



FACULTY OF  
BUSINESS &  
ECONOMICS

## Melbourne Institute Working Paper Series

### Working Paper No. 2/15

The Employment Effects of  
Terminating Disability Benefits

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MELBOURNE INSTITUTE®  
of Applied Economic and Social Research

# **The Employment Effects of Terminating Disability Benefits\***

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**Melbourne Institute Working Paper No. 2/15**

**ISSN 1328-4991 (Print)**

**ISSN 1447-5863 (Online)**

**ISBN 978-0-7340-4370-2**

**January 2015**

\* I wish to especially thank Mark Duggan, Bill Evans, John Ham and Melissa Kearney for helpful comments and suggestions, as well as Rich Burkhauser, Lisa Dettling, Seth Freedman, Eric French, Craig Garthwaite, Don Parsons, Steve Pischke and Belen Sbrancia. Useful feedback was also provided by participants at the IZA Conference on Risky Behaviors, Michigan Retirement Research Consortium Conference, and the NBER Summer Institute, and in seminars at Cornell University, Federal Board of Governors, George Washington University, London School of Economics, Monash University, Royal Holloway College, University of Maryland, University College London, University of Melbourne, University of New South Wales, University of Notre Dame, University of Warwick, and the Wharton School of the University of Pennsylvania. Thanks also to David Pattison, Jeffrey Hemmeter, Sherry Barber, Stuart Friedrich and Bernard Wixon for help in accessing the data used for this project, and for providing background on Social Security Administration programs and data systems. Part of this work was developed while visiting the University of Melbourne, whose hospitality is gratefully acknowledged. Financial support was provided by the Visiting Research Scholar program offered by the University of Melbourne, the Drug Policy Modeling Program at the University of New South Wales, through a Dissertation Fellowship in Retirement Income and Disability Insurance Research from the Center for Retirement Research at Boston College, and during two periods as an intern in the SSA's Office of Research, Evaluation and Statistics. Email: [tim\\_moore@gwu.edu](mailto:tim_moore@gwu.edu).

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## **Abstract**

Few Social Security Disability Insurance (DI) beneficiaries return to the labor force, making it hard to assess their likely employment in the absence of benefits. Using administrative data, I examine the employment of individuals who lost DI eligibility after the 1996 removal of drug and alcohol addictions as qualifying conditions. Approximately 22 percent started working at levels that would have disqualified them for DI, an employment response that is large relative to their work histories. Those who received DI for 2-3 years had the largest response, suggesting that a period of public assistance may maximize the employment of some disabled individuals.

**JEL classification:** H53, H55, J14

**Keywords:** Disability insurance, social security, health capital, labor force participation

## 1. Introduction

Governments in many industrialized countries are trying to reduce the size of their disability insurance programs and increase the employment of disabled individuals. In the United States, where four percent of 18 to 64 year olds receive Social Security Disability Insurance (DI) and a further two percent receive federal disability benefits through the Supplemental Security Income (SSI) program, recent efforts include providing beneficiaries with work incentives and employment support services through the “Ticket to Work” program and mandating funds for medical reassessments of current beneficiaries (Social Security Administration (SSA), 2013a). In the United Kingdom, where the fraction of the working-age population receiving disability benefits is similar to the US, reforms have resulted in reduced benefits, vocational support, and time limits for beneficiaries judged capable of working (Berthoud, 2011). Many other European countries have also recently introduced policies to reduce the number of disability beneficiaries.<sup>1</sup>

A growing literature has estimated how many individuals would work if they were not eligible for disability insurance. Starting with Bound (1989), most of these studies have used the employment of denied applicants to estimate the likely employment of accepted applicants (e.g., Chen and van der Klaauw, 2008; von Wachter, Manchester and Song, 2011; Maestas, Mullen and Strand, 2013; French and Song, 2014). The relationship between disability benefits and labor force participation has also been estimated using variation in benefit generosity in the United States (Autor and Duggan, 2003) and Canada (Gruber, 2000), differences in disability insurance rejection rates in the United States (Gruber and Kubik, 1997), and changes in disability eligibility criteria in Austria (Staubli, 2011). All of these studies focus on employment before or at the time of application, and as a result they provide good estimates of how employment might change as a result of limiting entry into these disability programs.

Studies examining policies that affect labor force participation during or after the receipt of disability insurance are far less common. There is recent evidence that beneficiaries do respond to work incentives, such as increasing their labor supply after the reduction of earnings penalties in Norway (Kostol and Mogstad, 2014), the introduction of higher earnings limits in Canada (Campolieti and Riddell, 2012) and decreases in benefit payments in the Netherlands (Borghans, Gielen and Luttmer, 2014). However, research on the employment of

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<sup>1</sup> Other recent reforms include tightening eligibility criteria in Sweden (Karlstrom, Palme, and Svensson, 2008); removing restrictions on work activity in Norway (Kostol and Mogstad, 2012); and comprehensive reforms in the Netherlands that included stricter eligibility criteria and widespread reassessments of younger beneficiaries (Borghans, Gielen and Luttmer, 2014).

individuals *after* exiting disability insurance is largely limited to documenting the number and characteristics of those who exit (e.g., Hennessey, 1996; Schimmel and Stapleton, 2011).

In this paper, I partly address that gap by examining the employment effects resulting from a reform in the United States that resulted in a large number of individuals losing their eligibility for DI. In March 1996, Congress removed alcohol and drug addictions as eligible conditions, including for those who did not have it as their primary disability. At the time, approximately two percent of DI beneficiaries had an alcohol or drug addiction that had contributed to their eligibility. Affected individuals could apply for continued eligibility on the basis of their other disabilities, and approximately 90 percent did so. Around half were judged to be re-eligible for DI, and continued to receive benefits. The remaining 65,000 individuals had their DI cash payments and benefits terminated in January 1997 (Stapleton et al., 1998).<sup>2</sup>

This is the only large-scale termination of DI eligibility since major reforms to the program in 1984. Figure 1 shows the annual DI exit rates between 1985 and 2012. Approximately one percent of beneficiaries exit annually due to no longer being disabled. The sole exception is in 1997, when the rate more than doubled due to the terminations examined here. Figure 1 also shows that the rate at which beneficiaries return to labor force has remained relatively constant, even as exit rates due to death or reaching normal retirement age have been declining, as beneficiaries have become younger and more likely to have low-mortality conditions (Autor and Duggan, 2003).

Using SSA administrative data and the tax earnings records covering most of the DI beneficiaries affected by the policy change, I first show there was a large employment response after the removal of disability benefits. This is estimated using difference-in-differences models with affected beneficiaries who remained on DI as the comparison group, as they have similar pre-treatment employment histories to terminated beneficiaries. Employment is primarily measured in terms of the 1996 “substantial gainful activity” (SGA) earnings threshold (\$8,602 per annum in 2013 dollars),<sup>3</sup> which is the level at which capacity for work is assessed. I find the fraction of terminated DI beneficiaries with annual earnings above this threshold increased by 22 percentage points following the termination of disability benefits, which is large relative to these individuals’ work histories. It is also far higher than

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<sup>2</sup> These changes also affected beneficiaries on the means-tested disability benefit program, Supplemental Security Income (SSI). I focus on DI because they have much higher labor force participation than SSI recipients, and Campbell, Baumohl and Hunt (2003) and Chatterji and Meara (2010) have previously examined the employment of SSI recipients.

<sup>3</sup> All dollars are in 2013 values, unless otherwise noted. Conversions are based on the CPI-U.

the base SGA employment of the control group, which is typically one percent per annum. The employment effects decline after four years, primarily because some individuals regain eligibility for disability benefits. Varying the earnings thresholds at which employment is assessed suggests that terminated beneficiaries who started working generally earned more than annualized SGA levels, although not much more.

There is considerable heterogeneity in the employment response. There are large and statistically significant differences related to an individual's age at termination, with the employment effects among 30-39 year olds of 25 percentage points being much higher than the estimate of 16 percentage points for 50-61 year olds. Terminated beneficiaries also had a higher employment response if they had higher earnings prior to getting onto DI or if they applied for DI when the unemployment rate was lower. There are not large differences by type of addiction, and the employment effects are similar for individuals whose primary disability had been an addiction, a mental disorder, or a musculoskeletal condition.

Individuals had received DI for different lengths of time prior to the terminations. After showing that cohorts of beneficiaries had similar employment and health characteristics prior to receiving DI, I examine how the employment effects vary as a function of time receiving disability benefits. I find that there is an inverted-U shaped relationship between the size of the employment effects and time spent on DI. The employment response is highest among those who received benefits for approximately 2.7 years prior to termination, and is 50 percent larger than the employment response of individuals who received benefits for nine months (the shortest period of receipt for anyone in the sample) and 31 percent higher than those who received benefits for six years. This inverted-U relationship is strongest among younger individuals.

It is surprising that the employment effects do not monotonically decline with time on DI, given the widespread evidence that healthy individuals become less able to work the longer they are out of the labor force (e.g., Mincer and Ofek, 1982; Kroft, Lange, and Notowidigdo, 2013). To better understand the role of initial health, I compare the employment effects for those immediately awarded DI to those awarded DI after successfully appealing an initial denial. Hu et al. (2001) and von Wachter et al. (2011) find that beneficiaries who were initially denied DI are healthier and more able to work than other beneficiaries. Among those who had spent less than 1.5 years on DI, the employment response for immediately-accepted beneficiaries is lower than for initially-denied beneficiaries, which is consistent with this prior evidence. However, the employment response for the immediately-awarded group increases sharply with time on DI, so much so

that those who had received DI for between two and four years had a larger employment response than the initially-denied group. These results suggest that assessments of health and work capacity made at the time of application do not necessarily hold over time. They also indicate that health changes while on DI may have affected terminated beneficiaries' ability to work, although it is not possible to quantify that effect. It is also not possible to attribute any changes to the cash and medical benefits that come with DI eligibility, as mean reversion in health is also possible.

This study complements previous research examining the employment effects of this policy, which does not use SSA administrative data and has primarily focused on SSI recipients. Chatterji and Meara (2010) use pooled cross-sections of the 1994-2002 National Survey of Drug Use and Health and a triple-difference interaction between the probability of SSI usage, likely substance abuse and an indicator for the post-policy change to estimate the effects of the terminations. They found increases in labor force participation and employment in a group with a broad definition of substance abuse, but not among a more narrowly-defined group. Campbell, Baumohl and Hunt (2003) analyzed the formal and informal employment of 661 participants in a study that interviewed former SSI beneficiaries across nine cities. Around half were employed two years after their terminations, and 12 percent were earning more than the cash benefits they lost. Finally, Orwin et al. (2004) used employment records of affected DI and SSI beneficiaries in Washington State. They found that employment increased by 10 percentage points after these terminations, although they could not distinguish between terminated and reclassified beneficiaries. While these studies convincingly establish that the terminations did increase labor force participation, the administrative data used here allows me to better understand the nature of these employment effects.

The employment effects estimated here complement existing studies of the labor disincentive effects of disability benefits. The aggregate employment effects are similar to those of Maestas et al. (2013). Given that the treatment effect is the combined effect of losing cash and medical benefits, and no longer being subject to DI work rules – the same consequences rejected DI applicants face – the results are relevant to this and other studies that use rejected applicants to estimate work capacity. This study also provides insights into how recent studies of the labor supply responses among current DI beneficiaries may translate into employment after exiting DI. The employment effects are much larger. For example, the relatively high employment effects among younger terminated beneficiaries and terminated beneficiaries from areas with low unemployment rates are largely consistent with

the findings of Kostol and Mogstad (2014) in a very different context. Furthermore, examining the heterogeneity in the employment effects by time on DI supplements the findings by Borghans et al. (2014), who show that the employment of long-term DI beneficiaries increase in response to the cut in benefits, but do not have sufficient statistical power to examine heterogeneity in the effects by duration.

The findings in this paper speak to several policy issues. First, the large employment response among a group who rarely exited DI prior to the removal of addictions as eligible conditions provides strong evidence of latent work capacity among DI beneficiaries, even if they had been on the program for several years. Second, information on the heterogeneity of the effects may be useful for improving the efficiency of return-to-work efforts, which have had limited success in returning beneficiaries to the labor force partly because there is little evidence on which beneficiaries should be targeted (SSA, 2012; Maestas et al., 2013). Third, differences by time on DI highlight the importance of considering dynamic effects when evaluating the likely employment of current beneficiaries. Judgments about the severity of disabilities may not hold over time. These dynamic effects, and the relatively high employment among those receiving benefits for two to three years, also raise questions about whether temporary benefits are appropriate for some individuals. In efforts to stem the growth of these programs, temporary awards may lead to better employment outcomes than more restrictive eligibility criteria.

Given that DI beneficiaries with drug or alcohol addictions were the only ones removed, it is difficult to know how the findings would generalize to other beneficiaries. The findings are likely to be most relevant to the 19 percent of current DI beneficiaries with a history of substance abuse problems.<sup>4,5</sup> They are also likely to be especially helpful for understanding the work capacity of DI beneficiaries with mental disorders and musculoskeletal conditions, as the employment effects are similar for subgroups with these conditions as their primary disabilities as for the overall sample. Currently, over half of all DI beneficiaries have a mental disorder and musculoskeletal condition as their primary disability (SSA, 2013b).

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<sup>4</sup> The policy change meant that, while applicants to DI could no longer count addictions among their disabilities, they could still apply on the basis of other disabilities. Moreover, many disability insurance systems in other countries still allow addictions to be considered as disabilities when it comes to gaining eligibility.

<sup>5</sup> Respondents to the National Survey of Drug Use and Health are asked about Medicare eligibility, which is a reasonable proxy for DI receipt when the respondent is under 65 years of age. Among 22-64 year old respondents, 19 percent of Medicare beneficiaries had substance abuse problems in the previous 12 months and/or had received substance abuse treatment. Author's population-weighted tabulations of the public-use data file (Substance Abuse and Mental Health Services Administration, 2009).



## **2. Policy Background and Sample Description**

### **2.1 The Removal of Addictions as Disabling Conditions**

Alcohol and drug addictions became eligible conditions for Social Security Disability Insurance (DI) in the 1970s. Those with severe addictions could potentially obtain benefits on that basis alone, or addictions could be included as a contributing factor for applicants with other disabilities. People receiving benefits because of an addiction were subject to the same rules as other DI beneficiaries: they needed to have been in employment covered by Social Security for at least five of the previous ten years; medical eligibility was based on disabilities that prevented work above “substantial gainful activity” (SGA) levels, a standard that is currently just above \$1,000 per month; payments were based on beneficiaries’ past earnings and a progressive formula that replaces a larger share of the earnings of low wage workers; benefits were provided five months after documented disability onset and Medicare was provided two years after documented onset. DI beneficiaries with addictions among their disabilities, known as “drug addict and alcoholic” (DA&A) beneficiaries, were also required to participate in treatment and be paid through responsible agents who could manage their money for them (Hunt and Baumohl, 2003; SSA, 2013a).<sup>6</sup>

These DA&A DI beneficiaries were subject to the same earnings restrictions as other DI beneficiaries, which generally prevent work above SGA levels. In practice, few DI beneficiaries work, and their earnings rarely approach SGA levels. In December 2012, for example, 0.3 percent of DI beneficiaries had benefits withheld because of substantial work (SSA, 2013b). Relative to the overall DI beneficiary population, DA&A beneficiaries did not display any greater capacity to work (Hunt and Baumohl, 2003).

The same medical standards for DI apply to Supplemental Security Income (SSI), a federal disability program that provides benefits to disabled individuals with limited assets. It provides cash benefits and immediate eligibility for public health insurance through state-based Medicaid programs. Approximately 28 percent of DI beneficiaries receive SSI at some stage, most commonly during the waiting period for DI payments (Rupp and Riley, 2011). The majority of the DA&A DI beneficiaries also qualified for SSI, and therefore had access to cash and medical benefits while waiting for DI payments (Stapleton et al., 1998). I consider whether the employment response differs by SSI status in Sections 3 and 4.

The number of DI and SSI beneficiaries gaining eligibility because of an alcohol or drug addiction grew after reforms in 1984 made it easier to qualify on the basis of multiple

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<sup>6</sup> Currently, 11 percent of DI beneficiaries have their benefits handled by a responsible third party (“representative payees”) (SSA, 2013b).

disabilities. The number of DA&A beneficiaries increased from approximately 5,000 in 1985 to 100,000 by early 1993. Like the overall DI beneficiary population, few returned to the labor force after entering DI: for example, less than one percent of the DA&A beneficiaries entering DI in 1990 had exited because of recovery or medical disqualification by 1994 (U.S. Department of Health and Human Services, 1994). In response to the growing numbers, Congress passed changes in late 1994 to better monitor treatment and introduced a three-year time limit on receiving benefits. Numbers continued to grow and, before most of these changes had been implemented, legislation was passed on March 29, 1996, removing alcohol and drug addictions as eligible conditions.

This change affected approximately 100,000 DI beneficiaries, which constituted around two percent of all DI beneficiaries. These beneficiaries were invited to apply to be reclassified on the basis of their other disabilities; those not reclassified would have their DI eligibility terminated at the beginning of 1997. Approximately 90 percent applied for reclassification, and decisions were made in the latter half of 1996. Around half were reclassified and kept receiving DI benefits, while unsuccessful reapplicants and those who did not reapply had their benefits terminated on January 1<sup>st</sup> 1997. A further 110,000 SSI-only recipients were also subject to this policy; approximately half of those recipients had their benefits terminated (Stapleton et al., 1998; Hunt and Baumohl, 2003).

There have been several studies of the effects of the DA&A terminations. As discussed in the introduction, Campbell et al. (2003), Orwin et al. (2004) and Chatterji and Meara (2010) convincingly demonstrate that the terminations led to an increase in employment, although lack the necessary statistical power to the employment effects in detail. The latter two studies also examine arrest rates, and in both cases the authors find no change as a result of the terminations. Chatterji and Meara (2010) also finds that the terminations were not associated in any changes in health care usage. Several studies, including Campbell et al. (2003), use data from interviews with 1,800 former DA&A SSI beneficiaries in nine cities between 1996 and 1998. Podus et al. (2003) finds decreases in the utilization of medical and mental health services, while Swartz et al. (2003) finds moderate increases in drug-related crime. It difficult to generalize these findings, however, as the sample is not nationally representative of former SSI DA&A beneficiaries (Wittenburg et al., 2003).

There were claims that the reclassification process was complex and somewhat arbitrary. There is evidence that initial DI eligibility decisions do vary across disability examiners (Maestas, Mullen and Strand, 2013). Examiners' judgments were probably even

more variable during the reclassification of DA&A beneficiaries, as examiners were required to determine how severe an individual's other disabilities would have been if the beneficiary did not have an alcohol or drug addiction. This is especially difficult because there is a lot of uncertainty about how substance abuse affects mental disorders (Grant et al., 2004) and musculoskeletal conditions (Diamond et al., 1989). There was also a variety of issues related to quickly implementing this one-off policy change. In a study commissioned by SSA, Stapleton et al. (1998) reported: (1) significant variation across offices in the effort to explain the reclassification process to affected beneficiaries; (2) a lack of medical documentation for determining eligibility; (3) the use of temporary disability examiners to cope with the increased examination workload; (4) claims that the examinations were too brief; and (5) claims that some examiners held strong views about substance abuse that influenced their decisions. In the next section, I show that terminated and reclassified individuals had similar employment histories. The challenges associated with determining who should remain on DI and who should be terminated likely contributed to these similarities.

## **2.2 Data and Sample**

Former DI DA&A beneficiaries were identified using historical extracts of SSA administrative data. SSA data systems no longer identify who had been a DA&A beneficiary (as the variable is no longer relevant to program management). Fortunately, DA&A records were periodically extracted from the Supplemental Security Record, the system used to manage SSI, and the March and June 1996 extracts were located for this project. Comparisons with Stapleton et al. (1998) indicate that approximately 75 percent of DI DA&A beneficiaries can be tracked using the June extract. While the missing beneficiaries are presumably those unlikely to have met the SSI asset restrictions, there are DI beneficiaries who never received SSI (applicants are sometimes entered into both the DI and SSI data systems before eligibility is determined). In Section 4, I separately analyze the employment effects for those who only ever received DI, those who had initially received SSI and those who continued to receive SSI.

SSA staff used Social Security numbers in the June 1996 extract to produce up-to-date extracts of the Supplemental Security Record, Master Beneficiary Record, 831 File and Master Earnings File. In combination, these provide a complete history of an individual's receipt of SSA program activity, taxable earnings, impairments, and various demographic characteristics, such as sex, age and education. Descriptions of the data and data preparation are provided in the online appendix. Information from the 831 File is available from 1989,

while the other data is available from 1981 or earlier. All of the datasets track these individuals through 2008.

A sample was created of individuals who were aged 30 to 61 years on January 1<sup>st</sup> 1997, the date the terminations took effect. The lower age limit restricts the sample to those who were at least 22 years old in 1989, when education and other time-varying information were first recorded, while the upper limit removes those eligible for Social Security Retirement Insurance at age 62. The sample was also limited to those who first received benefits between January 1<sup>st</sup> 1989 and April 1<sup>st</sup> 1996, and those receiving DI payments in the second quarter of 1996.

The characteristics of the 51,274 individuals who met these criteria are provided in Column 1 of Table 1. Approximately 80 percent of the sample is male. The only information on addiction is whether the beneficiary was addicted to alcohol, drugs, or both alcohol and drugs. Approximately 58 percent have only an alcohol addiction, 15 percent have only drug addictions, and 27 percent have both alcohol and drug addictions. Detailed information about the addiction is not available, but Stapleton et al. (1998) reported that the most common drug addictions were cocaine and heroin. The most common primary disabilities were alcohol/drug addictions (46 percent), mental disorders (22 percent), and musculoskeletal conditions (15 percent). The average time receiving DI payments before 1997, which includes periods of SSI payments if those were received during the DI waiting period, was 2.9 years. The average disability benefits paid in 1996 was \$10,859. In 1996, males comprised 60 percent of all DI beneficiaries and the average age of DI beneficiaries was 49 years, so DA&A DI beneficiaries were slightly younger than the general DI beneficiary population and disproportionately male (SSA, 1997).

The sample is divided into those terminated as a result of the policy and those reclassified based on other disabilities. Memos to Social Security offices in California indicate that disability beneficiaries terminated as a result of this policy should have been assigned a disability cessation code in January 1997; these memos are shown in the online appendix. Tabulations confirm that these rarely-used codes are used extensively in January 1997. A person is considered terminated as a result of the policy if, in January 1997, they had a newly-assigned cessation code and received no disability payments. A person is considered to have been successfully reclassified if, in January 1997, they were in current payment status and received disability payments. Approximately nine percent of the sample did not meet either definition; these are probably a mix of people who exited for other reasons, had an

unusual program status in January 1997, or were terminated as a result of the policy but were assigned a rare termination code instead of the right code.<sup>7</sup>

The characteristics of terminated and reclassified DI beneficiaries are shown in Columns 2 and 3 of Table 1, respectively. Compared to the reclassified group, terminated beneficiaries are younger by an average of 2.7 years and more likely to have had an addiction as their primary disability. The termination rate for those with an addiction as their primary disability is 52 percent, compared to 31 percent for mental disorders, 34 percent for musculoskeletal conditions, and 32 percent for other disabilities. Terminated beneficiaries are also relatively more likely to be male, more likely to be black, and less likely to have an addiction that was only alcohol. On average, terminated beneficiaries had received disability benefits for 4.5 months less than reclassified beneficiaries. All of these differences are statistically significant at the five percent level, which is not surprising given the large sample size.

The employment histories of terminated and reclassified beneficiaries are remarkably similar. In Figure 2a, I present their average employment rates for the eight years prior to applying for DI and for the year of DI application. Employment is based on having wage earnings above the annualized threshold for SGA in 1996 (\$8,908 in 2013 dollars). This is the main employment measure used in the paper, as anyone earning above SGA for a sustained period will not be eligible for DI. Over the nine years, the average absolute difference in the annual employment rates of terminated and reclassified beneficiaries is 0.7 of a percentage point. This is especially small given that employment rates decreased by approximately 50 percentage points over this period. Despite the large sample sizes, the mean differences are statistically significant at the five percent level in only three of the nine years.

The two groups also have similar trends in average earnings. Figure 2b shows terminated and reclassified beneficiaries' average annual earnings over the same nine-year pre-DI period. The average absolute difference in the mean earnings of the two groups is \$296, or two percent of average earnings over this period. Figure 2b also shows average earnings conditional on having earnings above 1996 SGA levels. The average absolute difference in conditional mean earnings across the two groups is \$604, or two percent of average conditional earnings.

Earnings trends based on calendar years are shown for 1981-2008 in Figure 3a. Terminated and reclassified beneficiaries have similar annual earnings trends up to 1996, the

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<sup>7</sup> As shown in the online appendix, the main results are similar if I assume that those assigned rare codes in January 1997 are terminated beneficiaries.

year the policy change was announced. This is the case even though there are large declines in earnings over this period, as individuals steadily stop working and apply for DI. The average earnings difference across the two groups is \$709 in 1990, approximately seven percent of average earnings for that year. This gap increases by roughly \$100 between 1990 and 1995, while the average earnings of both terminated and reclassified beneficiaries decline by approximately \$9,000 over the same period.

As shown in the next section, pre-treatment trends of terminated and reclassified beneficiaries become even more similar once controlling for sex-specific age differences. The similarity of their pre-DI labor market histories motivates the use of a difference-in-differences approach to estimate the employment effects of the DI terminations and using reclassified beneficiaries as the control group. These similarities are likely due to the unusual and complex nature of the reclassification process, where reasonably similar individuals received different judgments about their continued DI eligibility.

A second feature of the mean annual earnings plotted in Figure 3a is the large increase in the earnings of terminated beneficiaries from 1996, while there is little change in the earnings of reclassified beneficiaries. The difference in the mean earnings of terminated and reclassified DI beneficiaries is \$4,817 in 1997, peaks at \$6,766 in 2000, and declines to \$3,597 by 2008. The continued interaction between earnings and the disability programs helps to explain the decline in terminated beneficiaries' average earnings after 2000. The fractions of terminated and reclassified individuals who received a disability payment before and after the end of the DA&A category are shown in Figure 3b. Vertical lines are drawn at the end of 1996, when the last pre-termination disability payments were made. Terminated beneficiaries steadily re-enter DI or SSI throughout the 1997 to 2008 period, and 52 percent of terminated beneficiaries receive post-1996 Social Security payments by 2008.<sup>8</sup> As will be shown in the next section, the decline in the employment effects after 2000 is mainly due to this re-entry, as individuals are again subject to DI work rules and earnings limits.

### **3. Estimating the Employment Effects**

I estimate the aggregate employment effects due to the termination of disability benefits using a difference-in-differences linear probability model, where the employment of those who lost their disability benefits is judged relative to those who retained them. Binary employment outcomes are used, as we are primarily interested in how the terminations

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<sup>8</sup> Two percent of terminated beneficiaries first reappear from receiving retirement insurance or old-aged SSI.

affected how many individuals were working.<sup>9</sup> The main earnings threshold used to define employment is the annualized 1996 SGA level, which is equal to \$8,908 in 2013 dollars. An added benefit of using this level is that it is close to the average DI payments made in 1996, and so provides some idea of how many individuals “replaced” their benefits via wage earnings. Results using alternative employment thresholds are discussed below.

Data from 1989 to 2008 are used, which includes seven years of data before the terminations were announced (1989-1995), the year that the policy was announced (1996), and twelve years after the terminations occurred (1997-2008). Letting  $y_{it}$  denote the employment outcome for the  $i^{th}$  person in the  $t^{th}$  year, the equation estimated is:

$$y_{it} = \alpha + \theta_t + X_{it}\lambda + TERM_i\beta_0 + \sum_{\substack{t=1989 \\ t \neq 1995}}^{2008} D_t * TERM_i\beta_t + u_{it} \quad (1)$$

The constant is represented by  $\alpha$ , and  $\theta_t$  is a complete set of time fixed effects that capture common annual employment shocks. The vector  $X_{it}$  contains time-varying individual characteristics and initially represents two sex-specific cubic functions in age that control for age-related changes in employment. The variable  $TERM_i$  is a dummy variable equal to one if an individual had their DI benefits terminated and zero otherwise; it absorbs permanent employment differences between terminated and reclassified beneficiaries. Time-varying differences between terminated and reclassified beneficiaries are identified by the interaction of  $TERM_i$  with time dummy variables  $D_t$ , which are equal to one in year  $t$  and zero otherwise. The reference year is 1995, the year before the terminations were announced. Terminated beneficiaries may have responded to the policy change in 1996 if they decided not to reapply or sought work once they found out that their application to be reclassified had been unsuccessful. There are 19  $\beta_t$  coefficients of interest that measure the annual differences in the probability of employment of terminated and reclassified beneficiaries, relative to 1995. I estimate standard errors allowing for heteroskedasticity and an arbitrary correlation in errors for each individual.

The 19  $\beta_t$  coefficients (and 95 percent confidence intervals) measuring the annual employment probabilities of terminated beneficiaries relative to reclassified beneficiaries are plotted in the gray dashed line in Figure 4. Annual differences in employment during the pre-treatment period are small, with an annual difference of one percentage point or less between 1989 and 1994. These coefficients are precisely estimated, with standard errors of 0.5

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<sup>9</sup> Using earning is also complicated by the large number of observations with zero earnings. Using earnings as the dependent variable, which should lead to consistent estimates, leads to similar results to those presented using employment outcomes in terms of the similarity of the pre-treatment trends, a large post-termination response, and how the treatment effects vary by time spent on DI. These results are provided in the online appendix.

percentage points or less. In 1996, the year the policy change was announced, the relative fraction of terminated beneficiaries who are employed rises to 3.2 percentage points. Once disability payments ceased in 1997, the difference increases to 17.8 percentage points. The difference in employment probabilities increases to 22.8 percentage points in 1999 and remains similar in 2000, then steadily declines to 8.8 percentage points by 2008. All of these post-termination employment differences are statistically significant at the one percent level.

As shown in the black bold line in Figure 4, the coefficients remain similar with the addition of more time-invariant controls for demographic characteristics (race, sex, state of residence, age at termination); health characteristics (primary disability, addiction type); DI program activity (year applied, year started DI, level at which benefits were awarded); and work history (the combination of years employed for the five years before applying for DI). These controls do not change any of the 19 coefficients of interest by more than 0.4 percentage points. Both sets of results are presented in tabular form in the online appendix, together with similar results that come from a logit specification.

The employment effects are much higher than suggested by pre-termination exit rates among DA&A beneficiaries. As shown in the online appendix, exit rates were similar to the overall DI beneficiary population and averaged less than one percent per annum. The employment estimates are similar to recent estimates based on rejected applicants by Maestas, Mullen and Strand (2013), who estimate that DI receipt leads to a decrease in annual earnings above SGA of 18-19 percentage points two years after the DI allowance decision. In addition to being a sample with different characteristics from the overall DI beneficiary population, the receipt of DI for some time may have affected the employment response. I consider this possibility in Section 5.

Figure 5 provides more information about the nature and intensity of the employment response. In Panel A, I plot the 19  $\beta_t$  coefficients (and 95 percent confidence intervals) from equation (1) using a sample that I know definitely applied to be reclassified on the basis of their other disabilities. They represent 63 percent of the full sample.<sup>10</sup> These coefficients are similar to those for the full sample in all years except for 1996, where the employment response in this sample is lower than for the overall sample.

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<sup>10</sup> When individuals apply for DI a record is generated in the 831 File, which is one of the datasets used in this study. A new record was only generated in this dataset some of the time during this unusual reclassification process, as many reclassified beneficiaries do not have a new record on the 831 File during the reclassification period (April to December 1996). This explains why the fraction I can identify as having reapplied is lower than the 90 percent estimated by Stapleton et al. (1998).



I next present estimates of the employment effects without terminated beneficiaries who regained eligibility for a SSA program and without individuals who died in the post-termination period. These results are shown in Figure 5b. The employment response is larger without those who regained eligibility: the peak employment response in 1999 of 30 percentage points is seven percentage points higher than for the full sample. It is also more persistent: the employment response in 2008 is 20 percentage points, compared to eight percentage points for the full sample. Mortality also seems to account for some of the decline in the employment effects over time. Without those who died or returned to SSA, the estimated employment effect is 35 percentage points in 1999 and 26 percentage points in 2008. These differences are statistically significant at the one percent level. Given that it is difficult for SSA to track mortality among non-beneficiaries, the role of mortality is likely to be understated in this analysis.<sup>11</sup> It is difficult to interpret these patterns, as the re-eligibility of terminated beneficiaries may be due to poor health, limited employment prospects, or a combination of both. Furthermore, mortality may be affected by the policy change. These results are especially helpful, however, in explaining why the earning effects start to dissipate four years after the terminations.

Next, in order to understand the intensity of the employment response, different earnings thresholds related to 1996 SGA levels are used to define employment. These results are presented in Figure 5c. Halving the threshold to annual earnings above \$4,454 results in a peak employment response of 27 percentage points in 1999 and a response of 7.6 percentage points in 2008. Doubling the threshold to \$17,816 results in a peak employment response of 14.3 percentage points in 2000 and a response of 6.9 percentage points in 2008. Tripling the threshold to \$26,724 results in a peak employment response of 7.0 percentage points in 2000, which declines to 4.2 percentage points by 2008. These results suggest that terminated beneficiaries who started working generally earned more than annualized SGA levels, although not a lot more. They also indicate that the employment effects are more persistent at higher earnings thresholds.

The results using different earnings thresholds provide some information about the quality of employment found by those who lost DI eligibility. Another set of results provide more information about this; specifically, how individual's post-termination earnings compare to his or her pre-DI earnings. In Figure 5d, I provide employment results using

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<sup>11</sup> For non-beneficiaries, the only SSA dataset with date of death is the Numident File. Mortality information in the Numident File comes from a wide variety of sources, like funeral homes, hospitals, federal government agencies, and state governments. Several government reports, including the SSA Office of Inspector General (2012), find that the Numident File misses many deaths.

individual-specific thresholds based on each individual's earnings at two and five years before applying for DI. Over the period when the employment effects are largest (1998-2000), the estimate employment effect is 23 percentage points if employment is defined in terms of earnings two years before applying for DI and 18 percentage points if employment is defined in terms of earnings five years before applying for DI. In both cases, the declines in the employment effects are qualitatively similar to those in the main results.

Another informative measure is the fraction of terminated beneficiaries that had higher earnings after termination than before entering the DI program. In the online appendix, I report that 30 percent of terminated beneficiaries had a year of earnings in the post-termination period (1996-2008) that was higher than in the eight years prior to applying for DI. By comparison, approximately six percent of reclassified beneficiaries had their highest earnings year in the post-termination period. Among terminated beneficiaries who had at least one year of post-termination earnings that was above the 1996 SGA threshold, 53 percent had their highest earnings year in the post-termination period. Among terminated beneficiaries who had earnings above SGA in any year from 2001 to 2004, 61 percent had their highest earnings year in the post-termination period, while 66 percent of terminated beneficiaries with above-SGA earnings between 2005 and 2008 had their highest earnings year in the post-termination period. These fractions suggesting that the employment response in Figure 4 mostly represents individuals who earned more after termination than before entering DI, especially if they employed several years after the terminations.

In summary, the results suggest many terminated DI beneficiaries could earn at levels that would have disqualified them from the program. The employment effects are large relative to these individuals' work histories, although many terminated beneficiaries do not report taxable wage earnings after 1996. Taxable wage earnings are likely to understate employment, as Campbell et al. (2003) did find that terminated SSI beneficiaries had informal earnings. The decision to reapply did not strongly affect the employment response.

#### **4. Heterogeneity in the Employment Response**

I now examine how the employment effects differed depending on terminated beneficiaries' demographic and health characteristics, as well as their previous earnings and other factors that could affect labor force participation. As discussed in the introduction, it has been difficult for SSA to target return-to-work policies because there is limited information about who is best able to work.

The examination of heterogeneity is done by re-estimating equation (1) for different subsamples and presenting the 19 coefficients (and 95 percent confidence intervals) that measure the employment differences between terminated and reclassified beneficiaries relative to 1995. This is done in Figure 6, where the panels provide information about whether the employment effects differed by sex; age at termination; earnings prior to DI; state unemployment at the time of termination; addiction type; and primary disability. As discussed at the end of this section, some additional heterogeneity analysis is also provided in the online appendix.

It is important to separately examine the employment effects for males and female, particularly because welfare reform occurred in the late 1990s and affected the options available to single mothers. The results for males and females are shown in Figure 6a. The employment response for females is higher than for males: on average, the 1998-2000 coefficients are 1.9 percentage points higher for the female sample than the male sample (23.8 vs. 21.9 percentage points), a difference that is statistically significant at the one percent level. This difference persists throughout the post-termination period. These differences do not necessarily reflect relatively higher work capacity among females, however, as they could be explained by their termination rate being lower than for males (42.3 percent vs. 37.4 percent).<sup>12</sup> This is the only case where a difference in the termination rates is at odds with the differences in the employment effects; as shown in the online appendix, in the other cases the termination rates are either similar across or reinforce any employment differences.

Younger disabled workers likely experience different health trajectories to older disabled workers, and also have different incentives to develop “disability-specific human capital” (Charles, 2003). The results for different groups based on age at the start of 1997 are shown in Figure 6b. The employment effects decrease with age: the average of the 1998-2000 coefficients measuring the employment effects is 25.1 percentage points for those aged 30-39 years, 21.3 percentage points for those aged 40-49 years and 16.2 percentage points for those aged 50-61 years. These differences are statistically significant at the one percent level, as are the differences later in the post-termination period. The fraction of each age group that has their highest earnings year in the post-termination period also decreases with age; this is presented in the online appendix. Higher employment rates among younger DI beneficiaries

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<sup>12</sup> Given the rates at which reclassified beneficiaries work above SGA levels is close to zero, the combined fraction of terminated and reclassified beneficiaries who earn above the 1996 SGA threshold during 1998-2000 is approximately nine percent for both females (employment response of 23.8 percentage points x termination rate of 37.4 percent) and males (employment response of 21.9 percentage points x termination rate of 42.3 percent).

is consistent with employment estimates from studies of rejected DI applicants (e.g., von Wachter et al., 2011) and of current DI beneficiaries (e.g., Kostol and Mogstad, 2014).

Individuals whose labor force attachment was relatively high before applying for DI may be able to return to the workforce more easily than other terminated beneficiaries. To examine whether this was the case, I divide the sample into three groups based on average annual earnings in the 3-5 years before applying for DI:<sup>13</sup> those with average earnings that are above the 1996 SGA threshold, those with average earnings that are between half and one of the threshold, and those with average earnings that are less than half of the threshold. Results for these groups are presented in Figure 6c. Higher pre-DI earnings are associated with larger employment effects: the average of the 1998-2000 coefficients is 26.0 percentage points for those with average pre-DI earnings above the 1996 SGA threshold, 21.4 percentage points for those with average pre-DI earnings between half and one of 1996 SGA, and 16.8 percentage points for those with average pre-DI earnings of half 1996 SGA or less. These differences are statistically significant at the one percent level and persist throughout the post-termination period. Despite this, only 23 percent of terminated beneficiaries with above-SGA pre-DI earnings had their highest earnings year in the post-termination period, compared to 36 percent for the group with average pre-DI earnings 0.5-1 of SGA and 37 percent for the group with average pre-DI earnings less than half of the SGA threshold.

I next examine there were differences by local labor market conditions, as they have been found to affect entry into DI (Autor and Duggan, 2003) and how current DI beneficiaries respond to changing work incentives (Kostol and Mogstad, 2014). Average state-level unemployment rates in 1997 and 1998 are used to create three subsamples: those living in states where unemployment averaged less than 4.5 percent (“low unemployment”), those living where average unemployment was between 4.5 percent and 5.5 percent (“mid unemployment”); and those living where unemployment was above 5.5 percent (“high unemployment”). The employment effects for these three groups are shown in Figure 6d. The average employment response across the peak years of 1998-2000 is 11-12 percent smaller in the high unemployment sample than in the other two groups, a difference that is statistically significant at the one percent level. This effect declines in the later years; beyond 2001, the relative employment of terminated beneficiaries in the high unemployment group is actually higher than in the other two groups beyond 2001. As shown in the online appendix, there are

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<sup>13</sup> This is the definition used by Maestas, Mullen and Strand (2013).

not noticeable differences in the fraction of each group that records their highest earnings in the post-termination years.

The final two panels of Figure 6 provide results by type of addiction (Panel E) and primary disability (Panel F). Even though there are differences, the results by addiction type do not suggest a consistent difference between alcohol-vs.-drug addictions because there are small and statistically insignificant differences between the employment responses of the “alcohol only” and “drug only” groups during the first seven years after the terminations were announced. The employment response is relatively higher in the drug-only subsample beyond that, although that may be because they are younger (average age of 41.0 years ) than the alcohol-only group (average age of 44.9 years). The results for the different disability-based subgroups, which are shown in Panel F, demonstrate that the employment response is similar for those with alcohol/drug addictions, mental disorders, and musculoskeletal conditions as their primary disability. Those with other physical disabilities have an employment response that is approximately 25 percent lower than the other three groups during the first few years after the terminations, and their employment remains relatively low throughout the sample period.

In the online appendix, I provide further results by race, educational attainment and the DI beneficiaries’ involvement in the SSI program. Even when there are differences in the employment response that are statistically significant at conventional levels, they are neither large in magnitude nor persistent throughout the sample period.

## **5. The Role of Time Spent Receiving Disability Benefits**

I now examine how the employment effects differ by the time spent on DI. Individuals had entered the DI program at different points in time, and therefore had received disability benefits for different lengths of time prior to the terminations. As discussed in the introduction, there is lack of evidence on how work capacity changes while on DI.

It is important to recognize that, because the terminations occurred at the same time, an individual’s DI duration is correlated with when they applied for DI. This creates the potential for any pre-existing differences across beneficiary cohorts to be attributed to the role of time on DI. The first step in addressing this concern is to assess whether there were pre-existing differences in the employment and health characteristics of DI DA&A beneficiaries. In order to assess pre-existing employment differences, in Figure 7a I present the fraction of each cohort that earned more than the 1996 SGA threshold two years and five years before applying for DI, where the cohorts had between less than one year on DI and six

years on DI before the terminations took effect.<sup>14</sup> The employment rates are similar across the cohorts: the fraction employed five years before applying for DI is between 41 and 48 percent and the fraction employed two years before applying for DI is between 19 and 24 percent. Furthermore, there is not a consistent pattern in the differences: those on DI for one year had the highest fraction employed using the five-year pre-DI measure, while those on DI for five years had the highest fraction employed using the two-year pre-DI measure.

The cohorts also look similar in terms of their initial health, as measured by average mortality rates during the first year on DI. This is shown in Figure 7b. The overall average mortality rate in the first year of DI receipt is 2.4 percent, and each year of DI entrants have an average mortality rate that is within 0.3 percentage points of that value. In combination, these figures show that time on DI is not strongly correlated with initial measurements of health and work capacity. The potential influence of pre-DI differences is considered further after I estimate the role of time on DI.

So far, the employment effects have been allowed to vary each year in the post-termination period. Now, in order to make it easier to examine how the employment effects differ by time on DI, I impose a functional form on the post-termination employment response. The results presented so far show that the employment effects generally follow a similar pattern: the relative employment of terminated beneficiaries rises in 1996 and 1997; is highest from 1998 to 2000; and declines from 2000 to 2008. Given this, I adapt equation (1) by replacing the interactions between  $TERM_i$  and the post-1997 year dummy variables with two variables:  $SHIFT_{it}$  is equal to one if  $t \geq 1998$  and the individual is a terminated beneficiary, and zero otherwise; and  $DECLINE_{it} = t - 1999$  if  $t \geq 2000$  and the individual is a terminated beneficiary, and zero otherwise.<sup>15</sup> The dummy variables for the years 1996 and 1997 are retained, as are the dummy variables for the years 1989 to 1994. The regression specification now becomes:

$$y_{it} = \alpha + \theta_t + X_{it}\lambda + TERM_i\beta_0 + \sum_{\substack{t=1989 \\ t \neq 1995}}^{1997} D_t * TERM_i\beta_t + SHIFT_{it}\delta_1 + DECLINE_{it}\delta_2 + u_{it} \quad (2)$$

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<sup>14</sup> For this exercise, annual earnings are converted into 2013 dollars using the National Wage Index, which measures the average changes in wages in the United States and so takes account of wage growth.

<sup>15</sup> Jacobson, Lalonde and Sullivan (1993) imposed a functional form on the post-policy changes in earnings of displaced workers to get a better idea of the evolution of the differences across demographic groups. von Wachter, Song and Manchester (2011) uses a similar approach. I tested plausible alternative specifications, such as estimating  $DECLINE_{it}$  starting from 1999 or 2001. The differences across groups are similar in these alternate regressions.

The main coefficients of interest are now  $\delta_1$ , which measures the post-termination employment effects across 1998 to 2000, and  $\delta_2$ , which measures the trend in the employment effects from 2000 to 2008.<sup>16</sup> The estimates for these two coefficients are presented in Column 1 of Table 2. The  $SHIFT_{it}$  coefficient is 22.0 percentage points, close to the peak employment response using the more flexible specification. The  $DECLINE_{it}$  coefficient is -1.6 percentage points, reflecting the annual decline in the employment effects from 2000 to 2008. Both coefficients are statistically significant at the one percent level. The average of the six coefficients resulting from the interactions between  $TERM_i$  and the 1989-1994 dummy variables is 0.3 percentage points, with a standard error of 0.3 percentage points, which shows that terminated and reclassified beneficiaries have similar pre-treatment employment trends in this specification. As shown in the online appendix, the estimated coefficients on  $SHIFT_{it}$  and  $DECLINE_{it}$  are similar in plausible alternative specifications, such as allowing  $DECLINE_{it}$  to start in 1999 or in 2001.

Equation (2) is then adapted to allow the employment effects to vary by time on disability benefits,  $DI\_TIME_i$ , which is the length of time between the month when an individual first received benefits and when the terminations occurred in January 1997. Square and cubic terms of  $DI\_TIME_i$  are used to allow the employment effects to vary nonlinearly with time on DI. These three variables are interacted with all of the variables identifying employment differences between terminated and reclassified beneficiaries throughout the sample period. That is,

$$y_{it} = \alpha + \theta_t + X_{it}\lambda + TERM_i\beta_0 + Z_{it}\varphi_0 + DI\_TIME_i * Z_{it}\varphi_1 + DI\_TIME_i^2 * Z_{it}\varphi_2 + DI\_TIME_i^3 * Z_{it}\varphi_3 + u_{it} \quad (3)$$

Where  $Z_{it}\varphi_{(n)} = \sum_{\substack{t=1989 \\ t \neq 1995}}^{1997} D_t * TERM_i\beta_{(n)t} + SHIFT_{it}\delta_{(n)1} + DECLINE_t\delta_{(n)2}$ .

In addition to the coefficients on  $SHIFT_{it}$  and  $DECLINE_{it}$ , the primary coefficients of interest are those resulting from the interactions between  $SHIFT_{it}$  and  $DECLINE_{it}$  and the three cubic terms of  $DI\_TIME_i$ . Estimates of these eight coefficients for the full sample are presented in Column 2 of Table 2. The coefficient (standard error) on  $SHIFT_{it}$  is 0.069 (0.022), which can be interpreted as the estimated employment effect before receiving any disability benefits. All three coefficients from the interactions between  $SHIFT_{it}$  and the  $DI\_TIME_i$  terms are statistically significant at the one percent level, suggesting the increase in post-termination employment varies nonlinearly with DI receipt. In contrast, the three

<sup>16</sup> Differences across groups in the 1996 and 1997 coefficients are hard to interpret, as they may reflect timing differences of the reclassification process rather than just differences in the timing of the employment response.

coefficients from the interactions between  $DECLINE_{it}$  and the  $DI\_TIME_i$  terms are not jointly significant at the five percent level.

Together, these results suggest that the time on disability benefits affected the number of terminated beneficiaries who became employed but not the subsequent decline in the employment effects. For this reason, I focus on how the maximum employment response varies as a function of time on DI by calculating the nonlinear combination of the four coefficients related to the  $SHIFT_{it}$  variable at different values of  $DI\_TIME_i$ , and calculating standard errors using the delta method. This is plotted in Figure 7c for values of  $DI\_TIME_i$  between nine months, which is the shortest period of DI receipt in this sample, and six years, beyond which the confidence intervals become wide and uninformative. There is an inverted-U relationship between the employment effects and time spent on DI. For those who received DI for nine months, the maximum employment response is estimated to be 16.3 percentage points. The maximum employment response then increases with DI receipt up to 2.7 years of time on DI, when the total shift in employment peaks at 24.6 percentage points, or 50 percent higher than those on DI for nine months. The employment effects are smaller for those who received DI for longer than 2.7 years, and the maximum employment response is 18.8 percentage points for terminated beneficiaries who were on DI for six years. The 95 percent confidence intervals show these differences to be statistically significant at conventional levels. Given the evidence that capacity to work generally declines with time out of the labor force, it is surprising that the employment effects are initially increasing with time on DI. I conduct a number of additional exercises to understand the source of these differences.

In order to understand whether this pattern is concentrated among a particular disability type, results for the four disability-based groups used previously (alcohol/drug addictions, mental disorders, musculoskeletal, and other physical conditions) are presented in the online appendix. An inverted-U relationship between the employment effects and time on DI is present in all groups except for those with non-musculoskeletal physical conditions as their primary disability.

Next, I further assess the potential role of compositional differences in explaining the inverted-U relationship by estimating the relationship between time on DI and the employment effects for different age groups. As shown in the online appendix, few DA&A beneficiaries exited DI prior to the terminations: exit due to recovery was less than one percent per year and exit due to mortality was 2-3 percent per annum. Nevertheless, if the employment effects are increasing with time on DI because of attrition, then it should operate



through mortality rather than recovery (i.e., after two or three years on DI, those who are sick and likely to have low work capacity would have died and left a healthier and more able group). These differences should therefore be more pronounced among older beneficiaries, due to their relatively higher mortality rate. The regression results for those aged 30-39, 40-49, and 50-61 years at termination are presented in Columns 3-5 of Table 2 and in Figure 7d. The inverted-U pattern is strongest among the youngest group, further suggesting that the inverted-U relationship is not due to pre-existing differences between beneficiaries. It also remains in additional exercises aimed at limiting the role of beneficiary cohort effects, which are presented in the online appendix.<sup>17</sup>

Additional training while on DI is also not a plausible explanation. There is no evidence of vocational training in Stapleton et al. (1998) or any other report, and the mean years of education reported during the reclassification process in 1996 is the same as the mean years of education reported when applying for DI (in both cases, the average is 11.0 years). There are also not differences in termination rates that could explain the relationship.<sup>18</sup>

## 5.1 Differences by Initial Health

One possible explanation for the larger employment effects after 2.5–3 years of DI receipt is that health improvement initially dominates any negative effects of being out of the labor force. While the SSA administrative data do not contain direct measures of individuals' health status, there is information about how easily individuals gained eligibility for disability benefits that can serve as a measure of initial health. Hu et al. (2001) finds that individuals judged to be disabled at earlier stages of the DI determination process have, on average, more severe disabilities than those awarded eligibility at later stages. Such health differences do seem to affect employment. von Wachter et al. (2011) estimates that, prior to receiving DI,

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<sup>17</sup> First, given that some of the observable characteristics of DA&A beneficiaries changed as the program grew, to further rule out compositional effects equation (4) is estimated for subsamples based on those changing characteristics (which are sex, race and addiction type). Second, given changes to the DA&A program were passed in August 1994 and implemented between March 1995 and March 1996, the regression is estimated without individuals applying in August 1994 and later. An inverted-U relationship is also present in these analyses. These results are available in the online appendix.

<sup>18</sup> The termination rate is 47 percent for those on DI for a year or less, 47 percent for those on DI for 13-24 months, and 43 percent for 25-36 months. Differences across beneficiary cohorts are primarily a function of age: in a linear probability model where termination is used as the dependent variable and age controls are used, coefficients on dummy variables measuring time on DI suggest that time on DI only predicts termination for those with more than three years of DI receipt (when probability of termination is slowly decreasing with time on DI).

those awarded eligibility at earlier stages are less able to work than those awarded DI at later stages.

Information from the 831 File can be used to identify those awarded eligibility at three stages: (1) after their initial determination by medical examiners in state-level Disability Determination Services (DDS) offices; (2) after reconsideration by a different set of DDS disability examiners; and (3) by an Administrative Law Judge or at a higher-level hearing.<sup>19</sup> In this sample, 44 percent were awarded DI at the initial stage, 11 percent were awarded DI after reconsideration, and 45 percent were awarded DI at the hearings level.

Equation (3) is used to estimate the role of time on DI in the “Initial Award” and “Hearings Award” groups. These results are presented in Columns 6-7 of Table 2 and Figure 7e. The coefficient (standard error) on  $SHIFT_{it}$  for Initial Award group is 0.003 (0.032), compared to 0.117 (0.037) for the Hearings Award group. This suggests that employment prior to DI would have been higher for those awarded eligibility at later stages, which is consistent with von Wachter, Song and Manchester (2011). Figure 7e shows that the employment effects are also larger at nine months of DI receipt for the Hearings Award group than the Initial Award group, a difference that is statistically significant at the one percent level. However, the employment effects rise with DI receipt at a faster rate in the Initial Award group than in the Hearings Award group, so much so that the peak employment response for the Initial Award group is two percentage points higher than the peak for the Hearings Award group. DA&A termination rates further support health improvement being behind these patterns; they are higher for initial awardees (44 percent) than hearings awardees (31 percent). Those most readily defined as disabled when they applied for DI were least likely to be defined as disabled when reassessed some time later.

These differences suggest that the most clearly disabled individuals at the time of application improved the most, so much so that their employment is higher than those initially denied benefits after a period of benefit receipt. This could be due to the effects of the program or mean reversion in health, as those in the poorest health when applying for DI may have suffered from the largest health shocks. Initial access to Medicaid does not seem to account for the pattern: as shown in the online appendix, the inverted-U pattern is present among DI beneficiaries with initial access to SSI who were eligible for Medicaid, and also among DI beneficiaries who had to wait for Medicare eligibility for access to public health

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<sup>19</sup> Applicants denied at the DDS level can request a hearing with an Administrative Law Judge, and then appeal to the Social Security Appeals Council, to the U.S. District Court, and finally to the U.S. Circuit Court of Appeals. Around one third of DI awards are made through one of these ways, with nearly all of them made by Administrative Law Judges (SSA, 2012a).

insurance. It is not possible to further distinguish the role of Medicare from other aspects of the program.

## **6. Conclusion**

Reducing the fiscal burden associated with disability insurance requires policies that decrease the inflow into these programs, increase the outflow, or decrease the generosity of the benefits provided. Understanding the employment implications of different policies requires knowledge of disabled workers' ability to work before, during and after the receipt of DI. Direct evidence is particularly important in this context, as DI applicants and beneficiaries have incentives to understate their true work capacity in order to gain or maintain their program eligibility. The widespread loss of DI eligibility studied here provides a rare opportunity to understand how work capacity does change by observing the work activity of disabled individuals once they no longer receive benefits. Approximately 22 percent of terminated beneficiaries started working at levels above "substantial gainful activity" earnings standard used by SSA to judge eligibility for DI. This level of labor force re-attachment is large relative to their work histories, and especially surprising given that they received no formal vocational support to help them re-enter the labor force (Stapleton et al., 1998). It is also well above the levels suggested by the exit rate from DI due to medical recovery, which was less than one percent per annum. The employment response declines over time, largely through terminated beneficiaries requalifying for DI or social insurance programs managed by SSA.

There is substantial heterogeneity in the employment response, with age and prior earnings strongly related to the magnitude of the employment response. In addition, there is heterogeneity in the employment response by time on DI, with the largest employment response among terminated beneficiaries who had received DI for 2.5-3 years prior to the terminations. There is suggestive evidence that changing health may account for some of this pattern, although more needs to be done to establish the mechanisms underlying the role of DI duration.

While there is a possible interaction between cash payments and addiction, the fact that the estimates are similar across individuals addicted to alcohol and to drugs suggests that the response did not result from a strong interaction between substance abuse and disability payments, as the cash required to sustain a heavy alcohol addiction is very different to heavy heroin or cocaine addictions (Rhodes et al., 2000). Moreover, the similarity of the employment effects across those with addictions, mental disorders and musculoskeletal

conditions as their primary disability suggests that there are large and identifiable groups of current beneficiaries for whom the findings are likely to be informative.

The findings suggest ways in which current return-to-work initiatives may be made more effective in the United States and elsewhere. DI beneficiaries are currently scheduled to have medical reassessments (called “continuing disability reviews”) every one, three or seven years, depending on the severity and likely improvement of their disability. In order to deal with resource constraints and backlogs, many of these reviews are either waived or done in the form of a mailer that contains six questions about recent health work and training. Responses to this mailer generate a full reassessment in 2.5 percent of cases, while the full reassessments themselves generate terminations in approximately three percent of cases (SSA, 2012). While there is some profiling in terms of who is sent a mailer and who is subject to a full reassessment, the findings here suggest a more focused role for medical reassessments. For example, comprehensive reassessments after two or three years of benefit receipt may have better chances of terminations than earlier and later reviews and be a sensible way to allocate scarce resources.

A relationship between time receiving disability benefits and capacity to work has important implications for interpreting studies that use the earnings histories of rejected applicants to estimate the likely employment of those who successfully become beneficiaries (e.g., Bound, 1989; von Wachter et al., 2011; Maestas et al., 2013). While these studies provide precise estimates of the employment potential of accepted applicants at the point they are applying for DI, the dynamic effects identified here suggest we should be cautious about using that design to identify the potential employment of all disability beneficiaries.

The findings also speak to fundamental questions about how disability insurance programs might be reformed. Most are structured as permanent disability programs. This puts the onus on examiners performing the medical reassessments to show beneficiaries no longer meet the eligibility standard, which creates legal and political issues that may explain why relatively few individuals ever lose eligibility. Likewise, the low take-up of vocational support likely reflects the risks involved in giving up a relatively certain stream of disability benefits (Autor and Duggan, 2003). The employment effects identified here suggest that providing public assistance through an acute period of poor health may be an effective way to maximize labor force participation of some disabled individuals.

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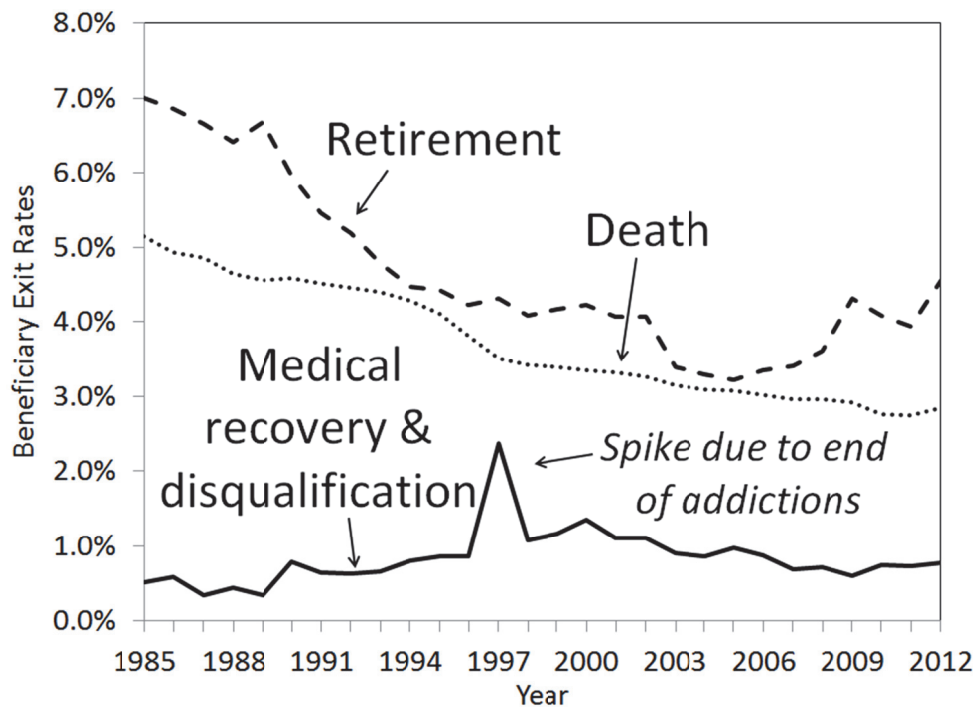
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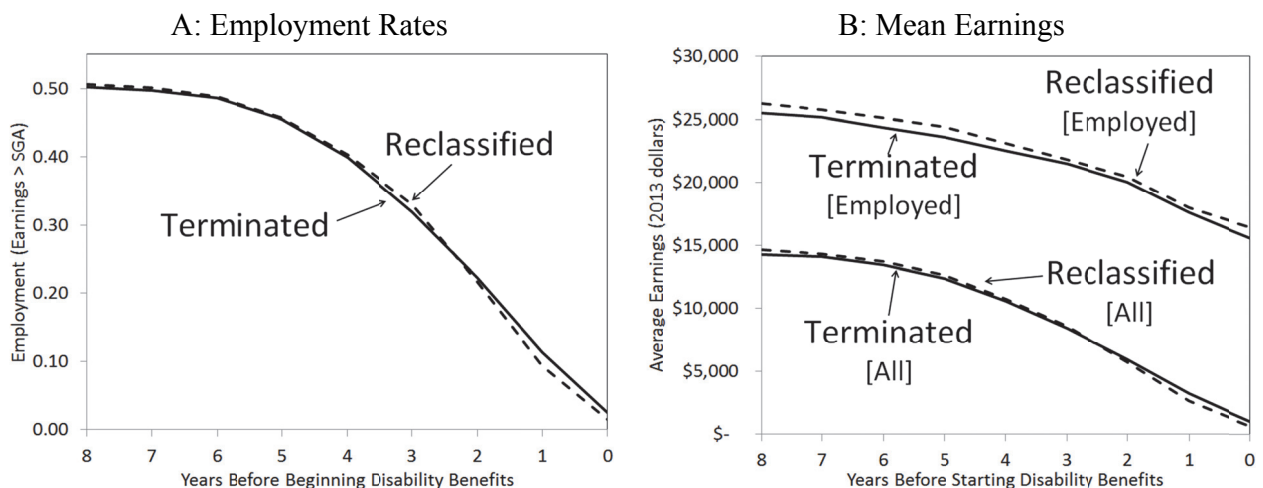


**Figure 1** Social Security Disability Insurance Termination Rates by Reason, 1985-2012



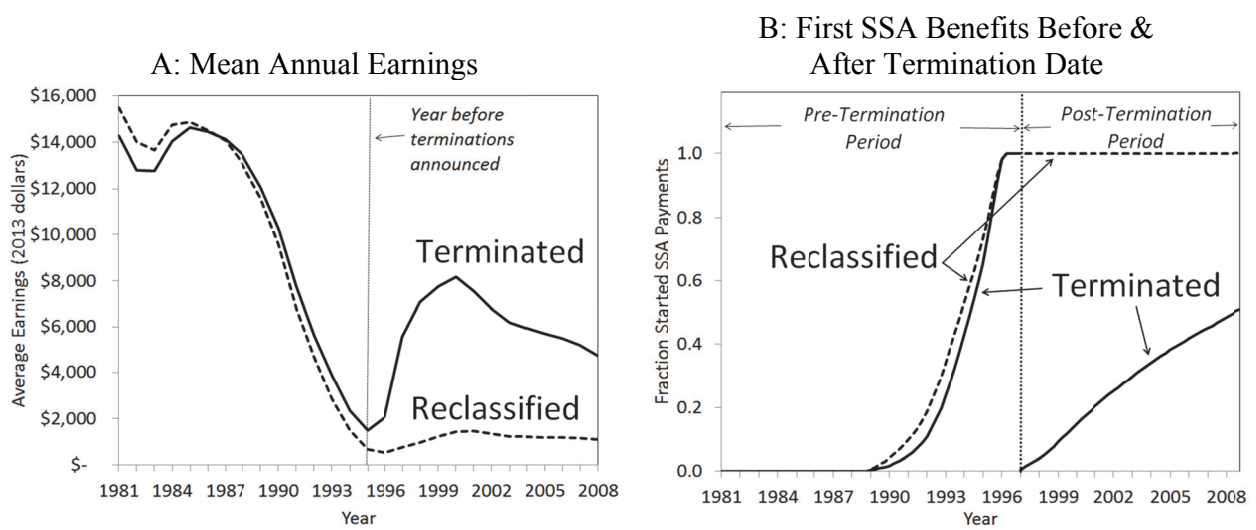
*Source: Annual Statistical Supplement to the Social Security Bulletin [various years].*

**Figure 2** Employment and Earnings in Relation to DI Entry, Terminated vs. Reclassified

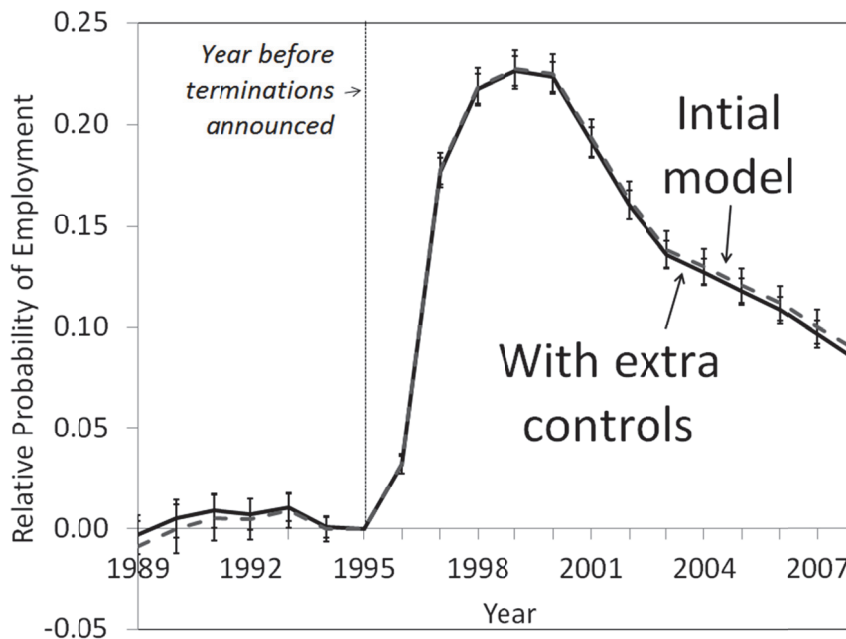


*Notes:* Employment is based on earning more than the 1996 level of annualized Substantial Gainful Activity (SGA), which is \$8,908. Earnings are in 2013 dollars.

**Figure 3** Mean Annual Earnings and Program Entry, Terminated vs. Reclassified, 1981-2008

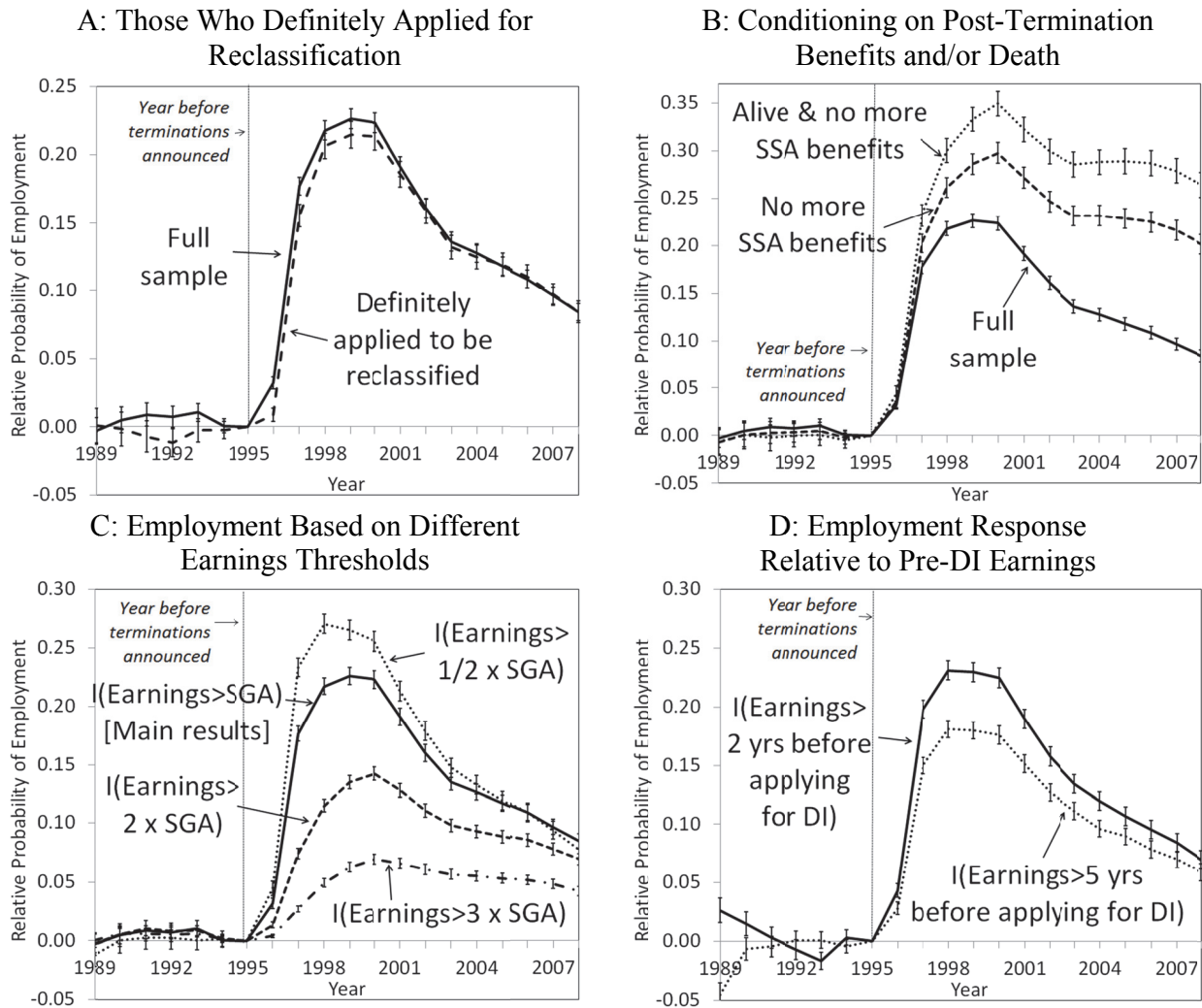


**Figure 4** Terminated Beneficiaries' Probabilities of Employment Relative to Reclassified Beneficiaries



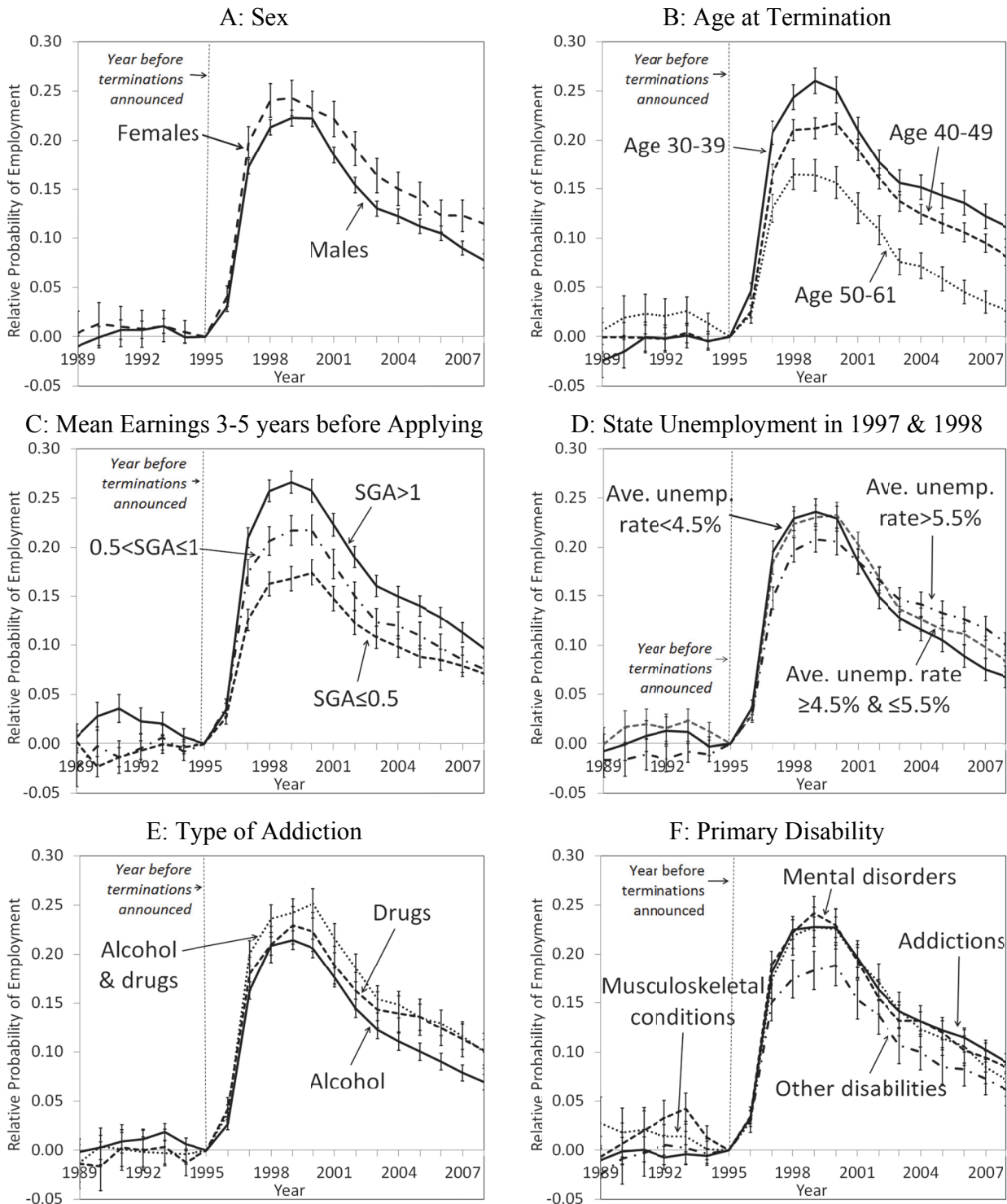
*Notes:* The figure shows the regression coefficients (and 95 percent confidence intervals) from the interaction between a binary variable identifying terminated beneficiaries and a full set of year dummy variables, where the dependent variable measures employment [earnings > \$8,908 (1996 SGA)]. The reference year is 1995, the year before the terminations were announced. In addition to the terminated and year dummy variables, other covariates include sex-specific cubic functions in age. Results with extra controls include individuals' demographic, health, program history and work history characteristics. Both regressions allow for arbitrary correlation in errors at the individual level and have 930,500 observations.

**Figure 5** Examining the Employment Effects



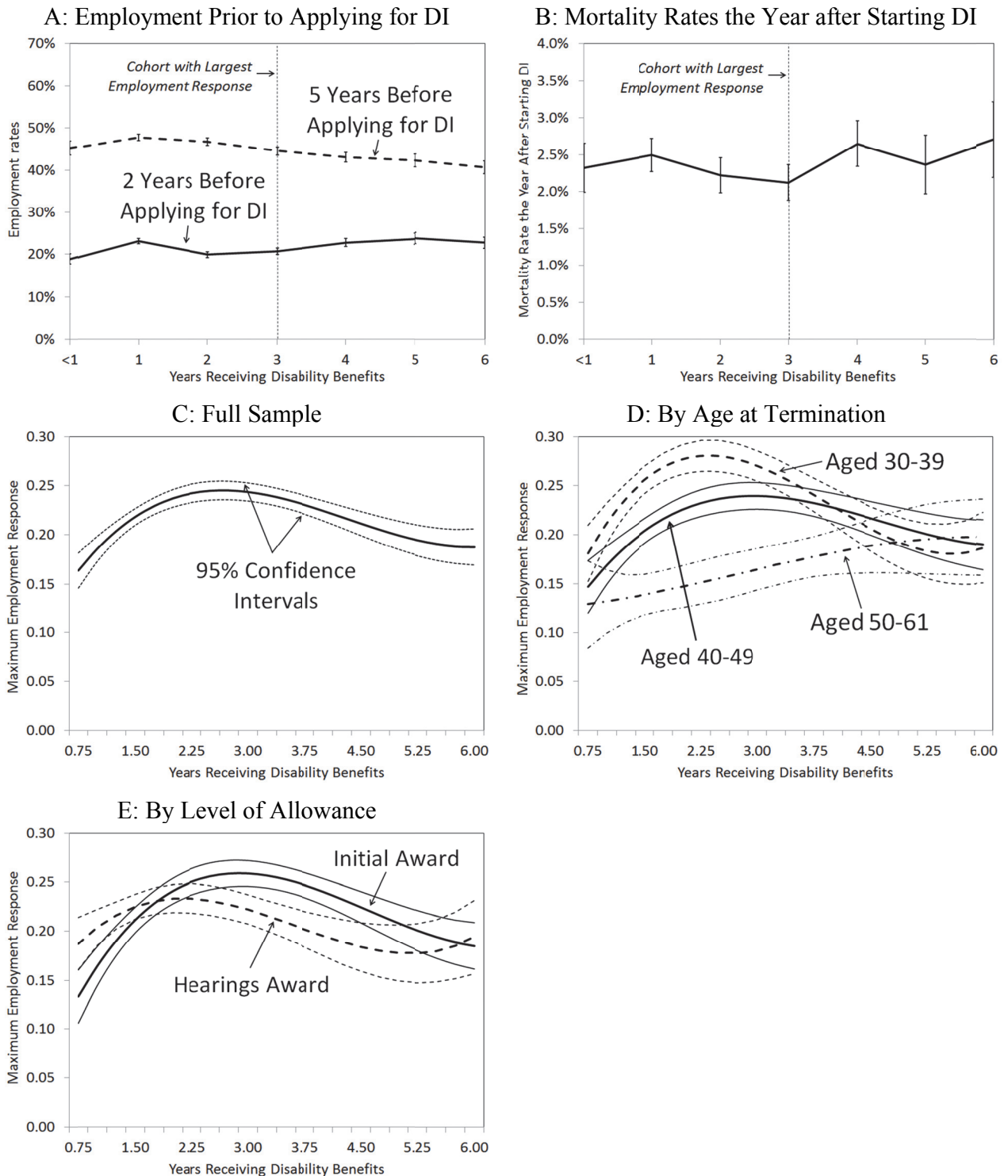
*Notes:* Each figure shows regression coefficients (and 95 percent confidence intervals) from interactions between a binary variable identifying terminated beneficiaries and a full set of year dummy variables. Unless noted, the sample and regression are those used to produce the bold line in Figure 4. In Panel A, the results for the full sample are compared to those who definitely applied to be reclassified (583,140 observations). In Panel B, results for the full sample are compared to samples without those who received post-1996 SSA payments (734,740 observations) and also without individuals who died by the end of 2008 (505,260 observations). In Panel C, results are based on different earnings thresholds: half of 1996 SGA (\$4,454), 1996 SGA (\$8,908), twice 1996 SGA (\$17,816) and three times 1996 SGA (\$26,724). In Panel D, earnings threshold are based on individuals' earnings before applying for DI: two years before (median: \$4,472; average: \$8,824) and five years before (median: \$8,366; average: \$13,282).

**Figure 6** Employment Effects for Different Subsamples



**Notes:** Each figure shows regression coefficients (and 95 percent confidence intervals) from interactions between a binary variable identifying terminated beneficiaries and year dummy variables. Employment is based on 1996 SGA (\$8,908). Regression details are as described for Figure 4. The subsamples in Panel C are based on 1996 SGA. Sample sizes and reclassification rates are provided in an online appendix.

**Figure 7** Employment Response by Time on Disability Benefits



**Notes:** Panels A and B show cohort-specific means (and 95 percent confidence intervals) for pre-termination employment and mortality. Panels C to E show, for different samples, the post-termination increases in employment (and 95 percent confidence intervals) for different values of  $DI\_TIME_i$ . Each is the nonlinear combination of a set of four coefficients related to  $SHIFT_{it}$  and presented in Table 2.

**Table 1** Characteristics of Sample at the Time of Program Termination

	All (1)	Terminated (2)	Reclassified (3)
<i>Demographics</i>			
Male	80%	82%	78%
Female	20%	18%	22%
White	58%	52%	62%
Black	33%	39%	29%
Other race	7.8%	8.0%	7.6%
Age in Jan 1997 (years) (Std. dev.)	43.4 (7.62)	41.9 (6.90)	44.6 (7.93)
Educational attainment (years) (Std. dev.)	11.0 (2.03)	11.1 (1.92)	11.0 (2.10)
<i>Type of addiction</i>			
Alcohol only	58%	54%	62%
Alcohol and drugs	27%	30%	24%
Drugs only	15%	16%	14%
<i>Primary disability when applying</i>			
Alcohol/drug addiction	46%	58%	38%
Mental disorders	22%	16%	26%
Musculoskeletal condition	15%	13%	17%
Other disabilities	17%	13%	19%
Neurological condition	2.6%	2.1%	2.9%
Digestive condition	2.3%	1.6%	2.6%
Respiratory	1.9%	1.3%	2.4%
Other disabilities	7.1%	6.3%	8.1%
<i>DI program involvement</i>			
Time on disability benefits (years) (Std. dev.)	2.92 (1.62)	2.74 (1.57)	3.13 (1.66)
1996 federal benefits (2013 dollars) (Std. dev.)	\$10,859 (3,163)	\$10,625 (3,052)	\$11,111 (3,220)
Observations	51,274	19,229	27,296

*Notes:* There are 4,749 individuals who could not be classified as having kept or lost benefits as a result of the policy; these individuals are not included in either group. Race is missing or inconsistent for 1.6 percent of the sample, and education is missing for 6.1 percent; these fractions are similar across the terminated and reclassified groups. Payments in 1996 are converted to 2013 dollars.

**Table 2** Regression Estimates of the Employment Effects by Time on DI

	Age at termination					Stage of award	
	All (1)	All (2)	30-39 (3)	40-49 (4)	50-61 (5)	Initial (6)	Hearings (7)
(a) $SHIFT_{it}$	0.220*** (0.003)	0.069*** (0.022)	0.041 (0.037)	0.055* (0.033)	0.123** (0.054)	0.003 (0.032)	0.117*** (0.037)
(b) $SHIFT_{it} \times DI\_TIME_i$		0.155*** (0.024)	0.237*** (0.041)	0.148*** (0.034)	0.004 (0.057)	0.209*** (0.033)	0.129*** (0.042)
(c) $SHIFT_{it} \times DI\_TIME_i^2$		-0.042*** (0.007)	-0.072*** (0.013)	-0.037*** (0.010)	0.005 (0.016)	-0.053*** (0.009)	-0.043*** (0.014)
(d) $SHIFT_{it} \times DI\_TIME_i^3$		0.0033*** (0.0006)	0.006*** (0.001)	0.003*** (0.001)	-0.001 (0.001)	0.004*** (0.001)	0.004*** (0.001)
(e) $DECLINE_{it}$	-0.016*** (0.0004)	-0.016*** (0.003)	-0.014*** (0.004)	-0.015*** (0.004)	-0.021*** (0.006)	-0.020*** (0.004)	-0.010** (0.004)
(f) $DECLINE_{it} \times DI\_TIME_i$		-0.002 (0.003)	-0.003 (0.005)	-0.002 (0.004)	0.005 (0.006)	0.002 (0.004)	-0.007 (0.005)
(g) $DECLINE_{it} \times DI\_TIME_i^2$		0.0006 (0.0008)	0.001 (0.001)	0.001 (0.001)	-0.001 (0.002)	-0.0004 (0.0011)	0.002 (0.002)
(h) $DECLINE_{it} \times DI\_TIME_i^3$		-0.0001 (0.0001)	0.0001 (0.0001)	-0.0001 (0.0001)	-0.0001 (0.0001)	0.00003 (0.00009)	-0.0002 (0.0001)
p-value on joint test that $DI\_TIME_i$ affects $SHIFT_{it}$ [i.e., (b)=(c)=(d)]		<0.01	<0.01	<0.01	0.10	<0.01	<0.01
p-value on joint test that $DI\_TIME_i$ affects $DECLINE_{it}$ [i.e., (f)=(g)=(h)]		0.50	0.84	0.44	0.72	0.43	0.28
R-squared	0.347	0.358	0.348	0.360	0.355	0.356	0.359
Observations	930,500	930,500	314,020	403,960	212,520	406,220	418,700

*Notes:* \*\* denotes  $p < 0.05$ , \*\*\* denotes  $p < 0.01$ . Employment is defined as earning more than 1996 SGA (\$8,908). For terminated beneficiaries, the dummy variable  $SHIFT_{it}$  equals one for years  $t \geq 1998$ , while  $DECLINE_{it}$  is a dummy variable that equals  $t - 1999$  for years  $t \geq 2000$ . The variable  $DI\_TIME_i$  measures the months on DI prior to January 1997. Other covariates include a binary variable identifying terminated beneficiaries, a full set of year dummy variables, the interaction of these variables for years 1989-1994 and 1996-1997, sex-specific cubic functions in age, and controls for individuals' demographic, health, program history and work history characteristics. The reference year is 1995. Standard errors are in parentheses and allow for within-person correlation in errors.

# Web Appendix for: “The Employment Effects of Terminating Disability Benefits”

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- A1. Data sources
- A2. Main data issues
- A3. Estimating the employment effects using different controls and specifications
- A4. Estimates of the earnings effects
- A5. Adding to the terminated group using rare termination codes
- A6. Examining whether highest earnings occurs before or after termination
- A7. Termination rates for the subsamples used in the heterogeneity analysis
- A8. Further examination of heterogeneity in employment effects
- A9. Assessing the characterization of the employment response
- A10. Exit rates for DI beneficiaries on the DA&A program prior to the terminations
- A11. Examining the role of time on DI in additional subsamples
- A12. Do beneficiary cohort effects explain the differences by time on DI?
- A13. Additional references



## **A1. Data Sources**

Six extracts of Social Security Administration datasets are used for this project: (1) the Supplemental Security Record – DA&A Extract; (2) the Supplemental Security Record – Longitudinal File; (3) the Master Beneficiary Record – 810 File; (4) the Disability Master File (831 File); (5) the Numident File; and (6) the Master Earnings File. More details about each of these datasets are provided here, including additional references for those wanting more information.

The *Supplemental Security Record – DA&A Extracts* are from the Supplemental Security Record, the system used to manage the SSI program, and include information on all recipients identified as having alcohol or drug addictions. These extracts were produced every three months in 1996, and the March and June 1996 extracts were obtained for this project. They provide snapshots of recent program activity and have been used by Barber (1996), Stapleton et al. (1998), and Waid and Barber (2001) to count and describe DA&A beneficiaries.

The *Supplemental Security Record – Longitudinal File (SSR)* and *Master Beneficiary Record – 810 File (MBR)* provide details of individuals' program history for, respectively, SSI and DI. The MBR also provides information on an individual's usage of Retirement and Survivor's Insurance. Both files include information on each individual's monthly program status and the federal payments due. A description of the SSR is provided by Pickett and Scott (1996), and documentation on both datasets is provided by the data linkage projects of SSA and the National Center for Health Statistics.

The *Disability Master File / 831 File* includes details about medical disability determinations; the "831" name refers to the form from which much of the information comes. A record is generated whenever an initial determination is made by state-level Disability Determination Services (DDS), and additional records are generated for subsequent decisions, corrections, and reviews conducted by DDS offices. Higher-level decisions, such as those made by Administrative Law Judges, are handled by a different part of SSA and are normally missing from the 831 File. Chen and van der Klaauw (2006) provide some details about the variables listed in the 831 File. Consistent extracts of the 831 File are available from 1989 and education information is reliable from 1992. Given that most DA&A beneficiaries applied after 1991 and most applied to be re-classified in 1996, education is available for nearly the whole sample.

The *Numident File* contains the records of all individuals who have applied for Social Security cards, and is updated whenever changes are made to Social Security cards and when deaths are reported to SSA. It includes information on individuals' date and place of birth.

The *Master Earnings File* contains earnings data used to calculate amounts for SSA benefit payments which comes from employers and the Internal Revenue Service. The extract used for this project lists annual wage (W-2) and self-employment earnings for individuals from 1978 to 2008. Olsen and Hudson (2009) provide an overview of the Master Earnings File, while Kopschuk, Saez and Song (2009) provide additional information about the quality of these data. There is a Social Security earnings cap above which earnings do not affect Social Security calculations, and the key issue with these data is the quality of earnings data above this cap. SSA retained information on uncapped W-2 earnings for the first time in 1978, and Kopeczuk et al. (2009) find these data to be reliable from 1981. Self-employment earnings are not used as they are less reliable and were effectively top-coded at the taxable maximum until 1993 (when the cap on the Medicare tax was eliminated) (Olsen and Hudson, 2009).

## **A2. Main Data Issues**

*Data Cleaning.* Records with missing sex, date of birth and state of residence information are excluded. Addiction information was missing in around eight percent of cases. These cases were omitted, as it was not completely clear whether this group included some beneficiaries whose drug and alcohol addiction was not material in their original application for disability benefits. A small number of values in the Master Earnings File were unusually large, were inconsistent with SSA program usage, and were obviously reporting errors. To remove these errors, 65 individuals who had W-2 earnings that would have put them in the top one percent of households in terms of income were removed; these earnings levels are taken from Piketty and Saez (2003) and updates that Saez provides on his website (<http://elsa.berkeley.edu/~saez/>).

*Sample Restrictions.* The key sample restrictions are mentioned in the text: (1) individuals aged between 30 and 61 years of age at the beginning of 1997; (2) who started to receive payments between 1<sup>st</sup> January 1989 and 1<sup>st</sup> April 1996; (3) who were in current payment status in the second quarter of 1996 (to remove individuals who had died or left the program before the end of the DA&A program was announced); (4) and who were due at least half of the standard SSI payment in the second quarter of 1996, which is also the minimum payment for

most DI beneficiaries and is used to remove individuals in unusual payment situations (e.g., who were repaying large DI overpayments).

Note that these restrictions do not exclude individuals who responded to the policy change prior to termination of benefits in January 1997. Individuals earning at levels that reduced their disability benefits or who no longer adhered to DI program conditions in the second half of 1996 were still included in the sample. Around three percent of the sample had program status codes in the second half of 1996 that indicated they were earning at levels that limited the disability benefits they received. These individuals were generally assigned program codes in January 1997 that indicated they had been terminated as a result of the policy change.

*Identifying Terminated and Reclassified Beneficiaries.* I identify terminated and reclassified beneficiaries using payment information and program status codes. A person is considered to have been reclassified if, in January 1997, he or she received DI payments and was in current payment status. A person is considered to have been terminated as a result of the policy if, in January 1997, he or she was due no payments and had a “disability cessation” program status code (the relevant program status codes are N07 in the SSR and T8 in the MBR). This was in line with the memorandum below. This code is rarely assigned; tabulations of the raw Master Beneficiary Record file show that there were 23,295 individuals assigned the disability cessation code in January 1997, compared to a monthly average of 53 people throughout 1996. Therefore the terminated group should include very few individuals who would have been assigned this code because of disability cessation unrelated to the policy change.

Approximately nine percent of the sample is neither clearly reclassified nor terminated as a result of the policy. This group is probably a mix of reclassified beneficiaries with an unusual payment status in January 1997, individuals losing benefits for reasons unrelated to the policy change, or terminated beneficiaries who were assigned a rare termination code instead of the T8 code. The use of rare codes does increase in January 1997, suggesting some staff may have been unclear on the correct administrative procedures for this one-off policy change. Counting these individuals as terminated leads to similar estimates to those presented in the paper, as shown in Section A6 of this appendix.

## Exhibit A1 Example of Memos to Social Security Offices

STATE OF CALIFORNIA—HEALTH AND WELFARE AGENCY PETE WILSON, Governor

### DEPARTMENT OF SOCIAL SERVICES

744 P Street, Sacramento, California 95814



August 8, 1997

ALL COUNTY LETTER NO. 97-43

TO: ALL COUNTY WELFARE DIRECTORS

#### REASON FOR THIS TRANSMITTAL

- State Law Change
- Federal Law or Regulation Change
- Court Order or Settlement Agreement
- Clarification Requested by One or More Counties
- Initiated by CDSS

SUBJECT: PROCESSING OF TERMINATED SUPPLEMENTAL SECURITY INCOME/STATE SUPPLEMENTARY PAYMENT (SSI/SSP) AND SOCIAL SECURITY DISABILITY INSURANCE (SSDI) CASH BENEFITS TO IN-HOME SUPPORTIVE SERVICES (IHSS) RECIPIENTS BASED ON NO LONGER DISABLED, INCLUDING DRUG ADDICTION AND/OR ALCOHOLISM (DA&A)

The purpose of this All County Letter (ACL) is to provide information to counties on terminating and referring IHSS recipients whose SSI/SSP or SSDI benefits were terminated because they are "no longer disabled". This includes situations where DA&A was determined to be material to the applicant's disabling condition.

#### BACKGROUND

The Social Security Independence and Program Improvement Act of 1994 (Public Law 103-296 effective March 1, 1995) stated a diagnosis of DA&A means that the drug addiction or alcoholism is a contributing factor material to the finding of disability and that the individual would not be found disabled if the person discontinued using drugs or alcohol. A new law, the Contract with America Advancement Act of 1996 (Public Law 104-121, effective March 29, 1996), prohibits SSDI and SSI/SSP disability benefits to people who are disabled because of DA&A. This provision was effective immediately for persons who file for benefits or whose cases were finally adjudicated on or after that date.

#### PERSONAL CARE SERVICES PROGRAM (PCSP) ELIGIBILITY

Persons receiving SSI/SSP disability benefits based on DA&A may have had their cash benefits terminated on December 31, 1996. The last regular monthly SSI/SSP check would have been dated November 29, 1996. Counties should immediately begin a review of IHSS eligibility, for those persons who have lost SSI/SSP eligibility.

If a former (no longer disabled) SSI/SSP recipient's cash benefits ended December 31, 1996, the person may be able to continue receiving benefits until a decision is made on their case. This would occur if he/she appealed their Social Security Administration (SSA) notice of termination for SSI/SSP, and has not received a final decision. A decision becomes final when an individual does not or cannot appeal the SSI/SSP decision any further. The period for filing an appeal must have ended.

In cases where SSA's initial disability determination was based on DA&A and the final decision did not find the applicant disabled, the counties should proceed in accordance with current regulations. If the recipient files a request for a state hearing prior to the effective date of any resultant notice of action, IHSS shall be continued.

To assist the counties in identifying those SSI/SSP recipients affected by this law change, we have developed a report from the SSA's State Data Exchange (SDX) via the Medi-Cal Eligibility Data System (MEDS). The report will include all IHSS recipients who have been terminated from SSI/SSP because they are "no longer disabled" (MEDS Payment Status Code N07 from the SDX). The report is sorted by county, district office, and social service worker number. Each recipient will be identified by name, case number, social security number, and aid code. County staff must contact the affected recipients or SSA to verify SSI eligibility status before terminating IHSS.

Counties will initially receive monthly reports covering the periods of December 31, 1996 through February 28, 1997. We expect to distribute the report to the counties during the second week of August. Thereafter, an SSI/SSP Eligibility Status Report showing all SSI/SSP terminations will be distributed to counties on a monthly basis to identify impacted IHSS Status Eligible recipients.

#### IHSS INCOME ELIGIBILITY

For IHSS income eligible recipients who may be affected by this law change, counties should identify these persons at their annual reassessment or at a medical reexamination, whichever is earlier. Counties can identify the Income Eligible DA&A cases by specific information on the most recent MC221, Disability Determination and Transmittal form, or the State Programs-Disability and Adult Programs Division (SP-DAPD) attachment to the MC221 in each recipient's case:

To identify most DA&A cases, counties will need to look for the following information on the MC 221:

- Item 13 will have the box "Is Disabled" checked;
- Item 14 will have "Reg-Basis Code" of A61, A62, or A63;
- Item 15 will include a diagnosis of Alcoholism, Substance Abuse or Addiction, or Drug Abuse or addiction. Counties should be aware that this item also includes non DA&A diagnoses such as pancreatitis, personality disorder, and low back pain.
- Item 16 will usually show a listing of 12.09 if the "Reg-Basis Code" is A61.
- Item 16 may show a listing number of 12.09 if the "Reg-Basis Code" is A62.
- Item 16 will be blank if the "Reg-Basis Code" is other than A61 or A62.

These examples are not all inclusive. If there is a diagnosis of drug abuse or alcoholism annotated on the MC 221, a new disability packet must be completed, and forwarded to SP-DAPD before any action is taken.

#### NOTICE OF ACTION

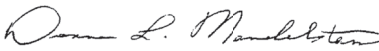
For all IHSS recipients found to be no longer disabled, counties will deny the application or stop benefits using the following NOA code:

- 440 You are not 65 or older, blind or so disabled that you cannot be expected to be able to work at any job for the next 12 months. 20 CFR Part 416 Subparts H & I and MPP 30-771.

Normal appeal and new application procedures would apply to any DA&A recipient who disagrees with the termination decision.

Please call me at (916) 657-2265 or Angela Duromola of the Adult Services Management Branch at (916) 229-4594 if you have any questions regarding this ACL.

Sincerely,

  
DONNA L. MANDELSTAM  
Deputy Director  
Disability and Adult Programs Division

Notes: This and other memos are at: <http://www.dhcs.ca.gov/services/medi-cal/eligibility/Pages/1996ACWDLs.aspx>.

### A3. Estimating the Employment Effects using Different Controls and Specifications

In Figure 4 of the paper I show estimates of terminated beneficiaries' annual probabilities of employment relative to reclassified beneficiaries using the linear probability model described by equation (1). In this section, these results are provided in tabular form, together with results using different controls and a logit specification.

Table A1 shows, using different specifications, the  $\beta_0$  coefficient on the dummy variable identifying permanent differences in employment between terminated and reclassified beneficiaries and the 19  $\beta_t$  coefficients that measure the annual differences in the probability of employment of terminated and reclassified beneficiaries, relative to 1995 (the year before the policy change was announced). The first set of coefficients, presented in Column 1, comes from a specification where the vector of time-varying individual characteristics  $X_{it}$  includes two sex-specific cubic functions in age. In the paper, these coefficients are shown in the dashed line in Figure 4 (labeled "initial model").

The results from adding more time-invariant individual characteristics to the regression are presented in Columns 2 to 5 of Table A1. In turn, I add controls for individuals' demographic characteristics (race, sex, state of residence, age at termination); health characteristics (primary disability, addiction type); their DI program activity (year applied, year started DI, level at which benefits were awarded); and their work history (combination of years employed for the five years before applying for DI). The coefficients in Column 5 of Table A1 are shown by a bold line in Figure 4 in the paper (labeled "with extra controls").

In a difference-in-differences context, the advantage of the linear probability model relative to a logit or probit model is that common unobservable trends between treated and comparison groups are differenced out. However, these alternative models better approximate the statistical properties of a binary variable, so I analyze the employment effects with a logit specification of the following form:

$$P[y_{it} = 1] = \exp(W_{it}\gamma) / [1 + \exp(W_{it}\gamma)] \quad (A1)$$

$$\text{Where } W_{it}\gamma = \alpha + \theta_t + X_{it}\lambda + TERM_i\beta_0 + \sum_{\substack{t=1989 \\ t \neq 1995}}^{2008} D_t * TERM_i\beta_t.$$

The notation is similar to the linear probability model, which is given by equation (1) in the paper: the dummy variable  $y_{it}$  is equal to one if earnings are above the 1996 annualized SGA level; the constant is represented by  $\alpha$ ; a complete set of time fixed effects is represented by  $\theta_t$ ;

the vector  $X_{it}$  represents time-varying individual characteristics and includes two sex-specific cubic functions in age; the dummy variable identifying terminated beneficiaries is represented by  $TERM_i$ ; and time-varying differences between terminated and reclassified beneficiaries are identified by the interaction of  $TERM_i$  with time dummy variables  $D_t$ . As with the linear probability model, the reference year is 1995 and standard errors are estimated allowing for heteroskedasticity and an arbitrary correlation in errors at the individual level. The coefficients are expressed as marginal effects using the double differences in the estimated probabilities when each dummy variable equals one as compared to when it is zero (Ai and Norton, 2003). Standard errors are calculated using the delta method.

The logit results are presented in Column 6 of Table A1, and are most directly comparable to the Column 1 results. The results are similar across the two columns: the annual employment differences are generally one percentage point or less in the pre-treatment period of 1989 to 1994; the relative employment of terminated beneficiaries' rises once the terminations occurred and peaks at 22.8 percentage points in 1999 (in both the logit and linear probability model specifications); and the employment differences then decline to 8.8 percentage points in 2008. In the logit analysis, the standard error of each coefficient is 0.4 percentage points or less.

**Table A1** Estimates of Terminated Beneficiaries' Relative Probabilities of Employment Based on Annual Earnings > 1996 Substantial Gainful Activity (\$8,908 in 2013 Dollars)

	Lin. Prob. Model (1)	+ Demog. Controls (2)	+ Disability Status (3)	+ DI History (4)	+ Work History (5)	Logit Model (6)
$TERMINATED_i$	0.021*** (0.002)	0.019*** (0.002)	0.017*** (0.002)	0.011*** (0.002)	0.004 (0.003)	0.023*** (0.001)
$TERMINATED_i \times$						
1989	-0.004 (0.005)	-0.004 (0.005)	-0.004 (0.005)	-0.003 (0.005)	-0.003 (0.005)	-0.017*** (0.004)
1990	0.004 (0.005)	0.004 (0.005)	0.004 (0.005)	0.005 (0.005)	0.005 (0.005)	-0.009*** (0.003)
1991	0.008 (0.004)	0.008 (0.004)	0.008 (0.004)	0.009 (0.004)	0.009** (0.004)	-0.003 (0.003)
1992	0.007 (0.004)	0.006 (0.004)	0.007 (0.004)	0.007 (0.004)	0.007 (0.004)	-0.002 (0.003)
1993	0.010*** (0.003)	0.010*** (0.003)	0.010*** (0.003)	0.010*** (0.003)	0.011*** (0.003)	0.004 (0.002)
1994	0.0004 (0.002)	0.0004 (0.002)	0.0004 (0.002)	0.001 (0.003)	0.001 (0.003)	-0.002 (0.002)
1996	0.032*** (0.002)	0.032*** (0.002)	0.032*** (0.002)	0.032*** (0.002)	0.032*** (0.002)	0.034*** (0.002)
1997	0.178*** (0.003)	0.178*** (0.003)	0.178*** (0.003)	0.177*** (0.003)	0.177*** (0.003)	0.179*** (0.002)
1998	0.219*** (0.004)	0.219*** (0.004)	0.219*** (0.004)	0.218*** (0.004)	0.218*** (0.004)	0.219*** (0.002)
1999	0.228*** (0.004)	0.228*** (0.004)	0.227*** (0.004)	0.227*** (0.004)	0.226*** (0.004)	0.228*** (0.002)
2000	0.225*** (0.004)	0.225*** (0.004)	0.225*** (0.004)	0.224*** (0.004)	0.224*** (0.004)	0.226*** (0.002)
2001	0.193*** (0.004)	0.193*** (0.004)	0.193*** (0.004)	0.192*** (0.004)	0.191*** (0.004)	0.194*** (0.002)
2002	0.163*** (0.004)	0.163*** (0.004)	0.162*** (0.004)	0.161*** (0.004)	0.161*** (0.004)	0.165*** (0.002)
2003	0.138*** (0.003)	0.138*** (0.003)	0.138*** (0.003)	0.137*** (0.003)	0.136*** (0.003)	0.142*** (0.002)
2004	0.130*** (0.003)	0.130*** (0.003)	0.130*** (0.003)	0.128*** (0.003)	0.127*** (0.003)	0.134*** (0.002)
2005	0.121*** (0.003)	0.121*** (0.003)	0.121*** (0.003)	0.119*** (0.003)	0.118*** (0.003)	0.126*** (0.002)
2006	0.112*** (0.003)	0.112*** (0.003)	0.112*** (0.003)	0.110*** (0.003)	0.109*** (0.003)	0.117*** (0.002)
2007	0.100*** (0.003)	0.100*** (0.003)	0.100*** (0.003)	0.098*** (0.003)	0.096*** (0.003)	0.106*** (0.002)
2008	0.088*** (0.003)	0.088*** (0.003)	0.088*** (0.003)	0.086*** (0.003)	0.084*** (0.003)	0.095*** (0.002)
R-sq.	0.127	0.132	0.151	0.235	0.322	--

*Notes:* \*\* denotes  $p < 0.05$ , \*\*\* denotes  $p < 0.01$ . Regression details are provided in the text above. All regressions have 930,500 observations.



#### **A4. Estimates of the Earnings Effects**

In the paper, I provide a number of employment measures in addition to the annualized 1996 SGA threshold. Below, in Table A2, I estimate the earnings effects. These estimates are generated using equation (1) from the paper, in the same way as is used to produce the main employment estimates (i.e., the bold line in Figure 4). These coefficients should be consistent, although because the data is skewed and non-normal it is difficult to assess statistical significance. As discussed in the paper, the large number of individuals without earnings in some years makes corrections like taking the natural logarithm of earnings or adjusting for sample selection sensitive to particular choices. Qualitatively, the coefficients show a similar pattern to those generated using employment outcomes: there are similar pre-treatment trends and a large post-termination response that declines beyond the year 2000.

**Table A2** Estimates of Terminated Beneficiaries' Relative Earnings

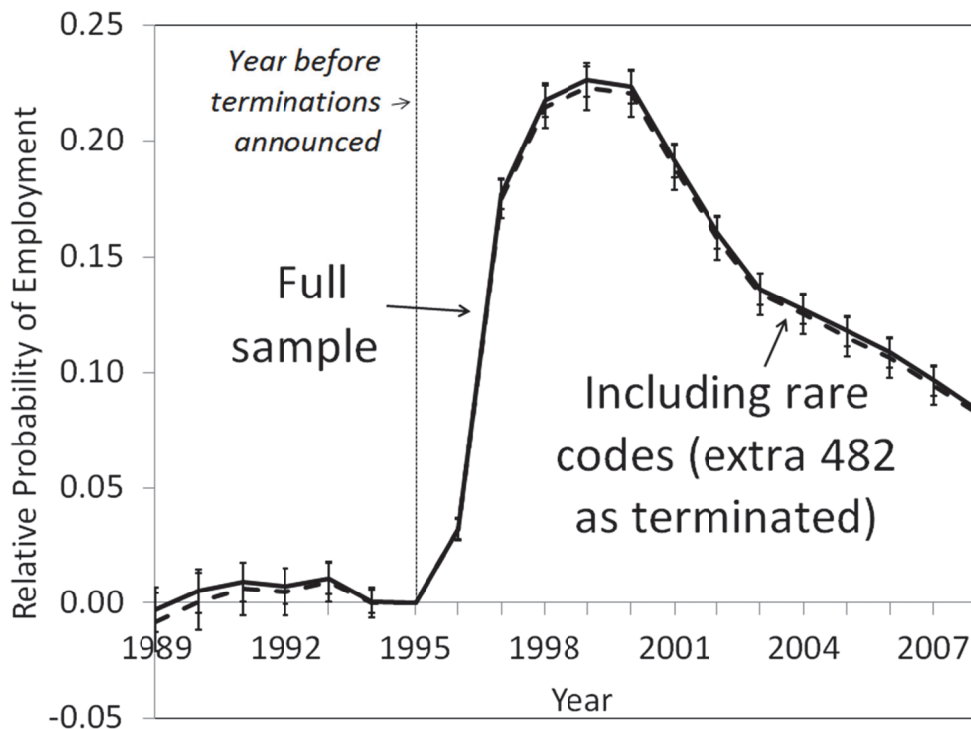
	Earnings used Directly (2)
<i>TERMINATED<sub>i</sub></i>	203 (268)
<i>TERMINATED<sub>i</sub> x</i>	
1989	-137 (140)
1990	70.7 (129)
1991	268 (114)
1992	236 (97.5)
1993	261 (75.5)
1994	73.0 (48.0)
	--
1996	696 (39.6)
1997	3823*** (67.2)
1998	5063*** (82.5)
1999	5451*** (91.8)
2000	5646*** (99.6)
2001	4991*** (102)
2002	4317*** (101)
2003	3827*** (101)
2004	3600*** (102)
2005	3354*** (102)
2006	3176*** (101)
2007	2876*** (101)
2008	2485*** (98.4)
R-sq.	0.402

*Notes:* \*\* denotes  $p < 0.05$ , \*\*\* denotes  $p < 0.01$ . Standard errors are in parentheses and allow for within-person correlation in errors. The regression is as described for Figure 4 and has 930,500 observations.

### A5. Adding to the Terminated Group using Rare Termination Codes

A wide variety of program status codes are used to manage SSA programs. As discussed in Section A2, I focus on the “current pay” status to identify the reclassified group and the “no longer disabled” status to identify the terminated group. A broader set of suspension/termination codes experience a jump in January 1997, suggesting some staff were unsure about what status to use after the terminations occurred. The relevant “Ledger Account File” codes are S6 (for better address), S7 (prisoner suspension; suspension because of extended trial work period; or suspension for refusing Vocational Rehabilitation Services); S8 (payee not determined); S9 (all other suspension reasons not specifically defined); and T9 (all other termination reasons). There are 482 individuals with these program status codes in January 1997 who did not receive any program payments. As shown in Figure A1, adding these individuals to the terminated group (who have a T8 program status code) does not change the size of the employment effects.

**Figure A1** Employment Effects When Including Individuals with Rare Termination Codes



*Notes:* The bold line is the same one presented in Figure 4; see the notes for that figure for details. The dashed line shows coefficients from the same regression for a sample where individuals with rare termination codes are defined as terminated (instead of omitted from the analysis). The relevant DI program status codes are now S6, S7, S8, S9, T8 and T9. There are 940,120 observations in this regression.

## A6. Examining Whether Highest Earnings Occurs Before or After Termination

**Table A3** Fraction of Beneficiaries with Their Highest Earnings Year after Termination

	Reclassified		Terminated		Terminated Beneficiaries with a year of Earnings > 1996 SGA during:							
	Number (1)	Fraction (2)	Number (3)	Fraction (4)	Number (5)	Fraction (6)	Number (7)	Fraction (8)	Number (9)	Fraction (10)	Number (11)	Fraction (12)
All	27,296	6.45%	19,229	30.2%	10,531	53.0%	8,998	54.6%	6,908	61.4%	4,883	66.4%
<i>Sex</i>												
Males	21,419	5.91%	15,712	29.1%	8,452	52.1%	7,251	53.6%	5,470	60.2%	3,825	65.4%
Females	5,877	8.44%	3,517	34.9%	2,079	56.9%	1,747	58.7%	1,438	66.0%	1,058	69.9%
<i>Age at termination</i>												
30-39 years	8,136	11.6%	7,565	40.8%	4,927	60.8%	4,182	62.5%	3,308	69.7%	2,523	73.3%
40-49 years	11,305	5.33%	8,893	26.0%	4,633	47.7%	3,958	49.5%	3,028	55.4%	2,061	60.1%
50-61 years	7,855	2.76%	2,771	14.8%	971	38.7%	858	39.7%	572	45.3%	299	51.5%
<i>Ave. earnings 3-5 years before applying for DI</i>												
Earnings ≤ 0.5 SGA	8,425	9.78%	5,632	37.1%	2,585	72.8%	2,128	74.1%	1,587	80.0%	1,137	82.1%
0.5 SGA < Earnings ≤ SGA	5,704	7.40%	4,480	36.1%	2,478	64.7%	2,098	66.3%	1,599	74.0%	1,087	80.7%
Earnings > 1996 SGA	13,167	3.92%	9,117	23.0%	5,468	38.4%	4,772	40.7%	3,722	48.1%	2,659	53.9%
<i>State unemployment rate in 1997 and 1998</i>												
Ave. unemp. < 4.5%	10,143	6.82%	6,840	31.7%	3,920	52.9%	3,427	54.2%	2,475	61.8%	1,676	66.0%
4.5% ≤ Ave. unemp. ≤ 5.5%	9,057	5.65%	6,767	29.7%	3,742	51.8%	3,233	53.1%	2,457	60.2%	1,742	64.7%
Ave. unemp. > 5.5%	8,096	6.89%	5,622	28.9%	2,869	54.9%	2,338	57.1%	1,976	62.4%	1,465	68.9%
<i>Type of addiction</i>												
Alcohol only	16,918	5.17%	10,323	27.3%	5,122	52.4%	4,385	54.0%	3,272	60.9%	2,189	66.6%
Alcohol and drugs	3,801	9.05%	3,141	33.4%	1,893	54.0%	1,587	55.5%	1,246	62.6%	949	66.0%
Drugs only	6,577	8.27%	5,765	33.6%	3,516	53.5%	3,026	54.9%	2,390	61.5%	1,745	66.5%

*Notes:* The highest earnings year occurs after termination if an individual's maximum annual earnings during 1996 to 2008 are higher than his or her maximum annual earnings while on DI and for the eight years before applying for DI.

**Table A3** Fraction of Beneficiaries with Their Highest Earnings Year after Termination (Continued)

	Reclassified		Terminated		Terminated Beneficiaries with a year of Earnings > 1996 SGA during:							
	Number (1)	Fraction (2)	Number (3)	Fraction (4)	1996-2008		1996-2000		2001-2004		2005-2008	
					Number (5)	Fraction (6)	Number (7)	Fraction (8)	Number (9)	Fraction (10)	Number (11)	Fraction (12)
All	27,296	6.45%	19,229	30.2%	10,531	53.0%	8,998	54.6%	6,908	61.4%	4,883	66.4%
<i>Primary disability when applying for DI</i>												
Alcohol/drug addiction	10,308	6.80%	11,148	31.0%	6,342	52.6%	5,421	54.1%	4,201	61.2%	3,032	66.2%
Mental disorders	7,895	7.31%	3,542	31.0%	1,945	54.0%	1,675	55.7%	1,255	61.4%	878	66.3%
Musculoskeletal cond.	4,578	5.42%	2,412	29.0%	1,256	54.2%	1,075	55.8%	837	61.6%	567	65.4%
Other disabilities	4,515	5.23%	2,127	26.0%	988	52.7%	827	53.9%	615	62.4%	406	70.0%
<i>Race</i>												
White	16,792	5.46%	10,091	27.8%	5,153	51.7%	4,414	53.4%	3,238	60.3%	2,194	65.2%
Black	8,019	8.12%	7,404	33.1%	4,486	53.3%	3,842	54.8%	3,073	61.2%	2,256	66.2%
Other race	2,082	7.83%	1,538	31.9%	788	60.3%	654	61.0%	522	70.1%	381	75.6%
<i>Educational attainment</i>												
<12 years	10,594	5.72%	7,035	30.8%	3,732	55.6%	3,165	57.3%	2,401	64.4%	1,655	70.1%
12 years	9,798	6.98%	7,036	29.7%	3,919	51.5%	3,375	52.9%	2,615	60.0%	1,848	64.0%
>12 years	2,713	6.75%	1,886	29.1%	1,094	48.2%	959	50.3%	732	56.4%	527	61.3%
<i>SSI receipt</i>												
Only received DI	3,538	4.69%	2,112	22.2%	1,059	42.1%	914	44.0%	730	48.9%	510	53.9%
Initially received SSI	12,672	5.04%	10,134	25.9%	5,723	44.6%	4,982	46.4%	3,747	53.2%	2,642	58.0%
Concurrently had SSI & DI	10,996	8.66%	6,983	38.8%	3,749	69.0%	3,102	70.8%	2,431	77.8%	1,731	82.9%
<i>Allowance level</i>												
Initial award	10,498	7.07%	9,813	31.4%	5,657	52.8%	4,852	54.0%	3,679	61.1%	2,598	66.6%
Reconsideration award	3,087	6.25%	2,192	28.5%	1,195	50.5%	1,005	52.1%	790	58.4%	549	62.3%
Hearings award	13,711	6.03%	7,224	29.0%	3,679	54.3%	3,141	56.3%	2,439	62.8%	1,736	67.5%

Notes: The highest earnings year occurs after termination if an individual's maximum annual earnings during 1996 to 2008 are higher than his or her maximum annual earnings while on DI and for the eight years before applying for DI.

## A7. Termination Rates for the Subsamples used in the Heterogeneity Analysis

**Table A4** Sample Sizes and Termination Rates for Different Subsamples

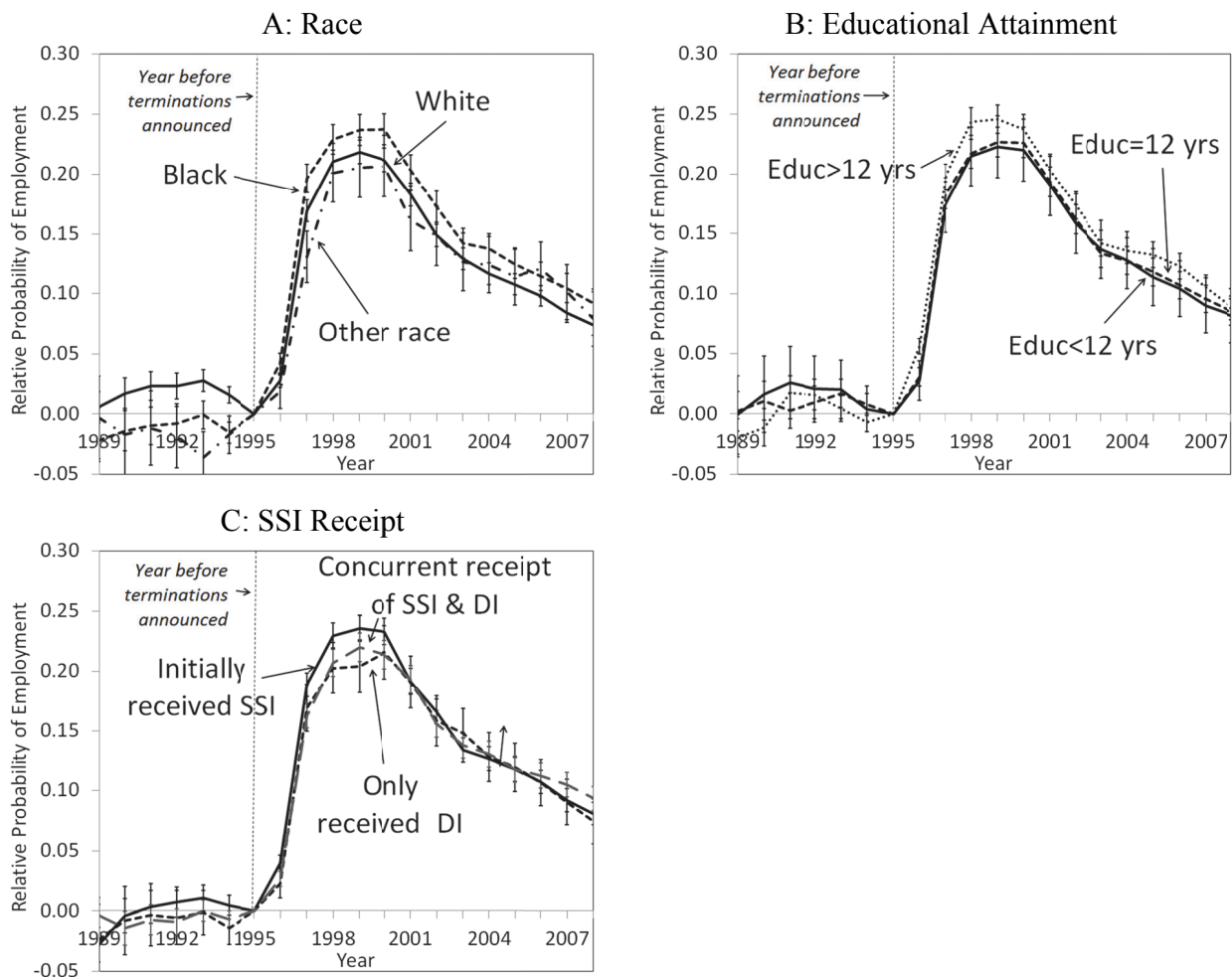
Category	Subcategories	Sample sizes (1)	Termination Rate (2)
All	Full sample	930,500	41.3%
Sex	Males	742,620	42.3%
	Females	187,880	37.4%
Age at termination	30-39 years	314,020	48.2%
	40-49 years	403,960	44.0%
	50-61 years	212,520	26.1%
Ave. earnings 3-5 years before applying for DI	Earnings $\leq 0.5 \times 1996$ SGA	265,960	41.1%
	$0.5 \times 1996$ SGA < Earnings $\leq 1996$ SGA	203,680	44.0%
	Ave. earnings > 1996 SGA	460,860	40.3%
State unemployment rate in 1997 and 1998	Ave. unemp. < 4.5%	339,660	40.3%
	$4.5\% \leq$ Ave. unemp. $\leq 5.5\%$	316,480	42.8%
	Ave. unemp. > 5.5%	274,360	41.0%
Primary disability when applying for DI	Alcohol/drug addiction	429,120	52.0%
	Mental disorders	228,740	31.0%
	Musculoskeletal condition	139,800	34.5%
	Other disabilities	132,840	32.0%
Type of addiction	Alcohol only	544,820	37.9%
	Alcohol and drugs	246,840	46.7%
	Drugs only	138,840	45.2
Race	White	537,660	37.5%
	Black	308,460	48.0%
	Other race	72,400	42.5%
Educational attainment	<12 years	352,580	39.9%
	12 years	336,680	41.8%
	>12 years	91,980	41.0%
SSI receipt	Only received DI	113,000	37.4%
	Initially received SSI	457,920	44.3%
	Concurrently received SSI & DI	359,580	38.8%
Allowance level	Initial award	406,220	48.3%
	Reconsideration	105,580	41.5%
	Hearings award	418,700	34.5%

*Notes:* Samples sizes only include individuals in the terminated and reclassified groups, rather than those whose status in relationship to the policy change was ambiguous. The number of individuals in each group is equal to the sample divided by 20.

## A8. Further Examination of Heterogeneity in the Employment Effects

The panels below in Figure A2 provide additional information to Figure 6 on how the employment effects vary for different subsamples. They are estimated in the same way. For these groups, Tables A3 and A4 also provide information about their sample sizes, highest earnings years and terminations rates.

**Figure A2** Employment Effects for More Subsamples



*Notes:* Each figure shows regression coefficients (and 95 percent confidence intervals) from interactions between a binary variable identifying terminated beneficiaries and year dummy variables. Employment is based on 1996 SGA (\$8,908); regression details are as described for Figure 4. Sample sizes and reclassification rates are provided in Table A3.

### A9. Assessing the Characterization of the Employment Response

In this section, I vary the definitions of the key variables in order to test the sensitivity of using equation (3) to define the employment effects. Table A5 presents results where  $SHIFT_{it}$ , the variable used to measure the peak employment from 1998 through to 2000, is started one year earlier and one year later, and where  $TREND_{it}$ , the variable used to measure the decline in employment after 2000, is started one year earlier and one year later. When  $SHIFT_{it}$  is defined one year earlier, the interaction on  $TERM_i$  and the year 1997 dummy variable is dropped; when  $SHIFT_{it}$  is defined one year later, an interaction on  $TERM_i$  and the year 1998 dummy is added.

The respective coefficients are similar in each case. R-squared is highest in the main results and when  $SHIFT_{it}$  is moved a year later. Given the latter specification has one additional variable (i.e., the interaction of  $TERM_i$  and the 1998 dummy), this suggests that the main specification performs reasonably well in explaining the variation in employment outcomes.

**Table A5** Regression Estimates using Different Definitions of  $SHIFT_{it}$  and  $TREND_{it}$

	Main Results (1)	Starting $SHIFT_{it}$ one year earlier (2)	Starting $SHIFT_{it}$ one year later (3)	Starting $TREND_{it}$ one year earlier (4)	Starting $TREND_{it}$ one year later (5)
$SHIFT_{it}$ [Begins 1998]	0.220*** (0.003)			0.231*** (0.003)	0.211*** (0.003)
$SHIFT_{it}$ [Begins 1997]		0.211*** (0.003)			
$SHIFT_{it}$ [Begins 1999]			-0.221*** (0.003)		
$DECLINE_{it}$ [Begins 2001]	-0.016*** (0.0004)	-0.015*** (0.0004)	-0.016*** (0.0004)		
$DECLINE_{it}$ [Begins 2000]				-0.016*** (0.0004)	
$DECLINE_{it}$ [Begins 2002]					-0.018*** (0.0004)
R-squared	0.3472	0.3470	0.3472	0.3471	0.3471

*Notes:* \*\* denotes  $p < 0.05$ , \*\*\* denotes  $p < 0.01$ . Employment is defined as earning more than 1996 SGA (\$8,908). In the main regression, for terminated beneficiaries the dummy variable  $SHIFT_{it}$  equals one for years  $t \geq 1998$ , while  $DECLINE_{it}$  is a dummy variable that equals  $t - 1999$  for years  $t \geq 2000$ . Other covariates include a binary variable identifying terminated beneficiaries, a full set of year dummy variables, the interaction of these variables for years 1989-1994 and 1996-1997, sex-specific cubic functions in age, and controls for individuals' demographic, health, program history and work history characteristics. The reference year is 1995. Standard errors are in parentheses and allow for within-person correlation in errors. Each regression uses 930,500 observations.



## A10. Exit Rates for DI Beneficiaries on the DA&A Program Prior to the Terminations

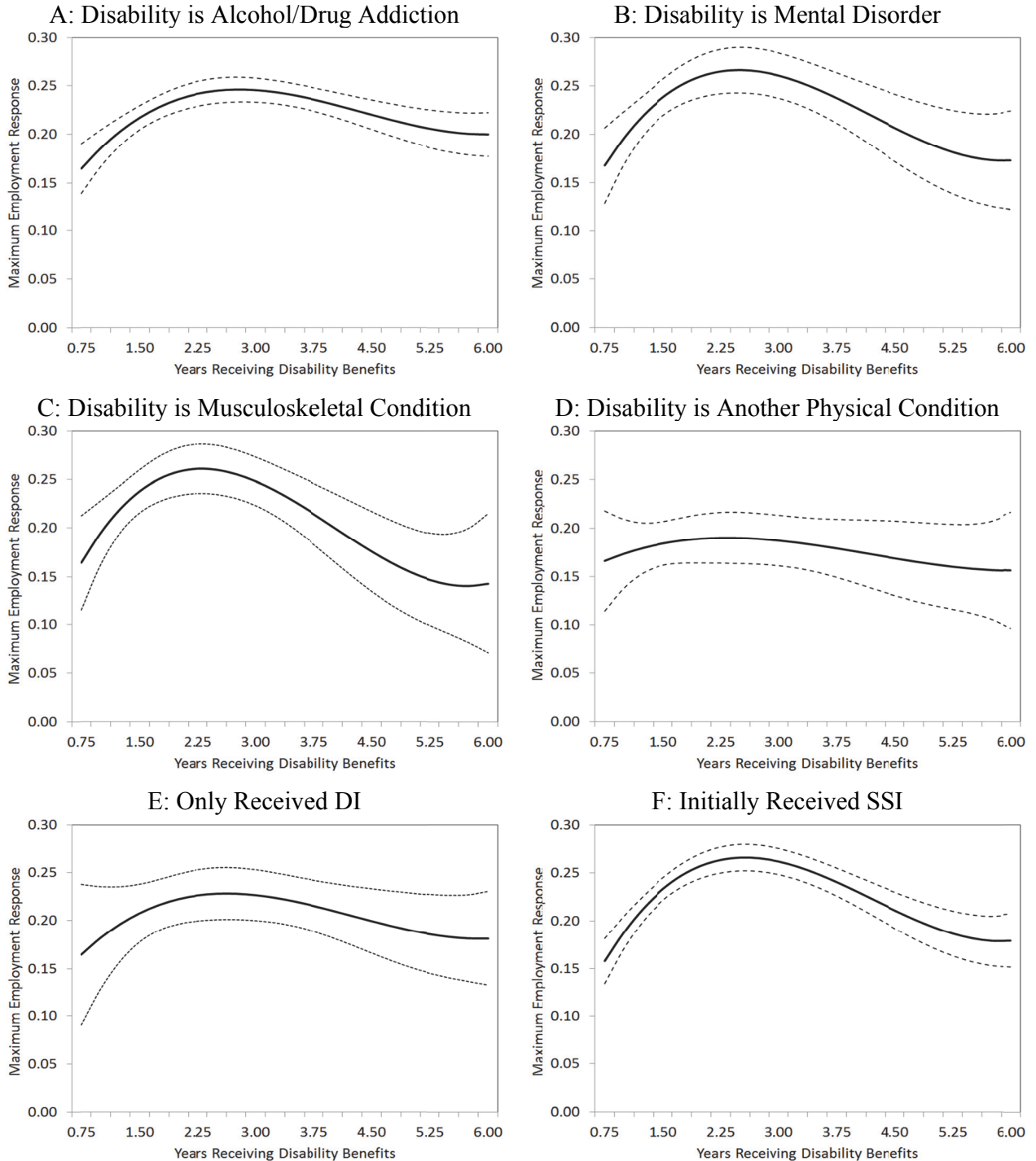
**Table A6** Exits due to Recovery/Medical Disqualification and Death for Different Entry Cohorts

Entering in	Initial number of beneficiaries (1)	Fraction exited due to recovery/ medical disqualification (2)	Fraction died (3)
1989 (7<yrs before terminations≤8)	1,694	5.43%	15.3%
1990 (6<yrs before terminations≤7)	3,088	4.05%	13.2%
1991 (5<yrs before terminations≤6)	4,559	2.46%	10.2%
1992 (4<yrs before terminations≤5)	8,642	2.40%	7.36%
1993 (3<yrs before terminations≤4)	11,628	1.20%	4.41%
1994 (2<yrs before terminations≤3)	12,364	0.40%	2.63%
<i>Aged 40-49 years in 1997</i>			
1989 (7<yrs before terminations≤8)	718	4.87%	16.3%
1990 (6<yrs before terminations≤7)	1,371	4.08%	13.3%
1991 (5<yrs before terminations≤6)	1,937	2.22%	10.3%
1992 (4<yrs before terminations≤5)	3,788	2.14%	7.37%
1993 (3<yrs before terminations≤4)	5,091	0.96%	4.91%
1994 (2<yrs before terminations≤3)	5,204	0.25%	2.59%
<i>Aged 30-39 years in 1997</i>			
1989 (7<yrs before terminations≤8)	400	11.3%	9.25%
1990 (6<yrs before terminations≤7)	749	7.48%	5.61%
1991 (5<yrs before terminations≤6)	1,261	4.60%	5.08%
1992 (4<yrs before terminations≤5)	2,681	4.10%	4.40%
1993 (3<yrs before terminations≤4)	4,093	1.86%	2.49%
1994 (2<yrs before terminations≤3)	4,586	0.72%	1.48%

*Notes:* Beneficiaries were included if they were in current payment status in the first quarter of the year they entered DI (e.g., entrants in 1989 were in current payment status in the first quarter of 1990). There are also 15,479 individuals entering DI in 1995 and 2,395 individuals entering DI in early 1996 who meet this criterion but who cannot be followed for a year or more.

**A11. Examining the role of time on DI in additional subsamples**

**Figure A3** Employment Effects by Time on DI for Different Subsamples



*Notes:* The panels show, for different samples, the post-termination increases in employment (and 95 percent confidence intervals) for different values of  $DI\_TIME_i$ . Each is the combination of the coefficients on  $SHIFT_{it}$  and the interactions between  $SHIFT_{it}$  and  $DI\_TIME_i$ . Sample sizes are provided in Table A4.

### A12. Do Beneficiary Cohort Effects Explain the Differences by Time on DI?

All of the terminations occur in January 1997, making it difficult to separate effects related to time on the program from effects related to differences across beneficiary cohorts. Several exercises are undertaken to determine if the inverted U-shaped relationship between time on DI and the employment effects is due to cohort effects.

This relationship is estimated by combining the coefficients for  $SHIFT_{it}$  and the interactions between  $SHIFT_{it}$  and the cubic terms of  $DI\_TIME_i$ . For reference, the relevant coefficients for the whole sample are presented in Column 1 of Table A7, together with the combined effect of the coefficients  $DI\_TIME_i$  at a value of nine months and at yearly intervals between one and six years. This provides similar information to Column 2 of Table 2 and in Figure 7c in the paper. The next three columns of Table A7 contain results from similar regressions where controls are added or the sample is varied in order to see whether the observed pattern disappears. The first variation is to control for unemployment rates at the time of application. As discussed in the paper, labor market opportunities can potentially affect the decision to apply for disability benefits. To see whether changes in unemployment rates over time can account for the U-shaped pattern, I add separate interactions between  $UNEMP_i$ , the state-level unemployment rates in the year individuals applied for disability benefits, with the variables identifying employment differences between terminated and reclassified beneficiaries throughout the sample period. That is:

$$y_{it} = \alpha + \theta_t + X_{it}\lambda + TERM_i\beta_0 + Z_{it}\varphi_0 + DI\_TIME_i * Z_{it}\varphi_1 + DI\_TIME_i^2 * Z_{it}\varphi_2 + DI\_TIME_i^3 * Z_{it}\varphi_3 + UNEMP_i * Z_{it}\varphi_4 + UNEMP_i^2 * Z_{it}\varphi_5 + UNEMP_i^3 * Z_{it}\varphi_6 + u_{it} \quad (A2)$$

$$\text{As before, } Z_{it}\varphi_{(n)} = \sum_{\substack{t=1989 \\ t \neq 1995}}^{1997} D_t * TERM_i\beta_{(n)t} + SHIFT_{it}\delta_{(n)1} + DECLINE_t\delta_{(n)2}.$$

The results from this regression are presented in Column 2 of Table A7. The three coefficients resulting from the interaction between  $SHIFT_{it}$  and the cubic terms of  $DI\_TIME_i$  are similar in magnitude to the main results and remain statistically significant at the one percent level. The standard error on the  $SHIFT_{it}$  coefficient is larger and it is no longer statistically significant at conventional levels; as a result, the differences in employment at different values of  $DI\_TIME_i$  are not statistically significant at conventional levels. The U-shaped relationship is present in the point estimates, however, and the interactions between  $DI\_TIME_i$  and  $SHIFT$  are jointly significant at the one percent level.

The second variation is to restrict the sample to individuals in states with relatively low program growth between 1989 and 1995. As discussed in the paper, the DA&A program grew rapidly during the late 1980s and early 1990s. Compositional changes should have been less important in the states with the lowest program growth. The relationship between time on DI and the employment effects is estimated using individuals in the 25 states with the lowest program growth, which is measured as the ratio of DI entrants in 1995 to 1989. The results are presented in Column 3 of Table A7. The four coefficients of interest are statistically significant at the one percent level and combine to create an inverted-U pattern that is similar to the main results.

The third exercise is to see if changes to the DA&A program in 1994 can account for the U-shaped relationship. The *Social Security Independence and Program Improvements Act* (P.L. 103-296) was signed into law on August 15, 1994. The legislation introduced a three year time limit for benefits and more active case management. The new rules related to time limits were introduced in March 1995 and so were still two years away from taking effect when DA&A eligibility was removed. The case management aspects of the legislation took longer, as they were handled through state-level contracts. Most new contracts were issued in September 1995; contracts for Michigan, New York and Oregon were issued in early 1996 (Hunt and Baumohl, 2003).

There is not an identifiable change in the type of individuals applying for DA&A disability benefits after August 1994, or after the primary implementation dates (March 1<sup>st</sup> and September 1<sup>st</sup> of 1995). However, I examine whether the inverted-U relationship is present without those who applied for DI after the legislation introduced in August 1994. These results are presented in Column 4 of Table A7. The four primary coefficients of interest are statistically significant at the five percent level. The total shift in employment displays a qualitatively similar relationship to time on disability benefits that was produced for the whole sample.

Finally, given some of the observable characteristics of DA&A beneficiaries changed as the program grew, I assess the role of time on DI for subsamples based on those changing characteristics. Entrants to the DA&A disability programs were increasingly female and black. They were also relatively more likely to report having a drug addiction and less likely to have only an alcohol addiction. Table A8 presents the results for some DI subsamples based on sex (males, females), race (white, black) and type of addiction (alcohol only, drugs). Each displays an inverted-U relationship that is qualitatively similar to those presented in the paper.

**Table A7** Robustness Tests for Results in Table 2 and Figure 7

	Main Results (1)	With Unemp. Rate Controls (2)	Low DI Growth States (3)	Without Aug 1994+ Applicants (4)
(a) $SHIFT_{it}$	0.069*** (0.022)	-0.003 (0.150)	0.110*** (0.036)	0.145*** (0.029)
(b) $SHIFT_{it} \times DI\_TIME_i$	0.155*** (0.024)	0.150*** (0.024)	0.112*** (0.035)	0.080*** (0.028)
(c) $SHIFT_{it} \times DI\_TIME_i^2$	-0.042*** (0.007)	-0.042*** (0.007)	-0.030*** (0.010)	-0.022*** (0.008)
(d) $SHIFT_{it} \times DI\_TIME_i^3$	0.0033*** (0.0006)	0.0033*** (0.0006)	0.0023*** (0.0008)	0.0017** (0.0007)
p-value on joint test that $DI\_TIME_i$ affects $SHIFT_{it}$ [i.e., (b)=(c)=(d)]	<0.01	<0.01	<0.01	<0.01
<i>Total Shift in Employment for <math>DI\_TIME_i</math> at:</i>				
9 months	0.163*** (0.009)	0.087 (0.149)	0.178*** (0.016)	0.193*** (0.013)
1 year	0.186*** (0.007)	0.108 (0.149)	0.194*** (0.012)	0.204*** (0.010)
2 years	0.237*** (0.005)	0.157 (0.149)	0.231*** (0.007)	0.229*** (0.005)
3 years	0.244*** (0.005)	0.161 (0.149)	0.235*** (0.007)	0.230*** (0.005)
4 years	0.225*** (0.005)	0.142 (0.149)	0.219*** (0.007)	0.216*** (0.005)
5 years	0.199*** (0.007)	0.118 (0.149)	0.196*** (0.009)	0.200*** (0.007)
6 years	0.188*** (0.009)	0.109 (0.149)	0.181*** (0.011)	0.191*** (0.009)
R-sq.	0.358	0.359	0.354	0.356
Obs.	930,500	930,500	402,240	777,400

*Notes:* \* denotes  $p < 0.10$ , \*\* denotes  $p < 0.05$ , \*\*\* denotes  $p < 0.01$ . Employment is defined as earning more than 1996 SGA (\$8,908). For terminated beneficiaries, the dummy variable  $SHIFT_{it}$  equals one for years  $t \geq 1998$ , while  $DECLINE_{it}$  is a dummy variable equals  $t - 1999$  for years  $t \geq 2000$ . The variable  $DI\_TIME_i$  measures the months on DI prior to January 1997. Other covariates include a binary variable identifying terminated beneficiaries, a full set of year dummy variables, the interaction of these variables for years 1989-1994 and 1996-1997, sex-specific cubic functions in age, and controls for individuals' demographic, health, program history and work history characteristics. In column (3), the regression includes interactions between the state unemployment rate at the time of application and the variables measuring employment differences between terminated and reclassified beneficiaries in the same way as is done for  $DI\_TIME_i$ . The reference year is 1995. Standard errors are in parentheses and allow for within-person correlation in errors.

**Table A8** Similarity of Results in Table 2 and Figure 7 for DI Subsamples,  
Based on Observable Characteristics that Changed over Time

	By Sex		By Race		By Addiction Type	
	Males (1)	Females (2)	White (3)	Black (4)	Alcohol (6)	Drugs (7)
(a) $SHIFT_{it}$	0.062** (0.025)	0.089* (0.053)	0.066** (0.028)	0.050 (0.041)	0.001 (0.030)	0.151*** (0.034)
(b) $SHIFT_{it} \times DI\_TIME_i$	0.158*** (0.026)	0.152*** (0.059)	0.156*** (0.030)	0.190*** (0.044)	0.210*** (0.032)	0.091** (0.036)
(c) $SHIFT_{it} \times DI\_TIME_i^2$	-0.043*** (0.008)	-0.041** (0.018)	-0.044*** (0.009)	-0.054*** (0.014)	-0.058*** (0.010)	-0.024** (0.011)
(d) $SHIFT_{it} \times DI\_TIME_i^3$	0.0033*** (0.0007)	0.0032* (0.0017)	0.0034*** (0.0008)	0.0045*** (0.0012)	0.0046*** (0.0008)	0.0017* (0.009)
p-value on test that $DI\_TIME_i$ affects $SHIFT_{it}$ [i.e.,(b)=(c)=(d)]	<0.01	<0.01	<0.01	<0.01	<0.01	0.02
<i>Total Shift in Employment for <math>DI\_TIME_i</math> at:</i>						
9 months	0.158*** (0.010)	0.181*** (0.021)	0.160*** (0.012)	0.164*** (0.017)	0.128*** (0.012)	0.206*** (0.014)
1 year	0.181*** (0.007)	0.203*** (0.015)	0.182*** (0.008)	0.191*** (0.012)	0.158*** (0.009)	0.219*** (0.010)
2 years	0.233*** (0.005)	0.256*** (0.011)	0.232*** (0.006)	0.250*** (0.008)	0.226*** (0.006)	0.249*** (0.007)
3 years	0.240*** (0.005)	0.265*** (0.011)	0.235*** (0.006)	0.254*** (0.008)	0.236*** (0.006)	0.250*** (0.007)
4 years	0.220*** (0.006)	0.249*** (0.014)	0.212*** (0.007)	0.231*** (0.009)	0.213*** (0.007)	0.233*** (0.008)
5 years	0.194*** (0.008)	0.228*** (0.020)	0.185*** (0.010)	0.207*** (0.012)	0.188*** (0.010)	0.208*** (0.011)
6 years	0.181*** (0.010)	0.221 (0.025)	0.173*** (0.012)	0.209*** (0.017)	0.188*** (0.012)	0.185*** (0.014)
R-sq.	0.356	0.363	0.357	0.359	0.359	0.3482
Obs.	742,620	187,880	537,660	308,460	544,820	138,840

*Notes:* \* denotes  $p < 0.10$ , \*\* denotes  $p < 0.05$ , \*\*\* denotes  $p < 0.01$ . Employment is defined as earning more than 1996 SGA (\$8,908). For terminated beneficiaries, the dummy variable  $SHIFT_{it}$  equals one for years  $t \geq 1998$ , while  $DECLINE_{it}$  is a dummy variable equals  $t - 1999$  for years  $t \geq 2000$ . The variable  $DI\_TIME_i$  measures the months on DI prior to January 1997. Other covariates include a binary variable identifying terminated beneficiaries, a full set of year dummy variables, the interaction of these variables for years 1989-1994 and 1996-1997, sex-specific cubic functions in age, and controls for individuals' demographic, health, program history and work history characteristics. The reference year is 1995. Standard errors are in parentheses and allow for within-person correlation in errors. The "Drug" subsample includes individuals whose addiction was both alcohol and drugs.

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