
1989	268,600	278,189	–9,589	0.24	–2,285	146,900	165,077	–18,177	0.30	–5,472
1990	293,300	284,260	9,040	0.27	2,433	168,500	175,259	–6,759	0.34	–2,270
1991	322,700	290,331	32,369	0.33	10,580	190,400	185,441	4,959	0.41	2,023
1992	395,600	296,402	99,198	0.32	32,071	241,300	195,624	45,676	0.41	18,683
1993	391,800	302,473	89,327	0.35	31,030	237,900	205,806	32,094	0.46	14,908
1994	379,300	308,544	70,756	0.36	25,737	234,000	215,988	18,012	0.51	9,157
1995	368,400	314,615	53,785	0.40	21,585	263,200	226,171	37,029	0.51	18,933
1996	347,100	320,687	26,413	0.45	11,854	256,900	236,353	20,547	0.56	11,492
1997	311,100	326,758	–15,658	0.55	–8,590	250,200	246,535	3,665	0.62	2,276
1998	331,400	332,829	–1,429	0.54	–778	271,900	256,718	15,182	0.62	9,471
1999	338,900	338,900	0	0.59	0	266,900	266,900	0	0.72	0
2000	329,800	344,971	–15,171	0.71	–10,745	282,400	277,082	5,318	0.79	4,199
2001	364,500	351,042	13,458	0.74	10,010	304,800	287,265	17,535	0.83	14,468
2002	406,336	357,113	49,223	0.80	39,378	343,667	297,447	46,220	0.85	39,287
2003	426,951	363,185	63,766	0.85	54,201	363,157	307,629	55,528	0.90	49,975
Total	—	—	—	—	220,642	—	—	—	—	186,934
Change in beneficiaries 1984–2003				Total	1.09%				Total	1.81%
				Excess	0.26%				Excess	0.21%
				% Excess	23.4%				% Excess	11.9%

Note: Awardee cohorts are proxied by count of year of entitlement cohort. Assume that awards are granted one year after entitlement. For 2002, assumes 80 percent of males and 85 percent of females remain in DI by end of 2003. For 2003, assumes 85 percent of males and 90 percent of females remain on DI by end of 2003.

Source: Authors' calculations based on information in the Annual Statistical Supplement of the Social Security Bulletin, 2004 and Office of the Chief Actuary, SSA.

to the growth in the disability rolls from 1984 to 2003. Second, marginal awardees may be healthier than the typical DI awardee and thus we may understate the actual fraction still on the program by December of 2003 when we use the average for all individuals awarded benefits in a certain year. Given that the effects bias our results in opposite directions, as long as neither effect is too large our estimates should be reasonably accurate.

11.5 Program Changes

Two key determinants of an individual's incentive to apply for DI benefits are the financial generosity of the program and the probability that the application will be successful. Since 1984, there have been important changes in both of these, with these changes serving to increase individuals' incentives to apply for DI benefits. In this section we aim to quantify the contribution of both factors to the growth in the DI rolls during the past two decades.

11.5.1 Changes in Replacement Rates

If an individual has sufficient work history to be insured by DI, his or her potential benefits are a function of earnings in the current year and in most previous working years. The formula used by the Social Security Administration has been in effect since 1978 and consists of two steps. First, the SSA calculates an individual's Average Indexed Monthly Earnings (AIME) in year T as described in the following equation:

$$\text{AIME}_i = \frac{1}{T}\sum_{t=1}^{T} Y_{it} \cdot \max\left(\frac{\overline{Y}_{T-2}}{\overline{Y}_t}, 1\right).$$

In this equation, Y_{jt} represents individual j's nominal monthly earnings in year t that were subject to Old age, survivors, and disability insurance (OASDI) taxes while $\overline{Y}_t$ equals the average national wage in year t. As is clear from the equation, nominal wages from a year before $T-2$ are inflated using the ratio of average wages in the United States in year $T-2$ to average wages in year t. Earnings for the two most recent years are not indexed and a person's five lowest years of indexed earnings are dropped from this calculation.[12]

The SSA then uses an individual's AIME to calculate his or her Primary Insurance Amount (PIA), which is equal to the monthly DI benefit in the year that the award is made, as specified in the following equation:

12. There are two exceptions to this. First, if an individual has less than five years or just slightly more than five years of earnings then fewer years are dropped from the calculation. Second, if a person has more than forty years of indexed earnings then only the best thirty-five are taken. Thus, for example, SSA would drop nine years of indexed earnings for a person who worked in each year from ages eighteen to sixty-one before applying for DI benefits.

$$\text{PIA} = \begin{cases} 0.9 \times \text{AIME} & \text{if AIME} \in [0, b_1] \\ 0.9 \times b_1 + 0.32 \times (\text{AIME} - b_1) & \text{if AIME} \in [b_1, b_2] \\ 0.9 \times b_1 + 0.32 \times (b_2 - b_1) + 0.15 \times (\text{AIME} - b_2) & \text{if AIME} > b_2 \end{cases}$$

with the bend points b_1 and b_2 rescaled each year by average wage growth in the economy. This formula is progressive as low-income workers enjoy a larger replacement rate than their high-income counterparts. This replacement rate is the most commonly used measure of DI generosity and represents the ratio of DI benefits to recent earnings. In years after the initial award, an individual's PIA is scaled up by the growth in the Consumer Price Index to account for increases in the cost of living.

As emphasized by Autor and Duggan (2003), since the formula was introduced in the late 1970s, DI replacement rates have changed substantially as a result of the increase in earnings inequality. These increases have been important for two reasons. First, because the bend points are scaled up in each year by average wage growth, low-skilled individuals are replacing an ever-greater fraction of their AIME at the 90 percent rate described in the PIA formula. Second, because wages for low-skilled individuals have tended to grow more slowly than the national average, indexed earnings in previous years will be greater than earnings in more recent years.

But rising income inequality has not been the only factor influencing DI replacement rates. An additional force that has tended to increase replacement rates for high-income individuals is the substantial increase in the amount of earnings subject to OASDI taxes. For example, in 1965 average annual wages as calculated by the SSA were equal to $4,659, while social security taxes were paid on just the first $4,800 in earnings. In contrast, by 1985 average wages were equal to $16,823, while an individual paid social security taxes on his or her first $39,600 in wages. The growth in the tax base that accelerated during the 1970s has led to a substantial increase in the AIME for high-income workers.

In table 11.7 we shed some light on the importance of both of these factors while presenting simulated replacement rates in 1984 and in 2002 for males in three different age groups and at different points in the earnings distribution. We must simulate replacement rates because we do not have full earnings histories for males in 1984 and in 2002. To simulate these replacement rates we follow the algorithm used by Autor and Duggan (2003) in which the authors assume that an individual at a certain earnings percentile in his age group in year t is at this same percentile among his age group in year $t - 1$.[13] We consider indexed earnings for the years when the

13. More specifically, a fifty-nine-year-old male at the 25th percentile in the earnings distribution in 2002 is assumed to be a fifty-eight-year-old male at the 25th percentile in 2001, a

Table 11.7 Changes in replacement rates from 1984–2002

	Replacement rate (%)		Monthly real wage		Percent change	% earnings taxed	
	1984	2002	1984	2002		1984	2003
			Males 30–39				
10th	48.4	59.4	1,619	1,371	–15	100	100
25th	41.3	49.2	2,476	2,125	–14	100	100
50th	36.2	41.9	3,536	3,250	–8	100	100
75th	29.4	34.7	4,803	4,917	2	98	100
90th	24.1	26.1	6,126	7,500	22	86	99
			Males 40–49				
10th	51.1	55.1	1,659	1,625	–2	100	100
25th	42.7	47.8	2,597	2,460	–5	100	100
50th	33.5	43.3	3,877	3,642	–6	96	100
75th	25.9	33.7	5,224	5,429	4	81	100
90th	19.4	24.8	7,012	8,250	18	64	93
			Males 50–61				
10th	55.2	64.0	1,522	1,573	3	100	100
25th	46.4	55.3	2,360	2,417	2	100	100
50th	34.7	45.9	3,607	3,667	2	87	100
75th	25.6	33.5	5,026	5,636	12	71	95
90th	19.0	23.7	6,782	8,333	23	55	79

Source: Authors' calculations from March Annual Demographic Supplement of the CPS, 1964–2002.

person is twenty-five through his or her current age and are therefore assuming that a person's lowest earnings years occurred before the age of twenty-five.

As is clear from the table, there were substantial increases in replacement rates from 1984 to 2002.[14] For example, among males between the ages of fifty and sixty-one, replacement rates for 10th percentile workers increased from 55.2 percent to 64.0 percent, while for the 25th percentile worker the increase was similar from 46.4 percent to 55.3 percent. Much of the reason for this increase is that a larger fraction of indexed earnings for both individuals were being replaced at the 90 percent rate in 2002 than in 1984. Specifically, the bend points in the PIA formula were—in real terms—scaled up by 19 percent during this eighteen-year period, while real wages for these two groups increased by just 2 to 3 percent. Because these workers

fifty-seven-year-old male at the 25th percentile in 2000, and so on. We use data from the 1964–2003 March Current Population Survey for these calculations and consider only nonzero wages in each year.

14. The increases are somewhat smaller than those documented in Autor and Duggan (2003) because they consider 1979 to 1998, and there was a large increase in inequality from 1979 to 1984 (Katz and Autor 1999).

had wages below the OASDI taxable maximum in each year, they paid social security taxes on 100 percent of their past earnings in both 1984 and in 2002. This point is summarized in the last two columns of the table.

But for the other three simulated work histories summarized in these columns of the table, the growth in the OASDI tax base contributed to the increase in the replacement rate from 1984 to 2002. For example, a near-elderly male in 1984 who had remained at the 90th percentile in the earnings history throughout his working years would have paid social security taxes on just 55 percent of his past earnings. His counterpart eighteen years later paid OASDI taxes on a much larger fraction (79 percent) of his earnings, and as a result the replacement rate for the 90th percentile worker increased from 19.0 percent to 23.7 percent during our study period. Interestingly, the largest increase in the replacement rate for near-elderly males occurred for the median worker. This was true because this worker both had very slow wage growth and experienced a mechanical increase in his AIME because of the growing tax base.

The other two panels in this table summarize the change in simulated replacement rates for younger males. As one can see in the table, the increase in earnings inequality is even more striking for men in their thirties and forties during our study period than for near-elderly males. For example, real wages for the 10th percentile male in his thirties fell by 15 percent from 1984 to 2002, while his counterpart at the 90th percentile enjoyed real earnings growth of 22 percent.

Taken together, the replacement rate simulations summarized in table 11.7 strongly suggest that the financial incentive for a typical male worker to apply for DI benefits increased substantially during our study period. Averaging across the five simulated workers in each age group, our findings suggest an increase from 36.2 percent to 44.5 percent for males ages fifty to sixty-one, from 34.5 percent to 40.9 percent for males in their forties, and from 35.9 percent to 42.3 percent for males in their thirties. Averaging across these three age groups, our findings suggest a 20 percent increase (from 35.5 percent to 42.6 percent) in the replacement rate for male workers from 1984 to 2002.

How important have these changes been to the rise in the disability rolls? To estimate this, one needs both the change in replacement rates and the elasticity of DI recipiency to benefit generosity. We use estimates from Bound et. al. (2004), who calculate an elasticity of 0.5.[15] Thus, a 1 percent increase in the DI replacement rate would lead to a 0.5 percent increase in the long-run number of DI recipients. Combining this with the 20 percent increase among males in the average DI replacement rate, this corresponds

15. Their calculation is based off application elasticities from Halpern (1979) and Lando, Coate, and Kraus (1979), information on historical award rates from Bound and Burkhauser (1999), and data from matched Survey of Income and Program Participation/Social Security Administration (SIPP-SSA) earnings data.

to an increase in the fraction of males receiving DI benefits of 0.26 percentage points from 1984 to 2002. Given that the baseline recipiency rate was 2.64 percent, the growth in replacement rates can therefore explain 24 percent of the increase to 3.72 percent in the share of men receiving DI benefits.

The algorithm used above to simulate replacement rates for men is less likely to produce reliable estimates for women given the substantial changes in female labor supply and in DI-insured status during our study period. Additionally, women are more likely to drop out of the labor force for a substantial amount of time than men, and thus the assumption that an Nth percentile earner in year T is an Nth percentile earner in all previous years will more often be violated. To approximate the change in DI replacement rates from 1984 to 2002 among women, we take the admittedly imperfect approach of scaling the increase of 20 percent in male replacement rates by the ratio of female to male DI award value growth over this same period. From 1984 to 2002, the inflation-adjusted DI award amount for women increased by 26 percent, while the corresponding increase for men was just 15 percent.

We therefore estimate that the average replacement rate for women increased by 35 percent during our study period.[16] Combining this with our benefit elasticity from above, this suggests that the growth in replacement rates among women can explain a 17.5 percent increase in the fraction of insured women receiving DI benefits. Scaling this to account for the changes in DI-insured status among women, this factor can explain a 0.50 percentage point increase in the fraction of women receiving DI benefits, thus accounting for 28 percent of the actual increase of 1.81 percentage points in DI receipt among women. This suggests that rising replacement rates have been even more important for women than for men during the last two decades.

11.5.2 Changes in Medical Eligibility Criteria

In 1984, the U.S. Congress passed legislation requiring the Social Security Administration to use a broader definition of disability when deciding whether to accept or reject a DI application. The legislation required SSA to liberalize its screening of mental illness by placing more weight on functional factors (e.g., ability to work) than on medical ones. Additionally, the SSA had to give added weight to pain and related factors that were not previously considered in the disability determination. This latter change influenced certain diagnosis categories much more than others. Applicants with common musculoskeletal conditions such as back pain and arthritis would now have a greater probability of qualifying for DI benefits.

16. This likely understates the true increase in replacement rates given that a much smaller fraction would now be equal to zero as a result of the increase in DI-insured status.

Following these changes, the fraction of DI awardees with a mental disorder or a musculoskeletal condition as their primary diagnosis increased substantially. From 1982 to 1983, just 28 percent of all DI awards went to individuals in one of these two diagnosis categories, but twenty years later that share had increased to 52 percent. These changes are summarized in table 11.8, which lists the fraction of awards by diagnosis category just before the change in medical eligibility criteria and twenty years later. This table also shows that a much smaller fraction of DI awardees now qualify because of cancer (neoplasms) or because of circulatory conditions (e.g., heart disease, hypertension, stroke, etc.), the two most common diagnoses in the early 1980s.

In the next column of the table, we summarize data on the average duration of DI receipt by diagnosis category using the results reported in Hennessey and Dykacz (1989). In their study, the authors followed 18,816 DI awardees from 1972 for seven to eight years to estimate the average length of time that individuals spent on the program and how this varied across conditions. The shift from conditions with low average durations such as neoplasms to those with high average durations (e.g., mental disorders) has no doubt contributed to the sharp fall in the exit rate from the DI program that we see in figure 11.6. In every year between 1978 and 1984, the annual

Table 11.8 **Percent of awards by diagnosis category**

	Awards		Duration estimates of awardees			
	1982–1983	2002–2003	Mean duration[a]	Percent dying within 4 years[b]	Percent remaining after 4 years[b]	Estimated annual exit rate (%)[c]
Circulatory system	23.4%	11.7%	7.5	19.8	67.1	12.5
Neoplasms	17.0%	9.6%	3.5	81.0	14.6	47.3
Musculoskeletal system	14.9%	26.3%	10.0	5.3	81.6	6.6
Mental disorders	13.5%	25.7%	15.6	5.4	88.2	4.1
Nervous System and sense organs	8.7%	8.7%	12.5	10.6	80.3	7.1
Respiratory system	6.2%	4.3%	7.3	24.9	63.6	14.0
Injuries	5.3%	3.9%	9.9	6.7	72.0	10.4
Endocrine	4.6%	3.1%	8.3	18.4	73.4	9.8
Digestive system	1.9%	2.3%	7.0	36.9	56.3	17.4
Genitourinary system	1.6%	2.3%	7.5	30.3	60.2	15.6
Infectious and parasitic	1.5%	1.5%	7.6	11.6	79.0	7.6
All other	1.5%	0.7%	12.1	—	—	—
Total	610,021	1,486,089	9.2	21.9	67.9	12.1

[a]From Hennessey and Dykacz (1989). Based on awardees in 1972.

[b]From Hennessey and Dykacz (1993). Based on awardees in 1985.

[c]Authors' calculations based on Hennessey and Dykacz (1993). Based on awardees in 1985.

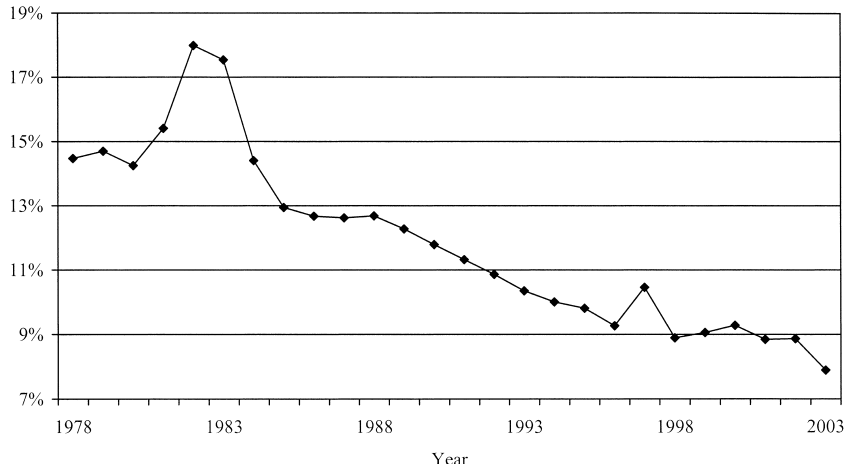

Fig. 11.6 Fraction of DI recipients with benefits terminated: 1978–2003
Sources: Annual Statistical Supplement of the SSB; SSA Office of the Chief Actuary.

exit rate from DI exceeded 14 percent, whereas this same exit rate in 2003 was just 7.9 percent.

Part of the reason for the difference in average durations across conditions is the difference in mortality rates. In two subsequent studies, Hennessey and Dykacz (1992, 1993) followed 34,762 DI awardees from 1985 for four years to determine the fraction that exited the program because of death, retirement (and thus a shift to Old-Age and Survivors Insurance [OASI]), or recovery. As the next column of the table shows, awardees with a mental disorder or with a musculoskeletal condition had a significantly lower probability of death during the subsequent four years than their counterparts with other conditions. This shift from high- to low-mortality diagnoses largely explains the 40 percent fall in the annual mortality rate of DI recipients during the past twenty years.

In figure 11.7 we divide DI awards into three different categories to summarize trends in award rates during our study period. The first group consists of awards with a primary diagnosis of cancer or a circulatory condition, while the second includes those with a mental disorder or a musculoskeletal condition. The final group includes awards with any other condition as the primary diagnosis. Each series in the figure represents the number of awards per 1,000 individuals insured for DI benefits.

As the figure demonstrates, there has been little change over time in the award rate for cancer and heart conditions. For example, in 1983 there were 1.15 awards in one of these two categories per 1,000 individuals insured by DI versus 1.12 twenty years later. This contrasts sharply with the trend in the award rate for mental disorders and musculoskeletal conditions, which

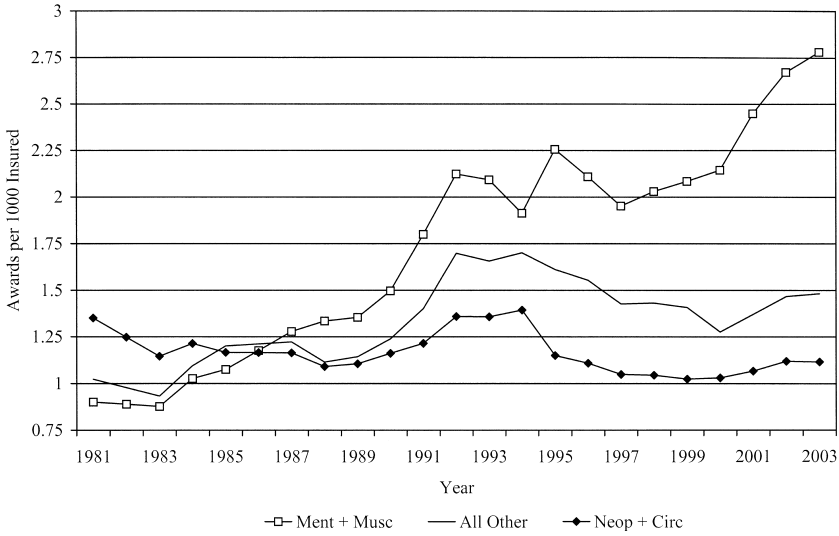

Fig. 11.7 DI awards per 1,000 insured persons by diagnois categories

Sources: Annual Statistical Supplement of the SSB; Annual Statistical Report of the SSDI Program; SSA Office of the Chief Actuary.

increased by more than a factor of three from 0.88 in 1983 to 2.67 twenty years later. The increase in the award rate for all other conditions was much smaller, though still substantial, from 0.93 to 1.47. However, awards for these conditions started to fall in 1994 while musculoskeletal and mental awards continued to rise.

Based on these trends and the description of the 1984 legislation above, it is reasonable to conclude that DI awards for certain conditions were much more affected by the liberalized medical eligibility criteria than others. For example, the changes presumably had little effect on the probability that an applicant with cancer or with a recent stroke would qualify for benefits, while substantially raising this same probability for an applicant with a mental disorder or musculoskeletal condition. This latter effect might have induced more individuals with these conditions to apply or to appeal a rejection.[17]

Reliably estimating the contribution of the liberalized medical eligibility criteria to the growth in the DI rolls is difficult given that other factors were also changing during this same period. As noted above, one would have expected an increase in DI award rates even without the less stringent criteria given the change in the age structure, the recessions in 1991 and in 2001, and

17. More than one-third of DI awards are made on appeal. Thus, while the initial allowance rate is just 33 percent, the probability that an initial application will ultimately result in a successful award is more than 50 percent.

the increase in replacement rates. To control for the effect of these other factors, we make the assumption that DI awards to individuals with mental disorders and musculoskeletal conditions would have grown at the same rate as for all other conditions from 1984 to the present if there were no changes in the medical eligibility criteria. We exclude neoplasms and diseases of the circulatory system from our control group given that there is little change in the award rates for these two conditions over time (suggesting that these conditions are unresponsive to the other factors studied above).

The key identifying assumption is that the responsiveness of DI awards to replacement rates, economic conditions, and changes in the age structure is no different for mental disorders and musculoskeletal conditions than for other conditions such as diseases of the nervous or respiratory system. To the extent that the changes in eligibility criteria affected other diagnoses as well, we will tend to understate the effect of the legislation. On the other hand, it is plausible that individuals with one of these two conditions are more responsive to economic conditions and rising replacement rates, and thus one would have observed a greater increase even without the new criteria. Recognizing these potential limitations, we estimate the effect of the change in criteria as summarized in the following equation:

$$C_T = \sum_{t=1985}^{2003} (A_{mt} - S_{mt})^*(1 - r)^{2003\text{-}t}.$$

In this equation, A_{mt} is equal to actual awards to individuals with a mental disorder or musculoskeletal condition in year t, S_{mt} is the simulated number of awards (assuming the same growth rate from 1984 to period t as for the other conditions), and r is equal to our estimate of the annual exit rate for these two diagnosis categories. We calculate this last parameter using the annual exit rates implied by Hennessey and Dykacz (1993).[18]

The results of this calculation are summarized in appendix table 11A.1. As the numbers summarized in the final row demonstrate, our estimates suggest that there are an additional 498,887 men and 595,512 women on the program in December of 2003 because of the more liberal screening criteria. Dividing these by the gender-specific nonelderly adult population in 2003, this last factor can explain a 0.57 percentage point increase in the DI recipiency rate among men and a 0.68 percentage point increase among women, thus explaining 53 percent and 38 percent, respectively, of the growth in DI receipt during the last two decades.

18. Let Z be the fraction of people left on DI after four years and assume a constant exit rate. Then the annual exit rate, R, is calculated as $R = Z \wedge (1/4)$. This would give us an exit rate of 9.2 percent. In this case, however, such an exit rate is likely to be too low for long-term projections because they are based off of recent awardees, who tend to be younger then the average beneficiary. Thus, we adjust the exit rate to be $R = Z \wedge (1/3)$, which gives us a program-wide exit rate of 12.1 percent, which is close to the official beneficiary exit rate of 12.9 percent in 1985.

11.6 Discussion

In the preceding three sections we have estimated the contribution of changing population characteristics, economic conditions, and program generosity to the growth in DI recipiency from 1984 to 2003. In doing this, we have estimated the impact of each factor separately rather than all of them simultaneously. We are therefore essentially assuming that the long-run change in each factor is orthogonal to the change in all other factors. This seems reasonable given that we have in many cases conditioned the change in factor *A* holding constant factor *B*. For example, when estimating the effect of rising replacement rates and more liberal eligibility criteria we were careful to condition on the age structure. If we had not done this an obvious concern would be that estimated contribution of each factor was to some extent driven by the shifting age structure and that we were therefore double counting. An additional limitation with our method is that it does not consider interaction effects. For example, if more liberal eligibility criteria influence the effect of rising replacement rates, we will miss this by assuming a constant elasticity of DI receipt to the replacement rate.

Recognizing these two limitations, table 11.9 summarizes our findings and reports results separately for men and women. Each entry in the table represents our estimate of the contribution of a certain factor to the increase from 1984 to 2003 in the proportion of men or women receiving DI benefits.

As is clear from the table, the more liberal medical eligibility criteria represent the most important factor for both men and women. Their contribution to the growth in DI receipt among men is larger in percentage terms because there is less to explain for this group—recipiency rates for men grew by 1.08 percent versus a 1.81 percent increase for women, while the percentage point increases due to medical eligibility criteria were similar for men and women. The change in DI-insured status is a much more important factor for women because of the substantial increases in female labor supply during our study period. Growing replacement rates accounted for approximately one-fourth of the growth in DI receipt for both groups

Table 11.9 **Determinants of DI growth for women and men (%)**

Determinant of DI growth	Women	Men
Age structure	4	15
DI-insured status	24	3
Economic conditions	12	24
Replacement rates	28	24
Medical eligibility criteria	38	53
Total explained	106	119

whereas economic conditions were more important for men than for women.

Summing up the contribution of each effect, we can explain 119 percent of the growth in DI receipt among men and 106 percent among women. There are at least two reasons why we may slightly over-explain the growth in DI receipt. First, our findings in 11.3.3 suggest that health has improved among near-elderly men and women during the past two decades. It is therefore likely that the growth in DI would have been even greater were it not for this change. Second, we may to some extent double count when performing our analyses. For example, if mental disorder DI awards were more responsive than other awards to economic conditions, we would count some of these excess awards twice in our calculations. Despite these potential limitations, the fact that our analyses yield a number so close to 100 percent for both groups is striking.

In this chapter, we have not tackled the important question of whether the increase in DI receipt has led to an increase or a reduction in social welfare. As recent research has demonstrated (Bound et al. 2004), this question is inherently difficult because it depends on a reliable estimate for the relative marginal utility of income when a person is disabled. More work on this issue is clearly warranted.

11.7 Will the DI Rolls Continue to Grow?

From 1984 to 2004, the average annual growth rate in the number of nonelderly adults receiving DI benefits was 4.44 percent, with this far outpacing population growth during this same period. For at least four reasons, we expect the rise in the disability rolls to continue and perhaps accelerate in the upcoming years.

11.7.1 Reaching the New Equilibrium

The equilibrium number of individuals on the DI program is equal to the average number of awards in a year divided by the average exit rate from the program. During our study period, the DI award rate has increased while the exit rate from the program has fallen by an even larger amount. Trends in the DI entry and exit rates are summarized in figures 11.6 and 11.8. As the first figure demonstrates, the fraction of individuals awarded benefits was substantially greater during the 1990s than during the 1980s, and the award rate reached its highest level ever in 2003. Even more striking has been the steady decline in the exit rate from the program, which fell from 14.4 percent in 1984 to 7.9 percent by 2003.

The increasing award rate coupled with a declining exit rate explains the rapid growth in DI recipiency during our study period. Given both of these flows, the program is currently far from its equilibrium size. If the number of DI awards remained at its 2003 level during the upcoming years while

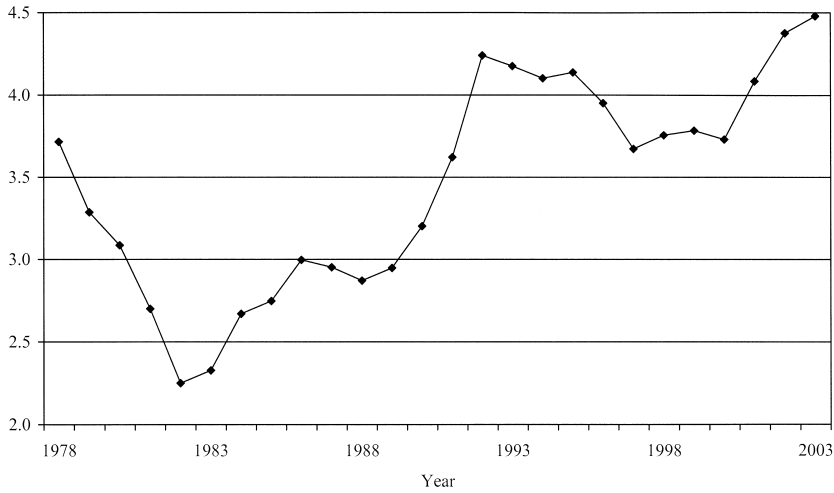

Fig. 11.8 DI awards per 1,000 individuals ages 20–64
Sources: SSA Office of the Chief Actuary; U.S. Census Bureau.

the termination rate stayed just below 8 percent, the number of individuals receiving DI benefits would converge to 9.8 million. This represents an increase of more than 62 percent from the current number of DI recipients. For this reason, it is likely that the rise in the disability rolls will continue and perhaps accelerate during the upcoming years.

11.7.2 Changes in the Age Structure

While DI award rates have increased substantially since the 1980s, the aging of the Baby Boom population suggests that this award rate will grow even more rapidly during the upcoming years. The potential importance of this trend is illustrated in figure 11.9. As is clear from the figure, the number of near-elderly adults is projected to increase substantially in the period from 2000 to 2020. For example, the number of individuals between the ages of sixty and sixty-four—the ages with the highest rate of DI receipt—is projected to increase by more than 92 percent from 2000 to 2020. Thus, absent other changes, the DI rolls will increase substantially as more and more individuals enter their fifties and early sixties.

In table 11.10 we summarize the change in DI receipt that will occur given the projected change in the age structure of the nonelderly adult population and assuming that award rates in each age group remain at their 2003 levels. Here we use the same algorithm as the one described in section 11.3.1 and find that changes in the age structure will lead to a 1.01 percentage point increase in DI receipt among men from 2003 to 2020 and a 0.74 percentage point increase among women. For men this is almost as

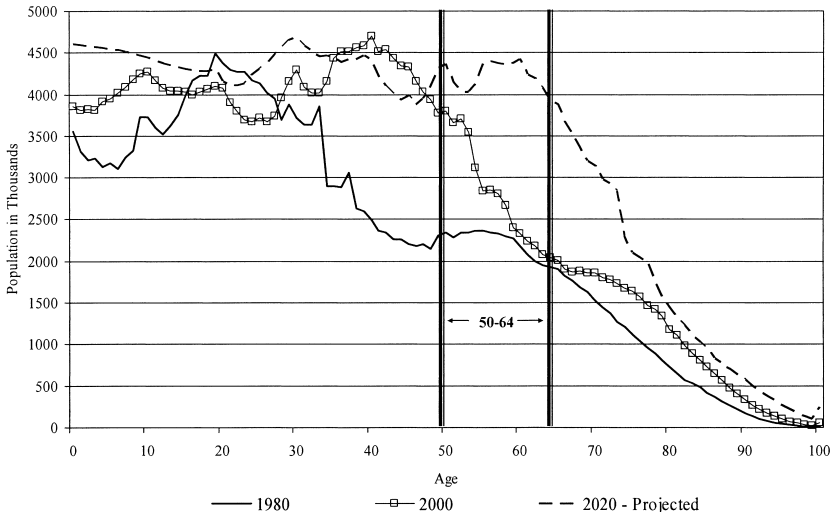

Fig. 11.9 U.S. Population by age—estimates and projections
Source: U.S. Census Bureau.

large as the entire increase from 1984 to 2003, while for women it is almost half as large as the change during this same period. Thus, the aging of the Baby Boom population will lead to substantial increases in DI receipt during the next fifteen years.

11.7.3 The Increase in the Normal Retirement Age

An individual born in 1937 or earlier and with sufficient work history to qualify for OASDI benefits could receive retirement benefits equal to 80 percent of their PIA (Primary Insurance Amount) if they claimed benefits at the age of sixty-two. For each additional month that these individuals waited to claim benefits, they would receive an additional 5/9 percent of their PIA until they could receive the full PIA at the age of sixty-five. Among individuals born in 1937, more than 59 percent of individuals who claimed retirement benefits did so at the age of sixty-two. An additional 19 percent claimed at the age of sixty-three or sixty-four. Thus, just 22 percent of individuals waited until the age of sixty-five or later to claim retirement benefits.

For cohorts born after 1937, the generosity of benefits at the early retirement age of sixty-two will be lower. For example, a person born in 1943 will be able to receive only 75 percent of her PIA if she claims benefits on her sixty-second birthday, while her counterpart born in 1960 or later will receive just 70 percent at this same age. These reductions in benefit generosity at the age of sixty-two are a result of the increase in the normal retirement age in the OASDI program, which is gradually increasing from

Table 11.10 **Projected growth in DI recipiency among males and females due to changes in age structure**

	2003 DI		2003 population		2020 population		Predicted Δ DI		
	% on DI	# on DI	# people	% of pop	# people	% of pop	% on DI 2020	# on DI 2020	Δ % on DI 2003–2020
					A. Males				
<30[a]	0.50	103	20,437	23.6	21,933	22.9	0.50	111	—
30–39	1.51	319	21,176	24.5	22,670	23.6	1.51	341	—
40–44	2.94	335	11,407	13.2	10,363	10.8	2.94	304	—
45–49	4.17	448	10,731	12.4	10,051	10.5	4.17	419	—
50–54	5.91	551	9,313	10.8	10,223	10.7	5.91	605	—
55–59	9.00	689	7,661	8.9	10,664	11.1	9.00	959	—
60–64	13.47	776	5,764	6.7	10,029	10.5	13.47	1,351	—
Overall	3.72	3,221	86,488	100.0	95,933	100.0	4.73	4,090	1.01
Predicted DI growth: 27%									
					B. Females				
<30[a]	0.41	79	19,459	22.3	21,179	22.1	0.41	86	—
30–39	1.29	270	20,936	24.0	22,177	23.1	1.29	286	—
40–44	2.41	278	11,555	13.3	10,310	10.7	2.41	248	—
45–49	3.41	376	11,030	12.7	10,168	10.6	3.41	347	—
50–54	4.79	466	9,731	11.2	10,479	10.9	4.79	502	—
55–59	7.03	572	8,133	9.3	11,212	11.7	7.03	788	—
60–64	9.60	609	6,342	7.3	10,827	11.3	9.60	1,039	—
Overall	3.04	2,650	87,187	100.0	96,353	100.4	3.78	3,296	0.74
Predicted DI growth: 24%									

Sources: U.S. Census Bureau Population Estimates, 2003; U.S. Census Bureau Interim Population Projections, 2004; Annual Report of the Social Security Disability Program, 2003.

[a]Population numbers for <30 reflects the twenty to twenty-nine population. All numbers are in thousands.

sixty-five for cohorts born in or before 1937 to sixty-seven for individuals born in 1960 or later.

No similar change is legislated for DI benefits. Thus during the upcoming years, DI benefits will increase from being 25 percent more generous than early retirement benefits to 33.3 percent more generous (for the 1943–1954 cohorts) and eventually to 42.9 percent more generous. These changes are likely to affect DI receipt for at least two reasons. The first is a mechanical one–DI beneficiaries will no longer be shifted to OASI retirement benefits on their sixty-fifth birthday, but instead during the month that they reach their cohort's normal retirement age. Thus, there are currently some sixty-five-year-olds on DI and soon there will be sixty-six-year-olds as well. The second one is behavioral—individuals may choose to apply for DI given the reduction in the relative generosity of OASDI retirement benefits. Estimating the magnitude of this and other behavioral responses resulting from changes to the OASDI program represents an important area for future research.

11.7.4 The Rising Value of Medicare

During the last several years, health insurance premiums have increased by 11 percent per year and the number of individuals without health insurance has increased by more than 10 percent. Both of these changes suggest that the incentive to apply for DI will increase with the rising value of health insurance through Medicare. Some recent research has explored the contribution of health insurance coverage through Medicaid to the rise in the SSI disability rolls and suggested that it can explain as much as 20 percent of the growth in SSI receipt (Yelowitz 1998). Additional research on this issue for the DI program is clearly warranted.[19]

Appendix

Data Sources

1. U.S. Dept. of Commerce, Bureau of the Census. "Current Population Survey: Annual Demographic File, 1964–2003 [Computer File]". Washington, D.C.: U.S. Dept. of Commerce, Bureau of the Census [producer], 2002. Ann Arbor, MI: Interuniversity Consortium for Political and Social Research [distributor], 2003.

19. In contrast to the SSI program, DI recipients must wait for two years from the onset of disability before their Medicare coverage begins (Gruber and Kubik 2002). It is therefore plausible that this program is less important for explaining the growth in DI than Medicaid is for the growth in SSI. See Fronstin (2000) for a discussion of the possible effects of Medicare on the DI application decision.

2. U.S. Dept. of Health and Human Services, National Center for Health Statistics. Data File Documentations, Multiple Cause-of-Death, 1979–2001 (machine readable data file and documentation, CD-ROM Series 20, various issues.), Hyattsville, MD: National Center for Health Statistics.

3. U.S. Dept. of Health and Human Services, National Center for Health Statistics. National Health Interview Survey, 1984–2002 [Computer file]. Conducted by U.S. Dept. of Commerce, Bureau of the Census. ICPSR ed. Ann Arbor, MI: Interuniversity Consortium for Political and Social Research [producer and distributor], 2003.

4. U.S. Department of Health and Human Services, Social Security Administration, Office of Research and Statistics. *Annual Statistical Bulletin of the Social Security Bulletin.* Washington, D.C.: 1980–2003. http://www.ssa.gov/policy/docs/statcomps/index.html

5. U.S. Department of Health and Human Services, Social Security Administration, Office of Research and Statistics. *Annual Statistical Report on the Social Security Disability Program.* Washington, D.C.: 2000–2004. http://www.ssa.gov/policy/docs/statcomps/index.html

6. U.S. Department of Health and Human Services, Social Security Administration, Office of the Actuary. "Estimated Number of Workers Insured in the Event of Disability, by Age Group and Sex, on December 31, 1970–2004." June 10, 2004. http://www.ssa.gov/OACT/STATS/table4c2DI.html

7. U.S. Department of Health and Human Services, Social Security Administration, Office of the Actuary. "Disabled Worker Beneficiary Statistics." June 29, 2004. http://www.ssa.gov/OACT/STATS/dibStat.html

8. U.S. Department of Health and Human Services, Social Security Administration, Office of the Actuary. "Social Security Administration Life Tables." Via the Berkeley Mortality Database. July, 1998. http://demog.berkeley.edu/wilmoth/mortality

Table 11A.1 The contribution of liberalized medical eligibility criteria to the growth in DI

	All Diagnoses		Mental + Musculoskel		Neoplasms + Circ		All other		Excess mental + Musculoskeletal			
Year	Men	Women	Men	Women	Men	Women	Men	Women	Men	Still On	Women	Still On
1984	243,949	113,191	72,287	37,617	92,470	37,526	79,192	38,048	0	0	0	0
1985	254,085	123,286	75,857	41,967	90,364	37,520	87,864	43,799	–4346	–1448	–1336	–496
1986	280,342	136,523	114,986	63,557	89,726	36,676	75,630	36,290	45950	16223	27678	10829
1987	273,579	142,269	90,272	54,777	91,316	40,781	91,991	46,711	6302	2357	8595	3543
1988	268,292	141,198	94,875	59,504	90,124	41,219	83,294	40,476	18844	7469	19487	8462
1989	274,677	150,905	96,598	63,319	88,931	41,656	89,148	45,930	15223	6393	17909	8193
1990	300,853	167,124	108,460	71,356	94,230	45,204	98,163	50,564	18856	8390	21365	10297
1991	341,117	195,317	130,460	88,193	99,214	48,449	111,443	58,675	28734	13547	30183	15325
1992	401,102	235,535	155,010	105,978	111,537	55,456	134,555	74,101	32187	16078	32716	17501
1993	395,368	239,870	152,785	107,515	111,590	57,299	130,993	75,056	33214	17579	33309	18772
1994	385,362	246,508	137,359	104,049	113,699	62,177	134,304	80,282	14765	8280	24676	14651
1995	378,526	267,119	160,348	128,858	94,102	53,364	124,076	84,897	47091	27980	44923	28099
1996	355,471	268,783	146,222	128,576	90,379	52,759	118,870	87,448	37717	23745	42119	27755
1997	326,828	260,872	133,621	124,710	86,656	52,154	106,551	84,008	36361	24254	41654	28917
1998	333,032	275,350	140,011	133,338	86,504	54,167	106,517	87,845	42782	30237	46488	34001
1999	337,533	283,026	145,146	140,588	86,199	54,237	106,188	88,201	48217	36108	53386	41136
2000	338,784	282,532	149,793	148,939	87,584	55,959	101,407	77,634	57228	45408	72184	58597
2001	374,355	315,405	172,363	172,854	91,980	58,453	110,012	84,098	71943	60483	89709	76720
2002	406,336	343,667	190,338	190,782	97,743	61,917	118,255	90,968	82394	73393	100844	90859
2003	420,516	357,389	200,400	201,770	96,233	60,605	123,883	95,014	87318	82411	107832	102354
Excess of actual over simulated									720780	498887	813722	595512

Source: Author's calculations from the Annual Statistical Supplement of the Social Security Bulletin 1986–2003 and the Annual Report of the Social Security Disability Program, 2003.

Table 11A.2 **Activity-limiting conditions amongst persons 50–64, 1984–1996**

	Prevlence of conditions (%)				Percent of people with condition who report work is "Major Activity" (%)			
	1984–1985	1995–1996	Change	Observations	1984–1985	1995–1996	Change	Observations
				A. Male				
Musculoskeletal	10.7	11.6	0.9 **	23,366	44.3	42.2	–2.1	2,603
Mental	0.8	1.3	0.5 ***	23,366	9.1	14.4	5.3	240
Circulatory	10.3	7.8	–2.5 ***	23,366	37.4	32.8	–4.6 **	2,185
Respiratory	2.9	2.1	–0.8 ***	23,366	35.3	28.2	–7.0 *	591
Diabetes	2.2	2.1	–0.1	23,366	32.6	25.4	–7.1 *	537
Cancer (malignant)	1.0	1.0	0.0	23,366	39.7	31.4	–8.2	235
Any activity limitation	25.4	24.3	–1.1 *	23,366	43.8	40.0	–3.8 ***	5,885
Any work limitation	21.2	19.6	–1.6 ***	23,366	35.8	31.0	–4.8 ***	4,873
Unable to work	13.1	13.2	0.0	23,366	11.2	10.7	–0.5	3,121
No limitations	74.6	75.7	1.1 *	23,366	85.0	84.1	–0.9	17,481
				B. Female				
Musculoskeletal	13.9	14.2	0.3	26,214	24.1	32.6	8.5 ***	3,763
Mental	0.9	1.6	0.7 ***	26,214	16.2	13.8	–2.4	311
Circulatory	9.8	6.9	–2.9 ***	26,214	18.0	19.7	1.6	2,310
Respiratory	2.4	2.9	0.5 **	26,214	19.8	20.3	0.6	721
Diabetes	2.7	2.9	0.2	26,214	16.0	17.3	1.3	807
Cancer (malignant)	1.1	1.2	0.1	26,214	22.7	22.5	–0.2	307
Any activity limitation	26.9	26.1	–0.8	26,214	23.3	31.0	7.6 ***	7,079
Any work limitation	21.3	19.7	–1.6 ***	26,214	19.8	26.4	6.6 ***	5,541
Unable to work	14.1	13.3	–0.8 *	26,214	6.7	9.3	2.6 **	3,710
No limitations	73.1	73.9	0.8	26,214	53.6	64.8	11.2 ***	19,135

Source: Authors' calculations from NHIS 1984–1996.

*** Significant at the 1 percent level.

** Significant at the 5 percent level.

* Significant at the 10 percent level.

Table 11A.3 Activity-limiting conditions amongst persons 50–64, 1997–2002

	Prevalence of Conditions			
	1997–1998 (%)	2001–2002 (%)	Change (%)	Observations
		A. Male		
Musculoskeletal	7.7	7.4	–0.2	26,999
Mental	1.9	2.4	0.5 ***	26,999
Circulatory	6.3	5.9	–0.4	26,999
Respiratory	2.0	2.0	0.0	26,999
Diabetes	2.0	2.3	0.3	26,999
Cancer (malignant)	1.0	0.9	–0.2	26,999
Any activity limitation	19.1	18.5	–0.5	26,999
Any work limitation	16.0	15.3	–0.7	26,999
Unable to work	10.7	10.3	–0.4	26,999
No limitations	81.0	81.5	0.5	26,999
		B. Female		
Musculoskeletal	10.0	10.3	0.4	29,675
Mental	2.6	3.1	0.5 **	29,675
Circulatory	5.8	5.3	–0.5 *	29,675
Respiratory	2.1	2.2	0.3	29,675
Diabetes	2.5	2.7	0.3	29,675
Cancer (malignant)	1.1	1.0	–0.1	29,675
Any activity limitation	20.5	19.4	–1.2 **	29,675
Any work limitation	17.3	16.0	–1.3 ***	29,675
Unable to work	11.2	10.58	–0.6	29,675
No limitations	79.5	80.6	1.2 **	29,675

Source: Authors' calculations from NHIS 1997–2002.

*** Significant at the 1 percent level.

** Significant at the 5 percent level.

* Significant at the 10 percent level.

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