

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

This appendix provides additional information about the data sources used for this project and the main data preparation issues. It also contains two sets of additional results. The first set is estimates of the aggregate employment response using different earnings thresholds to define employment. The second is a number of robustness tests that show beneficiary cohort effects do not explain the results in inverted-U relationship between the employment effects and time individuals had spent on DI.

## **A1. DATA SOURCES**

Five extracts of SSA administrative datasets are used for this project: (1) Supplemental Security Record – DA&A Extract; (2) Supplemental Security Record – Longitudinal File; (3) Master Beneficiary Record – 810 File; (4) Disability Master File (831 File); (5) Numident File; and the (6) Master Earnings File. More details about each of these datasets are provided here.

*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 for 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 on the 831 File. Consistent extracts of the 831 File are available from 1989; education information is reliable from 1992. Given most DA&A beneficiaries applied after 1991 and most applied to be re-classified in 1996, education is available for nearly the whole sample.

*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.

*Master Earnings File* contains earnings data used to calculate amounts for SSA benefit payments, and 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 and includes from 1978 to 2008. Olsen and Hudson (2009) provide an excellent overview of the Master Earnings File, while Kopscuk, 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 Kopczuk 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 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 and 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 (available at: <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 the also 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.* While I do not directly observe who was reclassified under a different disability and who was terminated as a result of the policy change, I do observe the program classifications and payments in January 1997 and I use that to infer an individual's outcome. The program status variables (PSTAT in the SSR and the Ledger Account File in the MBR) are backdated, so an individual's January 1997 variables should have been updated once the case was decided if it occurred later than then.

A person is considered to have been reclassified if they were in current payment status in DI in January 1997. A person is considered to have been terminated as a result of the policy if they were due no payments in January 1997 and had a "disability cessation" program status code (T8 on the MBR). 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 codes because of disability cessation unrelated to the policy change.

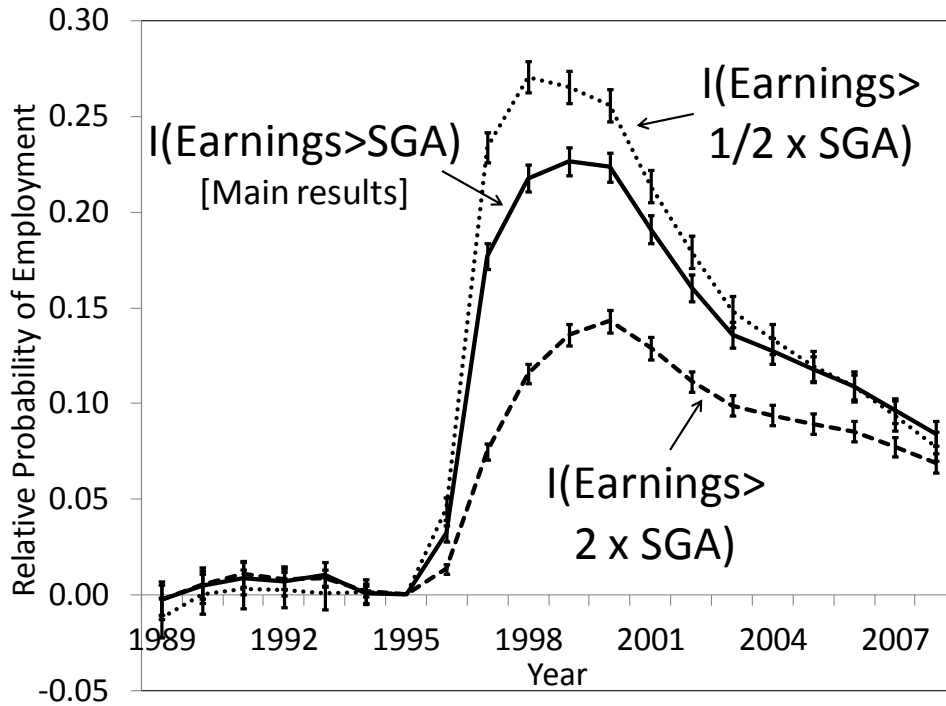
Approximately nine percent of the sample are neither clearly reclassified nor terminated as a result of the policy. This group is probably a mix of reclassified beneficiaries with an unusual payment status in Jan 1997, individuals losing benefits for reasons unrelated to the policy change, or terminated 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.

### **A3. EMPLOYMENT RESPONSE AT DIFFERENT EARNINGS THRESHOLDS**

As discussed in Section 3, I estimate the aggregate employment response using different earnings thresholds to define employment, in order to understand the intensity of the employment response. This is estimated using equation (4) with the full set of controls for individual characteristics, which generates the results shown in Column 5 of Table 2.

Figure A1 shows the 19  $\beta_t$  coefficients measuring the annual differences in the employment probabilities of terminated beneficiaries relative to reclassified beneficiaries, with 1995 as the reference year, using three annual earnings thresholds to define employment. One is the 1996 SGA threshold (\$8,602 per annum), another is double the 1996 SGA earnings level (\$17,204 per annum), and the third is one half of the 1996 earnings level (\$4,301 per annum). For each coefficient, the vertical bars represent 95% confidence intervals.

**Figure A1** Estimates of Terminated Beneficiaries' Relative Probabilities of Employment using Different Earnings Thresholds to Define Employment



**A4. DO BENEFICIARY COHORT EFFECTS EXPLAIN THE SECTION 4 RESULTS?**

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. As discussed in Section 4 in the paper, several exercises are undertaken to determine if the inverted U-shaped pattern presented in Table 4 and Figure 5 is due to cohort effects. More detail about these exercises is provided here.

Results in Table 4 and Figure 5 in the paper are generated using equation (4). Figure 5 is estimated by combining the coefficient for  $SHIFT_{it}$ , and the three coefficients from the interactions between  $SHIFT_{it}$  and the cubic terms of  $DI\_TIME_i$ . These four coefficients are presented in Tables A1 and A2 for various subsamples and specifications, along with their standard errors. Also presented is the combined effect of these coefficients  $DI\_TIME_i$  values of nine months, and yearly intervals between one and six years. Standard errors calculated using the delta method. This provides similar information to that presented in Figure 5 in the paper.

The main results in the paper are re-presented in Column 1 of Table A1. The next three columns 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:

$$y_{it} = \alpha + \theta_t + X_{it}\lambda + TERM_i\beta_0 + Z_{it}\varphi_0 + DI\_TIME_i * Z_{it}\varphi_1 + DI\_TIME_i^2 * Z_{it}\varphi_2 \quad (7) \\ + DI\_TIME_i^3 * Z_{it}\varphi_3 + UNEMP_i * Z_{it}\varphi_4 + UNEMP_i^2 * Z_{it}\varphi_5 + UNEMP_i^3 * Z_{it}\varphi_6 + u_{it}$$

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

The results from this regression are presented in Column 2 of Table A1. 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 statistically 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 total shift in employment different values of  $DI\_TIME_i$  is not statistically significant at conventional levels. The U-shaped relationship is present in the point estimates, however, and the changes with benefit receipt are of similar magnitudes to the main results presented in Column 1.

The second variation is to restrict the sample to individuals in states with program growth between 1989 and 1995 that was below the growth in the median state. 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. Equation (6) 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 A1. The four coefficients of interest are statistically significant at the one percent level. They combine to create a similar inverted-U pattern to the main results.

The third exercise is to see whether 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. New rules related to time limits were

introduced in March 1995, and were still two years 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, 1995, and September 1, 1995). However, to see whether the inverted-U relationship is present without those who applied for DI after the 1994 legislation, equation (5) is estimated using individuals who applied for disability benefits prior to August 1994. These results are presented in Column 4 of Table A2. 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, equation (6) is estimated 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 A2 presents the results for DI subsamples by sex (males, females), race (white, black, other race) and type of addiction (alcohol only, drugs). Each displays an inverted-U relationship that is qualitatively similar to Figure 5 in the paper.

**Table A1** Robustness Tests for Results in Table 4 and Figure 5

	Main Results (1)	With Unemp. Rate Controls (2)	Low Growth States (3)	Without Aug 1994+ Applicants (4)
$SHIFT_{it}$	0.069*** (0.022)	-0.003 (0.150)	0.110*** (0.036)	0.145*** (0.029)
$SHIFT_{it} \times DI\_TIME_i$	0.155*** (0.024)	0.150*** (0.024)	0.112*** (0.035)	0.080*** (0.028)
$SHIFT_{it} \times DI\_TIME_i^2$	-0.042*** (0.007)	-0.042*** (0.007)	-0.030*** (0.010)	-0.022*** (0.008)
$SHIFT_{it} \times DI\_TIME_i^3$	0.0033*** (0.0006)	0.0033*** (0.0006)	0.0023*** (0.0008)	0.0017** (0.0007)
<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

\* denotes  $p < 0.10$ , \*\* denotes  $p < 0.05$ , \*\*\* denotes  $p < 0.01$ . The variable  $SHIFT_{it}$  equals one for years  $t \geq 1998$ , and zero otherwise. The variable  $DECLINE_{it}$  equals  $t - 1999$  for years  $t \geq 2000$ , and zero otherwise.  $DI\_TIME_i$  measures the years on disability benefits before the terminations occurred in January 1997. Standard errors are in parentheses and allow for within-person correlation in errors. See the text in the paper and above for more details.



**Table A2** Similarity of Results in Table 4 and Figure 5 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)	Other (5)	Alcohol (6)	Drugs (7)
$SHIFT_{it}$	0.062** (0.025)	0.089* (0.053)	0.066** (0.028)	0.050 (0.041)	0.140* (0.083)	0.001 (0.030)	0.151*** (0.034)
x $DI\_TIME_i$	0.158*** (0.026)	0.152*** (0.059)	0.156*** (0.030)	0.190*** (0.044)	0.064 (0.088)	0.210*** (0.032)	0.091** (0.036)
x $DI\_TIME_i^2$	-0.043*** (0.008)	-0.041** (0.018)	-0.044*** (0.009)	-0.054*** (0.014)	-0.018 (0.026)	-0.058*** (0.010)	-0.024** (0.011)
x $DI\_TIME_i^3$	0.0033*** (0.0007)	0.0032* (0.0017)	0.0034*** (0.0008)	0.0045*** (0.0012)	0.0013 (0.0023)	0.0046*** (0.0008)	0.0017* (0.009)
<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)	0.179*** (0.035)	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)	0.188*** (0.025)	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)	0.208*** (0.016)	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)	0.209*** (0.016)	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)	0.198*** (0.016)	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)	0.183*** (0.023)	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)	0.172*** (0.030)	0.188*** (0.012)	0.185*** (0.014)
R-sq.	0.356	0.363	0.357	0.359	0.350	0.359	0.3482
Obs.	742,620	187,880	537,660	308,460	72,400	544,820	138,840

\* denotes  $p < 0.10$ , \*\* denotes  $p < 0.05$ , \*\*\* denotes  $p < 0.01$ . The variable  $SHIFT_{it}$  equals one for years  $t \geq 1998$ , and zero otherwise. The variable  $DECLINE_{it}$  equals  $t - 1999$  for years  $t \geq 2000$ , and zero otherwise.  $DI\_TIME_i$  measures the years on disability benefits before the terminations occurred in January 1997. Standard errors are in parentheses and allow for within-person correlation in errors. See the text in the paper and above for more details.

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