

WorkingPAPER

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The Labor Market Consequences of Receiving Disability Benefits During Childhood

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ABSTRACT

This paper estimates the labor market effects of gaining eligibility for Supplemental Security Income (SSI) disability benefits during childhood. In theory, access to SSI could help children treat their disabilities, thus improving labor market outcomes in the long run. Alternatively, children who are designated as disabled may reduce their investment in human capital, which would harm future labor market outcomes. I identify the effects of qualifying for SSI benefits through a natural experiment—a Supreme Court decision eased the criteria to be considered disabled, especially for children with mental disorders. The policy change also occurred earlier in some people’s lives than others. For individuals with a mental disorder, each additional year of exposure to eased standards during childhood increased their SSI receipt by 0.3 years and reduced cumulative labor market earnings through age 30 by \$1,600. Importantly, this does not address the full range of outcomes that may be affected by receiving benefits.

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I. INTRODUCTION

Government programs that aim to alleviate poverty in youth have been shown to improve health and labor market outcomes in adulthood (Chetty et al. 2016; Hoynes et al. 2016; Brown et al. 2015). However, children in poverty with disabilities are further disadvantaged: once they reach adulthood, having a disability adversely affects their employment and is associated with increased poverty (Houtenville et al. 2009; Livermore and Honeycutt 2015).

Supplemental Security Income (SSI), administered by the Social Security Administration (SSA), is one of the most prominent government programs that explicitly aims to help children with disabilities in poverty. SSI currently pays out approximately \$10 billion annually to 1.3 million child beneficiaries. Though research in economics has clearly established the long-term gains from mitigating poverty and addressing health issues in youth, as well as the labor market impacts of having a disability in adulthood, there have been few studies that credibly assess the long run impacts of targeting resources to disadvantaged youth with disabilities.

To analyze the causal effects of gaining eligibility for benefits on later life labor market outcomes, in this paper, I exploit a change in eligibility standards for child SSI benefits that was the result of a Supreme Court decision. I find that SSI benefit receipt in youth leads to lower cumulative labor market earnings through age 30: each additional year of exposure to the new, eased standards reduces cumulative labor market earnings by \$1,600. Exposure to eased standards in youth is associated with increased benefit receipt in adulthood, though the increased benefit income is not enough to make up for decreased earnings. Importantly, changes in labor market outcomes do not encapsulate the total impact of SSI. Other factors like health and living arrangements in adulthood seem especially important to consider, but cannot be examined with the data I have.

Sullivan v. Zebley, issued in 1990, led SSA to institute new, less stringent disability criteria. These changes disproportionately affected children with mental disorders. The policy change occurred earlier in some people's lives than in others', so the duration of exposure to new standards during childhood varied by a child's age at the time of the decision. This paper only examines individuals denied benefits prior to the *Zebley* decision to keep the composition of the sample constant. Eased standards likely led individuals with less severe disabilities, particularly those with mental disorders, to newly apply. Including new applicants would bias the results given their potential earnings are likely higher.

I implement an age-based difference-in-differences strategy, grouping previously rejected individuals by diagnosis type and age when standards changed. Cohorts that were already adults at the time of the decision were unaffected by the change in standards. These untreated cohorts control for the inherent difference between those with mental and nonmental disorders. Cohorts that were children experienced the eased standards of the post-*Zebley* regime during childhood, with exposure inversely related to age at the time of the decision. Children with mental

disorders¹ were most affected by the change in standards, leading younger cohorts diagnosed with mental disorders to be “treated” while other groups were all “untreated.”

The primary threats to my estimation framework are trends that differentially affect people with mental disorders of a particular age, such as changing employer attitudes. The Americans with Disabilities Act, passed in 1990, the same year as the *Zebley* decision, poses such a threat. Using individuals with mental disorders who were initially *accepted* to SSI benefits as a counterfactual group, rather than individuals denied with nonmental disorders, yields similar results.² This suggests that broader economic trends differentially affecting those with mental and nonmental disorders likely do not drive the results.

My paper is related to a recent paper by Deshpande (2016a) that shows individuals removed from SSI benefits at their 18th birthday experience modest gains in earnings, but these gains are substantially less than the value of the SSI benefits lost. However, the effects of gaining benefits in youth likely differ from losing benefits as one reaches adulthood. Behaviors such as parental investment and educational choices can still be influenced during childhood. Using data available from SSA on a limited basis, I present suggestive evidence that SSI receipt did not influence education decisions.

Deshpande exploits a policy change for the SSI program that required SSA to redetermine eligibility at age 18 under the adult standard for all individuals turning 18 after August 22, 1996. This affects some cohorts examined here. My main labor market estimates are the net result of both the easing of standards from the *Zebley* decision and the tightening of standards from this 1996 policy change, which led individuals with mental disorders to be more likely to lose benefits. I estimate the impact of additional years of SSI receipt, not the impact of the *Zebley* decision alone. The persistent growth in the child SSI program has been driven by those with mental disorders.

This paper is therefore relevant to the current policy debate surrounding SSA’s disability programs despite the law change occurring 25 years ago. Because I estimate the impact of receiving benefits specifically for people with mental disabilities, the lessons learned apply when considering the efficacy of the current program.

This paper proceeds as follows. Section II discusses the SSI program and describes in more detail how standards changed because of the *Zebley* decision. Section III describes the data that I use. Section IV provides the methodology and discusses my general identification strategy. Section V presents the primary results. Finally, Section VI concludes.

¹ Throughout the paper, I will routinely refer to individuals with mental disorders and individuals with nonmental disorders. It is important to keep in mind that I refer only to the subset of individuals with mental disorders and nonmental disorders who applied for SSI benefits in childhood, and thus are part of my sample.

² Though accepted applicants are not an ideal control group for rejected applicants, a strategy adopted in von Wachter et al. (2011) and Bound (1989), the “untreated” cohorts that were already adults at the time of the decision control for the inherent difference between accepted and rejected applicants. Accepted applicants that are younger are untreated (since they already receive SSI benefits) and rejected applicants that are younger are treated as they are newly exposed to eased standards.

II. SSI TAKE-UP AND THE ZEBLEY DECISION

In 1972, Congress passed legislation that created the Supplemental Security Income program. This program was designed as an additional means-tested component of the social safety net, providing an additional source of income for poor families. Those who are eligible for SSI include the elderly, blind, or disabled.³ SSI is an extremely large program, paying out approximately \$50 billion in benefits annually to its eight million beneficiaries as of 2014.⁴ In this paper, I focus on the 1.3 million children whose families receive SSI because their children have disabilities.⁵

The *Zebley* decision, issued in February 1990, changed the eligibility criteria for children applying to SSI. Prior to the decision, adults and children qualified for benefits if they both met the means test and had an impairment on the Listing of Impairments.⁶ Adults could additionally be deemed disabled if they demonstrated an inability to engage in substantial gainful activity, whereas no such criteria existed for children. The Supreme Court ruled this difference was inconsistent with the “comparable severity” standard for children’s SSI; a child with a disability of comparable severity to one that an adult would qualify with might not himself qualify. In response, SSA did two things: first, it established a new Individualized Functional Assessment (IFA) that loosened the criteria required for a child to be classified as disabled. Second, it revised its mental impairment listings to re-categorize certain mental impairments that had previously been listed, such as autism, and newly recognize some disorders, such as attention-deficit/hyperactivity disorder (ADHD, Duggan et al. 2016). These revisions made it easier for children with mental health impairments to qualify for benefits.

The new standards went into effect on February 22, 1991. SSA was required to mail a notice to all individuals denied for medical reasons after January 1, 1980. The notice informed them that their case had been rejected under obsolete standards and that they might newly qualify for benefits and retroactive payments. About 80 percent of denied applicants reapplied in the four

³ Individuals with disabilities are also potentially eligible for the Social Security Disability Insurance (DI) program, which has the same disability criteria as SSI. It is only available for adults with a work history, except for disabled widows or disabled adult children. There is also no means test like the one associated with SSI receipt, meaning that not all recipients are poor. Most papers about DI have focused on the labor market disincentives of the program, for example showing that those with lower disability severity see drastic reductions in employment because of benefit receipt (Maestas et al. 2013). Additionally, see Autor et al. (2015), French and Song (2014), Moore (2014), and von Wachter et al. (2011). Autor et al. (2016) and Coile et al. (2015) also examine the labor market effects of the U.S. Department of Veterans Affairs’ separate disability insurance program for veterans.

⁴ For comparison, the Temporary Assistance for Needy Families program has an annual budget of just under \$20 billion. See U.S. Congressional Budget Office, “Growth in Means-Tested Programs and Tax Credits for Low-Income Households”, February 2013. Available at <https://www.cbo.gov/publication/43934>. Accessed December 19, 2016.

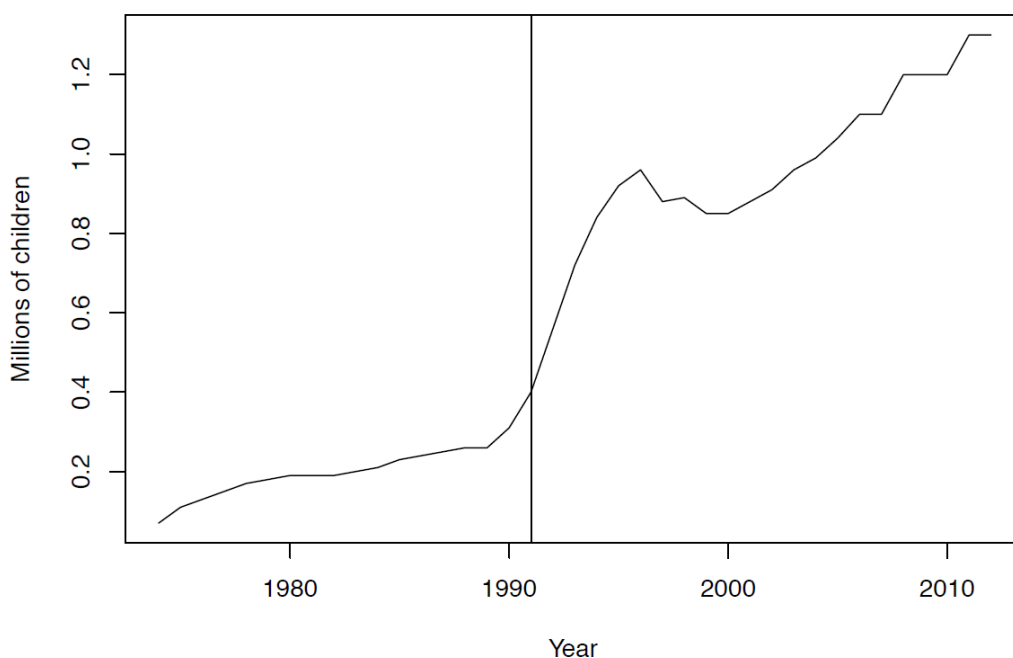
⁵ For an excellent review of the SSI program and related research on many aspects of the program, see Duggan et al. (2016). For children, who are unlikely to have any income themselves, the means test is based on a deeming formula that considers part of a parent’s earnings as “deemed” to the child.

⁶ The SSA website notes “The Listing of Impairments describes, for each major body system, impairments considered severe enough to prevent an individual from doing any gainful activity (or in the case of children under age 18 applying for SSI, severe enough to cause marked and severe functional limitations). Most of the listed impairments are permanent or expected to result in death, or the listing includes a specific statement of duration.” Having a disability on this list means that one automatically qualifies for benefits upon also meeting income criteria.

years following the *Zebley* decision. If a readjudication concluded that in addition to qualifying for benefits, the individual should have qualified for benefits prior to the *Zebley* decision given the new standards, he could receive retroactive payments. Such a readjudication was eligible to anyone denied after January 1, 1980, and led some new beneficiaries to receive substantial lump-sum payments.

As a result of this change in criteria, there was a dramatic increase in the number of child SSI beneficiaries, shown in Figure 1. The primary increases came from individuals who had mental disorders excluding those with intellectual disabilities⁷—among new awards, the share going to children with mental disorders rose from 9.5 percent in 1989 to 34 percent in 1994, and reached over 50 percent in 2003. The Government Accountability Office (1994) estimated that 70 percent of new beneficiaries were enrolled because of the change in the childhood mental impairments listings rather than because of the IFA.

Figure 1. Children's SSI enrollment



Source: SSI Annual Statistical Reports. The vertical line in 1991 represents the year new standards from the *Zebley* decision were implemented.

In addition to enrollments, the number of child applicants to SSI increased after the *Zebley* decision. The composition of applicants likely shifted, with children with less severe mental disabilities more likely to newly apply and qualify for benefits. An analysis using SSI applicants

⁷ Intellectual disabilities are inherently different from other mental disorders in their diagnosis. An intellectual disability diagnosis requires an IQ of less than 70 in addition to severely impaired functioning, and is thus more persistent than something like a mood disorder which may sometimes be active and sometimes not. There are also many distinct services and advocacy for people with intellectual disabilities that mean individuals with intellectual disabilities differ substantially from individuals with other mental disorders.

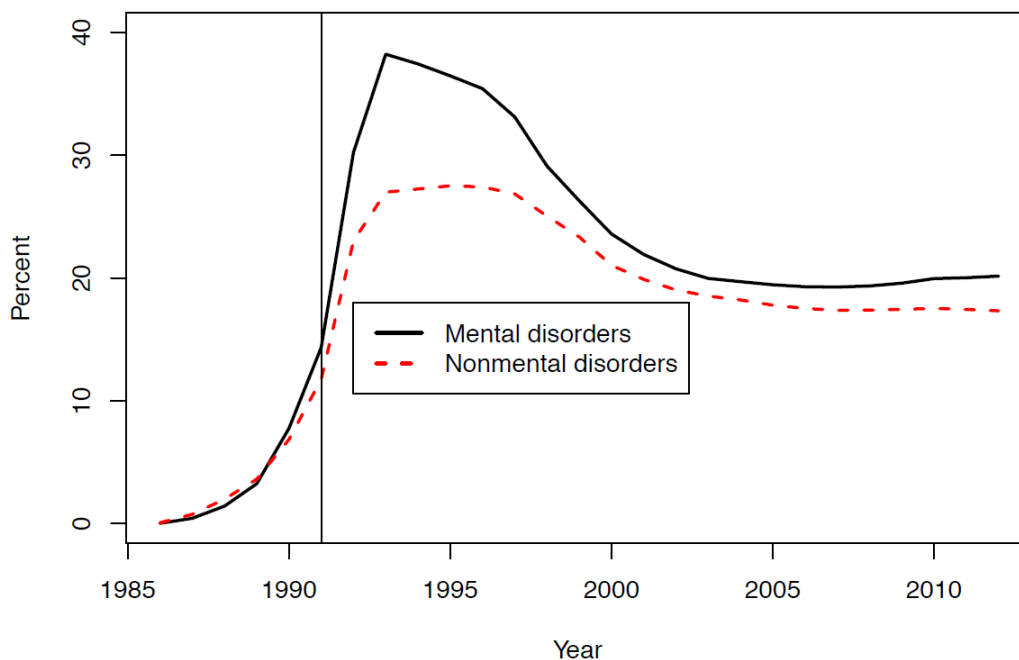
after the *Zebley* decision might be subject to selection bias given that there would be systematic unobservable differences between mental and nonmental applicants by age: 15-year-old applicants in 1993 with mental disorders might differ from 15-year-old applicants in 1988 with mental disorders in a different way than comparable children with nonmental disorders. To avoid selection bias, I restrict my sample to those who applied for, and were initially rejected from, SSI benefits between 1986 and 1989, the four years *before* the *Zebley* decision, when applications could not have been influenced by the future change in standards.⁸ Note that *all* such rejected individuals are included in my sample, regardless of whether they subsequently re-apply or newly qualify for benefits. Reapplication rates among rejected applicants increased following the *Zebley* decision. About 35 percent of individuals initially denied in 1986 and 1987 reapplied in the ensuing four years. Of individuals initially denied in 1988 and 1989, 62 percent reapplied in the ensuing four years, with this latter group subject to the eased criteria following the implementation of the new standards.⁹

Within the full sample of initially rejected applicants, those with mental disorders were particularly more likely to qualify for benefits after the *Zebley* decision given the change in standards. Figure 2 shows the share of individuals in the sample receiving SSI benefits in each year from 1986 to 2012, grouped by whether their primary disorder was listed as mental or nonmental on their initial application. This share is mechanically equal to zero in 1986 because everyone in my sample was rejected in 1986 or after. Some people newly qualified for benefits prior to the *Zebley* decision, though the likelihood is the same regardless of disability type. Following the *Zebley* decision, about 40 percent of those with mental disorders were receiving benefits in 1993, compared to only about 25 percent of those with nonmental disorders.

⁸ Individuals must have been rejected for medical reasons. Individuals rejected because of excess income and resources are excluded given that the change in disability standards likely did not affect their probability of newly qualifying for benefits.

⁹ There were also differential changes in the primary diagnosis codes of the reappliers. About 7 percent of early appliers with a nonmental disorder who reapplied within four years changed to having a mental disorder and about 48 percent with a mental disorder changed to a nonmental disorder. Among late appliers, 9 percent changed into a mental disorder and only 38 percent changed out of a mental disorder. Reappliers are more likely to end up with a mental diagnosis after the *Zebley* decision, and this allows them to take advantage of the relatively easier disability criteria for those with mental disorders. I thus consider an individual's diagnosis at the time of initial application because considering an individual's most recent diagnosis would potentially lead to biased results.

Figure 2. Share of initially rejected applicants receiving SSI benefits



Source: Author's calculations using SSA administrative data, 1986–2012. Includes individuals who applied for SSI benefits as children between 1986 and 1989 and were rejected for medical reasons. Individuals are grouped by diagnosis at time of initial application. The vertical line in 1991 represents the year new standards from the *Zebley* decision were implemented.

Figure A.1 breaks out SSI benefit receipt by disability type. Individuals with disorders of the nervous system, in particular cerebral palsy, qualify at similar rates as those with mental disorders. Rejected individuals with neurological and musculoskeletal disorders, diabetes, and asthma — the most prevalent disorders that are neither neurological nor mental — have a much lower probability of qualifying for benefits after the *Zebley* decision.

As a result of welfare reform, SSA experienced another significant policy change in 1996. In response to the drastic increase in child beneficiaries observed in Figure 1, Congress wrote new legislation that restricted the eligibility criteria for the SSI program. First, all individuals turning 18 after August 22, 1996 were required to have their eligibility redetermined at age 18 under the adult standard (Deshpande, 2016a). Second, any individual who qualified under the IFA was required to undergo an immediate continuing disability review (CDR), and all individuals were newly subjected to CDRs at least once every three years. These programmatic changes reduced the child disability rolls by 100,000. Individuals with mental disorders were the most likely to lose benefits from these CDRs (Hemmeter et al. 2009): Figure 2 shows a larger share of those with mental disorders losing benefits after 1996. The effects I find are the net result of both policies—children with mental disorders were more exposed to eased disability standards, albeit less exposed than they would have been in the absence of the second, more restrictive reform.

III. DATA

I use SSA's administrative data sets to establish my sample and gather outcome variables. SSA maintains a record of all individuals who ever applied for SSI benefits on the Supplemental Security Record (SSR). The SSR includes basic identifying information on an individual's application, including his or her Social Security number (SSN), date of birth, the date of application, whether the application was rejected or accepted, state in which the application was filed, and any parent SSNs. An individual's SSN can be used to link to the primary diagnosis at application, reported on the 831 form. The data on diagnosis for rejected applicants are only available starting in 1986. Given that I also exclude anyone who applies after the *Zebley* decision, my sample consists of any individual denied between 1986 and 1989 and follows such individuals and their SSI application and benefit receipt history from their initial application through 2012. This produces a sample of 62,491 people. Labor market earnings come from SSA's Master Earnings File (MEF). Earnings data include wage, salary, and tip income reported on W-2 forms for every year through 2012. Additionally, I gather parental earnings in the years preceding an individual's initial application by linking the parent SSN to the MEF. SSA records identify if and when an individual died.

In addition to the confidential data used from SSA, I also use aggregate data from the Bureau of Labor Statistics on age and gender unemployment rates and from the Bureau of Economic Analysis on state income per capita to control for the macro economy.

IV. EMPIRICAL STRATEGY

I estimate the long-run causal effects on adult labor market outcomes from receiving SSI benefits for more time in childhood. Such an estimating equation could be given by the following:

$$(1) \ y_i = \alpha + \beta * YEARS\ BENEFITS_i + \varepsilon_i$$

The coefficient β would measure the effect of an additional year of SSI benefit receipt in childhood on outcomes y_i , such as labor market earnings at a given age. Any cross-sectional attempt to link SSI receipt to outcomes is likely to suffer from a myriad of selection issues. For example, among a sample of applicants to SSI, accepted individuals with more years receiving benefits probably have more severe disabilities. Even estimated among a sample of individuals who were all initially denied, such an estimate would still be endogenous because those who receive benefits for the longest time likely have the most severe disabilities. The estimate of β would thus be biased downwards. In order for β to be unbiased, the econometrician would need to compare two people with equal disability severity, one who happens to receive benefits for a longer time than the other.

One option to approach the endogeneity associated with Equation (1) is to first limit the sample to all individuals initially denied SSI benefits, and then directly control for a host of observable variables. Factors like type of disability, age of first application, and their interaction are important indicators that could be used to attempt to equate disability severity. Table 1 shows basic summary statistics splitting people by age at the time of the *Zebley* decision and diagnosis type. Applicants with mental disorders are different from those with nonmental disorders. Those

who have mental disorders are more likely to be male, older, and first apply at an older age and less likely to have parents at the time of initial application. They also have lower earnings as adults compared to those with nonmental disorders (consistent with findings in Mann et al. 2015). Including these variables in Equation (1) would lead an estimate of β to be identified from variation in time receiving benefits for individuals with a similar diagnosis denied at the same age. Additional control variables, such as parental earnings at the time of initial application, could not create truly “random” variation in the time receiving benefits—such variables cannot fully account for all unobservable characteristics that influence the likelihood of a successful reapplication.

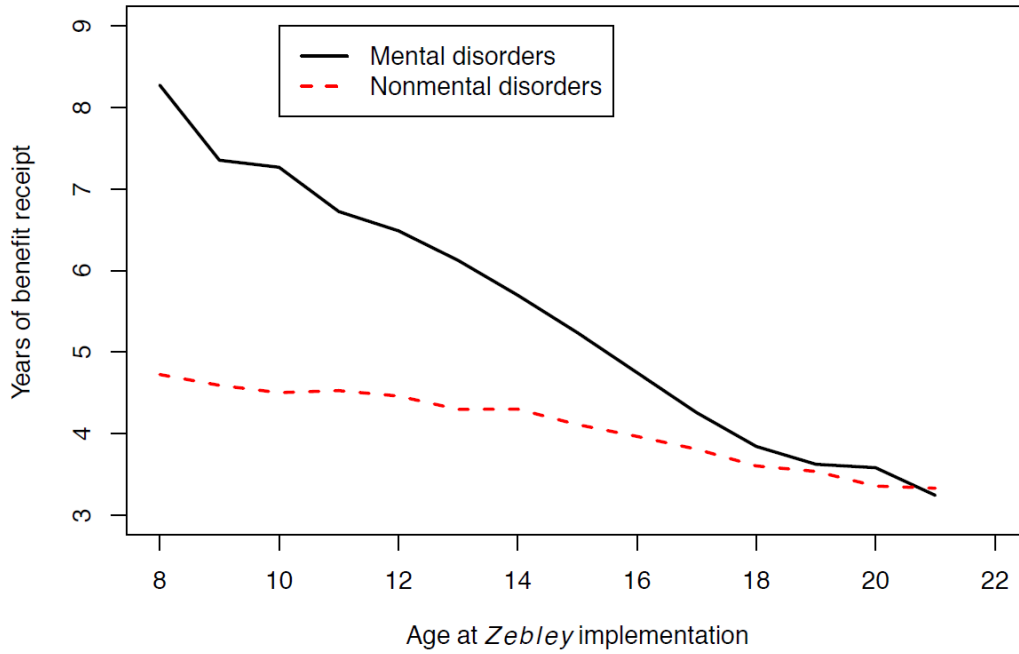
Table 1. Summary statistics

	Mental (\leq age 17)	Nonmental (\leq age 17)	Mental ($>$ age 17)	Nonmental ($>$ age 17)
Male	0.73	0.57	0.60	0.53
Age at <i>Zebley</i> implementation	12.44	10.12	19.19	19.23
Age at initial application	9.50	6.87	15.70	15.70
Year of initial application	1987.69	1987.41	1987.19	1987.19
Reapplied post- <i>Zebley</i>	0.78	0.83	0.59	0.80
Received a <i>Zebley</i> award	0.38	0.24	0.20	0.16
Ever had successful SSI application	0.57	0.44	0.44	0.40
Years until age 24 receiving benefits	3.91	3.49	1.28	1.02
Number of SSI applications	2.94	2.96	2.69	3.01
Died by age 24	0.02	0.03	0.02	0.03
Has mom at application	0.76	0.91	0.52	0.79
Has dad at application	0.22	0.38	0.17	0.34
Household earnings at application (dollars)	7,501.84	11,558.19	5,657.54	10,011.07
Labor earnings, age 20–22 (dollars)	7,223.93	9,730.03	5,655.89	7,544.13
Total income, age 20–22 (dollars)	8,844.65	11,017.28	8,195.69	9,509.78
Labor earnings, age 24–26 (dollars)	9,442.31	12,556.89	8,865.47	11,942.86
Total income, age 24–26 (dollars)	10,678.04	13,646.67	10,435.28	13,262.83
Observations	11,499	59,051	4,077	10,630

Note: The sample includes all individuals who applied for SSI benefits and were rejected for medical reasons between the years of 1986 and 1989, given a diagnosis that is considered mental or nonmental, excluding intellectual disabilities. Individuals are additionally grouped by if they were younger or older than 17 on February 22, 1991, the date the new standards were implemented.

The change in standards stemming from the *Zebley* decision creates a natural experiment increasing the probability of benefit receipt based on these observables. As Figure 2 shows, individuals with mental disorders were disproportionately affected by the change in standards from the *Zebley* decision. Age at the time of the *Zebley* decision also influenced the likelihood of receiving benefits during childhood—individuals who were 13 at the time of the decision were subject to eased standards from the ages of 14 to 17, whereas individuals who were 19 should not have been affected by the policy change given that it did not affect adult standards. Figure 3 shows that an individual’s age at the time of the *Zebley* decision and initial diagnosis type are good predictors of the number of years receiving benefits during childhood: younger individuals with a mental disorder spent a longer period receiving SSI. Crucially, individuals with mental and nonmental disorders who were already adults have no difference in years of SSI receipt.

Figure 3. Number of years receiving benefits through age 24



Source: Author's calculations using SSA administrative data, 1986–2012. Includes all individuals who applied for SSI benefits as children between 1986 and 1989 and were rejected for medical reasons. Individuals are grouped by diagnosis at time of initial application. Individuals are grouped into age cohorts by their age on February 11, 1991, the date of implementation of new standards. Averages are purged of age of application effects.

I therefore use these two variables to proxy for the number of years receiving benefits in an event study framework. I group individuals into age cohorts at the time of the *Zebley* decision. Such an age-based difference-in-differences, or event-study, strategy, as in Duflo (2001) and Persson (2014), allows the duration of exposure to benefits to vary by age group. If the primary impacts are due to an increased exposure to benefits, the trends should be more pronounced for younger age cohorts who spent a longer time in childhood exposed to the eased standards of the post-*Zebley* regime. Thus, I use the following equation to estimate the effects of receiving SSI benefits in youth:

$$(2) \quad y_i = \alpha + \beta_1 MENTAL_i + \sum_{c=8}^{21} \beta_{2c} 1(AGE_i = c) + \sum_{c=8}^{21} \beta_{3c} MENTAL_i 1(AGE_i = c) + \delta X_i + \varepsilon_i$$

Equation (2) is estimated among the sample of individuals who applied for, and were denied, SSI benefits between 1986 and 1989.¹⁰ In order to eventually receive benefits, an individual must therefore have reapplied for SSI. Not all individuals in my sample reapply or

¹⁰ Individuals age 7 and younger at the time of the *Zebley* decision are dropped because fewer than 10 percent of applicants in each cohort have mental diagnoses, too small a proportion to accurately identify any effects.

eventually receive SSI benefits—Table 1 shows that about one-fifth of these initially rejected applicants do not reapply for benefits following the *Zebley* decision, and about half never have a successful SSI application.

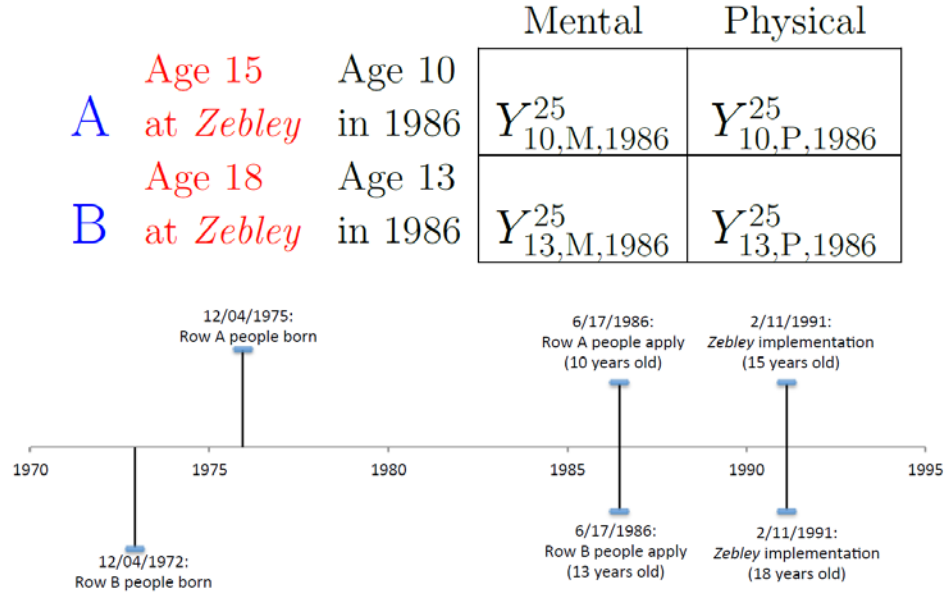
Individuals are grouped by primary diagnosis on the initial application, with the variable $MENTAL_i$ indicating a mental diagnosis. They are further grouped by age cohort at the time of the *Zebley* decision. The age-18 cohort serves as the omitted cohort, given that such individuals were already adults when standards changed and thus should have been unaffected by the change in standards. The outcome variable y_i can include the number of years receiving benefits or labor market earnings at a given age for person i . The coefficient of interest, β_3 , captures the differential effect on y_i of having a longer exposure to eased standards and a mental disorder.¹¹ This proxies for SSI receipt, given that those with mental disorders are more likely to receive benefits in response to the policy change, and those who were younger when eased standards are implemented are more likely to receive benefits *at an earlier age*.

Control variables in X_i include dummies for the age at which an individual was initially denied SSI benefits, as well as gender and state fixed effects. The age of application dummies are particularly important—to demonstrate why, Figure 4 shows the variation that is used to estimate the effects for the cohort that is age 15 at the time of the decision. Each entry in the table refers to an individual's labor market earnings at age 25, given a particular age, diagnosis, and year at initial application. Consider two groups of people born on December 4, one in 1972 and one in 1975. Assume one person in each group has a mental disorder and one has a nonmental disorder. The group born later will be 15 years old when the new standards from the *Zebley* decision are implemented, whereas the group born earlier will be 18.

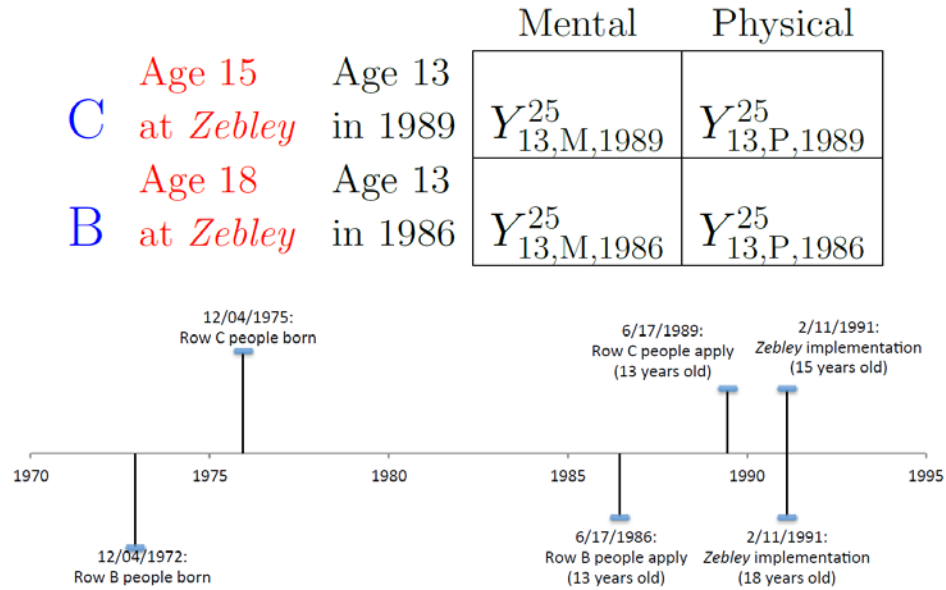
¹¹ The age at application dummies (and the interaction with an indicator for mental diagnosis) mean estimates of β_3 are identified by variation within a particular age of application. Because diagnosis data are only available from 1986, this means that for each age of application, there are only six possible age at *Zebley* cohorts. For example, among those who applied at age 12, individuals can be between 13 and 18 at the time of *Zebley* implementation. The oldest person would have applied at 12 on January 1, 1986, turned 13 on January 2, 1986, and then been 18 on February 22, 1991, the date that individuals are grouped into age cohorts. The youngest person would have applied at 12 on December 31, 1989, but not turned 13 until December 30, 1990, and thus have been 13 on February 22, 1991.

Figure 4. Identifying variation

Option A: Single year of application (not used)



Option B: All years of application



Note: The top panel shows a strategy that would not yield random variation, given that the difference between mental and nonmental cohorts is likely not the same for cohorts that apply at different ages. Row B is repeated in Option A and Option B as it refers to the same group of people. The observation $Y_{10,M,1986}^{25}$ refers to an individual's labor market earnings at age 25 who applied at age 10 in the year 1986 with a mental diagnosis.

Option A would estimate the difference-in-differences assuming all four people apply at the same time on June 17, 1986. This does not control for age at application because the younger cohort was 10 on this date and the older cohort was 13. The difference in outcomes for the group age 18 at the time of the *Zebley* decision controls for the inherent difference between those with mental and nonmental diagnoses; these people are adults when the new child standards are implemented and are thus unaffected. The additional difference in outcomes measured for those who are 15 at the time of the decision would reflect additional SSI receipt for the individual with mental disorders. However, this may be biased—diagnoses of mental and nonmental disorders evolve differently over a child’s lifetime, likely leading the difference in outcomes between mental and nonmental cohorts among those who applied at age 13 and those who applied at age 10 to not be constant.¹² The timeline in Figure 4 shows that more time has elapsed in the lives of those from Row B than from Row A when they first applied—they are older. This difference may invalidate the assumption that in the absence of changed standards those in Row A and those in Row B would be similar.

Option B presents the actual estimating strategy—all individuals applied at the same age but are different ages at the time of the *Zebley* decision because the initial application occurred in different years. Rather than applying at the same moment in time, individuals apply at the same stage of life—the cohort born in 1972 applies on June 17, 1986, at age 13, and the cohort born in 1975 applies on June 17, 1989, at age 13. Equation (2) estimates the analog difference-in-differences for each age cohort. The timeline shows that the only key difference in the lives of people from Row C and Row B of Figure 4 is that the *Zebley* decision occurs at different stages of life. Crucially, the group born in 1972 reaches age 18 before experiencing any change of standards, whereas when the group born in 1975 reaches age 18, they will have been exposed to eased standards for three years.

The figure motivates two assumptions underlying Equation (2). First, I must assume that there are parallel trends in outcomes, namely, that the difference in outcomes between those with mental disorders and nonmental disorders would have remained constant for younger cohorts in the absence of the *Zebley* decision.¹³ If true, then any differential trends in outcome variables across age cohorts can be attributed to differential exposure to eased SSI standards. Second, because controlling for age at application means that variation comes from individuals applying in different years, disability diagnoses must be stable over time.

The parallel trends assumption would normally be empirically testable by comparing trajectories of outcome variables by age and diagnosis prior to the *Zebley* decision. However, there are no earnings trajectories prior to the decision since everyone is necessarily a child.

Thus, I must assume that there are parallel trends. To perform an indirect test of the parallel trends assumption, I compare parental labor market outcomes at the time of the initial rejected

¹² An inherent assumption here is that age of application proxies for age of onset of a disability.

¹³ Table 1 shows that this assumption likely fails without the age at application controls—individuals with nonmental disorders tend to be younger than those with mental disorders in the subgroup age 17 and younger, whereas the age difference is constant in the subgroup age 18 and older, consistent with evidence from Duggan et al. (2016) that nonmental disabilities are relatively more prevalent among younger children. Mental disorders tend to be diagnosed later in life—in addition to simply being older, individuals with mental disorders who were older applied at a later age.

application to provide suggestive evidence that any changes in outcomes after the *Zebley* decision are not due to pre-existing differences in family earnings (Figure A.2). The comparison shows few, and small, differences in parent earnings at the time of initial application.¹⁴

The primary type of threat to this assumption is a differential trend that only affects those with mental disorders for a particular age cohort. For example, it is possible that over time, employers have become more open to hiring people with mental disorders. If true, younger cohorts with mental disorders would be more likely to be employed at a given age (say 25) because the older mental disorder cohorts would not have had this differential treatment when they were that same age. This would lead me to spuriously attribute increases in employment to a longer time receiving SSI benefits. In Section V, I discuss robustness checks that address these types of issues.

It is also possible that labor market outcomes are influenced by the economy faced at varying times in life, such as entering the job market during a recession, which would affect particular age cohorts.¹⁵ However, individuals of the same age cohort with nonmental disorders serve as a control for those with mental disorders. I also control for macroeconomic conditions at the time of earnings measurements.

I use administrative data to assess if disability diagnoses are stable over time. If the composition of applicants diagnosed with mental disorders in 1986 and 1989 is different, perhaps because of an increased overall likelihood to diagnose mental disorders over time, then my estimates would be invalid. Broader trends in the economy have led to increased diagnosis of mental disorders in the past 20 to 30 years, particularly for ADHD.¹⁶ However, because my sample is defined over a narrow window, time trends in diagnoses do not pose a threat to identification; approximately 20 percent of individuals in my sample have mental disorders in each of the four possible years of application. Additionally, the share of applicants with mental and nonmental disorders who are rejected stays constant over time, suggesting that the disability severity of rejected applicants does not change.¹⁷

To estimate the impact of an additional year of childhood exposed to eased SSI standards, I further assume that there is a linear relationship between years of exposure in childhood and SSI receipt or earnings. As will be shown in Section V, this is a reasonable assumption. Such an equation is given as:

¹⁴ To the extent that there are differences, younger cohorts with mental disorders have slightly more household resources, a difference that would likely lead to estimates of earnings to be biased upwards. However, I find negative impacts on earnings, so these preexisting differences likely work against that finding. I also include parental earnings at the time of initial application as control variables in an additional specification, which does not affect the results

¹⁵ The state of the economy may also affect adult SSI receipt—looking at the period from 1996-2010, Nichols et al. (2014) show that applications increase as the economy worsens. They do not study the relative effects by disorder type.

¹⁶ See <http://www.cdc.gov/nchs/data/databriefs/db70.htm>.

¹⁷ Precise data and figures are available on request.

$$(3) \ y_i = \theta + \gamma_1 \text{MENTAL}_i + \gamma_2 \text{YEARS EXPOSURE}_i \\ + \gamma_3 \text{MENTAL}_i * \text{YEARS EXPOSURE}_i + \phi \mathbf{X}_i + \omega_i$$

The variable *YEARS EXPOSURE_i* measures the number of years until age 18 that person *i* was exposed to eased standards, so it is equal to zero for all cohorts age 18 and older at the time of *Zebley* implementation. The coefficient γ_3 measures the differential impact of an additional year in childhood spent under the post-*Zebley* regime. Equation (3) produces an intent-to-treat estimate and evaluates the changes in the policy as is. To estimate the causal effects of an additional year of benefit receipt, or the treatment-on-the-treated, one could scale the estimate of γ_3 by the average additional years of benefit receipt from each year of exposure to eased standards for individuals with mental disorders.¹⁸

V. RESULTS

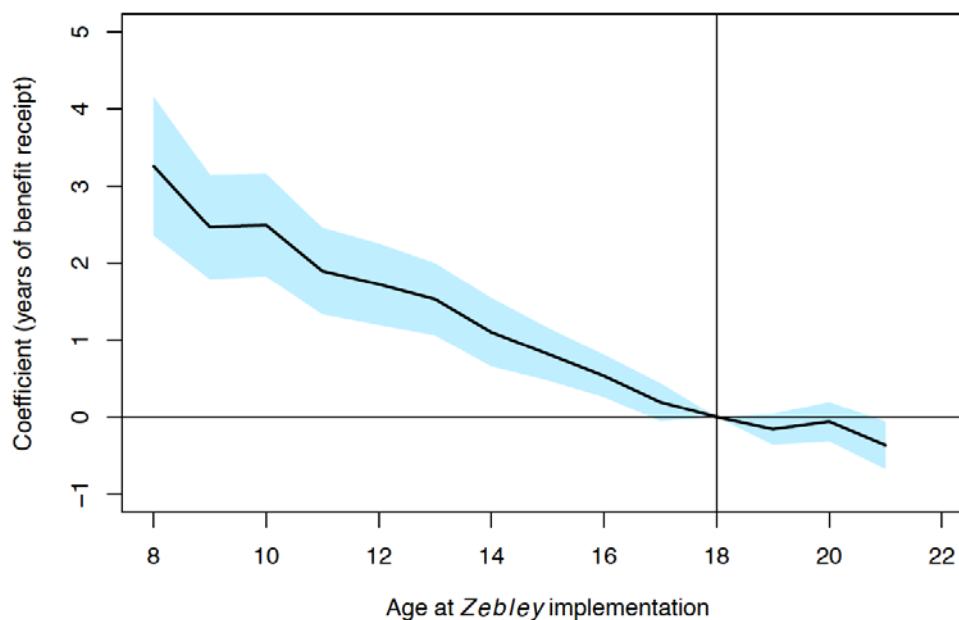
In this section, I first show that individuals rejected from SSI benefits who had a mental disorder and spent a longer time during their youth exposed to eased standards after the *Zebley* decision spent a longer time during their youth receiving benefits. Second, I present the primary labor market earnings estimates, which show that increased enrollment in SSI leads children with the longest exposure to eased standards to earn less money in their early 20s and to be less likely to have positive earnings. Third, I perform several robustness checks.

SSI receipt

Figure 5 shows the results of estimating Equation (2) on years of benefit receipt, clustering standard errors by an individual's age at *Zebley* implementation by the state in which the initial application was filed. The difference in years of benefit receipt between those with mental and nonmental disorders who are 18 at *Zebley* implementation is normalized to zero, though this difference is approximately zero (Figure 3) since these adult cohorts had no exposure to eased standards during childhood. As expected, individuals who are younger at the time of the *Zebley* decision receive SSI benefits for a longer time. Individuals with mental disorders who were 10 at the time of the decision spent 2.5 years longer receiving benefits than did their counterparts with nonmental disorders.

¹⁸ I focus on the intent-to-treat estimates rather than the treatment-on-the-treated because the impacts of changes in SSI standards may operate through other channels in addition to the number of years receiving benefits. For example, the dollar amount of benefits, Medicaid receipt, back payments, or a host of other factors could be important drivers. By focusing on the intent-to-treat estimate, I remain agnostic as to the exact channel that increased overall exposure to SSI influences long-term labor market outcomes.

Figure 5. Number of years receiving benefits through age 24, regression based



Note: Individuals are grouped into age cohorts by their age on February 11, 1991, the date of implementation of new standards. Plots the coefficient on the interaction of age cohort with having a mental disorder using Equation (2). Standard errors are clustered by the individual's age at *Zebley* implementation by the state in which the initial application was filed. The shaded region shows the 95% confidence interval. The vertical line at age 18 represents the omitted cohort, where the estimate is mechanically equal to zero.

The number of years of benefit receipt is linearly decreasing as age at *Zebley* increases until the age-18 cohort. For cohorts older than age 18 when new standards were implemented, there is no difference in years of benefit receipt. This motivates my use of Equation (3), which estimates a linear function in age that is equal to $18 - c$ for cohorts c younger than 18 and equal to zero for cohorts older than 18. The resulting coefficient yields the inverse of the slope of the line in Figure 5, or the estimated additional years of benefit receipt from an additional year during childhood exposed to eased standards for those with mental disorders.

Each additional year of exposure increases SSI benefit receipt by 0.3 years, as shown in the top row in Column (1) of Table 2. Individuals who were age 10 at the time of the decision had 8 years of exposure to benefits, implying that this cohort spent an additional 2.5 years receiving benefits, as in Figure 5. This is a 223 percent increase relative to those who were adults when new standards were implemented and were thus unaffected by the change in standards.

Table 2. Estimated impact on SSI receipt

	(1) Years on benefits	(2) Lifetime payments	(3) Received <i>Zebley</i> award	(4) On benefits at age 14	(5) On benefits at age 20	(6) Back pay amount	(7) Received back pay
<i>Years Exposure x Mental</i>	0.306*** (0.038)	1,762*** (342)	0.026*** (0.005)	0.035*** (0.005)	0.007 (0.004)	-176** (84)	0.024*** (0.004)
<i>Mental diagnosis</i>	-1.221 (1.022)	14,149 (11,297)	0.158 (0.187)	0.279* (0.143)	-0.053 (0.152)	14,654*** (4,399)	0.174 (0.179)
<i>Years Exposure</i>	0.110*** (0.019)	152 (178)	0.014*** (0.002)	0.022*** (0.002)	-0.012*** (0.002)	-405*** (45)	0.001 (0.002)
Unexposed mean	1.075	10,034	0.170	0.001	0.141	2,596	0.168
Observations	62,491	62,433	62,491	62,268	61,504	62,491	62,491
R^2	0.086	0.077	0.038	0.175	0.017	0.037	0.046

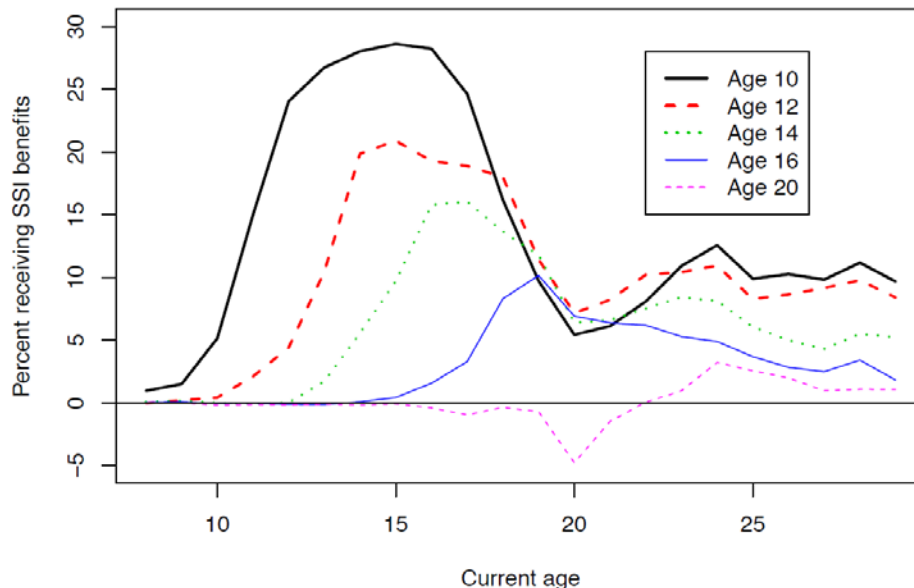
Note: The sample includes all individuals who applied for SSI benefits and were rejected for medical reasons between the years of 1986 and 1989, given a diagnosis that is considered mental or nonmental, excluding intellectual disabilities. *Years Exposure* measures the number of years prior to age 18 occurring after the *Zebley* decision in 1991 and is thus equal to zero for all cohorts age 18 and older at the time of the *Zebley* decision. The number of years on SSI benefits, Column (1), and total lifetime payments, Column (2), are through age 24. A *Zebley* award, shown in Column (3), is a new SSI award made between February 22, 1991 and December 31, 1994. Total lifetime payments are deflated to be in real 2012 dollars. *** p<0.01, ** p<0.05, * p<0.1.

The remaining columns of Table 2 show the impacts of an additional year of exposure, or being one year younger at the time of the decision, on other measures of SSI receipt for individuals with mental disorders. Column (2) shows that total lifetime SSI payments through age 24 increased by \$1,762 for each additional year of exposure. This means the age-10 cohort received an additional \$14,000 in SSI benefits, an increase of 140 percent relative to unaffected cohorts. Column (3) shows that for each year younger a child is, the likelihood of receiving a new award in the three years following the implementation of new regulations increased by 2.6 percentage points. The final two columns show that there were differences in retroactive payments, which could be paid after a previously denied applicant newly qualified for benefits after the *Zebley* decision. In Appendix B, I discuss an alternative strategy that shows these differences likely do not drive the primary labor market results.

Figure 6 plots the lifetime trajectory of SSI benefit receipt for different age cohorts. For each of the cohorts that were children at the time of the *Zebley* decision, SSI receipt immediately increases after reaching that age. This demonstrates the impact of the change in standards on benefits receipt for youths with mental disorders. SSI receipt reduced for the youngest cohorts by age 20, with all about equally likely to be on SSI; many younger children with mental disorders likely lost benefits when eligibility was required to be redetermined at age 18 because of welfare reform. After age 23 appears a rank ordering in SSI receipt, with the youngest cohorts most likely to have received benefits. This suggests that receiving benefits for a longer time in childhood increases the likelihood of benefit receipt during adulthood. This difference is important to take into account when considering the earnings impacts below.

Cohorts with mental diagnoses who are younger at the time of the decision spend a significantly longer share of their life receiving SSI benefits. Though the way that standards were implemented suggested this would be the case, it was possible that the administrative increase in childhood SSI beneficiaries with mental disorders observed after the *Zebley* decision was entirely due to increases in new applicants induced to apply because of the eased standards. If that were true, I would not have observed these increases empirically given that I restrict my sample to those initially denied benefits prior to the decision.

Figure 6. SSI receipt over time



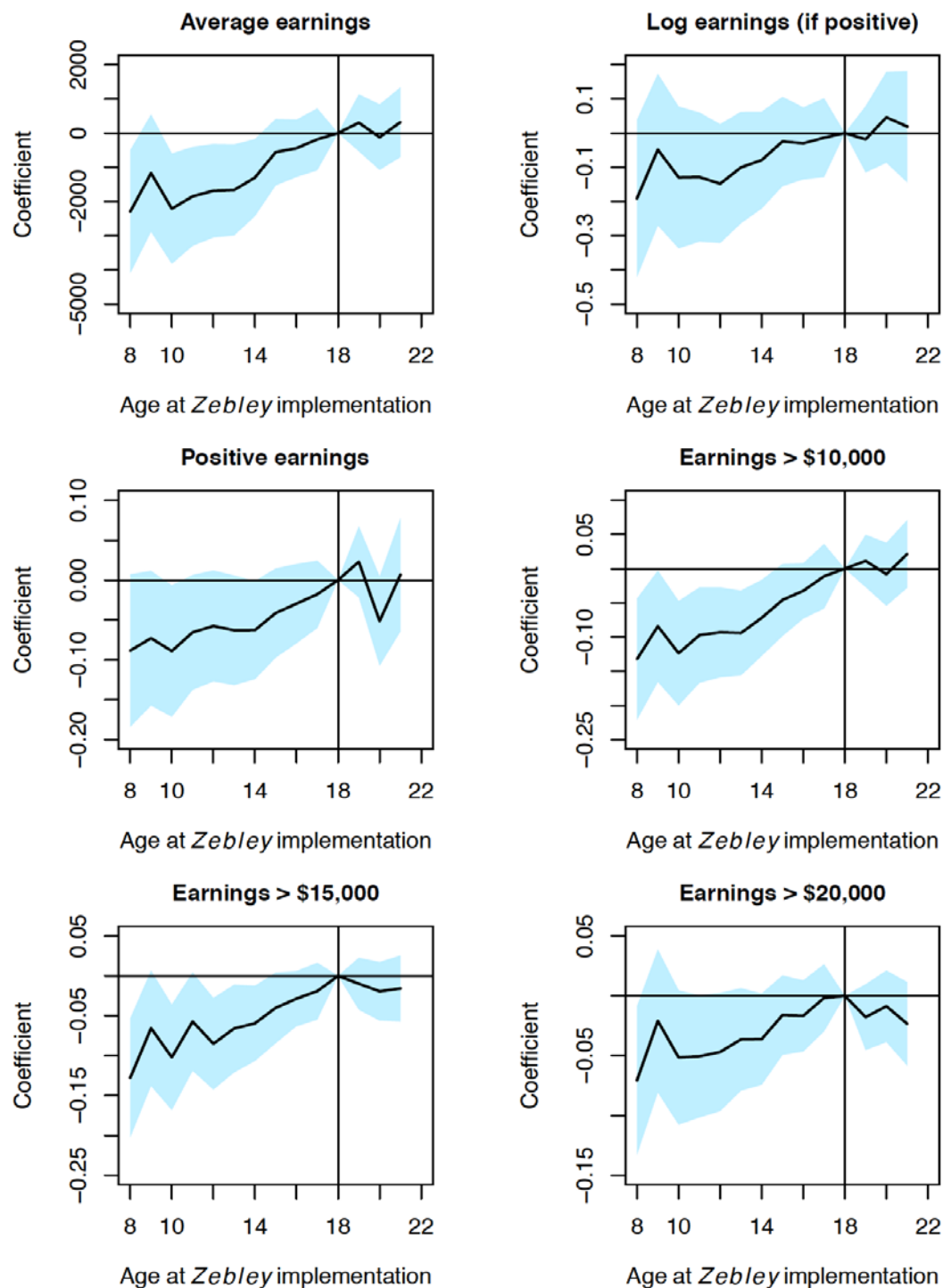
Note: Indicates if an individual receives SSI benefits at a given age. Individuals are grouped into age cohorts by their age on February 22, 1991, the date of implementation of new standards. Each line depicts the regression estimated lifetime benefits trajectory for a given age cohort. Each point plots the coefficient on the interaction of age cohort with having a mental disorder using equation (2) on SSI receipt at that age.

Labor market outcomes

Figure 7 plots the estimates β_{3c} from Equation (2) for each age cohort, showing the differential change in earnings from ages 20 to 22 for cohorts with mental disorders. Earnings reported are an individual's wage, salary, and tip income reported on a W-2 form in the year in which she turned 20, 21, and 22, deflated to be in real 2012 dollars. For example, earnings at age 20 for someone born on December 4, 1981, would be her reported earnings for calendar year 2001. This hypothetical individual would be grouped into the age-9 cohort since she was 9 on February 22, 1991, the date of *Zebley* implementation. Someone born six years earlier would be in the age-15 cohort and have reached age 20 in 1995. Given that the economy was in a recession in 2001 but was booming in 1995, I also include two variables to control for the state of the local economy each individual faced—the per capita income in her state of residence and the national age/gender unemployment rate. Such variables are not necessary to include since individuals with nonmental disorders of the same age faced the same economy as individuals with mental disorders, but they should add precision without influencing the estimates.¹⁹

¹⁹ Using National Longitudinal Survey of Youth 1997 data, I also confirm that general earnings trajectories for low-income youth without disabilities are similar for cohorts age 8 to 11, the only available overlap.

Figure 7. Average earnings from ages 20 through 22



Note: Earnings are reported from an individual's wage, salary, and tip income reported on W-2 forms in the year he turned a given age. Individuals are grouped into age cohorts by their age on February 22, 1991, the date of implementation of new standards. Plots the coefficient on the interaction of age cohort with having a mental disorder using Equation (2). Standard errors are clustered by the age cohort by state of residence at time of initial application. The shaded region shows the 95% confidence interval. The vertical line at age 18 represents the omitted cohort, where the estimate is mechanically equal to zero.

The top two panels show average earnings and log earnings (conditional on being positive) from ages 20 through 22, whereas the bottom four panels show indicator variables for various earnings thresholds.²⁰ The results show that a longer exposure to eased standards, and thus a longer time receiving SSI benefits in youth, is associated with reduced earnings as individuals transition to the labor force in their early 20s. This is true at all levels of the earnings distribution.²¹ I also estimate results using income from ages 20 through 22, which I define as labor market earnings plus SSI payments. Though not pictured, such a figure would remain mostly unchanged with one notable exception—the middle-left panel in Figure 7 shows that younger cohorts with mental disorders were less likely to have any positive earnings, but such cohorts were equally likely to have any positive income. This implies that SSI benefits serve as insurance against zero income. By the time individuals reach their mid-20s there is no longer any statistical difference in earnings (results not pictured). Because there were no differences in family earnings at the time of application (Figure A.2) and the policy led to increased SSI receipt in childhood (Figure 5), these effects are likely the causal estimate of a longer duration receiving SSI benefits.

The most compelling evidence that a longer time receiving SSI benefits in childhood leads to bigger reductions in earnings is presented in Figure 8, which plots cumulative labor market earnings starting from age 18. Each point is a regression estimate of total earnings up until that age for a given cohort. For example, the black line shows a regression estimate of β_{3c} for the age-10 cohort estimated for total earnings at ages 18 through 32.²² The value at age 25 of -\$15,000 means that individuals who were age 10 at the time of the *Zebley* decision and had a mental disorder have lifetime earnings through age 25 that are \$15,000 lower than those with nonmental disorders have, normalizing the difference to be zero for the age-18 cohort. The figure shows that for those with minimal exposure to eased standards in childhood (ages 16 and 20), there is essentially no effect on total lifetime earnings. The reduction in earnings is bigger for younger cohorts, consistent with longer exposure to eased standards enhancing effects. Note that the cumulative earnings estimate slightly flattens around age 23, consistent with the insignificant estimates on earnings in the mid-20s. Assuming that there is a linear relationship between years of exposure to eased standards and earnings, as in Equation (3), earnings through age 30 are reduced by \$1,600 for every additional year of exposure to eased standards.²³ Including SSI benefits to estimate the impacts on total income decreases this estimate to \$1,100, showing the

²⁰ I do not estimate a specification with unconditional log earnings given that there are so many people with zero earnings—about half of the population from age of 20 through 22.

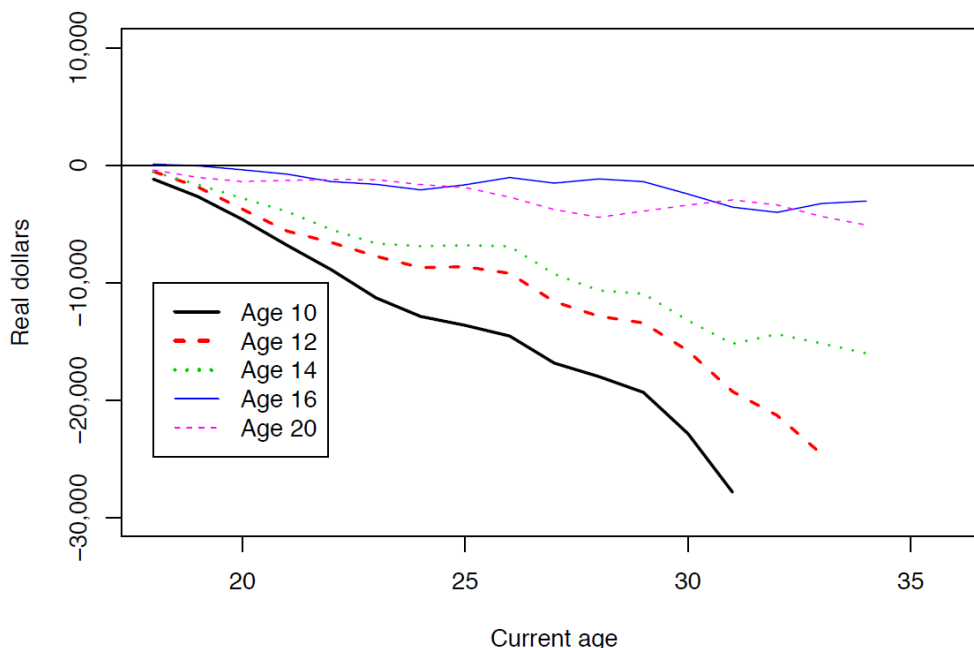
²¹ I also run quantile regressions to precisely estimate effects at different ends of the earnings distribution, rather than assigning arbitrary earnings thresholds. Results are similar at each quantile.

²² The line for the age-10 cohort ends prior to the other ages because data only goes through 2012. Individuals who were 10 at the time of the *Zebley* decision were just 32 in 2012, so there are no data for ages above 32.

²³ These findings are in stark contrast to Coe and Rutledge (2013), who use the same differential change in standards by comparing individuals who qualified for benefits with mental and nonmental disorders before and after the *Zebley* decision to estimate the long-run labor market impacts of SSI receipt. They find that increases in benefit receipt for those with mental disorders lead to improved employment outcomes. However, because of the compositional shift in applicants, people who qualified with mental disorders after *Zebley* likely have less severe disabilities than those who qualified with mental disorders pre-*Zebley*, which could explain the positive findings. By restricting my sample to those who applied and were denied SSI benefits prior to the *Zebley* decision, I avoid such selection bias issues.

insurance role that SSI provides, while demonstrating that SSI benefits do not make up for reductions in earnings.

Figure 8. Cumulative lifetime earnings



Note: Earnings are reported from an individual's wage, salary, and tip income reported on W-2 forms in the year he turned a given age. Cumulative earnings are the total lifetime earnings from age 18 up until the current age. Individuals are grouped into age cohorts by their age on February 22, 1991, the date of implementation of new standards. Each line depicts the regression estimated lifetime earnings trajectory for a given age cohort. Each point plots the coefficient on the interaction of age cohort with having a mental disorder using equation (2) on cumulative lifetime earnings at that age.

Table 3 presents the results assuming such a linear relationship. The estimate in Column (1) implies that an additional year of exposure to eased standards leads to a \$227 reduction in labor market earnings in each year between the ages of 20 and 22 for individuals with mental disorders. This estimate is statistically significant at the 1 percent level and is also economically significant—for the age-10 cohort, the implied reduction of \$1,812 is a 26 percent reduction in average earnings compared to those who were already adults at the time of the *Zebley* decision. To measure the treatment-on-the-treated, or the estimated reduction in earnings from an additional year of SSI receipt, one could scale the estimates by the first stage estimate of 0.3 from Column (1) of Table 2. This implies an additional year of benefit receipt leads to a \$742 reduction in annual earnings for individuals with mental disorders.

Each additional year of exposure reduces the likelihood of having both any positive earnings and earnings at the high end of the distribution (greater than \$15,000). Adding in SSI benefits received to create total income, as in Column (4), reduces the estimated decline but the effect is still significantly negative. However, in Column (5), the estimate shows that SSI benefits serve

Table 3. Estimated impact on earnings

	(1) Average earnings age 20–22	(2) Earnings > 0 age 20–22	(3) Earnings ≥ \$15k age 20–22	(4) Average income age 20–22	(5) Income > 0 age 20–22	(6) Average earnings age 24–26	(7) Average income age 24–26	(8) Five-year earnings growth	(9) Age of entry to labor force
<i>Years Exposure x Mental</i>	-227*** (87)	-0.006* (0.004)	-0.009*** (0.003)	-216** (87)	0.000 (0.004)	-69 (122)	-15 (118)	61 (99)	-0.01 (0.02)
<i>Mental diagnosis</i>	-954 (.)	-0.011 (.)	-0.098 (63)	-66 (.)	0.036 (106)	-1,412 (2,379)	-2,035 (2,379)	-43 (3,297)	0.81 (1.03)
<i>Years Exposure</i>	-192*** (58)	0.004** (0.002)	-0.005*** (0.002)	-338*** (56)	-0.006*** (0.002)	-223*** (77)	-304*** (74)	-445*** (63)	-0.06*** (0.02)
Unexposed mean	6,993	0.535	0.188	8,983	0.676	10,942	12,340	4,729	17.86
Observations	183,700	183,700	183,700	183,700	183,700	181,374	181,374	181,374	58,114
R^2	0.050	0.029	0.039	0.042	0.020	0.039	0.036	0.013	0.052

Note: The sample includes all individuals who applied for SSI benefits and were rejected for medical reasons between the years of 1986 and 1989, given a diagnosis that is considered mental or nonmental, excluding intellectual disabilities. *Years Exposure* measures the number of years prior to age 18 occurring after the *Zebley* decision in 1991 and is thus equal to zero for all cohorts age 18 and older at the time of the *Zebley* decision. For Columns (1) through (8), there is one observation per year per individual. Earnings are an individual's wage, salary, and tip income reported on W-2 forms. Income is earnings plus SSI benefits received. Columns (2), (3) and (5) are indicator variables. Five-year earnings growth is measured as the numerical change in income from age 20, 21, and 22 to age 25, 26, and 27, respectively. Age of entry to labor force is the first age at which an individual has positive labor market earnings. *** p<0.01, ** p<0.05, * p<0.1.

as insurance against zero income, with no relationship between years of exposure and an indicator for positive income. Columns (6) and (7) show that by the time individuals reach their mid-20s, there is no longer any statistical difference in earnings or income. The point estimates are still negative, but the magnitude has fallen substantially. The decrease in earnings early in working life does not persist. Given that accumulated human capital presumably plays a large role in one's labor market potential, one would expect lower earnings early in adulthood for those with mental disorders to lead to even lower earnings later in life.

One possible explanation is that SSI receipt may prolong schooling. In this case, earnings from ages 20 through 22 would be suppressed because of education enrollment but would likely increase more rapidly after completing program of study. Prior studies of the Earned Income Tax Credit and Supplemental Nutrition Assistance Program show that providing income transfers to families with poor children leads to increased education (Dahl and Lochner, 2012; Hoynes et al. 2016). However, as shown in Figure A.3, the earnings growth does not persist over time. The figure plots the estimate of an additional year of exposure to eased standards on earnings at each age from 18 through 30, as in Column (1) of Table 3. The initial catch-up in earnings experienced when individuals are in their mid-twenties reverts back to a somewhat random path as individuals approach age 30. Though there is a clear trend established early in adulthood, other factors not measured by SSI benefit receipt in youth likely begin to play a larger role as time goes on.

Two additional explanations indicate education does not drive the results. First, Kemp (2010) shows that only 5 percent of SSI beneficiaries between the ages of 18 and 22 make use of the Student Earned Income Exclusion. This exclusion incentivizes work and education by allowing students under age 22 to earn wages that are not offset by reductions in benefits. However, since it is rarely used and is applied automatically, it is unlikely people are still in school by age 20, the first age I consider for earnings. Second, I make use of very limited education data available from SSA administrative records. Given data availability, I am more likely to observe completed education for the youngest individuals with mental disorders. Thus, estimates on education should only be considered suggestive. Conditional on having education data, there is no difference in education for younger cohorts with mental disorders (results not pictured). Additionally, only about 50 percent of individuals with education data have completed high school, and only about 10 percent have any college education, making it unlikely that wages are lower as individuals transition into adulthood because they are still in school.

Table 4 estimates heterogeneous earnings effects by whether an individual lived with her parents at the time of the initial rejected application. The main results from Table 3 are driven by individuals who lived with their parents—there is no linear relationship between years of exposure and earnings from ages 20 through 22 for those who did not live with their parents, and the estimate is also small in magnitude. This is surprising, particularly because children who did not live with their parents have somewhat higher total years and amount of SSI benefit receipt. It is possible that parents still provide for their children with disabilities as they transition into adulthood, enabling them to remain out of the workforce, whereas people who did not live with their parents must work to support themselves. It is also possible that parents do not spend all of the SSI income received on their child with a disability, whereas the SSI income is directly

Table 4. Estimated impact on earnings, by living status at initial application

	(1) Years on benefits	(2) Total SSI payments	(3) Average earnings age 20–22	(4) Earnings > 0 age 20–22	(5) Earnings ≥ \$15k age 20–22	(6) Average income age 20–22	(7) Income > 0 age 20–22	(8) Average earnings age 24–26	(9) Average income age 24–26
Lived with parents									
<i>Years Exposure x Mental</i>	0.313*** (0.046)	1,740*** (408)	-197* (101)	-0.007 (0.004)	-0.009** (0.004)	-228** (98)	-0.003 (0.004)	-79 (142)	-59 (135)
Unexposed mean	1.106	10,750	7,349	0.548	0.202	9,453	0.693	11,516	12,970
Observations	50,515	50,500	148,513	148,513	148,513	148,513	148,513	146,684	146,684
Did not live with parents									
<i>Years Exposure x Mental</i>	0.320*** (0.073)	2,243*** (680)	-129 (207)	0.003 (0.009)	-0.006 (0.007)	22 (203)	0.017** (0.008)	143 (277)	306 (272)
Unexposed mean	1.010	8,507	6,236	0.507	0.158	7,980	0.641	9,715	10,996
Observations	11,976	11,933	35,187	35,187	35,187	35,187	35,187	34,690	34,690

Note: The sample includes all individuals who applied for SSI benefits and were rejected for medical reasons between the years of 1986 and 1989, given a diagnosis that is considered mental or nonmental, excluding intellectual disabilities. The top panel runs all regressions separately for individuals who lived with their parents at the time of initial application, while the bottom panel runs all regressions separately for individuals who did not live with their parents. *Years Exposure* measures the number of years prior to age 18 occurring after the *Zebley* decision in 1991, and is thus equal to zero for all cohorts age 18 and older at the time of the *Zebley* decision. The number of years on SSI benefits, Column (1), and total lifetime payments, Column (2), are through age 24. For Columns (3) through (9), there is one observation per year per individual. Earnings are an individual's wage, salary, and tip income reported on W-2 forms. Income is earnings plus SSI benefits received. Columns (4), (5) and (7) are indicator variables. *** p<0.01, ** p<0.05, * p<0.1.

invested in children not living with their parents. Further research is needed into exactly how SSI income is spent, and the role of parental involvement.²⁴

Robustness checks

The primary threat to validity of the identification strategy, as discussed in Section IV, is a differential trend affecting particular age cohorts with mental disorders. For example, if employers' attitudes toward hiring people with mental disorders relative to nonmental disorders changed over time, this would lead to biased results. The Americans with Disabilities Act (ADA) was passed in 1990, so some of the older cohorts may have experienced work environments unprotected by the ADA in early adulthood. Most papers on the ADA show minimal labor market effects, with slight reductions in employment due to the increased accommodation costs for employers to hire individuals with disabilities (Acemoglu and Angrist, 2001; Moss and Burris, 2007). DeLeire (2000) and Hotchkiss (2004) show that the reductions in employment are approximately equal regardless of disorder type.

To provide further evidence that differential trends by disability type do not drive the results, I estimate results using initially *accepted* applicants with mental diagnoses as the counterfactual group rather than rejected applicants with nonmental diagnoses. Figure A.4 shows that an additional year of exposure to eased standards for SSI benefits for denied cohorts similarly increases the number of years receiving benefits. Using accepted applicants as a counterfactual should yield a similar result—all accepted applicants with mental disorders should have been unaffected by the *Zebley* decision since they were already receiving benefits, whereas of denied applicants with mental disorders, only those who were children had increased benefit receipt. This strategy has a similar identification assumption—outcomes between accepted and rejected applicants would have remained constant for younger cohorts in the absence of the *Zebley* decision. Figure A.5 shows the analogous version of cumulative labor market earnings, with results approximately similar regardless of the counterfactual group. This implies that broader economic trends differentially affecting those with mental and nonmental disorders likely do not drive the results because they are not dependent on using individuals rejected from benefits with nonmental disorders as a counterfactual.²⁵

I also consider a type of “placebo” test, where I limit the sample to those who were adults when the *Zebley* decision occurred and therefore had no difference in childhood exposure to eased standards. For these individuals, I define the years of exposure by the number of years of exposure to eased standards by age 21. There is no relationship between this false measure of “exposure” and earnings from ages 20 through 22. This suggests that the main results are likely

²⁴ Though not reported, I estimate the impacts of a similar framework on parental earnings over time to see how a change in child eligibility affects parent outcomes. Such results are mostly imprecise. Deshpande (2016b) finds that parents of children who lose SSI respond by increasing labor market earnings. However, she finds evidence of an asymmetric response between losing and gaining benefits.

²⁵ A natural placebo test would be to use only individuals initially accepted with mental and nonmental disorders since neither group was affected by the *Zebley* decision. However, individuals with mental disorders are disproportionately more likely to lose benefits as a result of the 1996 policy change, as is shown in Figure 2. This leads to a difference between accepted mental and nonmental applicants in the number of years receiving benefits, which is the primary channel that I explore. Thus, this placebo test would not in fact be a placebo test since there is a non-zero first stage.

driven by SSI receipt itself, rather than younger cohorts with mental disorders generally faring worse in the labor market.

I also estimate results removing individuals diagnosed with cerebral palsy and any neurological disorder. Figure A.1 shows that those with neurological disorders, particularly cerebral palsy, had a similar likelihood of qualifying for SSI benefits following the *Zebley* decision as did those with mental disorders. Even though sample sizes decrease, removing these individuals does not affect the significance of the results, with the point estimates essentially unchanged.²⁶

VI. CONCLUSION

I provide some of the first causal estimates of receiving SSI benefits as a child on later life outcomes. I show that increased exposure to eased standards in childhood, and thus higher receipt of SSI benefits, most reduces cumulative labor market earnings through age 30 for cohorts with the longest duration of exposure. SSI benefits insure against experiencing zero income as an adult, though they do not fully replace the loss in labor market earnings.

Though labor market earnings decreased as a result of the policy changes associated with the *Zebley* decision, it is not clear that this means giving children SSI benefits for a longer time should be viewed as counterproductive. Particularly because these people likely suffer from adverse health stemming from their disability, it is important to consider the impacts of SSI receipt on long-term outcomes other than earnings, such as health and the ability to live independently as an adult. To better capture gains in total social welfare, existing studies analyzing the long-term impact of programs that aim to alleviate poverty consider other outcomes, such as college attendance, family formation and long-term health (Chetty et al. 2014, 2016; van den Berg et al. 2014; Brown et al. 2015). Qualifying for SSI benefits almost always includes eligibility for Medicaid, which can lead to better health (Finkelstein et al. 2012). Although this paper evaluates the impacts of receiving SSI benefits on labor market outcomes, it is not an analysis of the entire program. Future research could look into the effects of SSI receipt on other outcomes like health and participation in other government benefit programs.

Finally, it is important to get a better understanding as to exactly *why* SSI receipt leads these youth to have a harder time successfully transitioning into the labor force. The age when individuals transition into the labor force is a particularly sensitive time because many services provided through school become unavailable. SSA has developed several pilot programs, such as the Youth Transition Demonstration, that aim to provide additional services to youth during this crucial transitional time (Hemmeter, 2014). These programs thus far have had mixed results, but may eventually yield more insights into the results I find throughout this paper.

²⁶ Tables showing the results of these three robustness checks are available on request.

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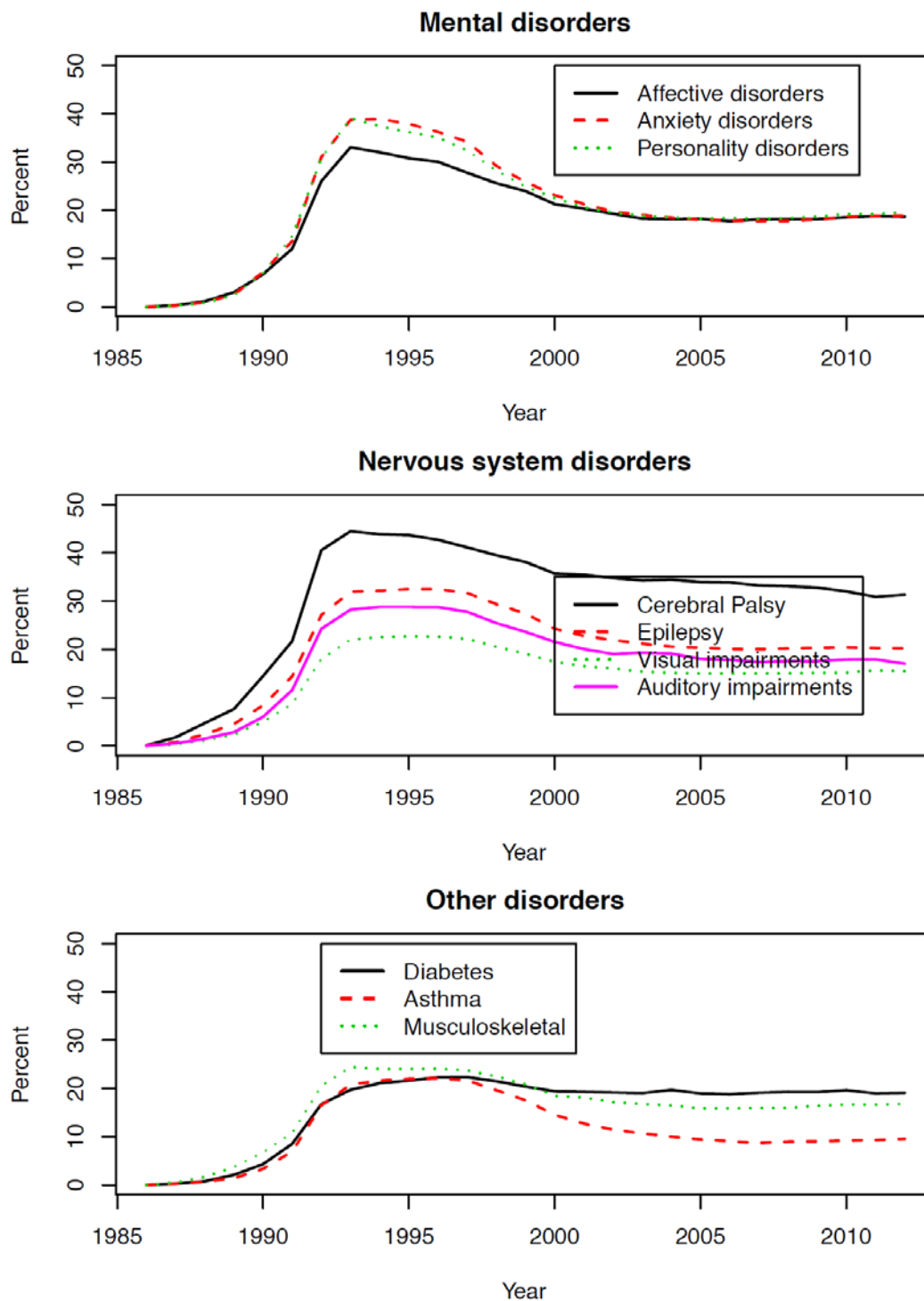
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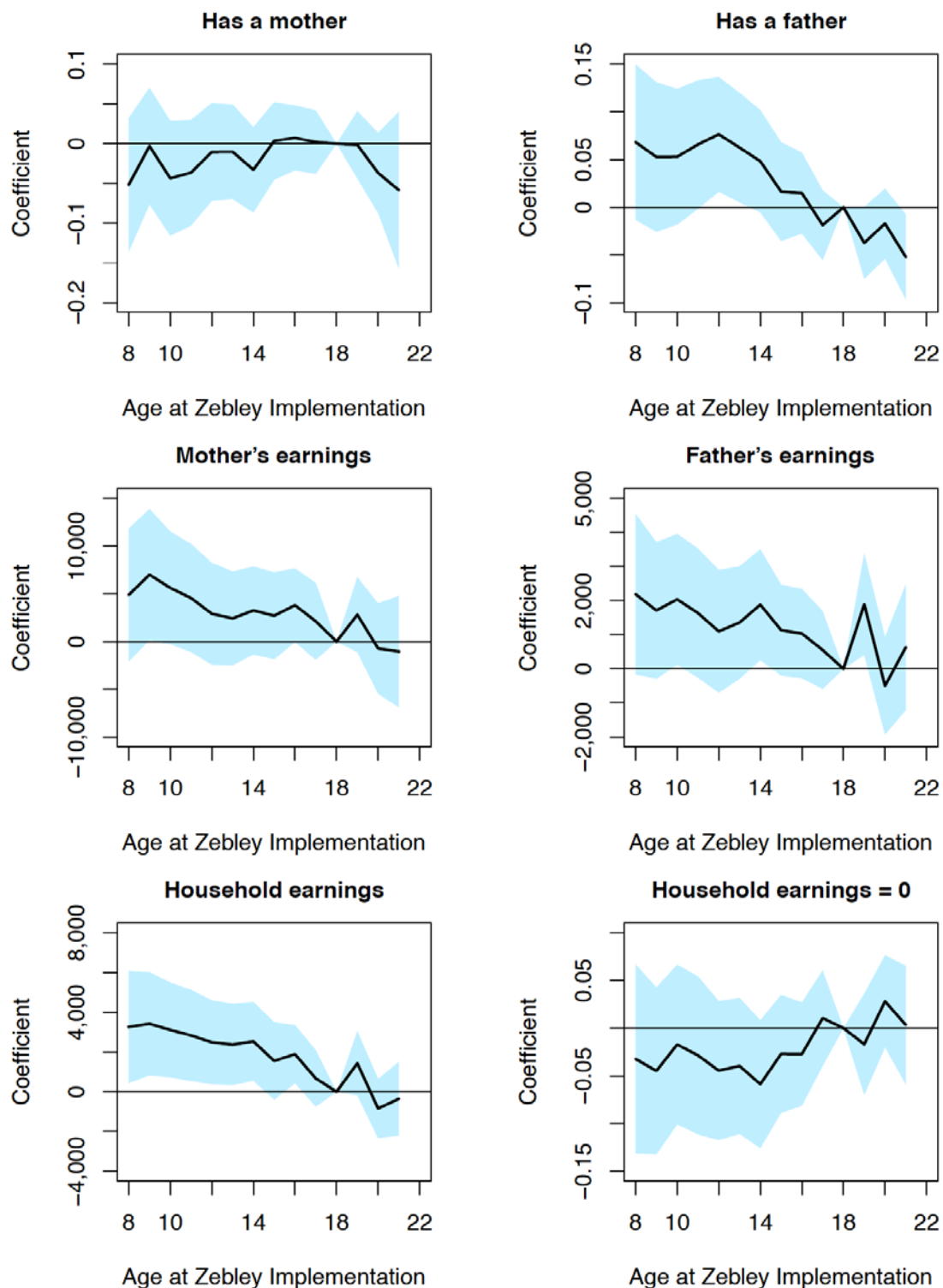
APPENDIX A. SUPPLEMENTAL FIGURES

Figure A.1. Percent of initially rejected applicants currently receiving SSI benefits, by disability type



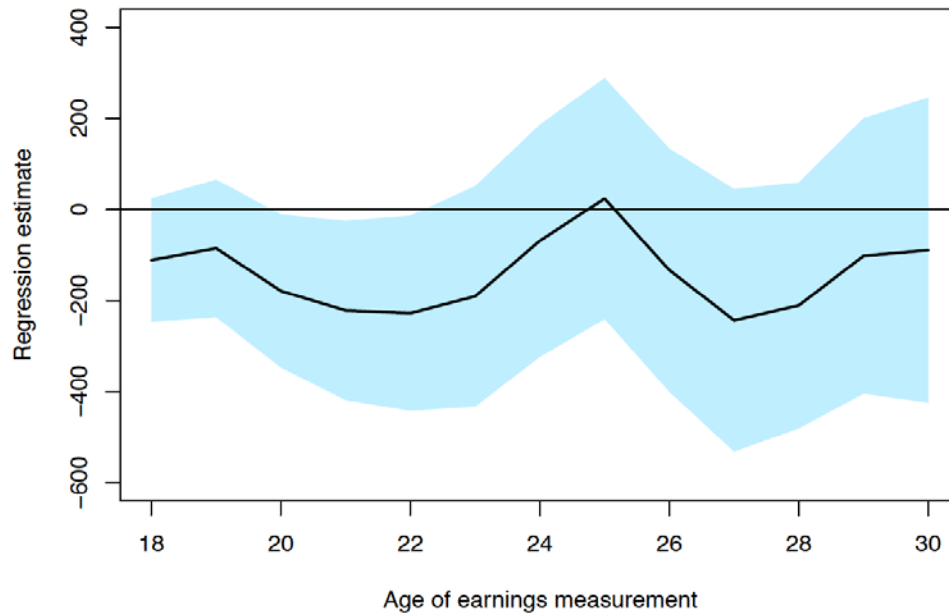
Note: Author's calculations using SSA administrative data. Includes individuals who applied for SSI benefits as children between 1986 and 1989 and were rejected for medical reasons. Individuals are grouped by diagnosis at time of initial application.

Figure A.2. Parental earnings in year of initial application



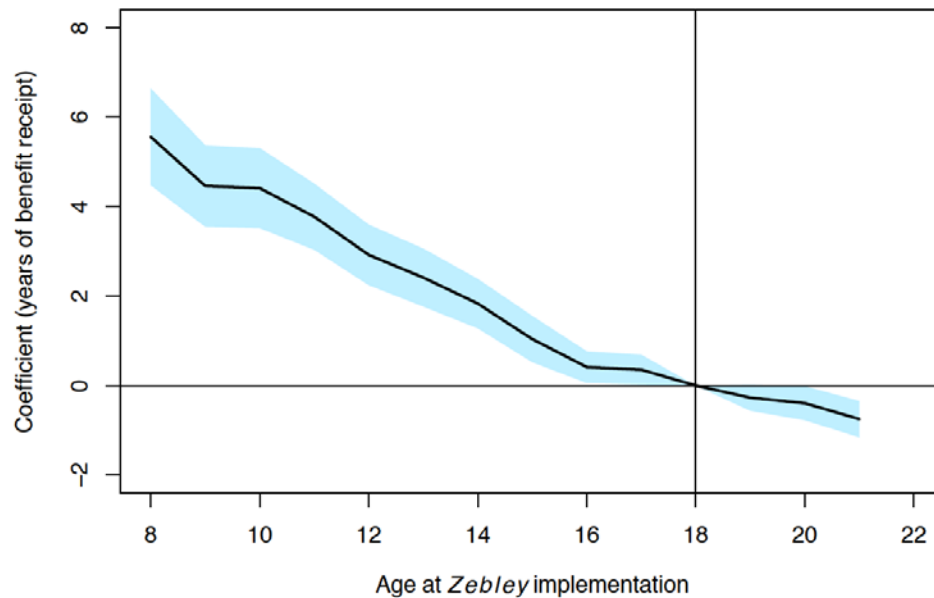
Note: All earnings are measured in the calendar year of the initial application. Household earnings are the sum of mother and father earnings. Individuals are grouped into age cohorts by their age on February 22, 1991, the date of implementation of new standards. Plots the coefficient on the interaction of age cohort with having a mental disorder using Equation (2). Standard errors are clustered by the age cohort by state of residence at time of initial application. The shaded region shows the 95% confidence interval.

Figure A.3. Earnings estimates over time



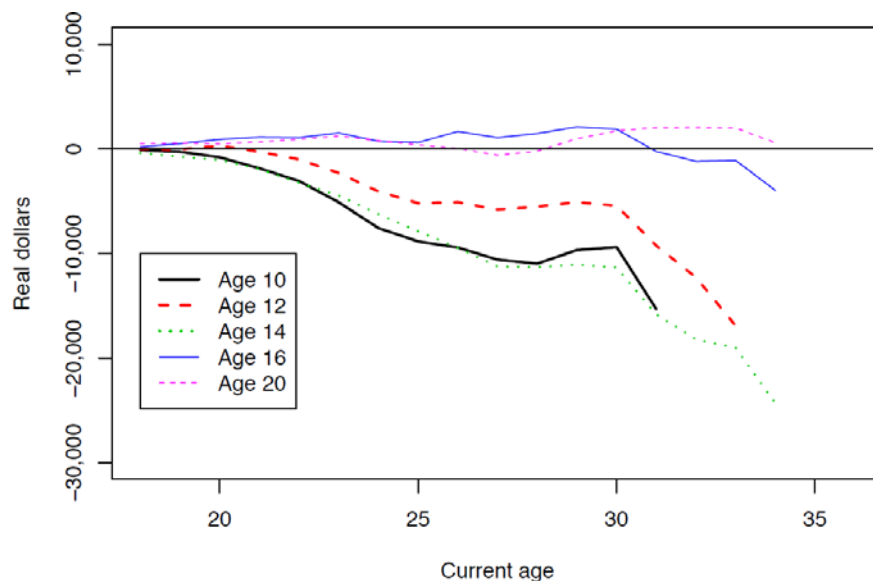
Note: Each point is similar to the top row in Column (1) of Table 3, plotting the estimate of an additional year of exposure to eased standards for mental cohorts on an individual's earnings at each given age. The shaded region shows the 95% confidence interval. The sample includes all individuals who applied for SSI benefits and were rejected for medical reasons between the years 1986 and 1989, given a diagnosis that is considered mental or nonmental, excluding intellectual disabilities. Earnings are an individual's wage, salary, and tip income reported on W-2 forms in the year he turned that age.

Figure A.4. Number of years receiving benefits through age 24



Note: Individuals are grouped into age cohorts by their age on February 11, 1991, the date of implementation of new standards. Includes accepted applicants with mental disorders as the counterfactual group, rather than rejected applicants with nonmental disorders. Plots the coefficient on the interaction of age cohort with being initially rejected using Equation (2). Standard errors are clustered by the individual's age at *Zebley* implementation by the state in which the initial application was filed. The shaded region shows the 95% confidence interval. The vertical line at age 18 represents the omitted cohort, where the estimate is mechanically equal to zero.

Figure A.5. Cumulative lifetime earnings



Note: Earnings are reported from an individual's wage, salary, and tip income reported on W-2 forms in the year he turned a given age. Cumulative earnings are the total lifetime earnings from age 18 up until the current age. Individuals are grouped into age cohorts by their age on February 22, 1991, the date of implementation of new standards, with each line depicting the lifetime earnings trajectory for a given age cohort. Includes accepted applicants with mental disorders as the counterfactual group, rather than rejected applicants with nonmental disorders. Each line depicts the regression estimated lifetime earnings trajectory for a given age cohort. Each point plots the coefficient on the interaction of age cohort with being initially rejected using equation (2) on cumulative lifetime earnings at that age.

APPENDIX B. RETROACTIVE PAYMENTS

Some people previously rejected from benefits who qualified after the *Zebley* decision also received a substantial lump-sum retroactive payment. If a readjudication concluded that in addition to qualifying for benefits, the individual also should have qualified for benefits prior to the *Zebley* decision given the new standards, he could receive payments retroactively. Such a readjudication was eligible to anyone denied after January 1, 1980, and thus applies to everyone in my sample. Cohorts that were younger at the time of the *Zebley* decision received smaller back payments, shown by the significantly negative estimate in Column (6) of Table 2. It could be that a smaller lump-sum retroactive payment, rather than increased SSI receipt, leads younger cohorts to experience lower cumulative earnings through their mid-30s. It is important to further explore this channel since the policy takeaways would differ substantially if a large lump-sum payment or increased SSI receipt was driving the main results.

Using an alternative sample, I provide suggestive evidence that these large lump-sum payments did not lead to significant impacts on labor market outcomes. I consider individuals newly given an award after the *Zebley* decision who were initially rejected in a 40-week window of January 1, 1980, the date cutoff for retroactive payments.²⁷ My main results used individuals initially rejected from SSI between 1986 and 1989, some of whom then proceeded to reapply, and qualify, for benefits after the *Zebley* decision. This alternative strategy uses individuals rejected between 1979 and 1980, *all* of whom proceeded to reapply, and qualify, for benefits after the *Zebley* decision. Those initially denied in the 40 weeks before January 1, 1980 would not have been eligible for any retroactive payment when newly qualifying, whereas those denied after would have been. To control for disability severity, I match eligible and ineligible individuals for back pay by the number of years after the *Zebley* award they continuously received benefits.²⁸ People tend to lose benefits because of changes in health status, not because of increased income.²⁹ If the primary reason for losing benefits was that people started to work, matching by length of benefit spell would ensure that people with similar durations of benefit receipt experienced similar levels of income.

I first show that eligibility for back payment led to increased receipt of back payment. Though not a true regression discontinuity given the non-randomness associated with disability severity, a similar model given the date cutoff associated with eligibility for retroactive payments is as follows:

²⁷ I also restrict the sample to people who did not reapply for benefits between this initial application date and the *Zebley* decision, because a reapplication could contaminate the sample by making someone who was initially rejected in 1979 eligible for a retroactive payment, given the new application

²⁸ In related work, I implement a regression discontinuity (RD) to show that getting the notification about the change in standards leads to an almost three times higher rate of reapplication. The increase in *successful* reapplications is much smaller but still significant. Using an RD strategy, I find that the benefit spell for accepted individuals eligible for back payment is about two years shorter, demonstrating the lower disability severity of the treated group. Therefore, I match on the length of this benefit spell to attempt to equate the disability severity.

²⁹ Forty percent of the individuals in this sub-sample lose benefits because of excess income or resources. However, only one code is noted when each individual loses benefits, and a change in health status would be listed even if there were simultaneous changes in health and income. It is thus possible that excess income is a more common reason for losing benefits than I measure.

$$(B.1) \quad y_i = \tau * 1(Week_i > c) + \beta_1(Week_i - c) + \beta_2(Week_i - c) * 1(Week_i > c) + \varepsilon_i$$

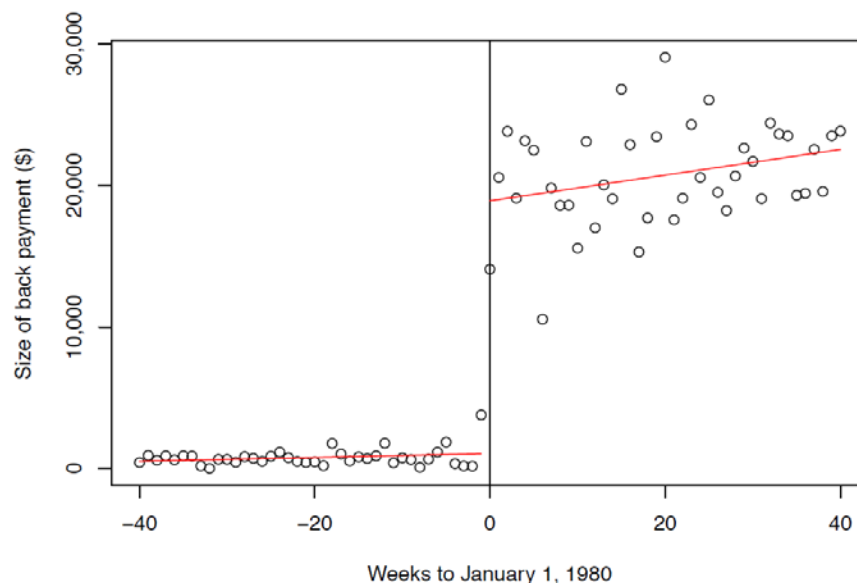
$Week_i$ refers to the week an individual was denied SSI benefits, centered around c , the cutoff date of January 1, 1980. Figure B.1 plots y_i , the amount of back pay individual i received, as a function of the number of weeks from January 1, 1980 that the individual was initially denied. The vertical jump at zero weeks of approximately \$20,000 is the estimate of τ , and shows that eligible individuals for back pay received \$20,000 more back pay than ineligible ones.

Figure B.2 plots a year-by-year estimate of τ from Equation (4) for the amount of SSI payments received. Individuals eligible for back payment receive substantially higher SSI payments in the several years following the *Zebley* decision precisely because of the additional back payment—recall that everyone in this sample necessarily qualified at some point between 1991 and 1994. After 1996, there is no longer any significant difference in total SSI payments received, which is to be expected given that the treated and untreated samples are matched by duration of benefits.

Figure B.3 considers cumulative labor market earnings in the years after back pay was awarded. Each point refers to its own estimate of τ from Equation (4), with standard errors clustered by the number of weeks from January 1, 1980 in which an individual was initially denied. The estimated difference in cumulative earnings between individuals eligible and ineligible for back pay is always insignificant and small in magnitude—13 years after the *Zebley* decision the point estimate for the increase in total lifetime earnings is just \$3,300. The result is the same for the distribution of labor market earnings in each year (as in Figure 7).

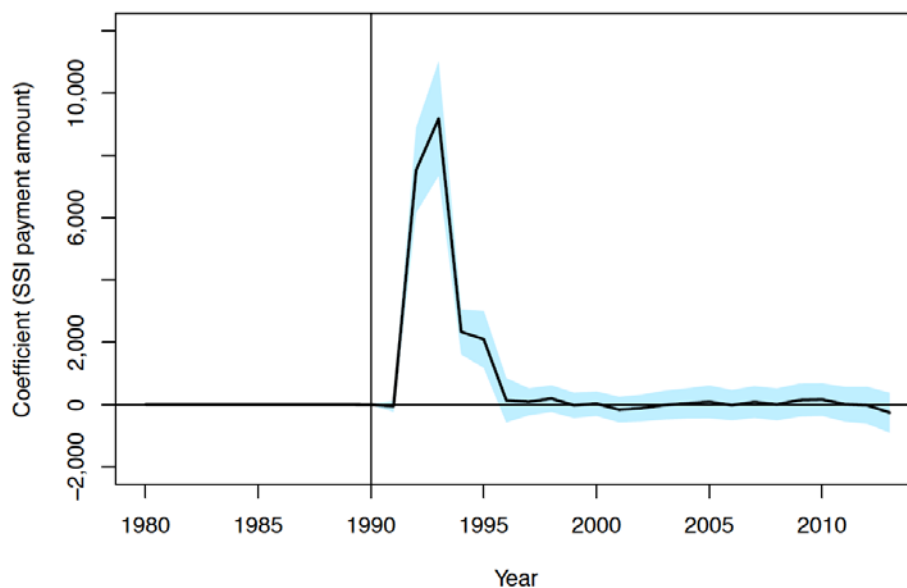
This suggests that a large lump-sum back payment does not affect labor market outcomes for individuals initially denied SSI benefits. These retroactive payments seem to not crowd out employment or earnings. In the primary sample, the maximum difference in back payment was just \$2,000 lower for the age-8 cohort relative to the age-18 cohort, substantially less than the \$20,000 back payment associated with this alternative matching strategy. Given that there are no significant labor market impacts with a back payment that is almost ten times as large, it seems safe to assume that the primary mechanism behind the main results is not a difference in back pay received.

Figure B.1. Amount of back pay received



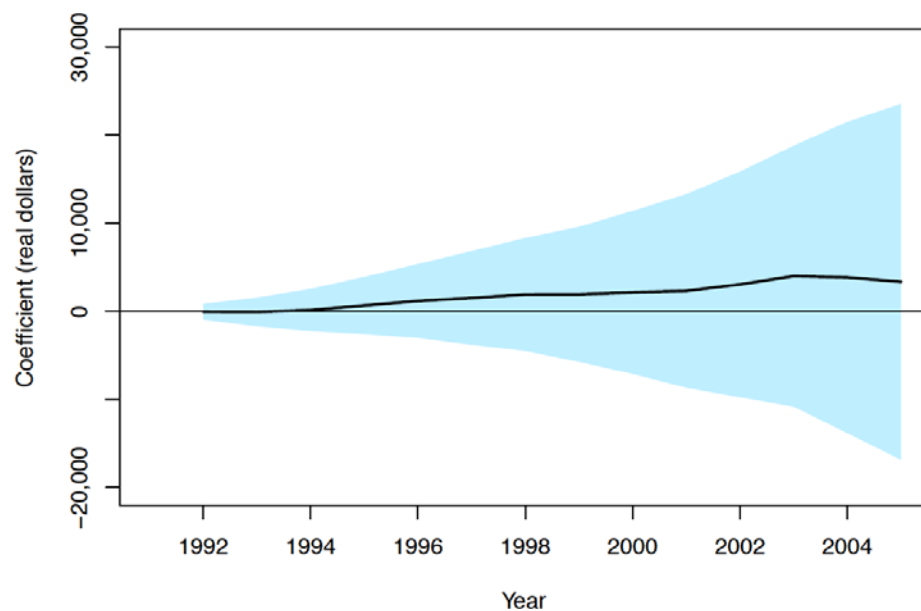
Note: Individuals are placed in a weekly bin based on the distance of the date of initial denial from January 1, 1980, the cutoff for being eligible for back payment. Only includes individuals who had a successful application following the *Zebley* decision who had not reapplied for benefits in the intervening decade. Untreated individuals with a benefit spell longer than 12 years are randomly dropped to match the share with that benefit length in the treated group to mechanically equate the duration of benefits.

Figure B.2. Level of SSI payments in a given year



Note: Each point is its own estimate of τ from Equation (4), indicating the difference in SSI payments received between treated and untreated individuals. Untreated individuals with a benefit spell longer than 12 years are randomly dropped to match the share with that benefit length in the treated group to mechanically equate the duration of benefits. Standard errors are clustered by the number of weeks from January 1, 1980 in which an individual was initially denied from SSI benefits. The shaded region shows the 95% confidence interval.

Figure B.3. Cumulative labor market earnings



Note: Each point is its own estimate of τ from Equation (4), indicating the difference in cumulative labor market earnings from 1992 on between treated and untreated individuals. Untreated individuals with a benefit spell longer than 12 years are randomly dropped to match the share with that benefit length in the treated group to mechanically equate the duration of benefits. Standard errors are clustered by the number of weeks from January 1, 1980 in which an individual was initially denied SSI benefits. The shaded region shows the 95% confidence interval.

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