Do Stronger Employment Discrimination Protections Decrease Reliance on Social Security Disability Insurance? Evidence from the Social Security Reforms[*]

Patrick Button
Assistant Professor,
Department of Economics, Tulane University,
Postdoctoral Scholar, Center for the Study of Aging,
RAND Corporation, NBER, and IZA

Mashfiqur R. Khan
Postdoctoral Fellow,
Department of Economics and
The Murphy Institute,
Tulane University

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Abstract

The Social Security Amendments of 1983 (SSA1983) increased the full retirement age (FRA) and increased penalties for retiring before the FRA. This cut to retirement benefits caused spillover effects on Social Security Disability Insurance (SSDI) applications and receipt by making SSDI relatively more generous. We explore if stronger disability and age discrimination laws moderated these spillovers, using variation whereby many state laws are broader or stronger than federal law. We estimate the effects of these laws on SSDI applications and receipt using a difference-in-differences approach, comparing cohorts affected by SSA1983 to similarly-aged unaffected cohorts, across states. We find that a broader definition of disability, where only a medically-diagnosed condition is required to be covered under state law, significantly reduces SSDI applications induced by SSA1983, but has no effect on SSDI receipt, likely because the forgone applications were for those with less severe conditions that were unlikely to have been approved for SSDI. We find some evidence that other broader or stronger features of state disability discrimination laws reduce both SSDI applications and receipt. We do not find much evidence that age discrimination laws reduce spillovers to SSDI. These results suggest that broader and stronger disability discrimination laws reduce employment barriers, allowing older individuals to work longer, possibly reducing reliance on SSDI and costly applications to SSDI.

JEL Codes: H55, J71, J78, K31, J14, J26

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Introduction

The Social Security Amendments of 1983 (SSA1983) made a number of significant cuts to the Social Security (SS) program. SSA1983 increased the full retirement age (FRA), the age at which individuals could retire with full SS benefits. The FRA increased gradually from 65 to 67 for cohorts born from 1938 or later, based on a graduated scale that increased for cohorts born later. SSA1983 also increased the penalty of claiming Old Age Survivor Insurance (OASI) benefits before the FRA for cohorts born from 1938 or later. Table 1 presents how the SSA1983 increased the FRA and reduced OASI benefits at different retirement ages, by year of birth. For example, for an eligible worker born in 1937, and unaffected by SSA1983, the monthly OASI benefit was 20 percent lower each month if benefits were claimed starting at age 62 relative to if claiming started at the FRA. However, for an eligible worker born in 1943, who was affected by the SSA1983, the monthly OASI benefit was 25 percent lower at age 62 than at the FRA.

This amendment made it such that retiring at the previous FRA of 65, or earlier, meant a cut in benefits, forcing individuals to choose between a cut in benefits or attempting to work longer to delay retirement. The SSA1983 was intended to increase employment and delay OASI benefit claiming to achieve the program's financial solvency in the long-run. Standard labor economic theory suggests that the SSA1983, did, in fact, increase labor supply,[1] and Neumark and Song (2013), and Behaghel and Blau (2012) , and Song and Manchester (2007), document this empirically.

However, part of the reduction in spending for OASI benefits in the short-run through these reforms were offset by the spillover effects onto the Social Security Disability Insurance (SSDI)

[1] The SSA1983 reduces the expected discounted value of Social Security benefits, which is effectively a cut in benefits, leading to a negative income effect and an increase in labor supply under the realistic assumption that leisure is a normal good. See Neumark and Song (2013) for a more detailed discussion.

program. For many older individuals, SSDI and OASI benefits are substitutes,[2] making SSDI relatively more generous, after the cut imposed by the SSA1983, at all ages before reaching the FRA for the affected cohorts. Li and Maestas (2008) document these spillovers, finding that an average four months increase in the FRA for those born between 1938 and 1940 increases the SSDI application rate by 0.04 to 0.30 percentage points, a moderate increase relative to the application rate of 4.3% for the affected cohort. They find a much stronger effect, ranging from a 0.22 to a 0.89 percentage point increase, for individuals at or above age 62 and for individuals having work-limiting health problems. Duggan et al. (2007) find that 0.6 percent of men and 0.9 percent of women between the ages of 45 and 64 were enrolled in SSDI program in 2005 due to the relative generosity of SSDI program induced by the SSA1983.

In this paper, we explore if stronger disability and age discrimination laws moderated the spillover effects of SSA1983 on SSDI application and receipt. Disability and age discrimination laws are intended to improve the employment of individuals with disabilities by reducing employment discrimination. Disability discriminations laws have the added requirement that employers provide "reasonable accommodations" to workers with disabilities. These discriminatory protections and on-the-job accommodations are important for some older individuals caught by the SSA1983 who then become possible applicants for SSDI. Reducing discrimination and improving on-the-job accommodations can increase hiring, employment, or reduce labor force exit and subsequent SSDI application. Thus, stronger discrimination protections could reduce barriers to work for those close to retirement who are affected by the SSA1983 and could also reduce spillovers onto SSDI.

[2] Since the incidence of disability rises with age (see, e.g., Neumark, Song, and Button 2017; Neumark et al. 2018; Ameri et al. 2018), many seniors may be eligible, or perceive that they are eligible, for both programs.

To explore how disability and age discrimination laws affect spillovers to SSDI, we focus on the differences in state discrimination laws, which are often stronger or broader than the federal *Americans with Disabilities Act of 1990* (ADA) (Long 2004; Neumark, Song, and Button 2017) and the federal *Age Discrimination in Employment Act of 1967* (ADEA). Many state laws are stronger or broader than the federal ADA or ADEA in primary three ways:

1. by lowering the burden of proof, relative to the ADA, for plaintiffs to establish under law that they have a disability ("medical definition of disability");
2. by covering employers with fewer than 15 employees (the minimum for the ADA to apply) or 20 employees (ADEA) ("lower firm size (disability)", "lower firm size (age)"); and,
3. by allowing plaintiffs to sue for more damages than allowed by the ADA or the ADEA ("larger damages (disability)", "larger damages (age)").

Using a difference-in-differences (DD) regression analysis, we estimate the effects of these stronger and broader discrimination laws on labor market outcomes (*in progress*) SSDI application, and SSDI receipt. We compare cohorts affected and unaffected by SSA1983 in states with and without discrimination law features, controlling for age. If, for example, SSDI application is higher for those affected by the SSA1983 (as we and others document), but this effect is weaker in states with stronger discrimination laws, then this suggests that these laws decrease spillovers and reduce barriers to employment.

This paper provides several contributions to the literature. First, the effect of disability and age discrimination laws on labor market outcomes is still not yet clear. Theory suggests ambiguous impacts of discrimination law on employment outcomes, as the laws could reduce terminations by increasing firing costs and improving employer accommodations, but these increased costs could

reduce hiring by making individuals with disabilities more expensive to hire (Acemoglu and Angrist 2001). Empirical studies have not settled the question either, as they all reach different conclusions such that there is no clear consensus for the disability discrimination law literature (see discussions in Button 2018; Button, Armour, and Hollands 2018a) or the age discrimination law literature (see Lahey 2008; Neumark and Button 2014; Neumark et al., forthcoming). The literature on the effect of disability discrimination laws on older workers is even less developed (Stock and Beegle 2004; Neumark, Song, and Button 2017; Neumark et al., forthcoming).

The SSA1983 provides an important, exogenous source of variation for which to identify the effects of these laws on labor market outcomes and SSDI application and receipt. The SSA1983 affects older workers uniformly in a way that is not correlated with existing state laws. Therefore, we avoid the possible endogeneity of discrimination laws, which could have been a problem in prior work, such as studies that exploit just federal changes in laws (e.g., Acemoglu and Angrist 2001), the adoption of state laws over time (e.g., Stock and Beegle 2004; Beegle and Stock 2003; Button 2018) or, worse, just do a cross-sectional comparison of outcomes by state laws (e.g., Neumark, Song, and Button 2017). If state laws are endogenous, then this can lead to biased estimates of their impact (Besley and Case 2000). For example, if states are more likely to adopt stronger discrimination laws when protected groups fare worse, then this negatively biases the estimated impact of these laws.

Our research design allows us to identify the effects of the SSA1983 using a more realistic control group than in much of the prior literature. Many studies (e.g., Acemoglu and Angrist 2001; DeLeire 2000; Deleire 2001) use control groups (e.g., individuals with vs. without disabilities) that violate parallel trend assumptions because the groups have significantly different trends (Mora and Reggio 2017; Button 2018). In our case, we can use cohorts that are more similar, those affected

(cohorts born 1938 to 1951) and unaffected (1931 to 1937) by the SSA1983, controlling for age, which provides for a control group that is more likely to have similar trends. But we go beyond this, by comparing the affected and unaffected cohorts across states by existing state law, thus controlling for any differences in trends between these two groups. Our assumption to identify an unbiased causal effect of state laws is thus that the age-specific trend difference between affected and unaffected cohorts does not vary by existing state law. This is a much weaker assumption than in much of the previous literature that studies the effects of discrimination laws on labor market outcomes.

Second, we know very little about how disability and age discrimination laws affect application and receipt of SSDI.[3] Our paper provides evidence of the effectiveness of important labor demand-side polices that could reduce the spillover effects of the SS reforms and otherwise reduce barriers to employment and help alleviate strain on the Social Security Trust Fund. This is critical because the SS Trust Fund risks being exhausted by 2034 as the population continues to age, leading to increased withdrawals from the fund in the form of a higher case load for OASI and SSDI (Board of Trustees 2017).

Background on Social Security Programs

Social Security Amendments of 1983 (SSA1983)

Since 1975, under the existing law, the Old-Age, Survivors, and Disability Insurance (OASDI) program expenditures had exceeded the revenues and it was anticipated that, without

[3] To our knowledge, the only study to look at how disability discrimination laws affect SSDI is Jolls and Prescott (2004), who analyzed this briefly in their NBER working paper. Additional work is in progress on this by Button, Armour, and Hollands (2017a). There is some related work, though, on how age discrimination laws affect claiming OASI (Neumark and Song 2013).

any legislative changes to the program, it would not have been possible to pay the OASDI cash benefits on time beginning in July 1983. In an effort to deal primarily with the short-term as well as long-term financial challenges faced by the OASDI program, the SSA1983 was signed into law on April 20, 1983. This law made comprehensive changes in Social Security coverage, financing, and benefit structure. The changes brought about by this law include an increase in the payroll tax rate,[4] expansion of the program to some federal government employees,[5] and an increase in the actuarial adjustment factors beyond the FRA, increasing the benefit to retiring after the FRA (Svahn and Ross 1983).[6] Perhaps the most significant change of all was a maximum of a two-year increase in the FRA and a corresponding increase from 20 to 30 percent in the penalty for claiming OASI benefits at the early retirement age of 62.

As we show in Table 1, these reductions in the generosity of OASI benefits were phased in gradually and occurred in two main stages. Individuals born in 1937 or earlier were unaffected by the change. The FRA then increased in two-month increments by subsequent birth cohort until reaching 66 for those born in 1943. For individuals born between 1943 and 1954 (inclusive) the FRA remained at 66 years until again increasing in two-month increments from the 1955 to 1960 cohorts. Along with this change, the proportion of full benefits that individuals could receive at the early retirement age of 62 fell from 80 percent for those born in 1937, to 75 percent for those

[4] SSA1983 increased the Social Security tax rates, which included the Hospital Insurance tax rates, for employers and employees from 7.0 percent in 1984 (subject to a credit of 0.3 percent to employees) to 7.65 percent in 1990 and thereafter.

[5] SSA1983 added the following groups under the Social Security system: (i) All federal employees hired on or after January 1, 1984; (ii) employees of the legislative branch not participating in the Civil Service Retirement System on December 31, 1983; and (iii) all Members of Congress, the President and the Vice-President, federal judges, and other political appointees of the federal government, effective January 1, 1984.

[6] SSA1983 increased the delayed retirement credits (DRCs) gradually from 3 percent for workers reaching FRA before 1990, to 8 percent for workers reaching the FRA after 2008.

born between 1943 and 1954, and to 70 percent for those born in 1960 or later.[7] While these amendments changed the OASI benefit structure, they did not change the benefit structure of the SSDI program, leading SSDI to be relatively more generous for some affected older workers.

Social Security Disability Insurance (SSDI)

The SSDI program is a social insurance program for workers with disabilities, with eligibility conditioned on previous sufficient employment in jobs covered by Social Security.[8] It is a part of the larger Old Age, Survivors, and Disability Insurance (OASDI) program of Social Security. The SSDI program defines disability as the "inability to engage in substantial gainful activity (SGA) by reason of any medically determinable physical or mental impairment(s) which can be expected to result in death or which has lasted or can be expected to last for a continuous period of not less than 12 months."[9] An activity is considered "substantial" if it involves significant physical and/or mental exertion and it is considered "gainful" if it is performed for pay or profit. SSA implements the definition of SGA by setting an earnings threshold, which is adjusted over time. For example, in 2018 the earnings threshold was $1,180 per month for non-blind individuals and $1,970 per month for blind individuals.[10] Anyone who is earning over the threshold is considered as engaging in SGA and is therefore disqualified from participating in the SSDI program.

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[7] This policy also changed the actuarial adjustment factors beyond the age of 62 from 5/9ths of a percentage point per month to 5/12ths of a percentage point per month. This converted back to 5/9ths of a percentage point 36 months before the full retirement age. Thus, a person born in 1943 could receive 75 percent of his or her PIA at the age of 62, 80 percent at the age of 63, 86.67 percent at the age of 64, 93.33 percent at the age of 65, and 100 percent at age 66.

[8] To qualify for SSDI program the required amount of labor force attachment depends on the age of disability onset. Generally, one needs to have worked 10 years, five of which needs to be during the 10 years preceding the year of SSDI application. Relatively younger workers may qualify with less work experience than this general rule.

[9] Code of Federal regulation § 404.1505 at https://www.ssa.gov/OP_Home/cfr20/404/404-1505.htm (accessed September 13, 2018).

[10] DI 10501.015 - Tables of SGA Earnings Guidelines and Effective Dates Based on Year of Work Activity at http://policy.ssa.gov/poms.nsf/lnx/0410501015 (accessed August 2, 2018).

Individuals apply for SSDI benefits at their local field office, which screens out those who are not currently insured (have insufficient work history covered by SS) or who are engaging in SGA. These are labeled as "technical denials" and do not receive further review. The remaining applications are forwarded to a state Disability Determination Services (DDS) office, where cases are assigned randomly to disability examiners for review. The disability examiner makes the determination of disability using eligibility rules and medical and vocational criterion laid out in the code of federal regulations. The rejected applicants at the DDS level are then entitled to a series of appeals.[11] The applicants are allowed to bring in new information to each level of appeals to make their case stronger. As the appeal process can take months and for some cases, years, to get final adjudication, some applicants who appeal the DDS rejection may simultaneously file a new application.

In 2016, approximately 8.8 million individuals with disabilities received SSDI benefits.[12] Among these beneficiaries, 4.5 million were men and 4.3 million were women. The average age of beneficiaries was 54 years. 4.7 percent of the population aged 18-64 received SSDI benefits in 2016. The average cash benefit received was $1,171 in 2016 ($1,293 for men, $1,043 for women), for a total of $11.3 billion across all beneficiaries. On average, two-thirds of the SSDI applicants are denied benefits at the Disability Determination Services (DDS) office. In 2015 alone 2.4 million individuals applied for SSDI and 1.5 million were denied at the DDS level. However, a fraction of these denied applicants appeal their initial denial and get approved for the benefits.

[11] First, the reconsideration stage, where the application returns to the original DDS to be reviewed by a different disability examiner, then to the Administrative Law Judge (ALJ), then to an Appeals Council, and finally to the federal court system.

[12] This is 87 percent of awards to all SSDI beneficiaries, with the remaining 13 percent going to disabled widow(er)s and disabled adult children (Social Security Administration 2017).

Literature Review

Social Security Programs

SSDI is a federal program and the *Social Security Act* and the regulations implementing it set up universal criteria to determine the disability status of someone who applies for SSDI benefits. Historically, not only are there variations in the application rate for SSDI across states[13] and over time but there are also similar variations in the receipt rate of SSDI (McVicar 2006; Stapleton et al. 1998). Much of the variations in application and receipt rates can be explained by economic, health, and demographic factors (Coe et al. 2011; Strand 2002; Gruber and Kubik 1997). We contribute to this literature by incorporating the effects of state discrimination laws in explaining the variations in SSDI application and receipt rates across states.

Both OASI and SSDI's cash benefits are calculated based on earnings history (see Appendix 2 for more details). The main difference between the OASI and SSDI benefit calculations is in the actuarial adjustment factors applicable only to OASI when the benefit is claimed between age 62 and the FRA. The SSA1983 not only increased the FRA for cohorts born after 1937, but also increased the penalty of claiming OASI benefit earlier than the FRA. Individuals may apply for SSDI benefits up to their FRA and there is no penalty in claiming the SSDI benefits earlier than the FRA. The fact that SSDI benefits, unlike OASI benefits, are not subject to actuarial reduction makes SSDI application quite valuable to individuals who think that they are disabled enough to qualify for SSDI.

The present value of OASI benefits at any given age is considerably lower for cohorts affected by the SSA1983 and the reduction is greater for the cohorts with a higher FRA, making

[13] In three states – Alaska, Hawaii, and Utah – the SSDI beneficiaries represent less than 3 percent of the state population. On the other hand, six states with the highest level of SSDI beneficiaries – 7 percent or more of state population – were Alabama, Arkansas, Kentucky, Maine, Mississippi, and West Virginia.

SSDI relatively more generous than OASI for younger cohorts insured under both programs (Duggan et al. 2007). Theoretically, this relative generosity provides greater incentives for people who would have claimed the OASI benefits earlier than the FRA to apply for and possibly get enrolled in the SSDI program.

As year-of-birth and age are the key determinants in reducing the OASI benefits claimed before the FRA, all else remaining the same, the incentive to apply for SSDI is higher for cohorts born in more recent years and for those who are closer to the age of claiming OASI benefits (see Table 1). Consequently, this incentive is proportionately greater at any given age for workers born on or after 1938, depending on their FRA, compared to people born on or before 1937. As a result, the incentive to apply for SSDI is proportionately greater for workers with higher FRA at any age before their FRA. Duggan, Singleton, and Song (2007) and Li and Maestas (2008) provide empirical evidence that the SSA1983 did indeed increase the SSDI application and receipt of workers affected by the law. Our paper contributes to this literature by providing evidence of differential spillover effects of the SSA1983 on SSDI program across states due to the variations in state discrimination laws.

Effects of Employment Discrimination Laws

There are three lines of related literature on the effects of discrimination laws on labor market outcomes. First, there is the literature on the effect of disability discrimination laws on labor market outcomes, and sometimes SSDI claiming, for individuals with disabilities. Second, there is literature on the effect of age discrimination laws on labor market outcomes and retirement for older workers. Third, there is a small but growing literature on the effect of disability discrimination laws on the labor market outcomes of older workers. Also related are discrimination laws covering other groups, summarized by Button (2018). Broadly speaking, the research on the

effects of discrimination laws on labor market outcomes does not come to a clear conclusions, although the mixed results tend to lean positive.

Economic theory.

Economic theory predicts mixed impacts of discrimination law. Protecting a group from discrimination should reduce firing, as firing a worker, regardless of whether there is discriminatory intent or not, opens employers to the risk of legal action. For disability laws specifically, quits could also decrease as the "reasonable accommodations" provided by some employers, a requirement under the ADA, could increase job satisfaction, help manage health conditions that impact work, or increase productivity (Acemoglu and Angrist 2001).

However, the theoretical effect on hiring is less clear. Since the law forbids discrimination in hiring, hiring could increase. However, there is little scope for hiring discrimination to be detected or enforced, compared to discrimination in firing where there are better worker records that could then be used in legal case. There is also much less incentive for attorneys to take on hiring discrimination cases because it is difficult to identify a class of affected workers, and the possible damages are much smaller (Neumark and Button 2014). There could, in fact, be a negative effect on hiring, as the higher possible firing costs (and the accommodation costs for disabilities) make a protected worker more expensive to hire in the first place (Bloch 1994). In net it is not clear what the effect on hiring is, and if, after considering the effects on separations, if there is a positive or negative effect on employment.

Disability discrimination laws and individuals with disabilities.

The empirical studies analyzing the effects of disability discrimination laws on labor market outcomes for individuals with disabilities often come to different conclusions. We summarize these studies in Appendix Table A1. Early work found negative effects of the ADA on

employment of individuals with disabilities (Acemoglu and Angrist 2001; DeLeire 2000; Deleire 2001). Numerous scholars questioned these results on technical grounds.

Kruse and Schur (2003) argued that the "work-limited" measure of disability used in previous studies was endogenous to employment, leading to a negatively-biased estimated effect of the ADA on employment. They also argued that the "work-limited" measure was very different than the definition of disability in the ADA. They developed a new set of disability measures using the functional limitation modules in the SIPP. They created a set of disability indicators defining an individual as having a disability if they report at least one limitation to an activity of daily life (ADL). This is more in line with the definition of the ADA, which requires that an individual is "substantially limited" in a "major life activity". Using this broader set of disability indicators, Kruse and Schur (2003) find that the effects of the ADA depended on the measure used, with negative effects only for the endogenous work-limited measure, and positive effects with the more appropriate ADL limitation measures. Further, Button, Armour, and Hollands (2017a) replicate Kruse and Schur (2003)'s comparison of work-limited and ADL measures, but instead use hiring as one of the outcome variables, and find similar results to Kruse and Schur (2003), that the ADA boosted hiring using the ADL measure of disability.

Houtenville and Burkhauser (2004), and later Button (2018) and Button, Armour, and Hollands (2017a), criticize the earlier research for using a control group that experienced different employment trends, such that the "parallel paths" (Mora and Reggio 2017) assumption did not hold, leading to negatively-biased estimated employment effects. Houtenville and Burkhauser (2004) argue that there was a pre-existing negative employment trend for individuals with disabilities, starting in the 1980s, and this was related to increased accessibility of SSDI and SSI programs. Bound and Waidmann (2002) also made note of this pre-existing trend. Houtenville and

Burkhauser (2004) also found no negative effects of the ADA, but instead found some positive effects if they instead used a work-limited measure of disability where the individual reported being work-limited two periods in a row.

Hotchkiss (2004) shows that the negative estimated effects of the ADA in Acemoglu and Angrist (2001), DeLeire (2000), and Deleire (2001) were attributable to a reclassification of individuals without disabilities, who were not in the labor force as, "disabled" under the work-limited measure, again reflecting concerns regarding the work-limited measure being endogenous.

Even discounting these earlier studies, the literature since then still shows mixed effects of disability discrimination laws, although these results lean towards showing positive effects or no effects. Bell and Heitmueller (2009) find that the UK's similar law, the Disability Discrimination Act, passed in 1995, decreased employment at least in the short-term. Button, Armour, and Hollands (2017a) and Armour, Button, and Hollands (2018) explore variation in the ADA since it was originally adopted. They find mixed effects, depending on how disability is defined, which labor market outcome (e.g., hiring vs. employment) is used, and which legal change is considered, although the effects generally lean positive. Using similar variation, Thompkins (2015) finds that neither the SCOTUS cases that narrowed the definition of disability, nor the Americans with Disabilities Act Amendments Act (ADAAA) which expanded it, were associated with employment effects. Ameri et al. (2018) take the innovative approach of conducting a resume-correspondence experiment quantifying discrimination in hiring. They compare the interview offer rates for on-average identical resumes submitted to accounting positions by individuals with and without disabilities (Asperger's or spinal cord injury), both of which should have no effect (or maybe even a positive effect) on productivity in accounting. They find that discrimination is lower

for larger firms covered by the ADA, compared to smaller firms that are not covered. However, they do not find any effects of the state disability discrimination laws that we explore in this paper.

Several studies exploit changes in disability discrimination laws at the state level, which allows for an additional control group: states with no changes in discrimination law. This additional control group is important as it does not require a direct comparison of individuals with and without disabilities, two groups that experience very different employment trends. It allows for multiple treatment and control groups, which can improve statistical inference (see, e.g., Donald and Lang 2007). Beegle and Stock (2003) explore the effects of state disability discrimination laws that were adopted before the ADA, generally finding no effect of these laws on employment after controlling for the pre-existing differential employment trends for individuals with disabilities. Jolls and Prescott (2004) explore how the introduction of the ADA differed based on existing state laws, finding that the negative effects of the ADA found in Acemoglu and Angrist (2001) and DeLeire (2000) were confined to states that did not, prior to the ADA, require reasonable accommodations. Button (2018) finds that employment of individuals with disabilities increased after California's Prudence Kay Poppink Act in 2001, which broadened the definition of disability under California law. However, Button, Armour, and Hollands (2017b) conduct a much broader evaluation of the effects of state disability discrimination laws adopted since the ADA and their early results do not find many effects.

Age discrimination laws and older workers

The research on how age discrimination laws affect labor market outcomes for older workers is also mixed, but again the effects lean positive (Appendix Table A2). Adams (2004) and Neumark and Stock (1999) find that the adoption of state and federal age discrimination laws increased employment of older workers. In contrast, Lahey (2008) finds that hiring rates for older

workers are lower in states where it was easier to file an ADEA claim. However, Neumark (2009) and Neumark and Button (2014) dispute the interpretation of the results in Lahey (2008), suggesting instead that the results can be interpreted differently in a way that shows a positive effect.

Recent work explores previously unexplored aspects of state age discrimination laws, which are also considered in this paper ("lower firm size (age)" and "larger damages (age)"). Neumark and Song (2013) use a research design similar to ours and find increased hiring of older workers "caught" by the SSA1983 in states with age discrimination laws that have "lower firm size (age)" and "larger damages (age)". Neumark and Button (2014) find more mixed evidence suggesting that the effect of age discrimination laws may vary over the business cycle, with the laws perhaps having a negative effect during the Great Recession. For men, "larger damages (age)" is associated with shorter unemployment durations before the Great Recession, but with unemployment durations that increased disproportionately more for older workers during and after the Great Recession. For women, "larger damages (age)" is associated with increased hiring of older workers before the Great Recession, but larger decreases in hiring during and after the Great Recession.

Neumark et al. (2018) takes a unique approach, using a resume-correspondence experiment modelled off Neumark, Burn, and Button (forthcoming) to measure if older workers get relatively fewer interview offers in states with stronger or broader age and disability discrimination laws (using all five measures considered in this paper). They find some evidence that "larger damages (age)" decreases age discrimination against older women and older men and "larger damages (disability)" decreases age discrimination against older women. But there is no evidence that broader laws, a lower firm size of a broader definition of disability, affect discrimination.

Disability discrimination laws and older workers

More importantly for this study, there is a small but growing literature on how disability discrimination laws affect older workers (Appendix Table A3). The first study of this kind, Stock and Beegle (2004), examine how the adoption of state disability discrimination laws prior to the ADA affected employment of older workers, finding that disability discrimination laws increase employment of older workers without disabilities but only when there is both an age and a disability discrimination law. Neumark et al. (2018), discussed just above, finds that "larger damages (disability)" may reduce age discrimination against older women. Neumark, Song, and Button (2017) also provide cross-sectional evidence that a broader definition of disability is associated with increased relative hiring of older men.

Data

Disability Discrimination Laws

We use a database of state disability discrimination laws first created by Neumark, Song, and Button (2017) and then updated by Neumark et al. (2018). The creation of this database required extensive background research on state statutes, and statutes in DC,[14] and their histories (primarily found through Westlaw), acts that amended these statutes (primarily found using Hein Online), and many other sources (e.g., case law, secondary sources, law journal articles, state offices). See Neumark et al. (2018) and especially its online appendix, for a more detailed discussions of how these laws were coded.

[14] For the purposes of our analysis, we consider DC to be a "state", since it has similar discrimination laws as the 50 other states, and all our data is also available for DC. This follows the approach of similar studies that examine state laws (e.g., Neumark, Song, and Button 2017; Neumark and Song 2013).

This database includes three dimensions of how state disability discrimination laws are broader or stronger than the federal ADA: "medical definition of disability", "lower firm size (disability)", and "larger damages (disability)". Table 2 presents how these characteristics of disability discrimination laws vary by state and how we code these laws into indicator variables. First, and most importantly, some states have a lower burden of proof to establish a disability than under the definition of disability in the ADA, leading to increased coverage of disability discrimination law in those states. These "medical definition" states define individuals with a medically-diagnosed condition to be disabled under law, regardless of if their condition "substantially limits" a "major life activity". Second, the ADA applies only to firms with at least 15 employees, but state laws often cover firms with fewer workers ("lower firm size (disability)"). Third, many states also allow for plaintiffs to sue for more damages than the ADA, leading state laws to have more bite than the ADA ("larger damages (disability)") (Neumark, Song, and Button 2017; Neumark et al. 2018; Button, Armour, and Hollands 2017a, 2017b). Below we summarize this legal variation, and we refer the reader to Neumark et al. (2018) for more information.

Medical definition of disability.

The federal disability discrimination in employment law, Title I of the *Americans with Disabilities Act of 1990* (effective July 1992), is significantly less broad in its coverage compared to employment discrimination laws covering other groups.[15] This stems from a narrow definition of disability. For plaintiffs to establish that they have a disability under the ADA, and to thus even have a *prima facie* case that can go forward, they must meet one of the three definitions of disability in the ADA:

[15] Title VII of the *Civil Rights Act of 1964* (race, color, religion, sex, national origin) and the *Age Discrimination in Employment Act of 1967* (age).

> "The term 'disability' means, with respect to an individual, (A) a physical or mental impairment that substantially limits one or more major life activities[16] of such individual; (B) a record of such an impairment; or (C) being regarded as having such an impairment." (42 U.S. Code §12102 (1))

The difficulty for plaintiffs was proving that the condition was at the level of "substantial." The burden of proof for "substantially limits" was high, leading plaintiffs to have their cases effectively thrown out because they did not meet the standard (Burgdorf 1997; Colker 1999).

Four states (Connecticut, Illinois, New Jersey, and New York) have a broader definition of disability whereby individuals are considered disabled under state law if they have a diagnosed medical condition.[17] This is irrespective of if the condition "substantially limits" a "major life activity, thus significantly lowering the burden of proof for individuals in these states to be covered by state disability discrimination law (Long 2004; Neumark, Song, and Button 2017).

Lower firm size (disability).

The ADA covers firms with at least 15 employees. As Table 2 shows, 34 states as of 1992 had disability discrimination laws with firm size minimums that were lower than 10, 25 states that are lower than 5, and 15 states that cover all employees regardless of firm size. The lower firm size matters, since older workers are especially more likely to work at smaller firms.[18] Following

[16] Major life activities were not defined in the ADA but were defined later in guidance documents provided by the EEOC. These originally included: "". However, these evolved over time, and the Supreme Court even weighed in on if the EEOC even had the mandate to define major life activities. See Button, Armour, and Hollands (2017a) for a detailed discussion.

[17] Washington, as of May 2007, also had a medical definition of disability, but we do not include Washington in this list since it does not provide identification in our regression models given the data that we use. California and Minnesota also have a lower burden of proof to provide disability. See Button (2018). For California, it established this new definition of disability in 2001, which does not provide identification given our data. We do, however, do a robustness check where we include Minnesota with the medical definition states, and these results are similar, but a bit weaker, reflecting that Minnesota's definition is not as broad. See Appendix Table D9.

[18] See discussion in Neumark and Song (2013) and Neumark and Button (2014, footnote 11).

previous studies (Neumark, Song, and Button 2017; Neumark et al. 2018) in our analysis we create an indicator variable equal to 1 if the firm size is less than 10, 0 otherwise, and compare states with a firm size of less than 10 versus greater than 10.

Larger damages (disability).

There is also variation in damages available under state law. Many states allow more damages than the capped sum of compensatory and punitive damages that are allowed under the federal ADA, which range from $50,000 to $300,000 depending on the size of the firm.[19] Following Neumark, Song, and Button (2017) and Neumark et al. (2018), we deem states to have "larger damages (disability)" if they have damage caps that exceed the ADA, or allow uncapped punitive damages, as punitive damages are likely to drive large judgments. As shown in Table 2, there are 13 states, as of 1992, that allow larger damages than the ADA.

Age Discrimination Laws

We use the age discrimination laws as determined and coded by Neumark and Song (2013). While there are several dimensions of state laws, the two that are important that the literature focuses on (Neumark and Song 2013; Neumark et al. 2018; Neumark and Button 2014) are the availability of damages and the firm size minimum. The idea behind both are similar to their counterparts for disability, but they differ in realization.

Lower firm size (age).

Firm size operates similarly, except that the federal ADEA only covers firms with at least 20 employees, while the ADA covers firms with at least 15 employees. As shown in Table 2, there

[19] 15-100 employees ($50,000), 101-200 employees ($100,000), 201-500 employees ($200,000), and 500 or more employees ($300,000).

are 46 states with a lower firm size than the ADEA, 36 states with a firm size less than 15, 35 less than 10, 26 less than 5, and 16 that cover all firms. The firm size for age and disability tend to match, since both often are in the same statute, but this is not the case for 9 states as of 1992.[20]

Larger damages (age).

Damages available are different for age. Instead of there being caps on compensatory and punitive damages, as under the ADA, the ADEA does not allow compensatory or punitive damages. It allows for back pay and benefits, and double this amount ("liquid damages") if there is willful violation (Neumark and Song 2013). We follow Neumark and Song (2013) and deem any state that allows compensatory or punitive damages as having "larger damages (age)". As shown in Table 2, there are 27 states, as of 1992, with larger damages for age discrimination. More states have larger damages for age than for disability because of the restrictive way that damages are treated in the ADEA. Because of this, the overlap for damages for age and disability under state laws is much lower than it is for firm size.[21]

Aggregated SSDI Application and Receipt Data

We use aggregated SSDI application and receipt data from the file-831 disability recodes, generated at state Disability Determination Services (DDS) offices, and provided to us by the Social Security Administration.[22] This SSA data includes the total number of applications and receipt of SSDI for each state by gender and age-groups (age 45-49, 50-54, 55-59, and 60-64) for

[20] Since we use the less than 10 cut-off, as in the previous literature, to group states into categories based on minimum firm size, there are 7 states where their disability and age firm size minimums cause them to fall into different categories: Arkansas (disability = 9, age = no law), Georgia and Indiana (disability = 15, age = 1), Illinois (disability = 1, age = 15), Kentucky and Louisiana (disability = 15, age = 8), and South Dakota (disability = 1, age = no law).

[21] There are 18 states that have larger damages for disability, but not age, 3 states that have larger damages for age, but not disability, 10 states that have larger damages for both, and 20 states that have no larger damages.

[22] We thank Alexander Strand for providing the aggregated SSDI application and receipt data.

each year from 1992 to 2013. Using the year and age-group information, we categorize the SSDI application and receipt data by groups of birth cohorts. For example, the SSDI application and receipt data for the age group 55-59 and year 1992 represent the data for the birth-cohorts of 1933-1937, which are a part of the cohorts unaffected by the SSA1983. Age-group 55-59 and year 1997 represent the application and award information of birth cohorts of 1938-1942, who are a part of the cohorts affected by the SSA1983.

State-by-Year Demographic and Economic Variables

We use the Current Population Survey (CPS) Annual Social and Economic Supplement (ASEC) (Flood et al. 2015) to get population estimates by gender, state, and age group from 1992 to 2013. We generate the rate of SSDI application and receipt by dividing the number of SSDI applications and receipts, respectively, by the gender and age-group-specific population in each state from 1992-2013.

We also use the CPS ASEC to generate state-and-year-specific population estimates by age-group and gender, estimates of labor force participation rates, unemployment rates, proportion African-American/Black in the working-age population, proportion Hispanic in the working-age population, the proportion of population who have completed a high school education, the proportion of population reporting a work-limiting disability, and proportion of population work in the agriculture, mining, and construction industries.[23] We use per capita disposable personal income data in current dollars by state and year from the website of Bureau of Economic Analysis

[23] Literature shows that these variables can explain half of the variation of the SSDI application and receipt rates across states (see, for example, Strand, 2002).

(BEA).[24] We use the Consumer Price Index (CPI) of all urban consumers, from Bureau of Labor Statistics (BLS), to generate real per capita disposable personal income in 2012 dollars.[25]

The Health and Retirement Study (HRS)

We use data from the *Health and Retirement Study* (HRS), a nationally representative longitudinal household survey of Americans over the age of 50. The original sample comprised of 12,561 individuals who were born from 1931 to 1941 or were the spouse of a participant in the survey; individuals born 1942-47, 1948-53, and 1954-59 were added in 1998, 2004, and 2010. Participants are interviewed every two years. This paper uses twelve waves of data from 1992 to 2014. We primarily use the RAND HRS version P data, which is a large subset of the HRS data that combines all waves, replaces missing information in section with information from another sections, and has robust imputation of financial variables (Bugliari et al. 2016). We complement this data with additional variables from different modules of HRS, downloaded directly from the HRS website.[26] The HRS has detailed self-reported information on SSDI application, award, re-application, and appeal as well as an array of information on health, wealth, demographic and socio-economic characteristics, and employment. The HRS keeps track of transitions in labor force status, transitions in occupation and industry, transitions in health, and important demographic transitions as individuals age.

Creating hiring and separation rates.

We exploit the longitudinal nature of the HRS to create hiring rates, following the approach developed by Neumark and Song (2013). To measure our dependent variable—hiring—as accurately as possible, we use more information not only on employment status and the job at each

[24] https://apps.bea.gov/iTable/index_regional.cfm (accessed August 21, 2018).
[25] https://data.bls.gov/pdq/SurveyOutputServlet (accessed August 21, 2018).
[26] https://hrs.isr.umich.edu/data-products (accessed August 11, 2018).

HRS interview, but also questions on labor market transitions between the interviews, or ‘‘inter-wave’’ information. Employment transitions from self- employed or not working to employed are coded as hires, as are transitions from employed at wave t-1 to working for a different employer at wave t (HRS waves are two years apart). Respondents who make transitions from nonemployment at wave t-1 to self-employed or nonemployment at wave t are coded as hires if they report working for a wage or salary between waves, and otherwise are coded as non-hires. Following Neumark and Song (2013) and Neumark, Song, and Button (2017), we focus on those initially non-employed (in period t-1), estimating if they were hired as of period t. By estimating hiring from non-employment, we best isolate those who were looking to get hired. Using all hires includes job-to-job transitions, which are harder to interpret.[27] We also do not exclude those who report that they are retired, or out of the labor force, from our measure of hiring from non-employment, because there are frequent transitions back to employment for workers classified this way (Neumark, Song, and Button 2017; Maestas 2010). We will use a similar methodology to estimate separation rates. We include all separations: transitions from a job to non-employment and job-to-job-transitions.

Social Security Administration (SSA) Form-831 Disability Records

The Disability Determination Services (DDS) makes the initial determination of eligibility for individuals applying for disability insurance benefits under Title II (Social Security) and Title XVI (Supplemental Security Income–SSI). An 831 file is established as soon as the DDS completes its initial disability decision. The SSA 831 file data contain the official disability determination information used by the DDS. This data is primarily used for analyzing the disability

[27] Job-to-job transitions capture both voluntary and involuntary transitions between jobs, whereas we can assume that non-employed workers who become employed were looking to get hired. Thus, the estimated effects of disability discrimination laws on hiring of the previously non-employed better isolates the effects of these laws on hiring (Neumark and Song 2013).

determination of the applicants at the DDS level and is available back to 1988. The 831 file contains data from the subsequent stages of disability determination, such as the decision made at the SSA's Office of Hearing and Appeals, however only minimal information is stored from subsequent appeals, such as the decisions made at the Administrative Law Judge level. The 831 file stores information on all new and repeat SSDI and SSI applications, but have no information on *technical denials* for SSDI, which are denials usually due to insufficient work history. The SSA 831 file data is not publicly available as it contains sensitive, confidential information of applicants, but is available for the HRS respondents as restricted use data, which can be accessed through the virtual desktop infrastructure (VDI) system from a secure data enclave maintained by the Michigan Center for the Demography of Aging (MiCDA).[28]

We use the HRS biennial public data files merged with the Social Security Administration (SSA) administrative Form-831 disability records. The 831 file contains information on the type of application (whether SSDI or SSI or concurrent), the award decisions of applicants at the DDS stages, the date an application was filed, the date an application decision was made, the date of disability onset determined by the DDS, the stage in the application process where the determination was made, and whether the individual was granted or denied benefits on the basis of either a medical listing or through the vocational grid at the DDS, and the type of claim applied for (e.g., child's benefit, widow's benefit). The 831 file contains detailed medical information, such as the severity of the applicants' health condition and the primary impairment code that the applicant falls under (known as *body system codes*). We also have information on age, education, industry, and occupation of most of the applicants from these 831 files.

Summary Statistics

[28] More information about the data access can be found here: https://hrs.isr.umich.edu/data-products/restricted-data/available-products/9695 (accessed September 15, 2018).

Table 3 presents summary statistics for the aggregated SSDI application and receipt data, and the associated CPS ASEC controls. Across all states and DC (Column (1)), the SSDI application rate is 1.33% per year, and the SSDI receipt rate is 0.73% per year. Notably, application rates are lower in states with a medical definition of disability (1.18%, Column (2)), compared to states without any broader or stronger disability discrimination laws (1.44%), although the difference is much smaller for receipt (0.70% versus 0.73%). States also differ in the control variables, which are correlated with SSDI program use according to the previous literature (Coe et al. 2011; Strand 2002; Gruber and Kubik 1997). For example, states with the medical definition of disability (Column (1)), compared to states without stronger or broader disability discrimination laws (Column (5)), have higher real disposable personal incomes, lower rates of work-limiting disability, a lower proportion of the population in agriculture mining, or construction industries, more Hispanics, and fewer African-Americans/Blacks.

Methodology

We exploit state variation in the degree of disability (age) discrimination protections relative to the ADA (ADEA) to identify the moderating effects of stronger or broader discrimination laws on the spillover effects of SSA1983. Using a difference-in-differences (DD) framework, we estimate the effects of stronger and broader discrimination laws on SSDI application and receipt, based on the differences in SSDI application and receipt of cohorts affected by SSA1983 and unaffected cohorts observed at the same age across states.

Methodology using Aggregated SSDI Application and Receipt Data

We first start by quantifying the effects of SSA1983 on spillovers to SSDI application and receipt. We also start by quantifying the impact of broader and stronger disability and age discrimination laws on SSDI application and receipt using the cross-sectional variation in laws, similar to the approach used in (Neumark, Song, and Button 2017). We quantify both of these using the following regression specification:

$$y_{ast} = \alpha + \gamma\, SSA1983_{at} + \rho\, SDP_s + \delta X_{st} + \sum_a A_a \omega_a + \sum_t T_t \psi_t + \varepsilon_{ast} \quad [1]$$

where, y_{ast} represents the two outcome variables defined as the proportion of working age population in age-group a living in state s in year t applied for SSDI and received SSDI. Since receipt of SSDI occurs on average 15 months after application, we lag the SSDI receipt variable one year (Autor et al. 2015).[29]

$SSA1983$ is an indicator variable that takes the value of 1 if the outcome is for cohorts born after 1937 (affected by SSA1983) and takes 0 otherwise (unaffected). SDP is an indicator variable, or a set of indicator variables, for states that have stronger or broader discrimination laws, discussed more below. X_{st} includes control variables at the state-year level: labor force participation rates, unemployment rates, the proportion of the working age population that has completed high school, the proportion that have a work-limiting disability, and per capita real disposable personal income. We include age-group fixed effects (A) and year fixed effects (T). We cluster our standard errors at the state level.

The coefficient γ captures the average effect, across all states, of SSA1983 on spillovers to SSDI. The coefficient ρ captures the cross-sectional difference between states with different

[29] Results are similar, although a bit weaker, if we instead do not lag SSDI receipt and consider SSDI receipt contemporaneously. These results are available from the authors upon request.

discrimination laws. Because we identify ρ using cross-sectional differences, the estimate of ρ is less likely to be causal as state laws could be correlated with other factors that are also correlated with SSDI use.

We then move to our main analysis, which explore how the effects of SSA1983 are moderated by existing state discrimination laws. Using the aggregated SSDI application and receipt data, we estimate the DD setup using the following regression specification:

$$y_{ast} = \alpha + \beta\, SSA1983_{at} \times SDP_s + \gamma\, SSA1983_{at} + \rho\, SDP_s + \delta X_{st} + \sum_s S_s\theta_s + \sum_a A_a\omega_a + \sum_t T_t\psi_t + \varepsilon_{ast} \quad [2]$$

Compared to Equation [1], this specification adds state fixed effects (S)[30] and the interaction between SSA1983 and state laws (SDP). β captures the DD estimate, which represents the change in the outcome variable for the cohorts affected by the SSA1983 living in states with stronger discrimination laws compared to both the unaffected cohorts and the affected cohorts living in control states without stronger laws. Our key identifying assumption is that the trends in the unobserved factors affecting the SSDI application and receipt of different cohorts do not systematically vary across states based on their discrimination laws.

For both the analysis using Equation [1] and the main analysis using Equation [2], we start by examining state laws one-at-a-time, following Neumark, Song, and Button (2017). We first examine disability discrimination laws. In our main specifications, our SDP indicator variable equals 1 for states with that particular broader or stronger dimension of disability discrimination

[30] While almost all state laws are consistent over our sample period, there are a few states that change laws. Therefore, the SDP variable on its own does not always drop out with the inclusion of state fixed effects. However, we do not present the coefficient on this variable since it is identified off very few states, and a more credible research design would be required to conduct inference for these few states that change laws (see, for example, Button, 2018).

law (e.g., medical definition) and 0 for states that have no stronger or broader disability discrimination law features at all (i.e. no medical definition, no larger damages, and a firm size greater than or equal to 10).[31]

Next, following Neumark, Song, and Button (2017) we include all three disability discrimination law features in the same regressions. We then follow the same approach for age discrimination laws, examining lower firm size, then larger damages, and then both at the same time. Finally, we follow Neumark et al. (2018) and do a combined analysis with all disability and age discrimination laws. Since the lower firm size for age and disability are very similar, we follow Neumark et al. (2018) and create one indicator variable for if either the age or disability discrimination law has a firm size minimum of less than 10.

Methodology using Health and Retirement Study Data Merged with SSA Records

Our methodology using HRS data is similar, but slightly different given that the HRS data is individual-level rather than being in aggregated cells based on age group and gender. We again start with measuring the average effects of SSA1983 on spillovers to SSDI and the cross-sectional impacts of state laws on our outcome variables. This is as follows:

$$y_{ias} = \alpha + \gamma\, SSA1983_i + \rho\, SDP_s + \delta X_{ias} + \sum_a A_a \omega_a + \varepsilon_{ias} \quad [3]$$

where y_{ias} stands for our outcome variables (hiring, separations, employment, retirement, SSDI application, and SSDI receipt), for individual i at age a in state s.

[31] Our main specifications differ slightly from Neumark and Song (2013) and Neumark, Song, and Button (2017), where their indicator variable equals zero for states that do not have that specific legal feature, regardless of which other legal features the state has. Our default approach provides a cleaner comparison by having the control group (SDP = 0) exclude states with other stronger or broader legal features. As a robustness check, we re-estimate all our results (see Appendix Tables D1 and D2) with all states without the legal feature making up the control group. Our results are similar, but slightly weaker. This is expected since our results show that stronger or broader laws reduce spillovers and adding states to the control group which have other stronger or broader laws leads to less of a difference between the treatment and control group.

Since this analysis uses individual-level data rather than aggregated data, we include individual-level controls rather than aggregate estimates of controls. Our individual-level controls include demographic information like race, gender, marital status, and level of educational attainment. Individuals' preference for work is measured by variables such as number of years worked, indicator for having at least one job with more than 5 years in tenure, and indicator for having retiree health insurance from employer. We also include indicators for different wealth quintiles. We include categorical variables for a variety of self-reported and medically diagnosed conditions and health outcomes, including health insurance coverage, to control for health status.

For our main estimation of how existing state laws moderate spillovers onto SSDI, our specification is:

$$y_{ias} = \alpha + \beta\, SSSA1983_i \times SDP_s + \gamma\, SSA1983_i + \rho\, SDP_s + \delta X_{ias} + \sum_s S_s\theta_s + \sum_a A_a\omega_a + \varepsilon_{ias} \quad [4]$$

the parameter β captures the causal effect of stronger discrimination protections on moderating the spillover effects of SSA1983.

Results

Results using Aggregated SSDI Application and Receipt Data

Average effects of SSA1983 on spillovers to SSDI.

We start with presenting the estimates for the average spillover effect of SSA1983 on SSDI application and receipt. Table 4 presents the results for SSDI applications. In our preferred specification in Column (8), which includes all law variables, the estimated spillover is 0.0008 (standard error 0.0003, significant at the 1% level), or an increase in the application rate of 0.08

percentage points. The estimated spillover is similar in the other columns. This 0.08 percentage point increase is relative to an average SSDI application rate of 1.33 percent per year (Table 3), so this is about a 6.0% increase in SSDI applications. This is in line with previous work that finds an increase in spillovers of between 0.9% to 7.0% for a similar population of those affected by SSA1983 (Li and Maestas, 2008).

Table 5 presents the results for SSDI receipt. Similar to how the rate of SSDI receipt is half that of the SSDI applications, the results are about half as large, so about half of SSDI applications are eventually successful. Our preferred estimate (Column (8)) shows that the receipt rate increases by 0.0005 (standard error 0.0002, significant at the 1% level), or a 0.05 percentage point increase. This is a 6.9% increase relative to the average receipt rate of 0.72% per year, mirroring the 6.0% increase in SSDI applications. Thus, we are able to replicate earlier work showing that the SSA1983 did, indeed, create spillovers onto SSDI.

Cross-sectional differences in SSDI use by state laws.

We next explore if there is a cross-sectional relationship between state laws and SSDI application and receipt. Table 4 presents the relationship for SSDI application. We do not find any cross-sectional relationship between existing state disability discrimination laws and SSDI applications. For age discrimination laws, however, there is some evidence that both a lower firm size (Column (5)) and larger damages (Column (6)) are associated with fewer SSDI applications, but these results are not robust to the inclusion of other laws in the regression (Columns (7) and (8)).

Table 5 presents the relationship for SSDI receipt. The results for age discrimination laws are similar, where there is some evidence that both a lower firm size (Column (5)) and larger damages (Column (6)) are associated with fewer SSDI receipt, but these results are not robust to

the inclusion of other laws in the regression (Columns (7) and (8)). We do, however, find some results for disability laws, but in the opposite direction as expected. We find that SSDI receipt rates are higher in states with larger damages for disability, as shown in Columns (4) and (8). We therefore do not see a clear cross-sectional relationship between existing state age and disability discrimination laws and SSDI applications and receipt for older individuals.

Moderating effects of existing state laws on spillovers to SSDI.

We now move to our main analysis of how the spillovers to SSDI from SSA1983 were moderated by existing state laws. In addition to determining if laws moderated spillovers, this also provides a more credible way to estimate the causal effect of state laws on economic outcomes and program use that does not rely on cross-sectional comparisons.

Table 6 presents the results for SSDI applications. The coefficient for SSA1983, in the first row, represents the spillovers in control states. For example, in Columns (1) to (4), the estimate for SSA1983 captures the spillovers for states with no broader or stronger disability discrimination law features (i.e. no medical definition, firm size 10 or greater, no larger damages). Similarly, the SSA1983 estimate in Columns (5) to (7) is based off of the spillover in states without a lower firm size for age and without larger damages for age discrimination. In Column (8), where we analyze both age and disability discrimination laws, the estimate for SSA1983 is based off of states without any broader or stronger features from either age or disability discrimination laws. Across all columns, the coefficient for SSA1983 is larger than it was in Table 4, suggesting that spillovers were generally larger in states without stronger or broader laws. For example, the estimated spillover in Column (8), our preferred specification since it includes all state laws, is 0.0016 (standard error of 0.0006, significant at the 1% level), suggesting a 0.16 percentage point increase. This is roughly double the corresponding estimate in Table 4 (0.08 percentage point increase).

This pattern of larger spillovers in states with fewer discrimination protections is reflected in some of the interactions as well.

In contrast with the cross-sectional results in Table 4 for disability discrimination laws, we find evidence that broader or stronger state disability discrimination laws reduce SSDI applications. For the medical definition of disability, our preferred specification (Column (8)) shows that there are effectively no spillovers in states with a medical definition of disability. The coefficient estimate for the interaction is -0.0015 (standard error 0.0007, significant at the 5% level), which is similar to the estimate of the spillover in control states (0.0016). This estimate is similar in Columns (1) and (4). For lower firm size, the estimates are negative, showing a reduction in spillovers, but are of a smaller magnitude (-0.0009 to -0.0005) compared to the medical definition, and are not statistically significant. There is some evidence the larger damages under disability discrimination law reduces spillovers. The estimates are between those for firm size and medical definition, ranging from -0.0014 and -0.0010, and are only sometimes statistically significant (significant Column (3), but not (4) or (8)). Thus, we find evidence that stronger and broader disability discrimination laws reduce applications to SSDI, with this evidence being strong and robust for the medical definition of disability, and being a moderate size, but not robust, for larger damages, and being largely non-existent for lower firm size.

For the effect of age discrimination laws on moderating SSA1983-induced applications to SSDI (Table 6, Columns (6) to (8)), we do not find any statistically significant evidence that age discrimination laws have any moderating effect. The estimates are negative, however, ranging from to -0.0008 to -0.0000.

These estimated effects on SSDI applications differ from our cross-sectional results. For the cross-sectional analysis, we found that age discrimination laws were associated with lower

SSDI applications, not disability discrimination laws. This mis-match may be because there are cross-sectional correlations between laws and other variables that affect SSDI applications (Coe et al. 2011; Strand 2002; Gruber and Kubik 1997). Our main results here do, however, match similar cross-sectional results in Neumark, Song, and Button (2017), who find that the medical definition of disability is associated with increased hiring of older workers relative to younger workers.

We find effects in a similar direction for how disability discrimination laws moderate spillovers to SSDI receipt (Table 7). Across all disability discrimination laws, the coefficients are smaller, ranging from -0.0012 to -0.0003, and statistically significant for lower firm size and larger damages. Thus, there is some evidence to claim that disability discrimination laws reduced the number of individuals receiving SSDI.

Given that we also found few effects of age discrimination laws on SSDI application, we find few effects for SSDI receipt. These results are presented in Table 7. These estimates are similar to those for SSDI receipt (Table 6), but in this case there is some statistical significance. We find a statistically significant effect (at the 10% level) for lower firm size in one case (Column (7)), but the other two cases (Columns (5) and (8)) are not statistically significant.

The fact that the results are weaker and less statistically significant for SSDI receipt could be for a few reasons. First, we may lack precision to detect effects, which are likely smaller than the effects on SSDI applications. Second, there could of course not be any effects, which could be the case if the induced applications would not have been successful. For example, we find that the medical definition of disability decreases applications to SSDI, but not receipt of SSDI. The medical definition makes the existing disability discrimination law broader, covering individuals with less severe conditions that are medically diagnosed, but do not meet the onerous "substantially

limit" requirement. If these individuals with less severe conditions are able to find work, and thus do not apply to SSDI, these applications that were less likely to have been approved were foregone. This could partially explain the fact that we find effects on SSDI application, but not receipt, for the medical definition of disability, but this requires further investigation. Third, it may be that SSDI receipt decreases, but only for certain sub-populations that we cannot identify with the aggregated SSDI data.

Exploring heterogeneous effects.

Our main estimates include both women and men and cover affected cohorts of the age groups 50-54, 55-59, and 60-64. We explore how our estimates may vary for these age groups and by gender, although our ability to explore heterogenous effects is much better with the HRS data.

First, we start by estimating effects separately for women and men. Most of the literature investigating the effects of discrimination laws focuses on men only while only a few studies explore age and gender intersectionality more in-depth (e.g., McLaughlin 2018; Lahey and Oxley 2017; Neumark and Button 2014; Neumark et al. 2018), which turns out to sometimes be important especially if women face more age discrimination (Neumark, Burn, and Button, Forthcoming; Lahey and Oxley 2017) and age discrimination laws are less able to protect older women (McLaughlin 2018; Button, forthcoming).

Appendix Tables C1 and C2 presents estimates for SSDI applications and SSDI receipt, respectively, for men only, and Appendix Tables C3 and C4 present the same but for women only. For men only, the estimates for how the medical definition of disability affects SSDI application (Appendix Table C1) are still large in magnitude but are now less precise compared to the pooled results in Table 6 and are now statistically insignificant. For men only, there are no statistically significant interaction effects with state laws for SSDI application. For SSDI receipt, there is some

weak evidence of effects. Both lower firm size under age and disability discrimination laws have interaction effects that are significant at 10% level (Columns (2) and (7)) but these are not robust to the inclusion or exclusion of other laws.

For women, Appendix Table C3 shows that the magnitude of the effects of the medical definition on spillovers to SSDI applications is similar for men, but the estimates for women are far more precise, leading to the coefficients in all three regressions to be significant at the 1% level. Similarly, larger damages for disability also decreases SSDI applications for women only, with both larger and more precise coefficients compared to men only or the pooled estimates. Two of these estimates are significant at the 1% level while one is significant at the 5% level. There is also weak evidence that the firm size for disability matters for women only, via the statistically-significant estimate in Column (2) (5% level), but this is not robust to the inclusion of other laws (Columns (4) and (8)). Age discrimination laws again do not affect spillovers.

For women only, there do appear to be some statistically significant effects on SSDI receipt. As Appendix Table C4 shows, larger damages for disability leads to reductions in SSDI receipt, with the magnitude of the spillover reduction being roughly the same size of the spillover, suggesting no spillover in these states. These estimates are statistically significant at the 5% level in all three cases. Mirroring the pooled results (Table 7), there is also evidence that a lower firm size, both under age (Column (7)) and disability (Column (2)) discrimination laws, reduces SSDI receipt for women. However, these estimates are again only significant at the 10% level and are not robust to inclusion or exclusion of other laws in the regression. Similar again to the pooled results, the medical definition of disability has no statistically significant effect on SSDI receipt, despite the large effect on applications.

We next estimate results without age group 50-54, thus including only age groups 55-59 and 60-64, who are relatively more affected by SSA1983. Appendix Tables C5 and C6 present the estimates for SSDI applications and SSDI receipt, respectively. These results are generally similar and stronger. For SSDI application, the estimates are larger and more statistically significant for the medical definition of disability and larger damages for disability. However, the one estimate that was marginally statistically significant (10% level) for lower firm size for disability in the main results (Table 6, Column (2)) is now not significant. There are still no statistically significant effects of age discrimination laws outside of the same marginally significant estimate (Column (7)) for the effects of firm size for age on SSDI receipt.

Robustness checks.

We conduct several robustness checks, considering other plausible specifications. We present all of these results fully in Appendix D. To summarize, we check if our results vary based on the following:

1. Using a similar control group to as in Neumark, Song, and Button (2017), where all states are included in the regressions for Columns (1), (2), (3), (5), and (6) rather than having the control group only include states without any broader or stronger law features (Appendix Tables D1 and D2).
2. Weighting the regression by the population of the state of age 50 and older (Appendix Tables D3 and D4).
3. Dropping 2009 and 2010 from the analysis to remove possible effects from the Great Recession (Appendix Tables D5 and D6).[32]

[32] While the Great Recession officially occurred from December 2007 to June 2009, according to the NBER Business Cycle Dating Committee (see http://www.nber.org/cycles/cyclesmain.html, accessed September 29, 2018), the effects on the labor market were lagged (see Neumark and Button, 2014), and we chose to drop 2009 and 2010 for this reason, and also because decisions around SSDI application may also come after these delayed labor market effects.

4. Removing the CPS ASEC control variables (Appendix Tables D7 and D8).
5. Re-running the "medical definition of disability" results adding Minnesota, which also has a broader (but not medical) definition of disability (Appendix Table D9).

Tables 8 and 9 summarize the main results for SSDI application and receipt, respectively, and how robust they are based on these checks (excluding 5. above) and the heterogeneity analysis in Appendix C. For SSDI application, the results for the medical definition of disability are somewhat robust, with 17 out of 22 possible estimates being statistically significant at the 10% level, and 13 out of 22 at the 5% level. Two factors have a meaningful impact on the results. First, the statistical significance goes away for men only due to an increase in the standard errors (Appendix Table C1). Statistical significance also decreases from 5%, 10%, and 5% (Columns (1), (4), and (8), respectively) in Table 6 to 5%, insignificant, and insignificant when the CPS ASEC control variables are removed (Appendix Table D7). These control variables are important in explaining SSDI application and thus removing them reduces precision. All other robustness or heterogeneity checks have a smaller effect on the results. Since the main results (Table 6) are either significant at the 5% level (2 out of 3 times) or at the 10% level (1 out of 3), all the other robustness checks often cause the estimates to change a bit such that they move to 5% from 10%, or vice-versa.

For larger damages, the results are much less robust, for example, only 5 out of 22 estimates are statistically significant at the 5% level. There only appear to be results for larger damages when looking at sub-populations that are most affected: women (Appendix Table C3 and Ages 55-64 (Appendix Table C5) rather than 50-64. For firm size (either age or disability) and larger damages (age), there is almost no evidence of effects.

For SSDI receipt, the results are much more marginally significant and are less robust compared to for SSDI applications. For larger damagers for disability, where there is the largest

evidence of effects, six out of 22 estimates are significant at the 5% level, and 12 are significant at at least the 10% level. Thus, the evidence here that larger damages for disability decreases spillovers onto SSDI receipt is not particularly strong, outside of the strong and statistically significant effects for women only. There is similarly some weak evidence of lower firm size for disability decreasing spillovers, but this is even less robust: only two out of 22 estimates are significant at the 5% level, and only seven are significant at at least the 10% level. For firm size for age, there are similarly only seven estimates that are significant at at least the 10% level, but no significance beyond that. Across all specifications and tables, no estimates are statistically significant for the medical definition of disability or larger damages for age.

Results using Health and Retirement Study Data Merged with SSA Records

We were granted access to the data by the University of Michigan in early 2019 through the VDI system. We are doing a preliminary analysis of this data now.

Discussion and Conclusion

In this paper, we study broader disability and age discrimination laws at the state level to see how they affect SSDI application and receipt for older workers. Older workers are likely to be affected by disability discrimination laws since they are more likely to have a disability and are also more likely to be perceived to have a disability, and this discrimination based on perception is protected again in disability discrimination law. Both disability and age discrimination laws at the state level that have broader coverage (cover individuals at smaller businesses or cover individuals with less severe disabilities) or are stronger (can sue for more damages) could reduce barriers to employment by reducing discrimination and increasing on-the-job accommodations,

making it less likely that some older workers must rely on SSDI. On the other hand, it is also possible that these laws make it most costly to hire older workers and individuals with disabilities in the first place, creating a negative incentive to hire them and leading to increased spillovers to SSDI.

To investigate this, we leveraged the *Social Security Amendments Act of 1983* (SSA1983), an exogenous policy change that increased the full retirement age gradually from 65 to 67 and increased the penalty to claiming Social Security benefits early. As others have documented (e.g., Neumark and Song, 2013), this reform pushed affected cohorts of older workers into the labor market in attempts to work longer, as was intended by the reforms. However, this led to spillovers to SSDI applications and SSDI receipt, as we and others document (Li and Maestas 2008; Duggan, Singleton, and Song 2007). If stronger and broader discrimination laws do, in fact, affect employment opportunities for older workers, then we should see that they moderate the effect of these spillovers.

To quantify how existing state laws moderate spillovers, we use a difference-in-differences identifications strategy – comparing cohorts who are affected by SSA1983 to those of a similar age who are not affected – and then comparing this difference by state laws. We find that stronger and broader disability discrimination laws, but not age discrimination laws, reduce SSDI applications. In particular, we see this effect most strongly for the medical definition of disability, where some states cover individuals with a medically-diagnosed condition under disability discrimination laws, avoiding the strict federal ADA standard that the condition must "substantially limit" a "major life activity". We find evidence that in many cases there is no spillover to SSDI applications in states with the medical definition of disability. We find weaker evidence that being able to sue for larger damages under state disability discrimination law

compared to federal law also reduces spillovers. Both these results are stronger for women than for men and are stronger for those 55-64 rather than 50-64, reflecting that those at ages closer to retirement are relatively more affected by SSA1983.

We find fewer effects on SSDI receipt. We find some evidence of reduced spillovers to SSDI receipt, especially for women, in states with larger damages under disability discrimination law. There is also some evidence, albeit weaker, that lower firm sizes for disability or age discrimination laws may also reduce spillovers to SSDI receipt. Thus, existing state-level discrimination laws could help reduce reliance on SSDI and take pressure of the Social Security Trust Fund as the population ages.

The results for lower firm size and larger damages are similar for SSDI applications and receipt. For disability, there is evidence that a lower firm size or larger damages reduce both applications and receipt, and for age, there is evidence is pretty consistent that lower firm size and larger damages affect neither applications not receipt. In contrast, the medical definition of disability significantly reduces spillovers to SSDI applications but never has any effect on SSDI receipt.

The fact that the effects on application and receipt align for lower firm size and larger damages align, but they do not for the medical definition of disability, could be explained by the types of individuals that are affected by these stronger or broader laws. For larger damages, the same number of individuals are covered by laws, but the law just has more "bite" since plaintiffs can possibly get larger damages. For firm size and the medical definition of disability, the law expands to cover more individuals. For firm size, individuals at smaller firms are covered, while for the medical definition of disability, those with less severe conditions, that do not meet the "substantially limits" requirement of the ADA, are covered. Our hypothesis to explain these results

is that those who are induced not to apply to SSDI in states with the medical definition would not have gotten approved for SSDI anyways. This may be a feasible explanation, since the medical definition of disability increases disability discrimination protections to those with less severe conditions, and these less severe conditions are less likely to qualify for SSDI. But this requires additional investigation using the HRS data that we will soon have access to. This data allows us to estimate effects by they of disability of health condition, which will allow us to test if this hypothesis is correct.

While our results only sometimes show that existing state laws reduce SSDI receipt, their ability to more significantly reduce SSDI applications is incredibly important even if these application reductions do not translate into reductions in SSDI receipt, as is the case for the medical definition of disability. SSDI applications are particularly expensive both for applicants and for the Social Security Administration to process, especially if cases get appealed. The SSDI application process imposes both direct and indirect costs on applicants. The direct costs include time and resources spent gathering all the necessary documentations required for the application. There are also monetary costs if lawyers are involved, which is common.

The indirect costs, however, may be even larger. These come from the potential employment and earnings losses of applicants due to the determination process for SSDI eligibility, and these costs are faced regardless of the ultimate acceptance or denial of the claim. To satisfy the "inability to engage in substantial gainful activity (SGA)" clause of eligibility for SSDI, most SSDI applicants drop out of the labor force well before filing an application and stay out of the labor force during the process of determination, which can vary from six months to several years (Autor et al. 2015). This prolonged determination process together with human capital deterioration due to long non-employment status results in large employment and earnings

losses, especially for denied SSDI applicants in the short-run as well as in the long-run (Autor et al. 2015; Khan 2018a; von Wachter, Song, and Manchester 2011; Khan 2018b). The proportion of workers who are bearing these costs without receiving SSDI benefits in the end are rising over time.[33] Thus, preventing these SSDI applications, through providing more appropriate employment opportunities instead, could have a large impact both on marginal SSDI applicants and on the strained Social Security Trust Fund.

These high costs of SSDI applications are also, unfortunately, more likely to be realized for the marginal applicants who are induced to apply to SSDI based more on the economic shock of SSA1983 and less on the severity of their medical conditions and are thus more likely to be denied. The fact that we find that the medical definition of disability decreases SSDI applications, but not SSDI receipt, may suggest that this broader disability discrimination law reduces SSDI applications that were less likely to be successful in the first place.

In addition to learning how stronger and broader state laws affect SSDI application and receipt, we also learn how they affect employment discrimination in general. The literature, both theory and empirical studies, are unclear on if discrimination laws improve or worsen economic outcomes for protected groups, especially disability discrimination laws where the laws are stronger because they require reasonable accommodations. The literature on how disability discrimination laws affect older workers is also very thin. We improve on the methods in the literature by using an exogenous source of variation, the SSA1983, to estimate the causal effects of these laws. This avoids critiques in the earlier literature, such as the difficulty in coming up with

[33] The total number workers applied for SSDI has gone up from 1.3 million in 1992 to 2.6 million in 2013, the sample period analyzed in this paper. The proportion of people received benefits decreased from 53 percent in 1992 to 40 percent in 2008 (Social Security Administration 2017).

a control group with similar trends, or the statistical costs around only exploiting changes in a federal law rather than leveraging state variation (see Button, 2018).

There is much future work that can be done to continue to answer these questions. Notably, we are in the process of getting access to the restricted geographic identification data of HRS respondents and File-831 disability records to merge with the HRS publicly available data, which will allow us to follow individuals over time and measure effects on labor market outcomes, such as hiring, separations, employment, and retirement, along with, again, SSDI applications and receipt. The individualized data will also allow us to better explore heterogeneity so that we can determine who faces the most spillovers, and who is most affected by state laws. This is especially important because the population of individuals with disabilities is highly heterogeneous and effects may differ by disability type (Armour, Button, and Hollands 2018; Button, Armour, and Hollands 2017a, 2017b). Moreover, the individual data will allow us to pin down the age and year of SSDI application of the benefit recipients, which will help us estimate more precisely the effects of these stronger and broader employment protections in moderating the spillovers of SSA1983 on SSDI receipt.

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Table 1: The Effect of the Social Security Amendments of 1983 (SSA1983) on OASI Benefits for Primary Earners, by Age at Retirement and Year of Birth

Year of Birth	Full Benefits Retirement Age (FRA)	Benefit as Percentage of Primary Insurance Amount (PIA) Received if Retiring at…			
		Age 67	FRA	Age 65	Age 62
1934-1937* and earlier	65	106-113%	100%	100.0%	80.0%
1938*	65 + 2 months	111.9%	100%	98.9%	79.2%
1939*	65 + 4 months	111.7%	100%	97.8%	78.3%
1940*	65 + 6 months	110.5%	100%	96.7%	77.5%
1941*	65 + 8 months	110.0%	100%	95.6%	76.7%
1942*	65 + 10 months	108.8%	100%	94.4%	75.8%
1943*	66	108.0%	100%	93.3%	75.0%
1944-1951**	66	108.0%	100%	93.3%	75.0%
1952-1954	66	108.0%	100%	93.3%	75.0%
1955	66 + 2 months	106.7%	100%	92.2%	74.2%
1956	66 + 4 months	105.3%	100%	91.1%	73.3%
1957	66 + 6 months	104.0%	100%	90.0%	72.5%
1958	66 + 8 months	102.7%	100%	88.9%	71.7%
1959	66 + 10 months	101.3%	100%	87.8%	70.8%
1960 and later	67	100.0%	100%	86.7%	70.0%

Notes: The * indicates cohorts that will be included in our HRS sample and ** indicates cohorts that are also included in our aggregated SSDI data sample, but not our HRS sample. Source: Social Security's Retirement Planner, at https://www.ssa.gov/oact/ProgData/ar_drc.html (accessed August 1, 2018).

Table 2: State Disability and Age Discrimination Laws from 1992 to 2000

	Disability discrimination laws			Age discrimination laws	
State	Minimum firm size	Larger damages than ADA	Medical definition	Minimum firm size	Larger damages than ADEA
Alabama	No law	No law	No law	20	No
Alaska	1	Yes	No	1	No/Yes (changed 1997)
Arizona	15	No	No	15	No
Arkansas	9	No (same as ADA)	No	No law	No law
California	5	Yes (uncapped)	No ("limits" as of 2001)	5	Yes
Colorado	1	No (same as ADA)	No	1	No
Connecticut	3	No (unclear)	Yes	3	No
Delaware	4	No (same as ADA)	No	4	Yes
District of Columbia	1	Yes (uncapped)	No	1	Yes
Florida	15	No (punitive capped at $100k)	No	15	Yes
Georgia	15	No	No	1	No
Hawaii	1	Yes (uncapped)	No	1	Yes
Idaho	5	No (punitive capped at $10k)	No	5	Yes
Illinois	1	No	Yes	15	Yes
Indiana	15	No	No	1	No
Iowa	4	No	No	4	Yes
Kansas	4	No (no punitive damages, damages capped at $2k)	No	4	Yes
Kentucky	15	No	No	8	Yes
Louisiana	15	No	No	8/20 (changed 1997)	Yes
Maine	1	Yes	No	1	Yes
Maryland	15	No (same as ADA)	No	15	Yes
Massachusetts	6	Yes (uncapped)	No	6	Yes
Michigan	1	No	No	1	Yes
Minnesota	1	No (punitive capped at $25k)	No ("materially limits")	1	Yes
Mississippi	No law	No law	No law	No law	No law
Missouri	6	Yes (uncapped)	No	6	Yes
Montana	1	No	No	1	Yes
Nebraska	15	No	No	25	No
Nevada	15	No	No	15	No
New Hampshire	6	No	No	6	Yes
New Jersey	1	Yes (uncapped)	Yes	1	Yes
New Mexico	4	No	No	4	Yes
New York	4	No	Yes	4	Yes

	Disability discrimination laws			Age discrimination laws	
State	Minimum firm size	Larger damages than ADA	Medical definition	Minimum firm size	Larger damages than ADEA
North Carolina	15	No	No	15	No
North Dakota	1	No (no damages)	No	1	No
Ohio	4	Yes (uncapped)	No	4	Yes
Oklahoma	15	No	No	15	No
Oregon	6	Yes (uncapped)	No	1	Yes
Pennsylvania	4	No	No	4	No
Rhode Island	4	Yes (uncapped)	No	4	Yes
South Carolina	15	No (same as ADA)	No	15	No
South Dakota	1	No	No	No law	No law
Tennessee	8	No	No	8	Yes
Texas	15	No (same as ADA)	No	15	No/Yes (changed 1993)
Utah	15	No	No	15	No
Vermont	1	Yes (uncapped)	No	1	No/Yes (changed 1999)
Virginia	1	No	No	1	No
Washington	8	No	No	8	Yes
West Virginia	12	Yes (uncapped)	No	12	No
Wisconsin	1	No	No	1	No
Wyoming	2	No	No	2	No

Notes: State laws cover 1992 to 2000. Age discrimination laws are from Neumark and Song (2013) and disability discrimination laws are from Neumark et al. (2018). For the states listed as "Yes" under Larger Damages than ADA, but not uncapped, details are as follows: Alaska – uncapped compensatory damages, punitive damages capped above ADA levels; Maine – exceeds ADA cap for firms of 201+ employees. For states listed as "No" under Larger Damages than ADA, unless otherwise noted, the "No" is because punitive damages are not allowed. See Neumark et al. (2018), and especially the online appendix to that paper, for more information on the laws.

Table 3: Summary Statistics – Aggregated SSDI Application and Receipt and CPS ASEC Control Variables

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	All states	Medical definition of disability	Firm size < 10 (disability)	Larger damages (disability)	Control states (disability)	Firm size < 10 (age)	Larger damages (age)	Control states (age)
SSDI application rate	0.0133	0.0118	0.0126	0.0134	0.0144	0.0127	0.0129	0.0153
SSDI receipt rate	0.0072	0.0069	0.0071	0.0076	0.0072	0.0071	0.0071	0.0078
Working age populations (mil)	4.19	8.25	4.16	4.39	4.50	4.11	4.93	2.45
Proportion of men in 16+ population	0.484	0.476	0.485	0.484	0.479	0.485	0.484	0.482
Proportion of 50+ in 16+ population	0.360	0.365	0.360	0.362	0.356	0.359	0.359	0.365
Proportion of African-American/Black in 16+ population	0.105	0.132	0.079	0.010	0.164	0.086	0.101	0.123
Proportion of Hispanic in 16+ population	0.074	0.113	0.070	0.072	0.081	0.068	0.083	0.064
Proportion completed high school in 16+ population	0.809	0.817	0.822	0.812	0.788	0.819	0.813	0.789
Proportion with work-limiting disability in 16+ population	0.103	0.085	0.099	0.103	0.108	0.010	0.101	0.116
Proportion of 16+ in agriculture, mining, and construction	0.075	0.049	0.075	0.067	0.074	0.073	0.071	0.080
Labor force participation rate	0.668	0.659	0.678	0.663	0.654	0.676	0.669	0.651
Unemployment rate	0.061	0.064	0.061	0.068	0.058	0.061	0.063	0.058
Yearly per capita real disposable personal income	34,053	41,726	35,391	35,892	31,610	35,293	35,127	30,180
N	3,774	296	2,442	1,110	1110	2,516	2,220	888

Note: Column 5 includes states that have disability discrimination laws that are similar to the ADA in all dimensions (i.e. no medical definition, no larger damages, no firm size < 10). Similarly, Column 8 includes states that have age discrimination laws that are similar to the ADEA in all dimensions. Age groups 50-54, 55-59, and 60-64 are included in all the samples.

Table 4: Effects of the SSA1983 and the Cross-Sectional Impacts of State Disability and Age Discrimination Laws on SSDI Application Rates

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
SSA1983	0.0009*** (0.0003)	0.0008** (0.0003)	0.0010** (0.0004)	0.0008*** (0.0003)	0.0008** (0.0003)	0.0007* (0.0004)	0.0008*** (0.0003)	0.0008*** (0.0003)
Medical definition of disability	0.0003 (0.0011)	…	…	0.0006 (0.0006)	…	…	…	0.0005 (0.0006)
Firm size < 10 (disability)	…	-0.0001 (0.0004)	…	-0.0005 (0.0005)	…	…	…	…
Larger damages (disability)	…	…	0.0007 (0.0006)	0.0007 (0.0004)	…	…	…	0.0006 (0.0004)
Firm size < 10 (age)	…	…	…	…	-0.0009* (0.0005)	…	-0.0003 (0.0005)	…
Larger damages (age)	…	…	…	…	…	-0.0010* (0.0005)	-0.0003 (0.0004)	-0.0003 (0.0004)
Firm size < 10 (disability and/or age)	…	…	…	…	…	…	…	-0.0003 (0.0005)
N	1,406	3,534	2,216	3,756	3,386	3,094	3,756	3,756

Notes: The mean SSDI application rate is 0.0133. Standard errors, in parentheses, are clustered at the state level. Significantly different from zero at 1-percent level (***), 5-percent level (**) or 10-percent level (*). Columns 1-3 compare states with each law feature to control states that have no disability discrimination law features beyond the ADA (i.e. the other law variables equal 0). Similarly, Columns 5-6 compare state with each law feature to control states that have no age discrimination law features beyond the ADEA. Columns 4, 7, and 8 include all 50 states plus DC. Age groups 50-54, 55-59, and 60-64 are included in all the regressions. The models include age-group fixed effects and year fixed effects. All the models also include variables that vary across states and over time, such as, labor force participation rates, unemployment rates, proportion of African-American/Black, proportion of Hispanic, proportion of working-age population completed high school degree, proportion of working-age population reported work-limiting disability, proportion of population 50 or over, faction of population works in agriculture, mining, and construction industry, and per capita real disposable personal income.

Table 5: Effects of the SSA1983 and the Cross-Sectional Impacts of State Disability and Age Discrimination Laws on SSDI Receipt Rates

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
SSA1983	0.0005** (0.0002)	0.0005* (0.0002)	0.0005** (0.0002)	0.0005** (0.0002)	0.0006*** (0.0002)	0.0005** (0.0002)	0.0005*** (0.0002)	0.0005*** (0.0002)
Medical definition of disability	0.0002 (0.0010)	…	…	0.0001 (0.0004)	…	…	…	0.00001 (0.0005)
Firm size < 10 (disability)	…	0.00004 (0.0004)	…	-0.0002 (0.0003)	…	…	…	…
Larger damages (disability)	…	…	0.0004 (0.0004)	0.0006** (0.0003)	…	…	…	0.0006** (0.0003)
Firm size < 10 (age)	…	…	…	…	-0.0007** (0.0002)	…	-0.0002 (0.0003)	…
Larger damages (age)	…	…	…	…	…	-0.0007** (0.0003)	0.0001 (0.0003)	-0.0001 (0.0002)
Firm size < 10 (disability and/or age)	…	…	…	…	…	…	…	-0.0002 (0.0004)
N	1,406	3,534	2,216	3,756	3,386	3,094	3,756	3,756

Notes: The mean SSDI receipt rate is 0.0072. See notes in Table 4.

Table 6: Interactions between State Disability and Age Discrimination Laws and SSA1983-Driven Spillovers to SSDI Application Rates

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
SSA1983	0.0013*** (0.0004)	0.0015*** (0.0004)	0.0017*** (0.0005)	0.0016*** (0.0004)	0.0014** (0.0006)	0.0013* (0.0006)	0.0015*** (0.0005)	0.0016*** (0.0006)
SSA1983 x …								
Medical definition of disability	-0.0019** (0.0008)	…	…	-0.0015* (0.0008)	…	…	…	-0.0015** (0.0007)
Firm size < 10 (disability)	…	-0.0009* (0.0005)	…	-0.0005 (0.0006)	…	…	…	…
Larger damages (disability)	…	…	-0.0014* (0.0007)	-0.0010 (0.0007)	…	…	…	-0.0010 (0.0007)
Firm size < 10 (age)	…	…	…	…	-0.0008 (0.0007)	…	-0.0007 (0.0005)	…
Larger damages (age)	…	…	…	…	…	-0.0008 (0.0007)	-0.0003 (0.0005)	-0.0000 (0.0005)
Firm size < 10 (disability and/or age)	…	…	…	…	…	…	…	-0.0005 (0.0006)
N	1,406	3,534	2,216	3,756	3,386	3,094	3,756	3,756

Notes: See the notes to Table 4. Compared to the regression controls included and detailed in the notes to Table 4, we add state fixed effects.

Table 7: Interactions between State Disability and Age Discrimination Laws and SSA1983-Driven Spillovers to SSDI Receipt Rates

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
SSA1983	0.0006*** (0.0002)	0.0011*** (0.0003)	0.0011*** (0.0004)	0.0011*** (0.0003)	0.0010** (0.0004)	0.0008* (0.0004)	0.0010*** (0.0004)	0.0012*** (0.0004)
SSA1983 x …								
Medical definition of disability	-0.0008 (0.0008)	…	…	-0.0003 (0.0009)	…	…	…	-0.0003 (0.0008)
Firm size < 10 (disability)	…	-0.0008* (0.0004)	…	-0.0005 (0.0004)	…	…	…	…
Larger damages (disability)	…	…	-0.0012** (0.0006)	-0.0008 (0.0005)	…	…	…	-0.0009* (0.0005)
Firm size < 10 (age)	…	…	…	…	-0.0006 (0.0005)	…	-0.0008* (0.0004)	…
Larger damages (age)	…	…	…	…	…	-0.0004 (0.0006)	0.0001 (0.0004)	0.0003 (0.0004)
Firm size < 10 (disability and/or age)	…	…	…	…	…	…	…	-0.0007 (0.0004)
N	1,406	3,534	2,216	3,756	3,386	3,094	3,756	3,756

Notes: See the notes to Tables 4 and 6.

Table 8: Summary of Heterogeneity and Robustness Checks for the Interactions between State Disability and Age Discrimination Laws and SSA1983-Driven Spillovers to SSDI Application Rates

	Number of Estimates that are Significantly Different from Zero at…			Insignificant at any level	Total Number of Estimates
	10% level	5% level	1% level		
Medical definition of disability	17	13	3	5	22
Firm size < 10 (disability)	5	3	0	17	
Larger damages (disability)	9	5	1	13	
Firm size < 10 (age)	2	1	0	20	
Larger damages (age)	2	1	0	20	

Notes: This table summarizes the main results (Table 6) and the heterogeneity and robustness checks (except Appendix Table D9). Estimates significant at the 1% (5%) level are also counted in the 5% and 10% (10%) columns.

Table 9: Summary of Heterogeneity and Robustness Checks for the Interactions between State Disability and Age Discrimination Laws and SSA1983-Driven Spillovers to SSDI Receipt Rates

	Number of Estimates that are Significantly Different from Zero at…			Insignificant at any level	Total Number of Estimates
	10% level	5% level	1% level		
Medical definition of disability	0	0	0	22	22
Firm size < 10 (disability)	7	2	0	14	
Larger damages (disability)	12	6	0	10	
Firm size < 10 (age)	7	0	0	15	
Larger damages (age)	0	0	0	22	

Notes: This table summarizes the main results (Table 7) and the heterogeneity and robustness checks (except Appendix Table D9). Estimates significant at the 1% (5%) level are also counted in the 5% and 10% (10%) columns.

Appendix A: Summary of Disability and Age Discrimination Literature

Appendix Table A1: Summary of Empirical Studies on the Effect of Disability Discrimination Laws on Individuals with Disabilities

Study	Legal Variation Studied	Treatment Group	Outcomes Studied and Results
DeLeire (2000)	ADA (1992)	Work-Limited Disability (WLD)	Employment (-), Wages (-)
DeLeire (2001)	ADA (1992)	WLD	Wages (-)
Acemoglu and Angrist (2001)	ADA (1992)	WLD	Employment (-), Earnings (-)
Beegle and Stock (2003)	Pre-ADA state laws	WLD	Employment (null), Earnings (-), Labor force participation (-)
Kruse and Schur (2003)	ADA (1992)	WLD, Limitations to ADLs (ADL)	Employment (+ or - depending on measure of disability)
Houtenville and Burkhauser (2004)	ADA (1992)	WLD; 2-period WLD	Employment (- or null, depending on measure of disability)
Hotchkiss (2004)	ADA (1992)	WLD	Employment (null)
Jolls and Prescott (2004)	Adoption of the ADA, given existing state laws	WLD	Employment (- only in states without pre-existing reasonable accommodation law, otherwise null)
Carpenter (2006)	Cook v. Rhode Island (Federal)	Obese v. not (via BMI)	Employment (+)
Bell and Heitmueller (2009)	UK's Disability Discrimination Act	WLD, ADL	Employment (- in short-term)
Thompkins (2015)	ADA, some post-ADA SCOTUS cases, and the adoption of the ADAAA (2009)	WLD	Employment (-, ADA; null, SCOTUS; null, ADAAA)
Neumark, Song, and Button (2017)	Cross-sectional state differences in age and disability laws.	Older vs. younger (both w/o WLD)	Hiring (+ broader definition, null otherwise)

Study	Legal Variation Studied	Treatment Group	Outcomes Studied and Results
Ameri et al. (2018)	ADA (post ADAAA), state laws (see Neumark, Song, and Button, 2107)	Resume-Correspondence study with spinal cord injury or Asperger's.	Callbacks (+ if covered by ADA, null for state laws)
Button (2018)	CA's Prudence Kay Poppink Act (2001)	WLD	Employment (+), Labor Force Participation (+), Unemployment (-)
Button, Armour, and Hollands (2017a)	ADA, some post-ADA SCOTUS cases, and the adoption of the ADAAA of 2009	WLD by Type (Salient Physical, Non-Salient Physical, Mental Retard. & Dev. Dis., Other Mental), ADL	Early results suggest… Hiring, ADA (+ for non-severe ADL limitations, otherwise null), Hiring, ADAAA (+ for non-salient physical, - for severe ADL limitation, otherwise null), Separations – Involuntary, ADA (+ for salient physical, - for non-salient physical, otherwise null), Separations – Involuntary, ADAAA (- for salient physical, otherwise null)
Button, Armour, and Hollands (2017b)	Replication of Jolls and Prescott (2004), Post-ADA/Pre-ADAAA changes in state laws, adoption of ADAAA given existing state laws, cross-sectional differences in state law features	See above	Early results suggest few effects of all this state law variation.
Armour, Button, and Hollands (2018)	ADAAA of 2009	Work-Limited by Type	Hiring (+, non-salient physical, otherwise null)

Appendix Table A2: Summary of Empirical Studies on the Effect of Age Discrimination Laws on Older Workers

Study	Legal Variation Studied	Treatment Group	Outcomes Studied and Results
Neumark and Stock (1999)	Pre-ADEA state age laws, ADEA	Older vs. Younger (Men only)	Earnings Growth (+), Employment (+)
Adams (2004)	Pre-ADEA state age laws, ADEA	White men	Employment (+) Retirement (-) Hiring (null)
Lahey (2008)	Less burdensome to file age discrimination claims in some states at the introduction of the ADEA	White men older than 50	Hiring (-), Weeks Worked (-), Retirement (+) Labor Force Participation (-), but see Neumark (2009) for a discussion of how the effects could be interpreted differently, showing positive effects.
Neumark and Song (2013)	Cross-sectional state age discrimination laws interacted with SSA1983	Men "Caught" by SSA1983 vs. not	Hiring (+ "larger damages" (age), + "lower firm size (age)")
Neumark and Button (2014)	Cross-sectional state age discrimination laws interacted with Great Recession	Older (55+) vs. younger (25-44)	Unemployment Rate (+, men, larger damages), Unemployment Duration (-/+ men, lower before and higher during and after GR, -, women, during GR), Employment (-, women, firm size), Hiring (-/+, women, higher before and lower during and after GR)
Neumark et al. (2018)	Cross-sectional state differences in age and disability laws.	Resume-correspondence study with older (age 64-66) vs. younger (age 29-31)	Callbacks (+ for men and women for states that allow larger potential damages than the ADEA, null for firm size)

Appendix Table A3: Summary of Empirical Studies on the Effect of Disability Discrimination Laws on Older Workers

Study	Legal Variation Studied	Treatment Group	Outcomes Studied and Results
Stock and Beegle (2004)	Pre-ADA state laws	Older vs. younger	Employment (+ only if combined with age discrimination laws)
Neumark, Song, and Button (2017)	Cross-sectional state differences in age and disability laws.	Older vs. younger (both w/o WLD)	Hiring (+ broader definition, null otherwise)
Neumark et al. (2018)	Cross-sectional state differences in age and disability laws.	Resume-correspondence study with older (age 64-66) vs. younger (age 29-31)	Callbacks (+ for women in states with larger potential damages than the ADA)

Appendix B: Details on the Calculation of OASI and SSDI Benefits

Understanding the benefit structures of OASI and SSDI programs is important to understanding how the SSA1983 made SSDI relatively more generous than OASI for people born after 1937. The first step in determining the cash benefit for either program is calculating the Average Indexed Monthly Earnings (AIME). For OASI benefits, the AIME is the average of the top 35 years of earnings, indexed to the year of age 60 using the Average Wage Index (AWI), divided by 12 to make it per month. For SSDI benefits, the AIME is the average of earnings from the year a worker turned 21 to the year of disability onset, indexed using the AWI to the year of disability onset. If a worker with a disability has over 35 years of indexed earrings, the Social Security administration averages the 35 highest years of earnings for SSDI benefit calculation.

The next step in calculating benefits under both programs is determining the Primary Insurance Amount (PIA), based on a progressive benefit equation.[34] The formula for calculating the PIA is the same for both OASI and SSDI. The OASI benefits are exactly equal to their full PIA only if they first claim the benefits at their FRA. If retirees choose to receive benefits earlier than their FRA, their benefits are adjusted downward by more for each month that the claim was earlier than the FRA.[35] The earliest age for OASI claiming is 62 and it has the largest actuarial reduction factor. On the other hand, the SSDI beneficiaries receive their full PIA regardless of the age at which they start receiving benefits.

[34] The progressivity ensures that lower income workers receive a higher return on their Social Security taxes than the higher income workers. This is achieved by breaking the AIME into three parts and weighting each part differently. The breakpoints in AIME to calculate PIA are adjusted annually based on changes in national average wages. However, the weighting scheme remains the same. For example, for a worker with a 62nd birthday in 2016, the PIA is equal to 90 percent of the worker's first $856 of AIME, plus 32 percent of the AIME between $856 and $5,157, plus 15 percent of the remaining AIME.

[35] OASI benefits are reduced by 5/9ths of one percent times the number of months between claiming and the FRA, if claiming was no more than 36 months early; if benefits were claimed more than 36 months early, benefits are reduced by 5/12ths of one percent per month up to where the 36-month period begins.

Appendix C: Tables for Heterogeneous Effects by Gender and Age Group

Appendix Table C1: Interactions between State Disability and Age Discrimination Laws and SSA1983-Driven Spillovers to SSDI Application Rates – Effects on Men Only

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
SSA1983	0.0012* (0.0006)	0.0013** (0.0006)	0.0016** (0.0007)	0.0014** (0.0006)	0.0013* (0.0008)	0.0011 (0.0008)	0.0014** (0.0007)	0.0016** (0.0007)
SSA1983 x …								
Medical definition of disability	-0.0020 (0.0012)	…	…	-0.0015 (0.0012)	…	…	…	-0.0016 (0.0012)
Firm size < 10 (disability)	…	-0.0009 (0.0007)	…	-0.0008 (0.0008)	…	…	…	…
Larger damages (disability)	…	…	-0.0011 (0.0010)	-0.0005 (0.0010)	…	…	…	-0.0005 (0.0010)
Firm size < 10 (age)	…	…	…	…	-0.0009 (0.0007)	…	-0.0008 (0.0007)	…
Larger damages (age)	…	…	…	…	…	-0.0010 (0.0009)	-0.0004 (0.0007)	-0.0003 (0.0008)
Firm size < 10 (disability and/or age)	…	…	…	…	…	…	…	-0.0006 (0.0007)
N	703	1,767	1,108	1,878	1,693	1,547	1,878	1,878

Notes: See the notes to Tables 4 and 6. Results here are based on men only, rather than on both men and women.

Appendix Table C2: Interactions between State Disability and Age Discrimination Laws and SSA1983-Driven Spillovers to SSDI Receipt Rates – Effects on Men Only

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
SSA1983	0.0007*	0.0011**	0.0011**	0.0011***	0.0010*	0.0007	0.0010**	0.0012**
	(0.0003)	(0.0005)	(0.0005)	(0.0004)	(0.0005)	(0.0005)	(0.0005)	(0.0005)
SSA1983 x …								
Medical definition of disability	-0.0010	…	…	-0.0002	…	…	…	-0.0003
	(0.0011)			(0.0012)				(0.0012)
Firm size < 10 (disability)	…	-0.0010*	…	-0.0008	…	…	…	…
		(0.0006)		(0.0006)				
Larger damages (disability)	…	…	-0.0012	-0.0007	…	…	…	-0.0008
			(0.0008)	(0.0007)				(0.0007)
Firm size < 10 (age)	…	…	…	…	-0.0007	…	-0.0010*	…
					(0.0007)		(0.0006)	
Larger damages (age)	…	…	…	…	…	-0.0005	0.0001	0.0002
						(0.0007)	(0.0006)	(0.0006)
Firm size < 10 (disability and/or age)	…	…	…	…	…	…	…	-0.0009
								(0.0006)
N	703	1,767	1,108	1,878	1,693	1,547	1,878	1,878

Notes: See the notes to Tables 4, 6, and Appendix Table C1.

Appendix Table C3: Interactions between State Disability and Age Discrimination Laws and SSA1983-Driven Spillovers to SSDI Application Rates – Effects on Women Only

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
SSA1983	0.0015** (0.0005)	0.0017*** (0.0004)	0.0018*** (0.0005)	0.0017*** (0.0005)	0.0015** (0.0007)	0.0014* (0.0007)	0.0015** (0.0006)	0.0017*** (0.0006)
SSA1983 x …								
Medical definition of disability	-0.0020*** (0.0006)	…	…	-0.0014*** (0.0004)	…	…	…	-0.0015*** (0.0004)
Firm size < 10 (disability)	…	-0.0010** (0.0005)	…	-0.0003 (0.0006)	…	…	…	…
Larger damages (disability)	…	…	-0.0018*** (0.0006)	-0.0014** (0.0006)	…	…	…	-0.0015** (0.0006)
Firm size < 10 (age)	…	…	…	…	-0.0007 (0.0007)	…	-0.0007 (0.0005)	…
Larger damages (age)	…	…	…	…	…	-0.0006 (0.0008)	-0.0001 (0.0004)	-0.0002 (0.0005)
Firm size < 10 (disability and/or age)	…	…	…	…	…	…	…	-0.0004 (0.0006)
N	703	1,767	1,108	1,878	1,693	1,547	1,878	1,878

Notes: See the notes to Tables 4 and 6. Results here are based on women only, rather than on both men and women.

Appendix Table C4: Interactions between State Disability and Age Discrimination Laws and SSA1983-Driven Spillovers to SSDI Receipt Rates – Effects on Women Only

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
SSA1983	0.0006** (0.0002)	0.0011*** (0.0003)	0.0012*** (0.0003)	0.0011*** (0.0003)	0.0010** (0.0004)	0.0009** (0.0004)	0.0010*** (0.0004)	0.0011*** (0.0003)
SSA1983 x …								
Medical definition of disability	-0.0006 (0.0005)	…	…	-0.0003 (0.0006)	…	…	…	-0.0003 (0.0005)
Firm size < 10 (disability)	…	-0.0006* (0.0004)	…	-0.0003 (0.0004)	…	…	…	…
Larger damages (disability)	…	…	-0.0012** (0.0005)	-0.0010** (0.0004)	…	…	…	-0.0011** (0.0004)
Firm size < 10 (age)	…	…	…	…	-0.0005 (0.0005)	…	-0.0007* (0.0004)	…
Larger damages (age)	…	…	…	…	…	-0.0003 (0.0005)	0.0001 (0.0004)	0.0003 (0.0004)
Firm size < 10 (disability and/or age)	…	…	…	…	…	…	…	-0.0005 (0.0004)
N	703	1,767	1,108	1,878	1,693	1,547	1,878	1,878

Notes: See the notes to Tables 4, 6, and Appendix Table C3.

Appendix Table C5: Interactions between State Disability and Age Discrimination Laws and SSA1983-Driven Spillovers to SSDI Application Rates – Effects on Ages 55-64 Only

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
SSA1983	0.0020*** (0.0006)	0.0017*** (0.0006)	0.0020*** (0.0007)	0.0017*** (0.0006)	0.0014* (0.0008)	0.0014 (0.0008)	0.0016** (0.0007)	0.0017** (0.0007)
SSA1983 x …								
Medical definition of disability	-0.0020** (0.0009)	…	…	-0.0017** (0.0008)	…	…	…	-0.0017** (0.0008)
Firm size < 10 (disability)	…	-0.0008 (0.0005)	…	-0.0002 (0.0006)	…	…	…	…
Larger damages (disability)	…	…	-0.0016** (0.0008)	-0.0014* (0.0008)	…	…	…	-0.0014* (0.0008)
Firm size < 10 (age)	…	…	…	…	-0.0007 (0.0008)	…	-0.0006 (0.0005)	…
Larger damages (age)	…	…	…	…	…	-0.0007 (0.0008)	-0.0003 (0.0005)	-0.00002 (0.0005)
Firm size < 10 (disability and/or age)	…	…	…	…	…	…	…	-0.0003 (0.0006)
N	1,026	2,582	1,618	2,744	2,474	2,260	2,744	2,744

Notes: See the notes to Tables 4 and 6. Here we drop age group 50-54.

Appendix Table C6: Interactions between State Disability and Age Discrimination Laws and SSA1983-Driven Spillovers to SSDI Receipt Rates – Effects on Ages 55-64 Only

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
SSA1983	0.0006* (0.0003)	0.0014*** (0.0005)	0.0012** (0.0005)	0.0014*** (0.0004)	0.0013** (0.0006)	0.0011* (0.0006)	0.0013** (0.0005)	0.0014** (0.0005)
SSA1983 x …								
Medical definition of disability	-0.0008 (0.0009)	…	…	-0.0003 (0.0010)	…	…	…	-0.0003 (0.0010)
Firm size < 10 (disability)	…	-0.0009* (0.0005)	…	-0.0006 (0.0005)	…	…	…	…
Larger damages (disability)	…	…	-0.0013* (0.0007)	-0.0010 (0.0006)	…	…	…	-0.0011* (0.0006)
Firm size < 10 (age)	…	…	…	…	-0.0007 (0.0007)	…	-0.0009* (0.0005)	…
Larger damages (age)	…	…	…	…	…	-0.0005 (0.0006)	0.0001 (0.0005)	0.0002 (0.0005)
Firm size < 10 (disability and/or age)	…	…	…	…	…	…	…	-0.0007 (0.0006)
N	1,026	2,582	1,618	2,744	2,474	2,260	2,744	2,744

Notes: See the notes to Tables 4, 6, and 18.

Appendix D: Tables for Robustness Checks

Appendix Table D1: Interactions between State Disability and Age Discrimination Laws and SSA1983-Driven Spillovers to SSDI Application Rates – Alternative Control Group Using All States

	(1)	(2)	(3)	(4)	(5)
SSA1983	0.0010*** (0.0003)	0.0014*** (0.0005)	0.0011*** (0.0003)	0.0014*** (0.0005)	0.0012*** (0.0004)
SSA1983 x …					
Medical definition of disability	-0.0016** (0.0008)	…	…	…	…
Firm size < 10 (disability)	…	-0.0009* (0.0005)	…	…	…
Larger damages (disability)	…	…	-0.0010 (0.0007)	…	…
Firm size < 10 (age)	…	…	…	-0.0008 (0.0006)	…
Larger damages (age)	…	…	…	…	-0.0005 (0.0006)
N	3,756				

Notes: See the notes to Tables 4 and 6. Columns 4, 7, and 8 of Table 4 are not repeated here as they would be the same as in Table 6. Compared to Table 6, the control group here is all states without that particular law feature, regardless of if they have other stronger or broader laws. This follows how the control group is defined in Neumark, Song, and Button (2017).

Appendix Table D2: Interactions between State Disability and Age Discrimination Laws and SSA1983-Driven Spillovers to SSDI Receipt Rates – Alternative Control Group Using All States

	(1)	(2)	(3)	(4)	(5)
SSA1983	0.0006*** (0.0002)	0.0010*** (0.0003)	0.0008*** (0.0002)	0.0010*** (0.0003)	0.0007** (0.0003)
SSA1983 x …					
Medical definition of disability	-0.0004 (0.0007)	…	…	…	…
Firm size < 10 (disability)	…	-0.0007* (0.0004)	…	…	…
Larger damages (disability)	…	…	-0.0009* (0.0005)	…	…
Firm size < 10 (age)	…	…	…	-0.0008* (0.0004)	…
Larger damages (age)	…	…	…	…	-0.0002 (0.0005)
N	3,756				

Notes: See the notes to Tables 4, 6, and Appendix Table D1.

Appendix Table D3: Interactions between State Disability and Age Discrimination Laws and SSA1983-Driven Spillovers to SSDI Application Rates - Weighting by Each State's 50 Years or Older Population

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
SSA1983	0.0014*** (0.0004)	0.0010*** (0.0004)	0.0016*** (0.0004)	0.0012*** (0.0004)	0.0017*** (0.0006)	0.0017*** (0.0006)	0.0018*** (0.0005)	0.0016*** (0.0005)
SSA1983 x …								
Medical definition of disability	-0.0014* (0.0008)	…	…	-0.0016** (0.0008)	…	…	…	-0.0014* (0.0008)
Firm size < 10 (disability)	…	-0.0006 (0.0005)	…	-0.0001 (0.0005)	…	…	…	…
Larger damages (disability)	…	…	-0.0010 (0.0006)	-0.0010 (0.0007)	…	…	…	-0.0007 (0.0005)
Firm size < 10 (age)	…	…	…	…	-0.0013** (0.0006)	…	-0.0007 (0.0004)	…
Larger damages (age)	…	…	…	…	…	-0.0013** (0.0006)	-0.0009* (0.0005)	-0.0006 (0.0005)
Firm size < 10 (disability and/or age)	…	…	…	…	…	…	…	-0.00003 (0.0005)
N	1,406	3,534	2,216	3,756	3,386	3,094	3,756	3,756

Notes: See the notes to Tables 4 and 6. Weights for each state's population of those 50 and older come from our estimates from the CPS ASEC.

Appendix Table D4: Interactions between State Disability and Age Discrimination Laws and SSA1983-Driven Spillovers to SSDI Receipt Rates - Weighting by Each State's 50 Years or Older Population

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
SSA1983	0.0006*** (0.0002)	0.0007*** (0.0002)	0.0008*** (0.0003)	0.0006*** (0.0002)	0.0008 (0.0005)	0.0006 (0.0005)	0.0009** (0.0004)	0.0008** (0.0003)
SSA1983 x …								
Medical definition of disability	-0.0005 (0.0005)	…	…	-0.0007 (0.0007)	…	…	…	-0.0006 (0.0007)
Firm size < 10 (disability)	…	-0.0003 (0.0004)	…	-0.0002 (0.0005)	…	…	…	…
Larger damages (disability)	…	…	-0.0005 (0.0004)	-0.0005 (0.0005)	…	…	…	-0.0004 (0.0005)
Firm size < 10 (age)	…	…	…	…	-0.0003 (0.0006)	…	-0.0004 (0.0004)	…
Larger damages (age)	…	…	…	…	…	-0.0002 (0.0006)	0.0002 (0.0005)	-0.0000 (0.0005)
Firm size < 10 (disability and/or age)	…	…	…	…	…	…	…	-0.0000 (0.0004)
N	1,406	3,534	2,216	3,756	3,386	3,094	3,756	3,756

Notes: See the notes to Tables 4, 6, and Appendix Table D3.

Appendix Table D5: Interactions between State Disability and Age Discrimination Laws and SSA1983-Driven Spillovers to SSDI Application Rates - Dropping 2009-2010 from the Sample

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
SSA1983	0.0013*** (0.0004)	0.0015*** (0.0004)	0.0017*** (0.0005)	0.0016*** (0.0004)	0.0015** (0.0006)	0.0013* (0.0006)	0.0015*** (0.0005)	0.0017*** (0.0006)
SSA1983 x …								
Medical definition of disability	-0.0020** (0.0008)	…	…	-0.0014* (0.0007)	…	…	…	-0.0015** (0.0007)
Firm size < 10 (disability)	…	-0.0010** (0.0005)	…	-0.0006 (0.0006)	…	…	…	…
Larger damages (disability)	…	…	-0.0015* (0.0007)	-0.0009 (0.0007)	…	…	…	-0.0010 (0.0007)
Firm size < 10 (age)	…	…	…	…	-0.0009 (0.0007)	…	-0.0008 (0.0005)	…
Larger damages (age)	…	…	…	…	…	-0.0008 (0.0007)	-0.0003 (0.0005)	-0.0001 (0.0005)
Firm size < 10 (disability and/or age)	…	…	…	…	…	…	…	-0.0005 (0.0006)
N	1,330	3,342	2,096	3,552	3,202	2,926	3,552	3,552

Notes: See the notes to Tables 4 and 6. Here we drop 2009 and 2010 from the sample to remove any possible effects of the Great Recession.

Appendix Table D6: Interactions between State Disability and Age Discrimination Laws and SSA1983-Driven Spillovers to SSDI Receipt Rates - Dropping 2009-2010 from the Sample

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
SSA1983	0.0006*** (0.0002)	0.0011*** (0.0003)	0.0011*** (0.0004)	0.0011*** (0.0003)	0.0010** (0.0004)	0.0008** (0.0004)	0.0010*** (0.0004)	0.0012*** (0.0004)
SSA1983 x …								
Medical definition of disability	-0.0008 (0.0007)	…	…	-0.0003 (0.0008)	…	…	…	-0.0003 (0.0008)
Firm size < 10 (disability)	…	-0.0008** (0.0004)	…	-0.0005 (0.0004)	…	…	…	…
Larger damages (disability)	…	…	-0.0011** (0.0005)	-0.0008 (0.0005)	…	…	…	-0.0009* (0.0005)
Firm size < 10 (age)	…	…	…	…	-0.0006 (0.0005)	…	-0.0008* (0.0004)	…
Larger damages (age)	…	…	…	…	…	-0.0004 (0.0005)	0.0001 (0.0004)	0.0003 (0.0004)
Firm size < 10 (disability and/or age)	…	…	…	…	…	…	…	-0.0007 (0.0004)
N	1,330	3,342	2,096	3,552	3,202	2,926	3,552	3,552

Notes: See the notes to Tables 4, 6 and Appendix Table D5.

Appendix Table D7: Interactions between State Disability and Age Discrimination Laws and SSA1983-Driven Spillovers to SSDI Application Rates – Estimates Without Control Variables

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
SSA1983	0.0013*** (0.0004)	0.0016*** (0.0004)	0.0018*** (0.0004)	0.0017*** (0.0004)	0.0016** (0.0006)	0.0014** (0.0006)	0.0016*** (0.0005)	0.0018*** (0.0006)
SSA1983 x …								
Medical definition of disability	-0.0021** (0.0009)	…	…	-0.0011 (0.0009)	…	…	…	-0.0012 (0.0009)
Firm size < 10 (disability)	…	-0.0012** (0.0005)	…	-0.0009 (0.0006)	…	…	…	…
Larger damages (disability)	…	…	-0.0015** (0.0008)	-0.0009 (0.0007)	…	…	…	-0.0010 (0.0007)
Firm size < 10 (age)	…	…	…	…	-0.0011 (0.0007)	…	-0.0010* (0.0005)	…
Larger damages (age)	…	…	…	…	…	-0.0010 (0.0007)	-0.0003 (0.0005)	-0.0001 (0.0005)
Firm size < 10 (disability and/or age)	…	…	…	…	…	…	…	-0.0008 (0.0006)
N	1,406	3,534	2,216	3,756	3,386	3,094	3,756	3,756

Notes: See the notes to Tables 4 and 6. Here we do not include the CPS ASEC controls that are detailed in Table 4.

Appendix Table D8: Interactions between State Disability and Age Discrimination Laws and SSA1983-Driven Spillovers to SSDI Receipt Rates - Estimates Without Control Variables

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
SSA1983	0.0007*** (0.0002)	0.0012*** (0.0003)	0.0012*** (0.0004)	0.0012*** (0.0003)	0.0010** (0.0004)	0.0009* (0.0004)	0.0010*** (0.0004)	0.0012*** (0.0004)
SSA1983 x …								
Medical definition of disability	-0.0010 (0.0008)	…	…	-0.0002 (0.0009)	…	…	…	-0.0003 (0.0008)
Firm size < 10 (disability)	…	-0.0009** (0.0004)	…	-0.0006 (0.0004)	…	…	…	…
Larger damages (disability)	…	…	-0.0013** (0.0006)	-0.0008 (0.0005)	…	…	…	-0.0009* (0.0005)
Firm size < 10 (age)	…	…	…	…	-0.0006 (0.0006)	…	-0.0009* (0.0004)	…
Larger damages (age)	…	…	…	…	…	-0.0005 (0.0006)	0.0001 (0.0005)	0.0003 (0.0005)
Firm size < 10 (disability and/or age)	…	…	…	…	…	…	…	-0.0007 (0.0005)
N	1,406	3,534	2,216	3,756	3,386	3,094	3,756	3,756

Notes: See the notes to Tables 3, 5, and Appendix Table D7.

Appendix Table D9: Interactions between State Disability and Age Discrimination Laws and SSA1983-Driven Spillovers to SSDI Application and Receipt Rates - Adding Minnesota to Medical Definition

	(1)	(2)	(3)	(4)	(5)	(6)
	SSDI application rate			SSDI receipt rate		
SSA1983	0.0013*** (0.0004)	0.0016*** (0.0004)	0.0016*** (0.0006)	0.0007*** (0.0002)	0.0011*** (0.0003)	0.0012*** (0.0004)
SSA1983 x …						
Broader definition of disability (medical + MN)	-0.0015** (0.0007)	-0.0011 (0.0007)	-0.0011 (0.0007)	-0.0007 (0.0006)	-0.0001 (0.0007)	-0.0001 (0.0007)
Firm size < 10 (disability)	…	-0.0005 (0.0006)	…	…	-0.0006 (0.0004)	…
Larger damages (disability)	…	-0.0010 (0.0007)	-0.0010 (0.0007)	…	-0.0008 (0.0005)	-0.0009* (0.0005)
Larger damages (age)	…	…	-0.0000 (0.0005)	…	…	0.0003 (0.0005)
Firm size < 10 (disability and/or age)	…	…	-0.0005 (0.0006)	…	…	-0.0007 (0.0004)
N	1,480	3,756	3,756	1,480	3,756	3,756

Notes: See the notes to Tables 4 and 6. We add Minnesota to the medical definition states since it also has a broader definition of disability via only requiring that a condition "limits" rather than "substantially limits". Here we re-do Columns (1), (4), and (8) in Tables 6 and 7.