The Effect of Economic Conditions on the Disability Insurance Program: Evidence from the Great Recession

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We examine the effect of cyclical job displacement during the Great Recession on the Social Security Disability Insurance (SSDI) program. Exploiting variation in the severity and timing of the recession across states, we estimate the effect of unemployment on SSDI applications and awards. We find the Great Recession induced nearly one million SSDI applications that otherwise would not have been filed, of which 41.8 percent were awarded benefits, resulting in over 400,000 new beneficiaries who made up 8.9 percent of all SSDI entrants between 2008-2012. More than one-half of the recession-induced awards were made on appeal. The induced applicants had less severe impairments than the average applicant. Only 9 percent had the most severe, automatically-qualifying impairments, 33 percent had functional impairments and no transferable skills, and the rest were denied for having insufficiently severe impairments and/or transferable skills. Our estimates imply the Great Recession increased claims processing costs by $2.960 billion during 2008-2012, and SSDI benefit obligations by $55.730 billion in present value, or $97.365 billion including both SSDI and Medicare benefits.

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1. Introduction

Nearly nine million former workers receive Social Security Disability Insurance (SSDI) benefits, a number equivalent to about five percent of the U.S. labor force. As the program has expanded, observers have debated the degree to which this program growth is due to past policy changes and anticipated growth in the insured population, or declining labor market opportunities for low-skilled workers. The SSDI program was designed to insure workers against permanent earnings losses arising from a severe, and long-lasting disability. While some disabilities qualify on medical criteria alone, disability awards can also take account of vocational factors that indicate skill transferability—education, prior jobs, and age. Individuals who have enough remaining work capacity to perform a prior job do not qualify for SSDI benefits; but those whose remaining work capacity and skills do not transfer to existing jobs, may be awarded SSDI benefits under medical-vocational criteria.

Because labor market opportunities factor into SSDI decisions, low-skilled, older workers may be especially likely to turn to the SSDI program should they lose their job during a cyclical downturn. Workers who are laid off from a long-term job experience near-permanent losses in earnings (Jacobson, Lalonde, and Sullivan, 1993; Von Wachter, Song, and Manchester, 2009), and these losses are especially large for older workers and those who are laid off during a recession (Davis and von Wachter, 2011). For such people, the SSDI program is the only available source of long-term earnings replacement prior to age 62—but only if they also have a serious health problem.

About 40 percent of SSDI applicants have at least some ability to work (Maestas, Mullen and Strand, 2013). It is this group for whom the decision to participate in the labor force versus apply for SSDI benefits may be sensitive to economic conditions. If they have a suitable job match (possibly one that accommodates their disability), they choose to work; but it they lose their job, they turn to the SSDI program. It is unknown whether these economically-induced applicants are 1) workers with very severe ("listing-level") impairments (e.g., chronic kidney disease, Crohn's Disease with complication), who qualify automatically regardless of whether they have transferable skills; 2) workers with less severe functional impairments who lack transferable skills, and therefore qualify under medical-vocational provisions, especially if they

are age 55 or older; or 3) workers with non-severe impairments or some transferable skills, who do not qualify.[1]

Once people qualify for SSDI benefits, they rarely re-enter the labor force. Although SSDI has incentive programs to encourage beneficiaries to work,[2] participation rates are low, perhaps because the expected compensation from employment for someone with reduced earnings capacity is often less than the value of stable cash benefits and Medicare coverage, especially when factoring in the risk of future job loss. As a result, some productive workers who are displaced during a downturn are not available for re-employment during the subsequent recovery because they have entered the SSDI program; this creates efficiency losses for the economy as a whole, and possibly also for the individual who foregoes the possibility of future income growth.[3]

In this paper, we estimate the effect of cyclical job displacement during the Great Recession on SSDI program participation. According to the National Bureau of Economic Research, the Great Recession began in December 2007, when the national unemployment rate was 5.0 percent. In the months that followed, unemployment rose rapidly, peaking at 10.0 percent in October 2009, four months after the recovery officially began. Figure 1 juxtaposes the monthly unemployment rate (left axis) against the number of SSDI applications filed each month, and the number of SSDI awards ultimately made to those applicants.[4] Organized in this manner, it is visually evident that SSDI claims rose in lockstep with the unemployment rate, and so did SSDI awards.[5] Figure 1 also reveals there were two distinct waves of applications during the Great

[1] According to Title 20 of the Code of Federal Regulations, the Listing of Impairments defines impairments that are severe enough to prevent *any* gainful activity (§ 416.925) whereas the more general definition of disability is the inability to do any *substantial* gainful activity (§ 404.1505). Also, our usage of "severe" follows one of several SSA usages: "Severe means medical severity as used by the medical community. The term does not have the same meaning as it does when we use it in connection with a finding at the second step of the sequential evaluation processes… " (Pt. 404, Subpt. P, App. 1).

[2] These include the Ticket to Work program, the Trial Work period, exclusion of Impairment-Related Work Expenses from earnings, and other related provisions.

[3] Burkhauser and Daly (2011) show that people with disabilities have experienced no real income growth over the past several decades.

[4] This is different from official statistics that would show awards by month of *award*. Because there can be substantial time lags between filing and award, our method of plotting awards by initial filing date makes it easier to detect the time series correlation between the unemployment rate and SSDI awards. In the figure, the number of claims and awards are adjusted for monthly seasonality, smoothed using a 3-month moving average, and re-centered around their initial value in October 2006, all to aid visual clarity.

[5] We use "awards" and "allowances" interchangeably, although the Social Security Administration draws an administrative distinction between them. Specifically, applicants can be *allowed* benefits on medical review, but not

Recession. The number of awards appears to have increased sharply during the first wave, but not as much during the second wave. The ratio of the award and application curves implies that the SSDI allowance rate decreased during the Great Recession, which in turn suggests the recession-induced claims were from applicants with less severe impairments, who in better economic times would have worked.

While compelling, Figure 1 is inconclusive owing to the possibility of confounding secular trends in both claims and allowances. There are at least two potential confounders. First, the Social Security Administration (SSA) began focused reviews of appellate claims decided by administrative law judges in 2011 (Ray, 2014). These reviews revealed systematic decision errors by judges, which once corrected, resulted in a steady reduction in the hearing-level allowance rate. A second potentially confounding factor is demographic: the oldest members of the Baby Boom cohort (b. 1946-1964) became eligible for early Social Security retirement benefits in 2008 and full retirement benefits in 2012. Indeed, after decades of nearly continuous growth, the size of the SSDI caseload began to plateau in 2010 (Social Security Administration, 2016; Table 3). Thus, as the leading edge of the Baby Boom began to age out of the disability program at full retirement age and into the retirement program, the applicant pool could have become slightly younger on average, resulting in relatively fewer applicants who would have qualified at a higher rate due to their being ages 55 and older.

Our analysis uses the universe of SSDI applications filed between 2006-2012 and tracks their outcomes through the appellate level. To address potential confounding from secular trends, we make use of variation in the timing and severity of the recession across U.S. states by regressing the number of applications of a given type filed by state and month on state-month unemployment. This methodology allows us to estimate the effect of cyclical unemployment on SSDI applications and awards.[6] Because our data also record the reasons for allowance or denial, we can investigate the characteristics of recession-induced applicants and beneficiaries, and shed light on the important question of whether the induced new beneficiaries were inframarginal individuals who could have qualified automatically before the Great Recession but who preferred

awarded benefits if they are subsequently found to be ineligible for technical reasons (e.g., return to substantial gainful activity).

[6] Bitler and Hoynes (2016) use a similar design to investigate the effects of the Great Recession on anti-poverty programs.

to work as long as they had a job, or whether they were people without transferable skills whose disabilities were closer to the margins of eligibility.

Our analysis yields six key findings. First, the Great Recession induced new SSDI applications that otherwise would not have been filed, and, to a lesser degree, accelerated the timing of applications that would have been filed anyway at a later date. Specifically, we estimate the Great Recession led 1.4 million former workers to apply for SSDI benefits during 2008-2012; nearly 1 million (72 percent) were induced in the sense they otherwise would not have applied, while the rest (28 percent) would have applied anyway, and the timing of their application was accelerated by only a few months. On net, the induced applicants (excluding the accelerated applicants) accounted for 11.6 percent of all applications filed during 2008-2012.

Second, more than one-half million of the recession-induced applicants were awarded benefits; over 400,000 were induced awards to people who otherwise would not have entered the SSDI program, while the rest were accelerated awards to people who would have entered the program anyway at a later date. On net, the induced awardees (excluding accelerated awardees) made up 8.9 percent of all new beneficiaries who entered SSDI during 2008-2012.

Third, the Great Recession had little effect on the number of awards made at the initial review level, but increased awards made at the appellate levels. The number of awards on appeal rose by 5.0 percent at the reconsideration level and by 3.3 percent at the hearing level—*for every one-point increase in the unemployment rate*. Compounding matters, the induced applicants were much more likely to file an appeal than the average applicant if they were initially denied. As a result, 53 percent of the induced new beneficiaries were allowed on appeal, compared to 37 percent of all new beneficiaries during 2008-2012. Separating the two types of appeals, reconsideration awards accounted for 14 percent of induced awards, compared to 7.5 percent of all awards, and awards made by administrative law judges accounted for 39 percent of induced awards, compared to 30 percent of all awards.

Fourth, we find the induced applicants had less severe impairments than the average applicant, and those who were awarded benefits were more likely to be allowed on the basis of functional limitations and no transferable skills. The mean allowance rate among induced applicants was 42 percent (accounting for appeals), substantially lower than the average allowance rate of 54 percent for the system as a whole, and indicating the induced applicants had less severe impairments than the average SSDI applicant. Further, allowances to applicants with

listing-level impairments—automatically qualifying conditions that are identifiably severe —did not rise by nearly as much as allowances to applicants for medical-vocational reasons—people with functional disabilities and no transferable skills. Denials spiked for applicants with non-severe and/or temporary disabilities. Furthermore, 62.3 percent of induced applicants and 58.7 percent of induced entrants had difficulty-to-verify conditions such as musculoskeletal and mental diagnoses. Overall, the induced applicants were either allowed for medical-vocational reasons (33 percent) or denied (58 percent); relatively few were allowed for severe, listing-level impairments (9 percent).

Fifth, because the induced applicants had less severe impairments than the average applicant, and also more likely to appeal an initial denial, we find the Great Recession was only partially responsible for the much-noted reduction in hearing allowance rates among administrative law judges since 2009. In fact, absent the effects of the Great Recession, the hearing-level allowance rate would have begun to decline sharply anyway, beginning with the appellate hearings held for applications that were initially filed in 2010 (hearings that would have been held in 2011 or later, given lengthy wait times for hearings during this period). Thus, the Great Recession cannot explain the significant decline in the hearing-level allowance rate that occurred after 2011, when SSA introduced focused reviews and new training initiatives to improve the quality of judicial decision-making.

Lastly, our estimates imply that the Great Recession had a significant impact on SSDI program costs, both administrative processing costs and benefit obligations. We estimate processing costs rose by $2.960 billion dollars during 2008-2012 as the system responded to an influx of induced applications (excluding the accelerated applications), many of which were reviewed more than once (and often three times) as they progressed from initial review to reconsideration to the hearing level. The impact of the Great Recession on benefit obligations was even more substantial because very few people leave the SSDI program to return to work and qualification for SSDI benefits confers entitlement to Medicare benefits. Based on our finding that the average induced beneficiary was 53 years old and therefore would claim SSDI benefits for an average of 13 years (until death or aging out), our estimates imply the Great Recession added $55.730 billion to SSDI benefit obligations in present value, or $97.365 billion including both SSDI and Medicare benefits.

These findings are novel and important contributions to the literature. Surprisingly, there are no estimates of the effects of cyclical unemployment on SSDI program participation that are both comprehensive (in accounting for applications *and* awards, including awards on appeal) and nationally generalizable. While Autor and Duggan (2003) showed that structural changes in labor demand for lower-skilled workers in the 1980s and 1990s contributed to SSDI program growth during that period, only a handful of studies have examined *cyclical* fluctuations. Stapleton et al. (1998) showed that *initial* SSDI applications were responsive to the annual unemployment rate across states during the 1980s and early 1990s, as did Cutler, Meara, and Richards-Shubik (2012) and Maestas, Mullen and Strand (2015) for the 2000s.[7] In addition, prior work has documented that people who apply for SSDI benefits during a recession have greater work capacity than those who apply during expansions (Coe and Rutledge, 2013, and Lindner, Burdick, and Meseguer, 2017) and have experienced a longer spell of non-employment (Maestas, Mullen, and Strand, 2015).

Stapleton et al. (1998) had data on initial awards (but not awards on appeal) and found that these increased among men, but not women, in response to increases in the unemployment rate in the 1980s through early 1990s. In contrast, Maestas, Mullen and Strand (2015) found initial awards *decreased* in response to increases in the unemployment rate during 1992-2006, and were unresponsive during 2006-2012, the period that included the Great Recession. Like the Stapleton et al. (1998) study, Maestas, Mullen and Strand (2015) examined initial awards, but not awards on appeal. The omission of awards on appeal is an important limitation. Historically, awards on appeal have accounted for around 40 percent of all SSDI awards (Social Security Administration, 2016; Table 60).[8] Thus, for a full accounting of the effects of recessions on the disability program, one must track and account for claims that progress beyond the initial review level.

Lastly, two papers have examined the local effects of cyclicality on SSDI benefit payments in areas heavily affected by extraction industries. In a study of Appalachia in the 1970s and 1980s, Black et al. (2002) found SSDI payments responded counter-cyclically to earnings shocks caused by the coal boom and bust cycle. A recent paper by Charles et al. (forthcoming) extends

[7] Consistent with these studies of the SSDI program, Nichols, Schmidt and Sevak (2017) found that applications for the Supplemental Security Income (SSI) program (the means-tested counterpart to SSDI), were responsive to the unemployment rate during the Great Recession.

[8] This is because more than one-half of applicants whose application is initially denied files an appeal and the allowance rate on appeal to an administrative law judge is higher than the allowance rate on initial review—59 percent versus 34 percent during 2006-2012.

the Black et al. analysis to oil and gas price shocks between 1970 and 2010 and finds a similar elasticity of SSDI payments with respect to area-level earnings. While these studies provide important evidence of cyclical effects, neither is generalizable to the national level (by design), and neither had the ability to directly measure and track the *inflow* of induced applications and awards because they did not use claims data. Claims microdata is necessary to estimate the number and characteristics of recession-induced SSDI applications and awards, the implied lifetime costs of the benefits awarded to induced beneficiaries, including Medicare benefits, and the administrative costs of processing an influx of recession-induced applications as they moved through the review system.

We next describe the institutional details of the SSDI program that are important for understanding the analysis. This is followed by a summary of our administrative data files in Section 3 and our empirical strategy in Section 4. Section 5 presents our main results, and includes subsections on dynamic effects of the Great Recession, net effects for the system overall and by administrative review level, and heterogeneous effects by type of applicant and type of impairment. In Section 6, we discuss implications of our findings for the SSDI program's performance, in terms of the system's allowance rates, administrative processing costs, and financial obligations to beneficiaries. Section 7 concludes.

2. Background on SSDI

The Social Security Disability Insurance (SSDI) program insures covered workers against loss of ability to perform substantial gainful activity in the economy because of a medical impairment that is expected to last at least twelve months (or result in death). The disability decision process proceeds in five steps. Step 1 is performed by SSA field offices, and consists of technical verification of SSDI insured status and confirmation that the applicant is not engaged in substantial gainful activity (SGA), defined in 2018 as earning $1,180 per month or more (if not blind). If these criteria are met, the field office collects all required application materials, and forwards the application to the state-run Disability Determination Service (DDS) office, where it is assigned to a disability examiner for medical review (Steps 2-5). Step 2 requires the examiner to determine if the individual's impairment is non-severe or temporary (i.e., expected to last less than twelve months). If this is the case, then the claim is denied on this basis. Step 3 requires the examiner to determine whether the applicant has a medical impairment that appears on SSA's

"Listing of Impairments," which includes over 100 impairments that are thought to be so severe that they preclude *any* gainful activity. If the applicant is found to have a listed impairment (or an unlisted impairment that "equals" the severity of a listed impairment), then the applicant automatically qualifies for SSDI without further review of their actual functional capacity and transferability of skills to other occupations. If the applicant does not have a listed impairment, he or she is not denied benefits but proceeds to Step 4. At Step 4, the examiner determines whether the individual is capable of performing any of their past jobs. If the applicant is found able to perform a past job then his claim is denied; otherwise, it is evaluated at Step 5, for which the examiner determines whether the applicant has the functional capacity and skills to perform *any* job in the *national* economy—based on the vocational factors of age, education and work history, regardless of whether such work exists in the applicant's area of residence. An applicant found capable of work is denied benefits; an applicant found incapable of work is allowed benefits based on his combination of medical and vocational factors.

Applicants denied benefits by the DDS have the option to appeal the decision.[9] The next level of appeal depends on the applicant's state of residence. Applicants residing in "non-prototype" states appeal again to the DDS for "reconsideration" of their case; those denied at the reconsideration level then have the option to request a hearing before an administrative law judge. Applicants residing in "prototype" states skip the reconsideration step and go straight to the hearing level. The ten prototype states are: Alabama, Alaska, California (LA North and LA West Only), Colorado, Louisiana, Michigan, Missouri, New Hampshire, New York, and Pennsylvania. At the hearing level, the judge is instructed to follow the same five-step disability determination process as the DDS examiners, but new evidence may be presented. Applicants whose claim is denied at the hearing level may further appeal to the Appeals Council. The number of cases that progress to the Appeals Council is very small.[10] Applicants denied by the Appeals Council can take their case to federal court, but this, too, is uncommon.

Applications that progress to the hearing level can take a very long time—in some cases, several years—to resolve. At the outset of the Great Recession, in fiscal year 2008, the average

[9] Allowed claimants may also appeal other aspects of their case, such as the onset date determined by the examiner, which has implications for when applicants are eligible to begin receiving benefits (or back pay). We exclude such appeals from our analysis.

[10] Specifically, the Appeals Council received 128,113 requests in FY2017. See https://www.ssa.gov/appeals/DataSets/07_AC_Requests_For_Review.html, accessed 12/30/17.

processing time for hearing requests was 514 days.[11] Using administrative data on initial claims filed in 2005, Autor et al. (2015) estimate an average *cumulative* processing time of 33.5 months for claims that progressed to the hearing level, with half of all hearing-level claims taking at least 28.6 months to progress from initial filing date to final decision and 90 percent of these claims taking at least 63.9 months. Hence, to observe the full effect of the Great Recession on the SSDI caseload, it is important to allow for a very long follow-up period.

3. Data and Summary Statistics

Our analysis data consists of all SSDI applications[12] filed between October 2006 and December 2012 that received medical review by a state DDS.[13] We extract these application records from the Social Security Administration's "831" files. Each record in the 831 data system represents a disability determination rendered by the DDS on either initial review or reconsideration, and contains the application filing date, the applicant's state of residence, the DDS decision (e.g., allowed or denied), and the basis for the decision (i.e., why the application was allowed or denied). Next, we determine which applicants subsequently appealed their initial determination, to either the reconsideration level, the hearing level, or both.[14] Hearing-level appeals are recorded in the Office of Hearings Operations (OHO) Case Processing and Management System (CPMS). We match our database of applications to these systems and record whether one or more appeals were filed at any point through September 2016, and if so, the outcome of the appeal. Consequently, we observe the universe of SSDI applications filed between October 2006 and December 2012, and any appeals that occurred up to 10 years after the initial application.[15]

Our primary measure of economic conditions is the state-level count of unemployed persons, measured monthly and seasonally-adjusted, from the Bureau of Labor Statistics

[11] See SSA's Annual Performance Plan for Fiscal Year 2010 and Revised Final Annual Performance Plan for Fiscal Year 2009, pg. 11, https://www.ssa.gov/budget/hist/FY2010/FinalFY10APP.pdf, accessed 12/30/17.
[12] We include SSDI applications that are concurrently evaluated for SSI eligibility.
[13] We exclude technical denials, most of which are rendered by local field offices prior to sending the application to the DDS for medical review. Common reasons for technical denial include insufficient work credits (resulting in non-insured status) and engagement in substantial work activity.
[14] A small number of appeals progress to the Appeals Council or federal courts, but we do not track these outcomes because they are too few to significantly impact system-wide allowance rates.
[15] Our sample includes reapplications. A small fraction (3.3%) of applicants submit a new application to the state DDS after being denied, often concurrent with an appeal (Autor, Maestas, Mullen and Strand, 2015).

(BLS).[16] The official unemployment level measures the number of "jobless persons who are available to take a job and have actively sought work in the past four weeks." The unemployment rate, i.e., the unemployment level as a percent of the labor force, is one of several major macroeconomic indicators that are used to monitor and define fluctuations in economic activity. Empirically, changes in the unemployment rate are negatively correlated with changes in GDP growth (Abel et al., 2013), another major indicator used to define economic expansions and contractions. While the unemployment rate is the official measure of labor underutilization in the economy, it has several well-known limitations. The main concern is that it *understates* labor utilization because during a prolonged contraction many people who would prefer to work become discouraged and stop searching; once that happens, they are no longer considered part of the labor force, and they drop out of both the numerator and the denominator of the measured unemployment rate. In addition, the official unemployment rate counts the underemployed (people who are working fewer hours than they would like to for economic reasons) as if they were fully employed. As a result, BLS offers several alternative measures of labor underutilization designed to specifically capture discouraged workers, the long-term unemployed, and involuntary part-time workers. Unfortunately, none of these series are measured at the state-month level during our period of interest. Nonetheless, the different measures of labor underutilization track one another closely over time, including across business cycles, and this holds for states as well as the nation (Local Area Unemployment Statistics, 2017).

In October 2006, the start of the fiscal year before the Great Recession began, the national unemployment rate was only 4.4 percent. Although unemployment subsequently rose in all states during the Great Recession, there was substantial variation across states in the timing and magnitude of the increase in unemployment and in the subsequent recovery. Figure 2 shows the variation in the unemployment rate by state and month between 2006 and 2012, with states grouped by Social Security region for visual clarity. States within the same region often had very different experiences. For example, the unemployment rate spiked rapidly in Michigan prior to rising in nearby states, reached a high of 14.2 percent in late 2009, then declined relatively quickly. Nevada also experienced rapid growth in unemployment, but high unemployment was

[16] The unemployment series were extracted using the local area unemployment statistics searchable database available at https://www.bls.gov/lau/#data.

more persistent there, remaining above 10 percent well into 2012. States in the Dallas Region (Arkansas, Louisiana, New Mexico, Oklahoma and Texas) were notably less affected by the Great Recession than states in other regions (although even there the unemployment rate doubled), and two states—North Dakota and Nebraska—had low unemployment to begin with and peaked at just 4.3 and 4.8 percent unemployment, respectively, during the Great Recession.

Between October 2006 and December 2012, 10.2 million individuals applied for SSDI benefits. As shown in Table 1, their mean age was 46.6, females comprised 48 percent, and 52 percent filed concurrently for means-tested SSI benefits—an indicator of impoverishment. About one-quarter of applicants resided in a prototype state, and therefore would skip the reconsideration step if their case progressed to an appeal. Some 32 percent of applicants applied because of a musculoskeletal impairment, 20 percent applied because of a mental impairment, 9 percent indicated a circulatory disease, and 7 percent had a neoplasm (cancer). Only 34 percent were allowed benefits at the initial determination, but 54 percent ultimately received SSDI benefits.

Figure 3 shows how these SSDI applications flowed through the disability review system, from initial review to the hearing level. Overall, applications were filed at a rate of 135,945 per month (see also Table 1), with 103,557 originating in non-prototype states and 32,388 originating from prototype states. The rate of initial allowance was slightly higher in prototype states than in non-prototype states (36.6 versus 33.6 percent, respectively). Among applicants who were initially denied, just over half chose to file an appeal of their initial denial (54.7 percent in non-prototype states, 52.6 percent in prototype states). In non-prototype states, these applications proceeded to reconsideration, where only 14.8 percent were allowed. Among those who were denied at reconsideration, 81.3 percent chose to further appeal this decision to the hearing level. In contrast, appellants in prototype states moved directly from initial denial to the hearing level. Hearing-level appeals were filed at a rate of 37,414 per month, for a total of 2.8 million over the 75 months in our sample period.[17] Of these, 58.6 percent were allowed, 27.1 percent were denied, and 14.4 percent were dismissed.[18]

[17] As noted earlier, we exclude appeals of initial allowances that dispute some other aspect of their case such as the date of disability onset (less than one percent of all appeals).
[18] The most common reasons for dismissal are abandonment and withdrawal.

Table 2 summarizes how allowances and denials were distributed across the different justifications for determination at each level of administrative review. Initial allowances were divided approximately evenly between listing-level allowances (most severe) and medical-vocational allowances (less severe); reconsideration allowances were similarly evenly divided between listing and medical-vocational allowances. In sharp contrast, the clear majority (85 percent) of allowances at the hearing level were medical-vocational allowances.[19] Among denials, more applications were denied on initial review for non-medical reasons, or for being non-severe or of short duration, than was the case among appellate denials. Denials on the basis of medical-vocational factors (i.e., for being capable of past work or other work) were more common on initial review than on appeal. About 14 percent of appellate cases were dismissed by a judge.

4. Empirical Strategy

Our goal is to estimate the number of SSDI applications induced by the Great Recession, and among those, the number ultimately awarded. We begin by collapsing the claims microdata to the state-month level by counting the number of initial claims filed in a state and month. We then regress the number of initial claims per state-month on the number of unemployed persons observed in the same state and month, as shown in equation (1):

$$y_{jst} = \beta^j(L)U_{st} + \alpha_s + \delta_t + \varepsilon_{jst} \qquad (1)$$

where y_{jst} is the number of SSDI claims of outcome type j (e.g., all initial applications, all initial allowances, all initial denials appealed, all appellate allowances, etc.) filed in state s in month-year t. U_{st} is the number of unemployed persons in state s in month-year t. The function $\beta^j(L)$ is a lag polynomial that measures the effects of both contemporaneous and past values of unemployment on the number of SSDI applications filed in month-year t per state. We refer to β^j as the sum of the individual lag weights β_k^j, and thus β^j represents the cumulative, net number of SSDI claims induced by current and past changes in unemployment. Lastly, a_s and δ_t are state and month-year fixed effects, respectively, which control for common national trends

[19] Hearing level allowances that are neither listing-level nor medical-vocational allowances include "fully favorable decisions without a hearing" made by Senior Attorney Adjudicators based on (new) evidence in the appellant's file.

and states differences in factors that affect the number of SSDI claims filed, such as population size.[20]

To obtain the implied number of applications filed per month *nationwide* and per one-point change in the national unemployment *rate*, we multiply β^j by 51 (the number of states plus the District of Columbia) and by 1.54 million (the number of persons equaling one percent of the national labor force during our sample period). Although we could have regressed the state application rate on the state unemployment rate, our approach avoids confounding from state-time differences in labor force size (the denominator of the state unemployment rate). In addition, because we keep the units the same on both sides of the estimating equation (an individual person), the estimated coefficients give the number of SSDI applications filed per unemployed person per month averaged across states, making it straightforward to scale the coefficients to obtain the national number of applications filed per unemployed person or per one-point change in the percent of the labor force that was unemployed (i.e., the unemployment rate).

We repeat this series of steps for each outcome type *j* to obtain the number of initial applications filed between 2006-2012 that were eventually allowed, denied or dismissed at each administrative level due to the Great Recession. For example, to estimate the number of induced hearing level claims, we again collapse the microdata by state and initial filing month, but this time we count only the number of initially denied claims that were decided at the hearing level by September 2016. We then re-estimate equation (1) for this new outcome variable. Following the same procedure, we further subset claims that proceeded to the hearing level according to whether they were allowed, denied or dismissed, and the coefficients on unemployment at time *t* from each model will sum to the coefficient on unemployment at time *t* from the model of the total number of induced claims handled at the hearing level. Importantly, across all models, *t* always refers to the initial filing month.

Once we obtain an estimate of the number of induced applications of a given type (e.g., initial) and the corresponding number of induced allowances, we can compute the *allowance rate* among induced applications of that type by dividing the estimated number of induced allowances

[20] Because our dependent variables are counts of the entire population of claims, and not rates, there is no need to further weight the data to adjust for state differences in population size (as one would do in a rate-based model) or in precision due to sampling variation (as one would do with survey-based measures of claims).

(given by the coefficient on unemployment in the equation for allowances) by the estimated number of induced applications (given by the coefficient on unemployment in the equation for applications).

5. Main Results

This section begins by answering the question of whether the Great Recession induced *new* SSDI applications, or merely accelerated applications that would have been filed anyway. We then present estimates of the effects of changes in the unemployment rate by application outcome (allowed or denied), overall and by administrative review level (initial, reconsideration, and hearing level). This is followed by a series of robust tests to alternative specifications, including common specifications in the prior literature. We then present an analysis of the characteristics of the recession-induced applicants, in terms of disability severity and skill transferability, as well as type of health impairment.

5.1. Dynamic Effects of Unemployment

To understand whether the Great Recession resulted in new costs for the SSDI program, or simply shifted forward costs that would have been incurred anyway, we begin with an analysis of the dynamic effects of changes in unemployment. If such shifting occurs, one might expect an increase in unemployment in a given month to increase SSDI applications contemporaneously, and perhaps a few months later, but at the same time *decrease* SSDI applications a few months or years in the future.

To investigate this, we estimate equation (1) using a polynomial distributed lag model, and compare it to a base model with no lags, which we estimate by ordinary least squares regression. The two specifications are presented side-by-side in Table 3, first for the number of applications filed (columns 1 and 2) and then for the number of allowances made at any level (columns 3 and 4). To select the polynomial degree and number of lags used for each model, we minimize the Akaike Information Criteria (AIC)/Bayesian Information Criteria (BIC). Using these criteria, we select a quartic polynomial and 14 monthly lags for the effect of unemployment on applications. The model for allowances calls for a quadratic polynomial and 3 monthly lags of unemployment.

In the distributed lag model for applications (Table 3, column 2), contemporaneous changes in unemployment have the largest effect, and the first lag comes in statistically significant at about one-third the size of the coefficient on contemporaneous unemployment. The coefficients

on lags 3 through 6 are negative (and statistically significant for lags 3 through 5), implying the *absence* of applications that otherwise would have been filed in those months. In other words, some of the additional applications filed in months 0 through 2 in response to an increase in unemployment in month 0 were indeed shifted forward—albeit by only a few months. The remaining lag weights are mostly positive, but comparatively small and in most cases statistically insignificant. Figure 4 presents the estimated lag weights graphically, for the optimal quartic polynomial, as well as for polynomials of greater and lesser degree. For all degrees, the same pattern is evident; most of the impact of unemployment on SSDI applications in a given month occurs contemporaneously, with a modest amount of shifting by only a few months.

If we sum the positive lag weights, we find that the gross number of applications filed per month for every one-point increase in unemployment was 6,455. Of these, 1,836 (28 percent) were shifted forward (obtained by summing the negative lag weights). Thus, on-net, there were 4,619 induced new applications (s.e.=96) filed each month for every one-point increase in unemployment (obtained by adding up the coefficients across all lags). Notably, 4,619 is statistically equivalent to the base model estimate of 4,445 induced claims (s.e.=978), and thus we can reasonably interpret the base model estimate as the number of induced new claims *net of any forward-shifted claims*. In addition, the AIC/BIC criteria are virtually identical between the two models. Thus, if the purpose is to estimate the total number of induced claims net of any accelerated claims, the distributed lag model adds little value over the model with only contemporaneous unemployment. Because this is our purpose, in the next sections, we use the base specification with no lags.

Importantly, dynamic effects were less important for allowances (Table 3, columns 3 and 4). Most of the effect of unemployment at time *t* arises contemporaneously, with the first lag coming in only one-fifth the size of the contemporaneous impact and not statistically significant. There is, again, modest evidence of shifting, but just by a couple of months. In gross terms, there were 2,618 new awards made each month per one-point increase in unemployment, but 733 (28 percent) were shifted forward by 2 to 3 months—i.e., they would have been awarded anyway a couple of months later—and therefore the net number of induced awards is 1,885. As in the model for applications, the net number of induced awards is similar to the number of induced awards implied by the base model with no lags (1,860) and the AIC/BIC criteria are nearly identical across models. Thus, for awards too, the base model with contemporaneous

unemployment and no further lags is sufficient to capture the total number of net new induced awards.

Lastly, if we annualize the above monthly estimates and multiply by the observed difference between the average unemployment rate of 4.6 percent in 2007 and the annual unemployment rate each year from 2008-2012, we obtain an estimate of the gross number of applications and awards attributable to the Great Recession, the number of induced claims that were new, and the number that were merely accelerated. In total, we find the Great Recession led 1.4 million former workers to apply for SSDI benefits during 2008-2012. Nearly 1 million (72 percent) were induced and otherwise would not have applied, while the rest, approximately 400,000 (28 percent) would have applied anyway. In terms of awards, more than one-half million of the recession-induced applicants were awarded benefits, and over 400,000 were induced awards to people who otherwise would not have entered the SSDI program. The remainder, approximately 100,000, were accelerated awards to people who would have entered the program anyway 2 to 3 months later than they did.

5.2. The Effect of Unemployment on SSDI Claims, Allowances and Denials by Administrative Review Level

We present our main estimates in Table 4. Each group of numbers presents the estimated effect of a one-point increase in the unemployment rate on the number of SSDI applications filed per month of a given type for the nation as a whole.[21]

We find that a one-point increase in the unemployment rate induced 4,455 new SSDI claims per month nationwide in the same month, representing a 3.3 percent increase in claims per one-point increase in unemployment. Thus, at the peak of the recession in October 2009—when the unemployment rate had risen by 5 points—the SSDI system was receiving 16.5 percent (3.3*5) more claims than usual. Of these 4,455 induced claims, 873 claims were initially allowed (marginally significant, p=0.062) and 3,582 claims were initially denied. In percent terms, initial allowances increased by a marginally significant 1.9 percent per one-point increase in the

[21] As explained above, the coefficient β^j in equation (1) gives the number of new applications (of type *j*) filed per month per state *per person unemployed*. In Table 4, we report the implied number of applications filed per month nationwide and per number unemployed equal to one percent of the national labor force, obtained by multiplying β^j by 51 and by 1.54 million (the number of persons equivalent to one percent of the national labor force in our sample period). To obtain the annual impact, the reported monthly coefficients can be further multiplied by 12.

unemployment rate, while initial denials rose by 4.0 percent per one-point increase in unemployment. To infer the initial allowance rate among the induced claims, we divide the number of induced allowances (873) by the number of induced claims (4,455). This gives an initial allowance rate of 19.6 percent among the induced claims, which is well below the initial allowance rate of 34.3 percent for all claims received during this period (see Table 2). Thus, we find that induced claimants were only 57 percent as likely as average claimants during the sample period to be awarded SSDI benefits at the initial level. The fact that induced applicants were less likely to qualify for benefits implies the average recession-induced claimant was healthier than the average SSDI claimant.

But, as Figure 3 showed, more than half of applicants who are initially denied go on to appeal their initial decision—and many ultimately succeed—at either the reconsideration or hearing level. To assess whether this was true for recession-induced claims, we estimate equation (1) for the number of reconsideration claims, and, separately, for the subsets of reconsideration claims that were allowed and denied. The second column of Table 4 shows that 1,997 individuals filed for reconsideration each month, a 5.3 percent increase in the total number of reconsideration claims, for every one-point increase in the unemployment rate. The implied rate of appeal to reconsideration among induced applicants—possible only in non-prototype states—is 72.4 percent,[22] substantially higher than the average rate of appeal to reconsideration of 54.7 percent (see Figure 3). Thus, induced claimants were much more likely to appeal an initial denial to the reconsideration level than the average claimant during this time. This is not surprising since the opportunity cost of continuing a claim—potential earnings—would have been lower for recession-induced applicants. Among the induced claims filed for reconsideration, 259 per month were allowed at that level. As a result, reconsideration allowances increased by 5.0 percent for every one-point increase in the unemployment rate. That said, reconsideration denials also increased—there were 1,738 induced denials per month, representing an increase of 5.3 percent. On net, the allowance rate among induced reconsideration claims was 12.9 percent (259/1,997)—lower than the average reconsideration allowance rate of 14.8 percent during this period (see Figure 3).

[22] Using the estimates in Table 4, the rate of appeal to reconsideration among induced applicants is 1997/(3582*0.77), where the denominator is the number of induced initial denials multiplied by 0.77, the proportion of all initial denials that come from non-prototype states (recall reconsideration is not an option in prototype states). The numerator is the number of induced reconsideration claims.

Claimants who are denied on reconsideration in non-prototype states or on initial review in prototype states may file an appeal to the hearing level, where their case is heard by an administrative law judge. Table 4, Column (3) shows that hearing-level appeals increased by 1,736 cases each month, a 4.6 percent increase in workload per one-point increase in unemployment, or an increase of 23 percent at the peak of the recession. These hearing-level appeals, which include appeals from both non-prototype and prototype states, comprised 48.5 percent (1,736/3,582) of all induced initial denials; once again, higher than the 41.9 percent (37,414/(68,769+20,548), see Figure 3) of all initial denials that progressed to the hearing level during this time.[23]

A substantial number of induced hearing-level appeals were allowed. Of the 1,736 hearing-level appeals filed each month, 728 were allowed, a 3.3 percent increase in the number of allowances for every one-point increase in unemployment (Table 4, Column (3)). Another 733 appeals were denied (a 7.2 percent increase in the number of denials), and 275 claims were dismissed (a 5.1 percent increase in dismissals). Overall, the allowance rate among induced claims at the hearing level was 41.9 percent (728/1,736), well below the average hearing-level allowance rate of 58.6 percent during this period (Figure 3). Thus, even though the recession-induced claims were allowed by judges at a lower rate than the average claim—presumably because the recession-induced applicants had less severe impairments on average—a substantial proportion of the recession-induced claims that proceeded to the hearing level (41.9 percent) were nonetheless awarded benefits. In fact, our estimates imply that 53 percent ((728+259)/(873+259+728) from Table 4) of the induced beneficiaries were allowed on appeal (reconsideration or hearing), compared to 39 percent of all new beneficiaries during 2006-2012. Breaking apart the two types of appeals, reconsideration awards accounted for 14 percent of induced awards, compared to 7.5 percent of all awards, and awards made by administrative law judges accounted for 39 percent of induced awards, compared to 30 percent of all awards.

Considering the combined effect of all review levels, we find that the number of SSDI awards increased by 1,860 per month (2.5 percent) for every one-point increase in the rate of unemployment (Table 4, Column (4)). Relative to the number of induced initial claims, we find

[23] If, alternatively, we calculate the appeal rate relative to the sum of initial denials from prototype states and reconsideration denials from non-prototype states, then we find a hearing-level appeal rate of 67.8 percent among induced applicants, slightly lower than the overall hearing-level appeal rate of 70.2 percent.

that 41.8 percent of all recession-induced applicants (1,860/4,455) were awarded SSDI benefits. Scaling these estimates by the actual increase in the national unemployment rate experienced in each year between January 2008 and December 2012 relative to the average unemployment rate in 2006, we find the Great Recession induced a total of 997,475 additional SSDI applications and 416,454 additional SSDI disabled worker beneficiaries. Thus, recession-induced beneficiaries accounted for 8.9 percent of the 4.5 million new beneficiaries who entered the SSDI program during 2008-2012.[24] In Section 6, we investigate the characteristics of these new beneficiaries, including the proportion who entered the program based on medical-vocational criteria.

5.3. Robustness

It is possible that some individuals who became unemployed during the Great Recession searched for new employment before applying for SSDI benefits. If this were the case, then the relevant unemployment rate might not be economic conditions at the time of filing, but rather conditions at the time they were laid off from their job. To explore this, we examine whether the number of SSDI claims in month *t* is affected by the unemployment rate in the *month of disability onset*, rather than the (later) filing month. Importantly, the date of disability onset is not necessarily the date of *medical* onset; rather, it is the later of the medical onset date and the date the applicant stopped working. If an individual who experienced onset of a medical problem subsequently continued to work (perhaps with accommodations from their employer), but was laid off during the recession, the established disability onset date could be the lay-off date.[25] Even if the applicant searched for a new job for several months, any subsequent SSDI application should be attributed to economic conditions at the time of layoff. The date of disability onset is determined by the disability examiner and is only recorded for initially allowed claims in the 831 files; thus, this test can only be performed on this subset of claims. After sub-setting on initially allowed claims and re-collapsing the data to count claims by onset month and state, we show in Appendix Table A1 that a one-point increase in unemployment *in the month of disability onset* led to an increase in the number of initial allowances equal to 757 per month

[24] The total numbers of disabled worker applications and beneficiaries during 2008-2012 were computed from our data extract, which differs slightly from official statistics owing to definitional differences.

[25] Applicants who have had an impairment for a long time can *allege* an earlier onset date, but SSA will set the "established onset date" to be no earlier than the date the applicant most recently stopped working. The established onset date determines how much back pay is owed to the applicant at the time of approval, up to a maximum of 12 months' worth of benefits.

(s.e.=449), which is not statistically different from our main estimate for initial allowances of 873 (s.e.=458) from Table 4 (and reproduced in Appendix Table A1 for ease of comparison). Further, unemployment at onset and filing explain an identical proportion of the variation in filing.

Finally, we test the robustness of our main estimates to alternative specifications used in the prior literature. As described above, our base specification regresses state-month application counts on the number unemployed per state-month, with state fixed effects to account for fixed differences across states in factors such as population size (and month fixed effects to account for secular trends in applications). This count-on-count specification facilitates transparent accounting of individual applications as they progress across different levels of review. It also implicitly assumes that state population size affects applications additively. In this section, we explore several specifications that let state population enter multiplicatively.

Stapleton et al. (1998) regressed the *log* SSDI application rate in year *t* (estimated from administrative data) on the log unemployment rate. One rationale for the log(rate)-log(rate) specification (as opposed to our count-on-count or a rate-on-rate model) is that it is easy to estimate percent changes as opposed to percentage-point changes. To implement this specification, we first convert our application counts to application rates by dividing the counts by state population, obtained from the Census Bureau (expressed in thousands). We then regress the log application rate on the log of the unemployment rate, weighted by state population (as in Stapleton et al., 1998). Because we use the same population denominator on both sides of the equation, this specification is equivalent to estimating a log(count)-on-log(count) (because the log(population) terms cancel out). From this specification, we obtain an elasticity of 0.20 (Appendix Table A2, column 2), implying a 0.20 percent increase in SSDI applications for every 1 percent increase in the unemployment rate, or a 20 percent increase in claims at the height of the Great Recession, which doubled unemployment in most states. This elasticity is comparable to the elasticity of 0.25 implied by our count-on-count specification, reproduced in column (1) of Appendix Table A2.

Our second alternative specification is the rate-on-rate specification, whereby we regress the application rate per 1,000 workers (i.e., in the labor force) on the unemployment rate (this is similar to that used by Cutler et al. 2012, except we use the labor force as the denominator on both sides of the equation, whereas Cutler et al. scaled DI applications by the number of *covered*

workers. The rate-on-rate specification gives a somewhat lower elasticity than the other specifications, 0.12, implying a 12 percent increase in applications at the peak of the recession. One complication with this specification is that if SSDI application rates vary systematically with population size, then the estimated elasticity is the coefficient on an interaction term, which then must be interpreted in conjunction with its main effect. In our data, state application rates are positively correlated with population size, suggesting that the elasticity from the rate-on-rate model is not readily comparable with the elasticity from the other models. Finally, we include a specification that regresses the log application count on the number unemployed per thousand (as in Maestas, Mullen and Strand 2015). This estimated elasticity is 0.21, similar to the elasticity from the other log specification and our baseline specification.

6. Characteristics of the Recession-Induced Applicants

Our main results indicate that 416,454 disabled workers entered the SSDI program because of the Great Recession, making up 8.9 percent of all new beneficiaries during 2008-2012. It is important to understand the composition of these induced beneficiaries, particularly with respect to the type and severity of their impairments. On the one hand, induced entrants might be individuals who were medically eligible for SSDI but who otherwise had been working (perhaps with employer accommodation). If they were laid off, they might immediately apply for SSDI benefits, recognizing they would be likely to succeed (and perhaps also recognizing the difficulty of finding a new employer willing to accommodate them). Such individuals would have qualifying impairments that were easier to medically determine, and as a result these applicants would be more likely to qualify on the initial review than on appeal, and to qualify because their impairments meet or equal the listing of impairments (regardless of vocational factors). On the other hand, the induced entrants might be people with functional impairments and diminished long-run labor market opportunities. If they are laid off, these individuals might spend more time searching for work before applying for SSDI, they would be more likely to succeed on appeal than on initial review (perhaps after further case development), and more likely be allowed for vocational reasons than because their impairments meet or equal the listings. Their impairments would be harder to medically diagnose and verify.

Several pieces of evidence point to the induced entrants being of the latter type. First, as we documented in Table 4, the induced applicants were less likely to be allowed than the average

applicant during this time, which indicates they generally had impairments of lesser severity. Second, as documented in Maestas, Mullen and Strand (2015), more time had elapsed between alleged disability onset and time of filing for induced applicants than for the average applicant, suggesting they were more likely to have spent time searching for work before applying for SSDI benefits. The next body of evidence comes from Tables 5, 6, and 7 which show how claims for disabilities of different types and severities were treated at different levels of the system.

6.1. By Reason for Allowance or Denial (an Indicator of Impairment Severity)

When disability adjudicators decide a case, they must record the justification for their decision, using the 5-step process described in Section 2. In particular, the process is designed to distinguish applicants with non-severe or temporary impairments from applicants (step 2) with the most severe, automatically-qualifying impairments (step 3). If an application is neither non-severe or medically qualifying, the adjudicator then considers whether the applicant has the skills to perform the occupations that their residual functional capacity would allow them to do (steps 4 and 5). In this section, we use this information to draw inferences about the severity of disabilities in the recession-induced applicant pool and present our findings in Table 5. To obtain the estimates in Table 5, we subset the initial claims filed in each month by the type of determination they received, separately for the initial and appellate levels. We then regress the number of each outcome type on state unemployment in the month of initial filing. This disaggregation procedure yields a set of coefficients that add up to the coefficient for the aggregated outcome (either initial claims or appellate claims),[26] and thus by dividing each disaggregated coefficient by the aggregate coefficient, we obtain the percent distribution of induced claims across the determination categories.

Table 5 shows that at the initial level (first column), allowances for meeting or equaling the listing of impairments—the most severe kind of impairments—were largely unresponsive to the increase in unemployment; they rose by a statistically insignificant 1.0 percent per one-point

[26] For example, the reported coefficients in the first column of Table 5 add up to the coefficient on initial claims in Table 4 (4,455), which is an estimate of the total number of induced initial claims per month per one-point increase in unemployment. The coefficients in the second column of Table 5 add up to the total number of induced appellate claims, which is 2,317 per month per one-point increase in unemployment. Note this is not the sum of the induced reconsideration and hearing claims reported in Table 4, because in this section we use the term appellate claim to refer to *any* reconsideration or hearing-level claim; that is, claims that proceed to *both* reconsideration and the hearing level are counted only once.

increase in unemployment. On the other hand, initial allowances for medical-vocational reasons rose by a statistically significant 2.6 percent. As a share of all induced claims, listing allowances were just 4.7 percent (second column), compared to 15.6 percent of initial claims in the full population (Table 2). Medical-vocational allowances made up 14.9 percent of all induced applications as compared to 18.7 percent of the general applicant population. Thus, a *smaller* share of recession-induced applicants qualified by meeting the listings compared to the general applicant population.

At the same time, initial denials for reason of non-severity spiked, by 7.1 percent for every one-point increase in unemployment (Table 5, first column), making up 25.9 percent of all induced claims. In the general applicant population, initial denials for non-severity made up only 11.9 percent of claims (Table 2). Perhaps most revealing, initial denials for being capable of substantial gainful activity (either past or other work) also rose by 4.1 and 3.7 percent respectively, together accounting for 50.1 percent of initial applications, compared to 32.3 percent in the general applicant population (Table 2).

Although *initial* allowances for listing-level impairments did not increase in response to the rise in unemployment, Table 5 shows that listing allowances did increase at the appellate level (reconsideration and hearings combined)—by 3.9 percent per one-point increase in unemployment (Table 5). Medical-vocational allowances at the appellate level also rose in response to unemployment, by 3.6 percent per one-point increase in unemployment. As a share of all induced claims that reached the appellate levels, 8.2 percent were allowed for meeting or equaling the listing of impairments, and 33.8 percent were allowed on medical-vocational grounds—this implies that nearly 79.3 percent of recession-induced allowances at the appellate levels were for medical-vocational reasons, the same as in the general appellate population (79.5 percent). Appellate denials of all types also increased sharply, especially those based on capability for past work or other work.

6.2. Subsequent Appellate Outcomes by Reason for Initial Denial

The initial and appellate review systems use the same criteria and 5-step review process; yet case outcomes often diverge substantially. This is perhaps most evidenced by the fact that a large number of cases that are denied on initial review are eventually allowed on appeal, after an administrative hearing before an ALJ. To investigate this, we turn to Table 6, which crosswalks

appellate outcomes by reason for initial denial. The first column of Table 6 (Panel A) reproduces the total number of induced initial denials from Table 4 and their breakdown by reason for initial denial from Table 5. The next four columns of Table 6 show how many induced denials of each type were not appealed, or if appealed, how many were allowed, denied or dismissed. These mutually exclusive subcategories in each row add up to the total number of induced denials in column 1, and Panel B shows the subcategory estimates as a percent of the total number of induced denials of a given type. For example, among the 3,582 initial denials rendered each month, 1,265—or 35.3 percent—were not appealed. The percent not appealed was highest among initial denials for non-medical reasons (56.3 percent), followed by initial denials for non-severity (50.1 percent). This is not surprising, since the initial review outcome signals to applicants whether they are likely to ever qualify. Still, among those initially denied for non-medical reasons or non-severity, 11.6 percent and 12.9 percent, respectively, were allowed at the appellate level. Finally, induced applicants who were initially denied for work capability were most likely to appeal (76.2 percent of those capable of past work and 70.8 percent of those capable of other work), and experienced higher allowance rates than the average induced initial denial (27.5 percent). Some 38.4 percent of those denied for past-work capability were allowed at the appellate level and 34.7 percent of those denied for other-work capability were allowed at the appellate level.

6.3. By Type of Impairment

Our final analysis tracks induced applications and their outcomes by type of impairment, with the goal of understanding whether the recession-induced claims were more likely to come from people with difficult-to-verify impairments and, if so, how these claims fared as they moved through the adjudication system. The first column of Table 7 (Panel A) shows estimates of the number of induced initial claims per one-point increase in unemployment by primary diagnosis, while the second and third columns show the number of these that were allowed and denied, respectively. The last four columns show the appellate outcomes that resulted for those claims that were initially denied, by primary diagnosis. The coefficients in the first column of Table 7 indicate that the Great Recession induced new claims in *all* impairment categories; however, claims increased relatively more for musculoskeletal impairments (4.1 percent) and mental impairments (3.7 percent), than for circulatory, neoplasm and all other diagnoses

combined. Because musculoskeletal and mental impairment claims are also the largest categories of claims, the coefficients also imply that the induced claims came disproportionately from applicants with difficult-to-verify medical problems. These coefficients imply that musculoskeletal impairments made up 40.0 percent (1,785/4,455) of induced claims, compared to 31.9 percent in the general claimant population (Table 2), while mental impairments were 22.3 percent (992/4,455) of induced claims, compared to 19.9 percent of the general population (Table 2). Applicants with impairments in the other categories—circulatory diseases, neoplasms, and other diagnoses combined—were less likely to be among the induced claimants than in the general applicant population.

The coefficients in the second and fifth columns of Table 7 report the effect of a one-point increase in unemployment on initial allowances and appellate allowances, respectively. The number of initial allowances for musculoskeletal impairments increased by 3.8 percent for every one-point increase in unemployment, and appellate allowances for these impairments rose by a similar percentage (4.0 percent). Interestingly, initial allowances for mental impairments were not responsive to the unemployment rate, while appellate allowances for mental impairments rose by 5.2 percent. These coefficients imply that musculoskeletal and mental impairments together made up 58.7 percent ((463+459-52+222)/1,860) of all induced allowances, a greater share than in the general population (51.8 percent, Table 1).

Panel B of Table 7 uses the coefficients within each row of Panel A to compute the share of induced claims that were initially allowed or denied by primary diagnosis. Panel C computes the shares of induced initial denials that were either not appealed or, if appealed, were subsequently allowed, denied or dismissed on appeal. We find that 25.9 percent of induced claims for musculoskeletal impairments were initially allowed while 74.1 percent were initially denied (Panel B). Among the initially denied, 71.8 percent (=100-28.8, Panel C) appealed and 34.7 percent were ultimately allowed on appeal (Panel C). Thus, the ultimate allowance rate for induced musculoskeletal claims was 51.6 percent (0.259+(0.347*0.741))*100, Panels B and C). Among induced applicants with mental impairments, none were initially allowed. Among the denied, 56.0 percent (100-44.0, Panel C) appealed and 21.3 percent (Panel C) of those were ultimately allowed on appeal. The ultimate allowance rate for induced mental claims was only 12 percent ((0.560*.213))*100, Panel C). In contrast, most induced applicants with neoplasms—typically easier-to-verify than musculoskeletal and mental impairment—were initially allowed

(73.7 percent, Panel B), nearly two-thirds of the initially denied neoplasm claims appealed (Panel C), and 37.0 percent (Panel C) were allowed on appeal. The ultimate allowance rate for induced neoplasm claims was 83.4 percent (.737 +(0.370*.263))*100, Panels B and C).

In sum, there is little evidence to suggest that the induced applicants were medically eligible workers prior to the Great Recession. Rather, they presented with less severe impairments, were more likely to be allowed on appeal than on initial review, and when allowed, they were more likely to be allowed for medical-vocational reasons than for having an automatically-qualifying medical problem on the listing of impairments. Indeed, nearly two-thirds of them were for difficulty-to-verify conditions such as musculoskeletal and mental diagnoses (compared to just over half in the general population of applicants).

7. Implications for the SSDI Program

In this section, we discuss the implications of our findings for the SSDI program. We focus on how the Great Recession impacted three measures by which program performance and financial sustainability are often evaluated: system allowance rates, administrative processing costs, and benefit obligations.

7.1 The Effect of the Great Recession on Allowance Rates

The Great Recession induced both allowances and denials at all administrative levels. However, the induced claims were also more likely to result in denial at all levels. These effects combine to affect the allowance rates at the initial and hearing levels. We illustrate the effect of the Great Recession on the allowance rate with a simple simulation. First, we multiply the estimated coefficients in Table 4 by the observed difference in the national unemployment rate each month relative to October 2006, to simulate the numbers of claims and allowances that were attributable to the Great Recession. Next, we subtract the number of induced claims from total claims and the number of induced allowances from total allowances to simulate the number of claims and allowances that would have been observed at each level if the unemployment rate had remained at pre-recession levels over the entire period from 2007 to 2012. Finally, to obtain the counterfactual allowance rate in the absence of the Great Recession we divide the estimated number of non-induced allowances by the estimated number of non-induced claims.

Figure 5 presents the results of the simulation, with Panel A showing the effect of the Great Recession on the allowance rate at the initial level and Panel B showing the effect on the allowance rate at the hearing level. In the figure, the solid lines represent the actual allowance rate among all applications at the initial and hearings levels, respectively, and the dashed lines represent the simulated allowance rate removing the induced applications.[27] As can be seen in both panels of the figure, since unemployment did not accelerate until 2008, there were few induced claimants and the actual and counterfactual allowance rates were similar before then. However, during 2009, the unemployment rate peaked at 10.0 percent. This induced a flow of claims with a below-average probability of allowance.

Panel A shows that without the Great Recession and the accompanying induced claims, the allowance rate at the initial level would have been around two to four percentage points higher, reflecting the absence of the recession-induced applications from applicants with less severe impairments. That said, the evolution of the allowance rate during this period—rising then falling slightly and flattening—is unchanged with and without the induced applications. Panel B, on the other hand, shows the Great Recession had a large effect on the allowance rate at the hearing level. The actual allowance rate—including the induced claims—fell steadily over this period, from around 80 percent for claims initially filed in 2007 to around 57 percent for claims filed in 2013. By contrast, the simulated allowance rate without the induced claims predicts, in the absence of the Great Recession, the allowance rate at the hearing level would have remained near 80 percent for applications initially filed through the end of 2009, at which point it would have started falling precipitously, beginning with the appellate hearings held for applications that were initially filed near the start of 2010 (hearings that would have been held in 2011 or later, given lengthy wait times for hearings during this period). Thus, the Great Recession cannot explain the significant decline in the hearing-level allowance rate that began in 2011 (and is evident when decisions are organized by decision date rather than by filing date as we do in Figure 5 (Ray 2015)). Concurrent with this decline, SSA introduced focused reviews and new training initiatives to improve the quality of judicial decision-making (Ray and Lubbers 2014).

7.2. The Effect of the Great Recession on Program Costs

[27] Since we measure timing by initial filing, note that the allowance rates will not necessarily coincide with SSA official statistics which tend to group applications by decision year (vs. filing year).

Our findings imply the Great Recession had a substantial impact on the administration and financing of the SSDI program. According to tabulations provided by SSA to the Social Security Advisory Board,[28] the unit cost of processing an initial claim is $1,187. Given our estimate that 997,475 induced claims were processed at the initial level, this implies the Great Recession increased initial processing costs by a total of $1.184 billion.[29] Some 447,128 of these claims were then reviewed a second time by the DDS under a request for reconsideration; at a unit cost of $585 per claim, this resulted in increased reconsideration costs of $261.4 million. Of the nearly 1 million induced claims, 388,690 were appealed to the hearings level, where they were heard by an administrative law judge. Given the average cost of a hearing is $3,653, this implies increased processing costs at the hearing level of $1.42 billion. If denied cases were further appealed to the Appeals Council and to federal court at the same rate as in the general applicant population, then we estimate claims processing costs at these levels increased by $84.4 million and $10.2 million, respectively.[30] In total, the Great Recession increased SSA's claim processing costs by $2.960 billion between 2008 and 2012.[31]

Nearly 42 percent of recession-induced applications or 416,454 people were ultimately awarded benefits. If they were to receive benefits for only one year, then, assuming an average annual SSDI benefit of $13,546 in 2010 and average Medicare expenditure of $11,897 in 2010, this would imply additional benefit payments equal to $5.641 billion for SSDI alone, or $10.596 billion for SSDI and Medicare combined.[32] For context, SSDI benefit payments to all disabled workers were $105.122 billion in 2010.[33] But, most SSDI entrants receive benefits until they convert to regular Social Security retirement benefits at full retirement age or they die. Since the average age of the induced entrants was 53.1 (somewhat older than the average applicant during this time, who was 47), the average induced entrant would receive benefits for a maximum of 13

[28] This information was provided to us by the Social Security Advisory Board via personal communication.
[29] We exclude the shifted claims from this calculation since they would have been processed anyway.
[30] The unit cost of processing claims at the Appeals Council and in federal court is $1,220 and $5,444, respectively (same source for unit costs as referenced above).
[31] As noted above, we do not include the small fraction of applications denied at the hearing level that went on to further review by the Appeals Council, and if denied there, to the federal courts.
[32] We use the average medical expenditure among all Medicare beneficiaries because the average expenditure for the induced applicants is not known.
[33] Total payments made to disabled worker beneficiaries in 2010 taken from Table 20 of the Annual Statistical Report on the Social Security Disability Insurance Program, 2010, accessed 1/25/18 from https://www.ssa.gov/policy/docs/statcomps/di_asr/2010/sect01c.html

years (from age 53 to 65).[34] Assuming a discount rate of 2 percent and an annual mortality rate of 3.1 percent (following Autor and Duggan, 2006), we estimate the Great Recession increased SSDI benefit obligations by $55.359 billion in present value, or $96.298 billion for SSDI and Medicare benefits combined.[35] In addition, the Great Recession accelerated the awards of an additional 164,192 awardees by 2 to 3 months. Including these additional benefit costs increases total SSDI benefit obligations to a grand total of $55.730 billion, or $97.365 billion including Medicare.[36]

As large as they are, these costs are an underestimate of the total effects of the Great Recession on the disability insurance system. They do not account for the costs of issuing technical denials to applicants who were not insured for SSDI benefits (such applicants are denied by their local field office before they submit applications for medical review), the additional costs of providing dependent benefits to eligible recipients, and the costs of providing SSI and Medicaid benefits to impoverished beneficiaries who are dually entitled to SSDI and SSI.[37]

8. Conclusion

The Great Recession led 1.4 million former workers to apply for SSDI benefits during 2008-2012. Of these, nearly 1 million (72 percent) would not have applied if the recession had not occurred, while the rest (28 percent) would have applied anyway, but at a later date. By the recession's peak, the system was receiving 16.5 percent more applications than usual, resulting in substantial processing backlogs. Induced applicants (excluding the accelerated applicants) accounted for 11.6 percent of all applications filed during 2008-2012.

More than one-half million of the recession-induced applicants were awarded benefits. Over 400,000 were awards to people who otherwise would not have entered the SSDI program, while

[34] We obtain the average age of induced entrants by estimating separate regression models for the number of final allowances on unemployment for the following age groups: 18-39 (8 percent of induced allowances), 40-49 (10 percent), 50-61 (71 percent) and 62-64 (12 percent). We then multiply the midpoint of each age group by the age-group's share of induced allowances to estimate the average age among induced beneficiaries.

[35] We assume Medicare benefits begin one year after SSDI benefits payments begin to account for the Medicare waiting period (which begins with disability onset date, not award date), and would have been received through age 64.

[36] This assumes the forward-shifted beneficiaries would draw cash benefits and/or Medicare for an additional 2 months as well.

[37] Other potential costs include higher benefit payments to the induced beneficiaries when they convert to Social Security retirement benefits at full retirement age.

the rest were awards to people who would have entered the program anyway in the near future. The induced awardees were more likely to have been allowed on appeal than on initial review—53 percent of the induced new beneficiaries were allowed on appeal (rather than on initial review), compared to 37 percent of all new beneficiaries during 2008-2012. On net, the induced awardees (excluding accelerated awardees) made up 8.9 percent of all new beneficiaries who entered SSDI during 2008-2012.

While some people with automatically-qualifying disabilities choose to work rather than claim SSDI benefits, we find little evidence that the recession-induced applicants came from this group. In fact, the induced applicants had less severe impairments and were more likely to have transferable skills. They were either allowed for medical-vocational reasons (33 percent) or denied (58 percent); relatively few were allowed for severe, listing-level impairments (9 percent). The mean allowance rate among induced applicants was 42 percent (accounting for appeals), substantially lower than the average allowance rate of 54 percent for the system as a whole. Perhaps not surprisingly, 58.7 percent of the induced applicants who were awarded benefits had a musculoskeletal or mental impairment, a somewhat higher proportion than in the general population of applicants.

Importantly, we find the Great Recession does not account for the decline in the hearing-level allowance rate that began in 2011, when SSA introduced focused reviews and new training initiatives to improve the quality of judicial decision-making. Our estimates imply that absent the effects of the Great Recession, the hearing-level allowance rate would have had a sharp decline anyway, beginning with the appellate hearings held for applications that were initially filed in 2010, and that would have had hearings in 2011 or later.

The impact of the Great Recession is economically significant. In terms of human capital, over 400,000 workers were awarded benefits who would not otherwise have entered the program. Because working above SGA after program entry is rare, this corresponds to a near-permanent decline in productive capacity. In terms of the fiscal health of the U.S. disability insurance system, both contemporaneous and future SSDI program costs increased significantly. Administrative claims processing costs rose by $2.960 billion dollars during 2008-2012, while SSDI benefit obligations increased by $55.730 billion in present value, or by $97.365 billion when the present value of Medicare benefits is included.

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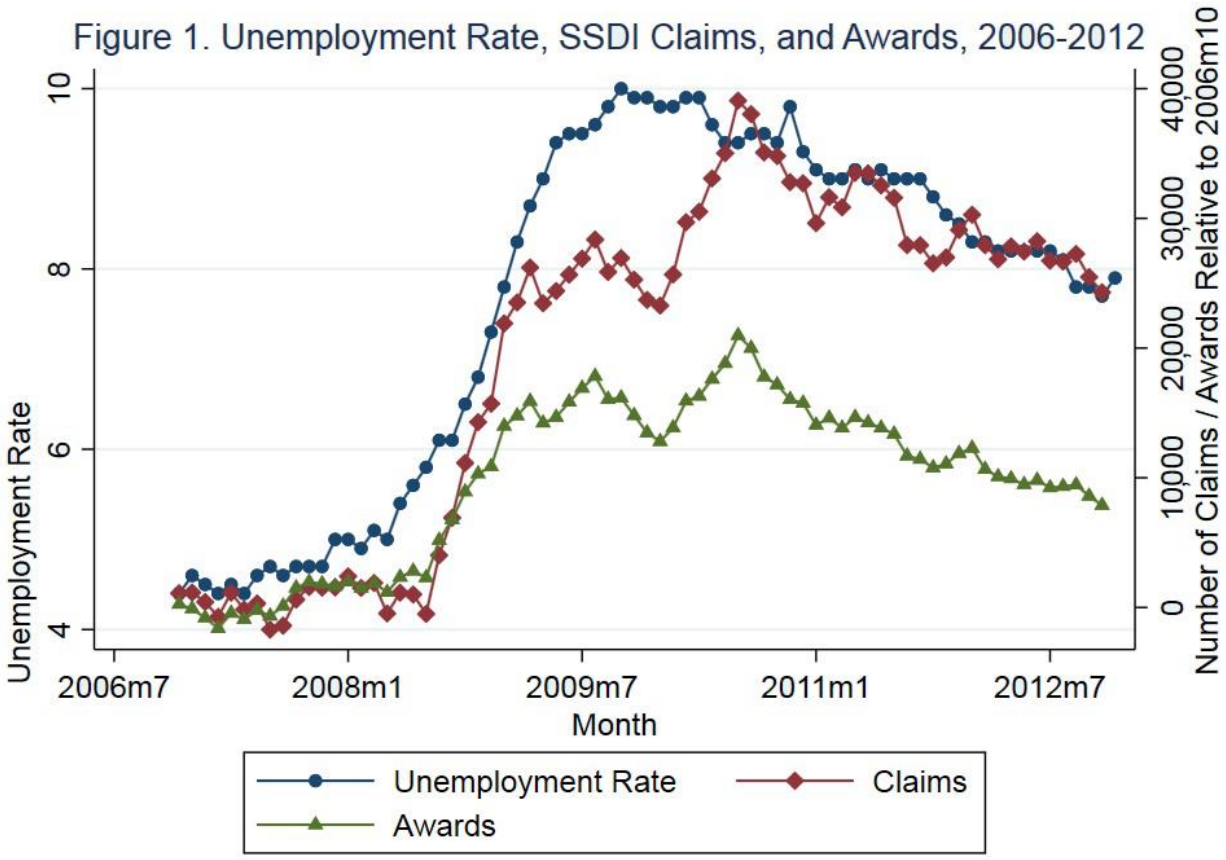
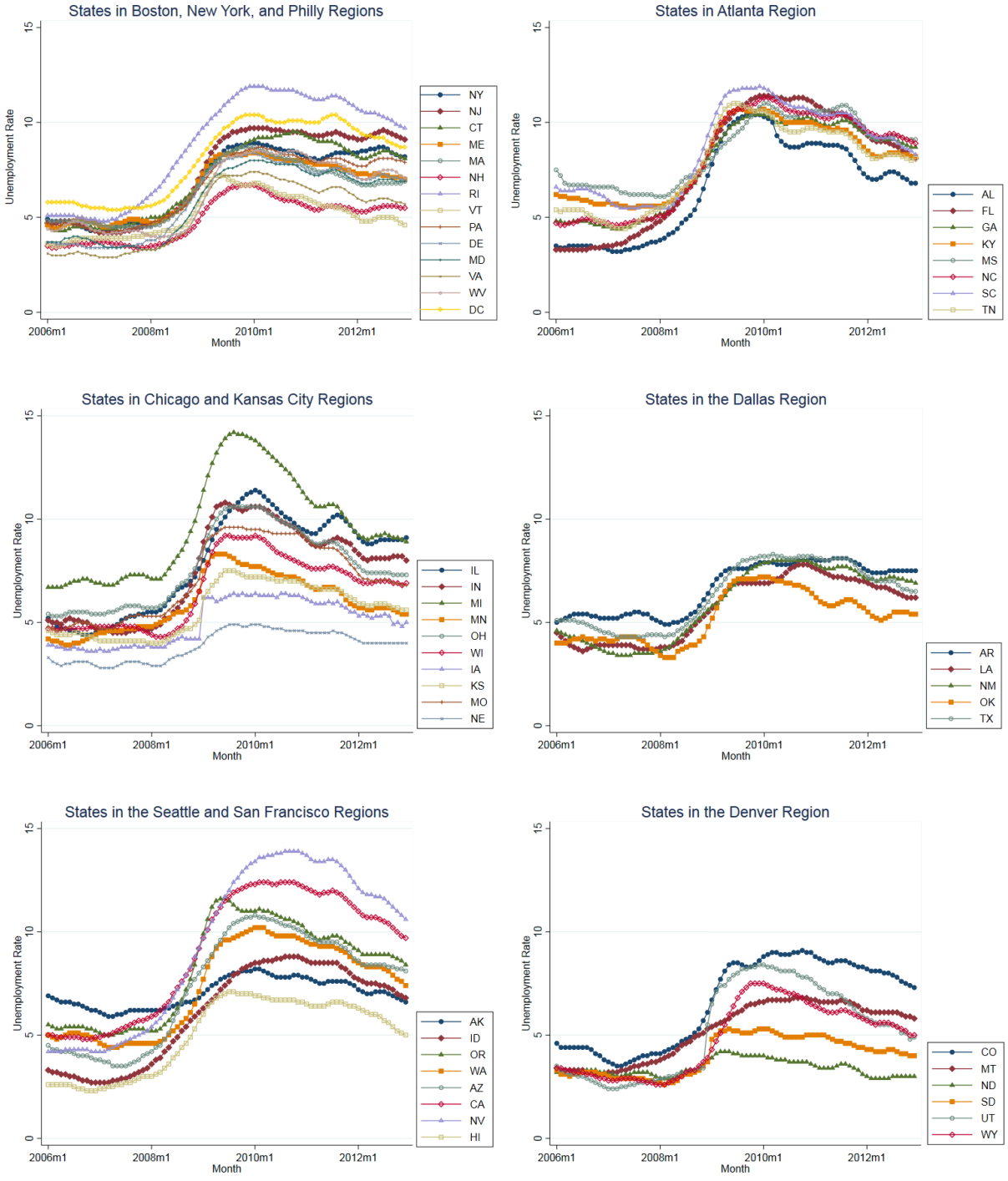


Notes: Awards, like claims, are organized by month of initial filing, not month of award. SSDI claims and awards are adjusted for monthly seasonality and then smoothed using a 3 month moving average. We then re-center each series around its initial value in 2006m10 to make it easier to see them on the same scale.

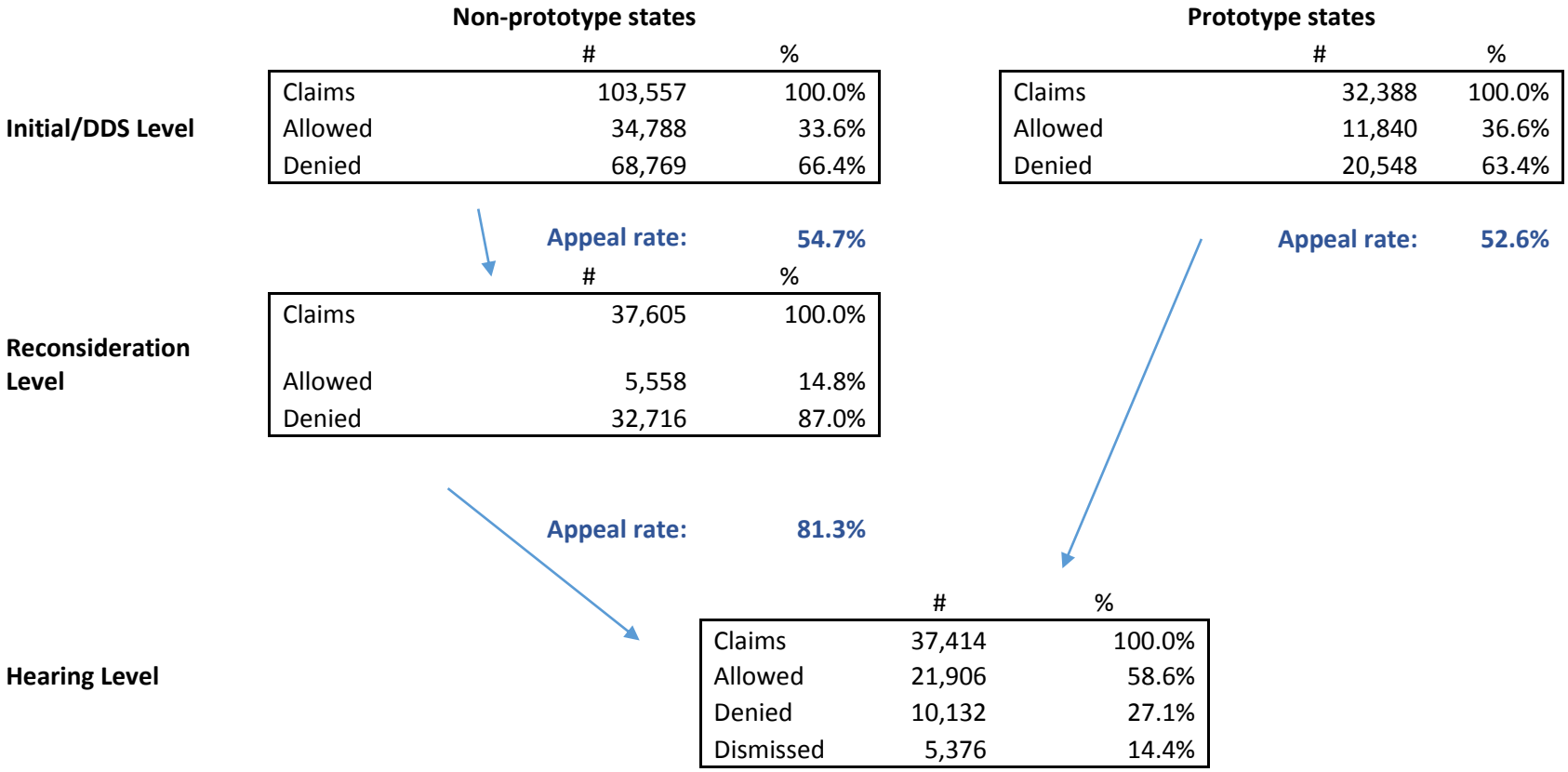
Sources: Bureau of Labor Statistics (Unemployment Rate, Seasonally Adjusted) and Social Security Administration 831 Files in Case Processing and Management System (SSDI Claims and Awards).

Figure 2. Monthly Unemployment Rate by State, 2006-2012



Source: Bureau of Labor Statistics Unemployment Rates for States, Seasonally Adjusted

Figure 3. Monthly Flow of SSDI Claims Filed in 2006-2012



	#	%
Claims	103,557	100.0%
Allowed	34,788	33.6%
Denied	68,769	66.4%

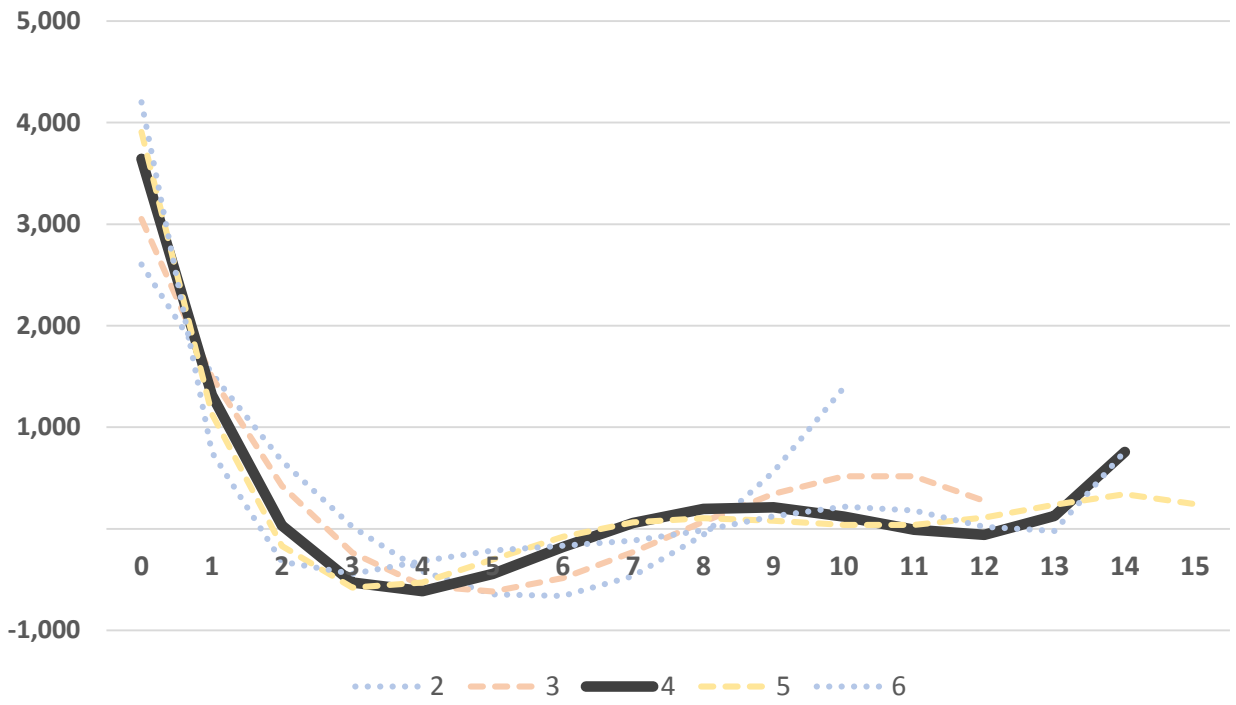
	#	%
Claims	32,388	100.0%
Allowed	11,840	36.6%
Denied	20,548	63.4%

	#	%
Claims	37,605	100.0%
Allowed	5,558	14.8%
Denied	32,716	87.0%

	#	%
Claims	37,414	100.0%
Allowed	21,906	58.6%
Denied	10,132	27.1%
Dismissed	5,376	14.4%

Notes: We do not include as appeals claims that were initially *allowed* but subsequently appealed. There are 300 claims per month of this type (for a total of 22,460 applications during the sample period). Also, in this figure, we do not include as reconsiderations claims that were filed in prototype states but received a reconsideration in a non-prototype state. Prototype states are Alabama, Alaska, California (LA North and LA West Only), Colorado, Louisiana, Michigan, Missouri, New Hampshire, New York, and Pennsylvania.

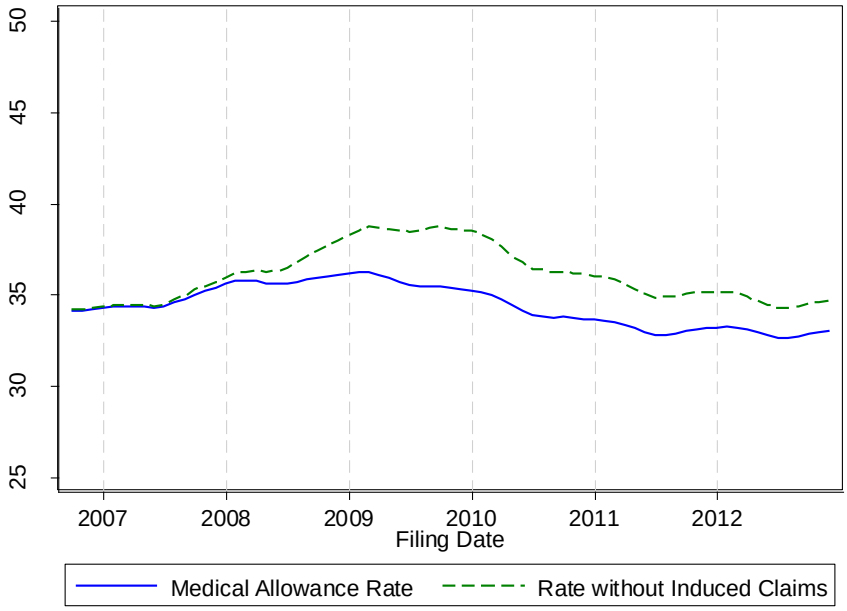
Figure 4: Dynamic Effects of Unemployment on SSDI Applications: Estimated Lag Pattern by Polynomial Degree



Notes: Number of lags for each polynomial determined by minimum AIC/BIC.
Polynomial of degree 4 is the global minimum.

Figure 5. Counterfactual Allowance Rates in Absence of Great Recession

A. Initial Level



B. Hearing Level

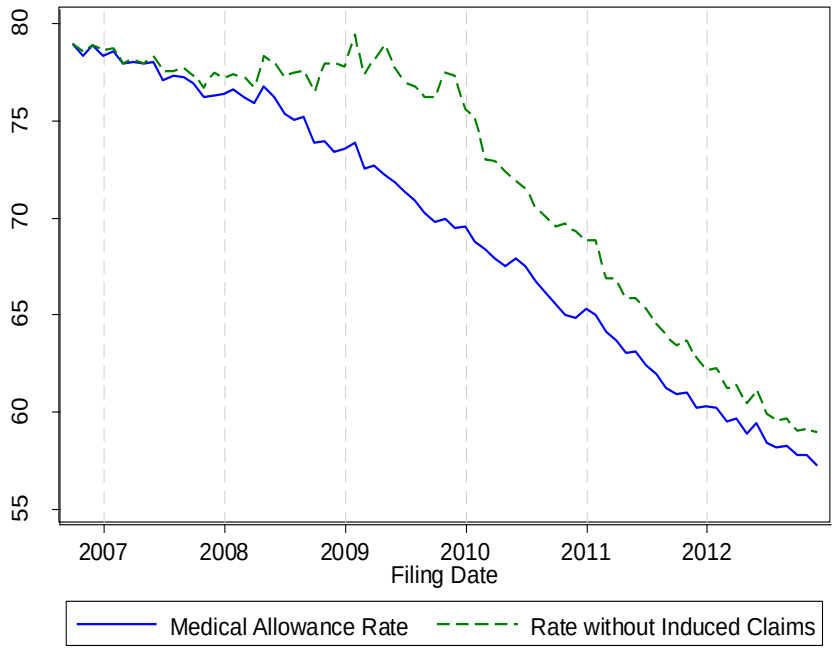


Table 1. Summary Statistics for SSDI Applications Filed 2006-2012

Characteristic	Statistic
Age (years)	46.6 (11.4)
Female (%)	48.1
Concurrent claim (%)	52.2
Prototype state (%)	23.8
Primary diagnosis category (%)	
Musculoskeletal	31.9
Mental	19.9
Circulatory	9.3
Neoplasms	6.6
Other categories	32.3
Total	100.0
Initial allowance (%)	34.3
Final allowance (%)	54.3
Claims	10,195,864
Claims per month	135,945

Notes: Standard deviation in parentheses. Sample is all SSDI applications filed from October 2006 through December 2012.

Table 2. Percent Distribution of SSDI Applications across Decision Outcomes, by Administrative Level

	Initial	Recon-sideration	Hearing
Allowed			
Meets or equals listings (%)	15.6	5.8	7.2
Medical-vocational (%)	18.7	7.9	49.6
Other (%)			1.8
Denied			
Non-medical (%)	7.5	3.3	1.1
Not severe (%)	11.9	13.1	1.3
Short duration (%)	4.0	4.0	0.0
Capable of past work (%)	18.4	27.5	8.2
Capable of other work (%)	23.9	38.3	16.4
Dismissed	0.0	0.0	14.4
Total (Column %)	100.0	100.0	100.0
N	10,195,864	2,852,831	2,806,061

Notes: Sample is all SSDI applications filed from October 2006 through December 2012.

Table 3. Effect of Unemployment Rate on Monthly SSDI Claims, Base Model vs. Distributed Lag Specification

	Number of applications				Number of allowances, all levels			
	Base model (1)		Distributed lag model: AIC/BIC optimizing lag (2)		Base model (3)		Distributed lag model: AIC/BIC optimizing lag (4)	
Contemporaneous	4,455 ***	(978)	3,642 ***	(345)	1,860 ***	(555)	2,195 ***	(286)
L1			1,319 ***	(101)			423 *	(245)
L2			31	(184)			-415 *	(246)
L3			-528 ***	(184)			-318	(276)
L4			-615 ***	(133)				
L5			-444 ***	(106)				
L6			-180	(129)				
L7			57	(144)				
L8			196	(129)				
L9			210 **	(105)				
L10			119	(131)				
L11			-8	(183)				
L12			-60	(184)				
L13			126	(96)				
L14			755 ***	(329)				
Total Effect	4,455 ***	(978)	4,619 ***	(96)	1,860 ***	(555)	1,885 ***	(50)
Mean DV	135,945		135,945		73,751		73,751	
Pct. Change	3.3		3.4		2.5		2.6	
Elasticity	0.25		0.26		0.19		0.19	
AIC	54,534		54,475		49,802		49,761	
BIC	54,540		54,512		49,808		49,786	
R-squared	0.987		--		0.987		--	
N	3,825		3,825		3,825		3,825	

Notes: standard errors in parentheses. *** Significant at the 1 percent level. ** Significant at the 5 percent level. * Significant at the 10 percent level. In all models, N=3825 state-month observations of the number of SSDI claims filed. Estimates are the coefficient on the unemployment rate multiplied by 51 and by the number of workers equivalent to one percent of the national labor force, and thus indicates the number of additional applications of a given outcome type induced by a one-point increase in the unemployment rate.

Table 4. Effect of Unemployment Rate on Monthly SSDI Claims, Allowances and Denials by Administrative Level

			Appellate		
		Initial	Reconsideration	Hearing	All Levels
		(1)	(2)	(3)	(4)
Claims	*Coef.*	4,455 ***	1,997 ***	1,736 ***	
	SE	(978)	(386)	(314)	
	Mean DV	135,945	38,038	37,414	
	Pct. Change	3.3	5.3	4.6	
	Elasticity	0.25	0.40	0.35	
Allowances	*Coef.*	873 *	259 ***	728 ***	1,860 ***
	SE	(458)	(22)	(101)	(555)
	Mean DV	46,627	5,217	21,906	73,751
	Pct. Change	1.9	5.0	3.3	2.5
	Elasticity	0.14	0.38	0.25	0.19
Denials	*Coef.*	3,582 ***	1,738 ***	733 ***	2,596 ***
	SE	(545)	(371)	(175)	(446)
	Mean DV	89,318	32,821	10,132	62,194
	Pct. Change	4.0	5.3	7.2	4.2
	Elasticity	0.31	0.40	0.55	0.32
Dismissals	*Coef.*			275 ***	
	SE			(61)	
	Mean DV			5,376	
	Pct. Change			5.1	
	Elasticity			0.39	
Allowance Rate among Induced Claims (%)		19.6%	12.9%	41.9%	41.8%
Claims as % of Induced Initial Denials		--	72.4%†	48.5%	--

Table 4 notes: *** Significant at the 1 percent level. ** Significant at the 5 percent level. * Significant at the 10 percent level. Each group of figures presents regression estimates for a different outcome. In all models, N=3825 state-month observations of the number of SSDI claims filed that resulted in a given outcome. Coef. refers to the coefficient on the unemployment rate multiplied by 51 and by the number of workers equivalent to one percent of the national labor force, and thus indicates the number of additional applications of a given outcome type induced by a one-point increase in the unemployment rate. Mean DV, the mean of each dependent variable, gives the average monthly claims of a given outcome type. Percent change is the Coef./Mean DV, or the percent change in the outcome. †Induced reconsideration claims computed as % of initial denials in non-prototype states

Table 5. Effect of Unemployment Rate on Claims by Reason for Determination and Administrative Level

		Initial Level			Appellate		
		Effect of Unemp. Rate		% of Induced Initial Claims	Effect of Unemp. Rate		% of Induced Appell. Claims
Allowances							
Meets or equals listings	*Coef.*	208		4.7%	191	***	8.2%
	SE	(130)			(20)		
	Mean DV	21,231			4,893		
	Pct. Change	1.0			3.9		
	Elasticity	0.07			0.30		
Medical-vocational	*Coef.*	666	**	14.9%	782	***	33.8%
	Std. Err.	(330)			(93)		
	Mean DV	25,396			21,571		
	Pct. Change	2.6			3.6		
	Elasticity	0.20			0.28		
Other Allowances	*Coef.*	--		--	13	***	0.6%
	Std. Err.	--		--	(4)		
	Mean DV	--		--	659		
	Pct. Change	--		--	2.0		
	Elasticity				0.15		

Table 5 Continued.

		Initial Level			Appellate		
		Effect of Unemp. Rate		% of Induced Initial Claims	Effect of Unemp. Rate		% of Induced Appell. Claims
Denials							
Non-Medical	*Coef.*	242	***	5.4%	35	***	1.5%
	Std. Err.	(84)			(8)		
	Mean DV	10,248			879		
	Pct. Change	2.4			4.0		
	Elasticity	0.18			0.30		
Not Severe	*Coef.*	1,153	***	25.9%	164	***	7.1%
	Std. Err.	(111)			(17)		
	Mean DV	16,152			1,967		
	Pct. Change	7.1			8.3		
	Elasticity	0.54			0.63		
Short Duration	*Coef.*	-42		-0.9%	-9		-0.4%
	Std. Err.	(27)			(7)		
	Mean DV	5,424			310		
	Pct. Change	-0.8			-2.8		
	Elasticity	-0.06			-0.22		
Capable of Past Work	*Coef.*	1,018	***	22.9%	320	***	13.8%
	Std. Err.	(228)			(65)		
	Mean DV	25,063			4,979		
	Pct. Change	4.1			6.4		
	Elasticity	0.31			0.49		
Capable of Other Work	*Coef.*	1,210	***	27.2%	546	***	23.6%
	Std. Err.	(136)			(140)		
	Mean DV	32,430			8,586		
	Pct. Change	3.7			6.4		
	Elasticity	0.28			0.48		

Table 5 Continued.

		Initial Level		Appellate		
		Effect of Unemp. Rate	% of Induced Initial Claims	Effect of Unemp. Rate		% of Induced Appell. Claims
Dismissed	*Coef.*	--	--	275	***	11.9%
	Std. Err.	--	--	(61)		
	Mean DV	--	--	5,376		
	Pct. Change	--	--	5.1		
	Elasticity			0.4		

Notes: *** Significant at the 1 percent level. ** Significant at the 5 percent level. * Significant at the 10 percent level. Appellate refers to reconsideration and hearings claims combined. Each group of figures presents regression estimates for a different outcome. In all models, N=3825 state-month observations of the number of SSDI claims filed that resulted in a given outcome. Coef. refers to the coefficient on the unemployment rate multiplied by 51 and by the number of workers equivalent to one percent of the national labor force, and thus indicates the number of additional applications of a give outcome type induced by a one-point increase in the unemployment rate. Mean DV, the mean of each dependent variable, gives the average monthly claims of a given outcome type. Percent change is the Coef./Mean DV, or the percent change in the outcome.

Table 6. Effect of Unemployment Rate on Appellate Outcomes, by Reason for Initial Denial

				Appellate Outcome among Initial Denials							
		Initial Denials		No appeal		Allowed		Denied		Dismissed	
A. Effect of Unemployment Rate											
All Induced Denials	*Coef.*	3,582	***	1,265	***	986	***	1,056	***	274.6	***
	SE	(545)		(176)		(108)		(226)		(61)	
	Mean DV	89,318		40,096		27,124		16,722		5,376	
	Pct. Change	4.0		3.2		3.6		6.3		5.1	
By Reason for Initial Denial											
Non-Medical Reason	*Coef.*	242	***	136	***	28		43	***	34	***
	Std. Err.	(84)		(44)		(18)		(16)		(12)	
	Mean DV	10,248		7,469		1,238		1,041		499	
	Pct. Change	2.4		1.8		2.3		4.2		6.9	
Not Severe	*Coef.*	1,153	***	578	***	149	***	304	***	123	***
	Std. Err.	(111)		(48)		(10)		(36)		(21)	
	Mean DV	16,152		9,065		2,360		3,406		1,321	
	Pct. Change	7.1		6.4		6.3		8.9		9.3	
Short Duration	*Coef.*	-42		-45	***	-1		5		-1	
	Std. Err.	(27)		(8)		(10)		(11)		(2)	
	Mean DV	5,424		2,405		1,992		778		249	
	Pct. Change	-0.8		-1.9		-0.1		0.7		-0.3	

Table 6 Continued.

			Appellate Outcome among Initial Denials			
		Initial Denials	No appeal	Allowed	Denied	Dismissed
Capable of Past Work	*Coef.*	1,018 ***	243 ***	391 ***	333 ***	52 ***
	Std. Err.	(228)	(72)	(51)	(100)	(18)
	Mean DV	25,063	9,455	9,539	4,777	1,292
	Pct. Change	4.1	2.6	4.1	7.0	4.0
Capable of Other Work	*Coef.*	1,210 ***	353 ***	420 ***	371 ***	67 ***
	Std. Err.	(136)	(36)	(32)	(70)	(24)
	Mean DV	32,430	11,702	11,994	6,719	2,016
	Pct. Change	3.7	3.0	3.5	5.5	3.3
B. Appellate Outcome as Percent of Induced Initial Denials						
All Induced Denials		100.0	35.3	27.5	29.5	7.7
By Reason for Initial Denial						
Non-Medical Reason		100.0	56.3	11.6	17.9	14.2
Not Severe		100.0	50.1	12.9	26.3	10.6
Short Duration		100.0	--	--	--	--
Capable of Past Work		100.0	23.8	38.4	32.7	5.1
Capable of Other Work		100.0	29.2	34.7	30.6	5.5

Notes: *** Significant at the 1 percent level. ** Significant at the 5 percent level. * Significant at the 10 percent level. Each group of cells presents results from separate OLS estimations of Equation (1). In all regressions, N=3825 state-month observations on the number of SSDI claims filed that resulted in a given outcome. Coef. refers to the coefficient on the unermployment rate, and thus indicates the number of additional applications of a give outcome type induced by a one-point increase in the unemployment rate. Mean DV, the mean of each dependent variable, gives the average monthly claims of a given outcome type. Percent change is the Coef./Mean DV, or the percent change in the outcome. Coefficients, standard errors and means have been multiplied by 51 to give monthly impact at national level.

Table 7. Effects of Unemployment Rate on Initial Claims, Denials, Appellate Claims, and Outcomes on Appeal, by Primary Diagnosis

								Among Initial Denials										
		Initial Claims		Initial Allowances		Initial Denials		No Appeal		Allowance		Denial		Dismissal				
		(1)		(2)		(3)		(4)		(5)		(6)		(7)				
A. Effect of Unemployment Rate																		
Musculoskeletal	*Coef.*	1,785	**	463	**	1,322	***	381	***	459	***	397	***	86	***			
	SE	(345)		(181)		(171)		(41)		(48)		(76)		(21)				
	Mean DV	43,423		12,228		31,196		11,731		11,515		6,149		1,800				
	Pct. Change	4.1		3.8		4.2		3.2		4.0		6.5		4.8				
Mental	*Coef.*	992	***	-52		1,044	***	459	***	222	***	282	***	81	***			
	SE	(241)		(99)		(147)		(60)		(28)		(54)		(15)				
	Mean DV	27,059		8,706		18,353		8,960		4,307		3,758		1,328				
	Pct. Change	3.7		-0.6		5.7		5.1		5.2		7.5		6.1				
Circulatory	*Coef.*	352	**	124	*	227	***	78	***	69	***	68	***	13	*			
	SE	(132)		(62)		(73)		(24)		(19)		(26)		(7)				
	Mean DV	12,592		5,578		7,014		2,955		2,530		1,158		371				
	Pct. Change	2.8		2.2		3.2		2.6		2.7		5.9		3.5				
Neoplasms	*Coef.*	184	***	136	***	49	***	17	***	18	***	12	***	2	**			
	SE	(22)		(25)		(7)		(5)		(3)		(2)		(1)				
	Mean DV	9,011		7,075		1,936		926		680		250		80				
	Pct. Change	2.0		1.9		2.5		1.8		2.6		4.9		2.0				

Table 7 Continued.

								Among Initial Denials										
		Initial Claims		Initial Allowances		Initial Denials		No Appeal		Allowance		Denial		Dismissal				
		(1)		(2)		(3)		(4)		(5)		(6)		(7)				
Other	*Coef.*	1,142	***	203	**	940	***	331	***	218	***	297	***	94	***			
	SE	(256)		(100)		(168)		(63)		(22)		(72)		(21)				
	Mean DV	43,859		13,041		30,819		15,524		8,091		5,406		1,798				
	Pct. Change	2.6		1.6		3.0		2.1		2.7		5.5		5.2				
B. Primary Diagnosis Percent of Induced Claims																		
Musculoskeletal		100.0		25.9		74.1												
Mental		100.0		-5.3		105.2												
Circulatory		100.0		35.3		64.7												
Neoplasms		100.0		73.7		26.3												
Other		100.0		17.8		82.3												
C. Primary Diagnosis Percent of Induced Initial Denials																		
Musculoskeletal						100.0		28.8		34.7		30.0		6.5				
Mental						100.0		44.0		21.3		27.0		7.8				
Circulatory						100.0		34.3		30.3		29.8		5.6				
Neoplasms						100.0		34.4		37.0		25.2		3.3				
Other						100.0		35.2		23.2		31.6		10.0				

Notes: *** Significant at the 1 percent level. ** Significant at the 5 percent level. * Significant at the 10 percent level. Each group of figures presents regression estimates for a different outcome. In all models, N=3825 state-month observations of the number of SSDI claims filed that resulted in a given outcome. Coef. refers to the coefficient on the unemployment rate multiplied by 51 and by the number of workers equivalent to one percent of the national labor force, and thus indicates the number of additional applications of a give outcome type induced by a one-point increase in the unemployment rate. Mean DV, the mean of each dependent variable, gives the average monthly claims of a given outcome type. Percent change is the Coef./Mean DV, or the percent change in the outcome.

Table A1. Effects of Unemployment Rate at the Time of Filing and the Time of Onset, Respectively, on *Initial Allowances*

	Filing	Onset
Coef.	873 *	757 *
SE	(458)	(449)
Mean DV	46,627	46,755
Pct. Change	1.9	1.6
Elasticity	0.14	0.12
R-squared	0.982	0.982
n	3,825	3,825

Notes: *** Significant at the 1 percent level. ** Significant at the 5 percent level. * Significant at the 10 percent level. In all models, N=3825 state-month observations of the number of SSDI claims filed. Coef. refers to the coefficient on the unemployment rate multiplied by 51 and by the number of workers equivalent to one percent of the national labor force, and thus indicates the number of additional applications of a given outcome type induced by a one-point increase in the unemployment rate. Mean DV, the mean of each dependent variable, gives the average monthly claims of a given outcome type. Percent change is the Coef./Mean DV, or the percent change in the outcome.

Table A2. Effect of Unemployment Rate on Monthly SSDI Claims, by Specification

		Count-count (1)	Log(rate)-log(rate) (2)	Rate-rate (3)	Log(count)-rate (4)
Claims	*Coef.*	4,455 ***	0.195 ***	0.0016 ***	0.0153 **
	SE	978	0.0354	0.000475	0.00581
	Mean DV	135,945	-2.441	0.0933	8.293
	Pct. Change	3.3	--	--	1.5
	Elasticity	0.25	0.20	0.12	0.21
Weighted by state population?		No	Yes	No	Yes
R-squared		0.987	0.976	0.956	0.997
n		3,825	3,825	3,825	3,825

Notes: *** Significant at the 1 percent level. ** Significant at the 5 percent level. * Significant at the 10 percent level. In all models, N=3825 state-month observations of the number of SSDI claims filed. Coef. refers to the coefficient on the unemployment rate multiplied by 51 and by the number of workers equivalent to one percent of the national labor force, and thus indicates the number of additional applications of a given outcome type induced by a one-point increase in the unemployment rate. Mean DV, the mean of each dependent variable, gives the average monthly claims of a given outcome type. Percent change is the Coef./Mean DV, or the percent change in the outcome.