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The U.S. Social Security Disability Insurance (SSDI) program is designed to provide income support to workers who become unable to work because of a severe, long-lasting disability. At present, nearly nine million former workers receive SSDI benefits, following several decades of rapid growth. As the program has expanded, observers have debated the degree to which this program growth is due to, on the one hand, past policy changes and anticipated growth in the insured population, or on the other hand, declining returns to labor force participation among low-skilled workers. Underscoring the important role of labor markets is the evidence that SSDI payments in Appalachia responded counter-cyclically to local earnings shocks caused by the coal boom and bust of the 1970s and 1980s (Black, Daniel and Sanders, 2002).

More recently, Linder and Burdick (2013) show that the unemployment rate was positively associated with disability benefit claiming during and after the 2001 recession.

A finding that SSDI receipt is sensitive to economic cycles is of concern for several reasons. The first is that there is little evidence that the incidence of severe disability is itself countercyclical. Because of this, SSDI is designed to insure against *permanent* earnings shocks due to onset of disability, and not transitory earnings shocks due to labor market conditions. Its strict eligibility rules, lengthy application processing times, and implicit work disincentives reflect this purpose, and indeed very few SSDI beneficiaries ever return to substantial labor market activity. It is thus problematic if displaced and discouraged workers turn to the SSDI program when they are in need of *temporary* assistance, since they are unlikely to ever return to work once the labor market recovers.

One explanation for these business cycle effects is that they are driven by *conditional applicants*; that is, workers with health impairments who would prefer to remain in the labor force, but who would apply for SSDI

benefits if they lost their present job (Autor and Duggan, 2003). Because applying for public SSDI benefits in the United States requires that one's earnings are below the threshold defining substantial gainful activity (SGA), the opportunity cost of applying for benefits is reduced when one becomes unemployed. Thus, not only should there be *more* SSDI applicants during economic downturns, there should be notable compositional differences between those who apply during economic expansions and those who apply during economic recessions. Using survey data, Coe and Rutledge (2013) find that SSDI applicants during recessions have higher past earnings and more recent work experience (see also Lindner and Burdick, 2013).

In this study, we use administrative data to estimate the effect of labor market conditions, as measured by the unemployment rate, on the number of SSDI applications, the number and composition of initial allowances and denials, and the timing of applications relative to disability onset. We analyze the period of the Great Recession, and compare this period with business cycle effects over the past two decades, from 1992 through 2012. Our analysis isolates the quantity and composition of applicants who are induced to apply for SSDI benefits when labor market

opportunities decline, and therefore provides important new evidence about the group for whom SSDI application is a substitute for labor force participation, and their impact on the SSDI program.

I. Data

To examine the cyclical nature of disability insurance applications, we rely on two sources of administrative data from the Social Security Administration (SSA). The first data source is the 831 Research Files, which include all claims filed for SSDI that received a medical determination. We use data for claims filed from 1992 through 2012. (These data are incomplete for several states prior to 1992, so we cannot observe the 1990-1991 recession.) The 831 files exclude applications that were denied for nonmedical reasons, such as the applicant not having accumulated enough work credits to be insured for SSDI or the applicant having been disqualified for earning more than the SGA threshold (\$1,070 per month in 2014 (non-blind)). These data contain the application filing date, the initial outcome of the application (allowed or denied) and the basis for the initial determination (i.e., why the application was allowed or denied, discussed in more detail in the next section). For initially allowed applicants, the 831 files also record the

established onset date of the qualifying disability.

The second administrative data source is SSA's Electronic Disability Collection System (EDCS). The EDCS contains applicant responses to the questions in forms 3368 and i3368, the adult disability reports, or application forms, for the entire universe of applicants starting in 2005 when the Disability Determination Service (DDS) offices began switching to electronic disability folders. By October 2006, all but two states (Nebraska and New York) had achieved "Independence Day Assessment (IDA) Certification," which established the electronic disability folder as the official agency record. We therefore limit our sample of claims from the EDCS to those filed between October 2006 and December 2012.

Importantly, the EDCS contains information supplied by the applicant about when his impairment(s) began to limit his ability to work, that is the applicant's *alleged* onset date. The time between alleged onset date and the application filing date is notable because it gives a measure of how long an applicant (claims to have) struggled with a work-limiting health condition before applying for SSDI benefits. If necessary, as part of the disability determination, the alleged onset date is revised in order to be compatible with

medical evidence and statutory requirements; in this case the alleged onset date will differ from the established onset date. Note that the established onset date is only relevant for allowed applicants. The EDCS is the only data set we are aware of that contains the alleged onset date for all applicants.

II. Institutional Background

In 2007, before the start of the Great Recession, disability examiners evaluated an average of 107,456 claims for disabled worker benefits per month. Of these, 67 percent were denied benefits at the initial level, although many likely were (or will be) awarded benefits on appeal. (Unfortunately, we do not observe final benefit receipt in this data set, but in 2005-2006 approximately half of initially denied applicants eventually received benefits (Maestas, Mullen and Strand, 2013).) An applicant can be denied benefits for one of four (medical) reasons: the health impairment was deemed not severe (11 percent of all claims in 2007); the health impairment was not expected to last more than 12 months (5 percent); the applicant was considered capable of performing a job he had held in the past (20 percent); or, the applicant was deemed capable of performing another job in the national economy (regardless of whether such a job was available) (21 percent). (An additional 11

percent of claims were denied for nonmedical reasons, such as insufficient evidence, at the DDS.) See Wixon and Strand (2013) for details on identifying the determination basis in administrative data files.

On the other hand, an applicant can be allowed benefits for one of two reasons: he can have a diagnosable medical impairment that “meets or equals” the Listing of Impairments (15 percent of claims in 2007), or vocational factors can be used in combination with medical factors to determine that he cannot do any work in the national economy (18 percent). The fraction of allowances made based on medical factors alone has declined in recent years. Since 2007, 35 percent of allowances were medical listing allowances, compared to more than half prior to 2007. Applicants whose impairments meet the listings are presumed unable to work above SGA, so these medical allowances should be insensitive to economic conditions—a hypothesis which we test below.

When an applicant is allowed, the disability examiner establishes the onset date of the qualifying disability. SSA defines the onset date as the date that the applicant’s health condition became severe enough to prevent him from earning more than the SGA threshold. As discussed above, when the applicant submits the claim for SSDI benefits

he provides an alleged onset date. The median time between alleged onset date and the filing of the claim was 8.2 months in 2007. There was substantial heterogeneity in these durations, however, with the median allowed applicant waiting 6.2 months and the median denied applicant waiting 10.3 months to apply. In particular, claims that were denied because the impairment was determined to be non-severe had extremely long durations: half of these applicants waited more than 29.8 months before applying for benefits in 2007.

Because the disability onset date determines when the applicant became entitled to start receiving benefits and the size of any back payments, applicants have an incentive to allege the earliest onset date supportable by the medical evidence. In 2007 seventy-four percent of allowed applicants had established onset dates that were the same as they alleged. Among those with a different established onset date, the median adjustment was 13.9 months later, although 10 percent of initially allowed claims had an established date that was earlier than they alleged. In the end, the median time from established onset to filing among allowed applicants in 2007 was 4.2 months.

III. Business Cycles and Disability Insurance Claiming

We begin by examining the relationship between unemployment and disability insurance application over the last two decades. Figure 1 presents a smoothed time series of quarterly SSDI applications (left axis) against the seasonally adjusted national unemployment rate (right axis) between 1992 and 2012. The shaded areas mark the last two recessions which took place March 2001–November 2001 and December 2007–June 2009 (the Great Recession) as dated by the National Bureau of Economic Research. Note the start of our observation period immediately follows the July 1990–March 1991 recession.

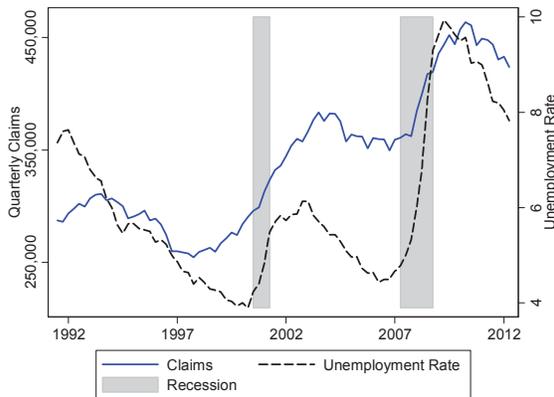


FIGURE 1. QUARTERLY SSDI CLAIMS AND UNEMPLOYMENT RATE, 1992-2012

Sources: SSDI claims: Authors' calculations using the 831 Files; unemployment rate: Bureau of Labor Statistics.

In all three cases the unemployment rate did not peak until *after* the official end of the

recession, when gross domestic product stopped declining. SSDI applications also did not peak until after the recession end dates, closely corresponding to the peaks in the unemployment rate.

To quantify this relationship, we estimate the following regression:

$$(1) \quad \log y_{st} = \beta UR_{st} + \alpha_s + \delta_t + \varepsilon_{st}$$

where y_{st} is the number of SSDI applications filed in state s in month-year t , UR_{st} is the state unemployment rate, α_s and δ_t are state and month-year fixed effects, respectively. This specification exploits variation in the severity and timing of recessions across states and flexibly controls for common national trends in SSDI applications over time. The coefficient of interest β gives the estimated percent increase in SSDI applications induced by a one percentage point increase in the unemployment rate. We also estimate versions of Equation (1) where the outcome is the subset of SSDI applications with a particular basis for the initial determination of allowance or denial.

Table 1 presents the results of these regressions. We find that, historically, a one percentage point increase in the national unemployment rate is associated with a 3.1 percent increase in monthly SSDI applications. Initially denied claims increase

by 6.6 percent and allowed claims *decrease* by 3.4 percent, indicating that the initial allowance rate falls in economic downturns. Virtually all of the increase in denied claims comes from claims that are denied because the applicant was deemed capable of past work or other work based on a combination of medical and vocational factors. Interestingly, the decrease in allowed claims is also concentrated among claims that are evaluated using both medical and vocational criteria. We do not detect a significant change in claims that meet or equal the medical listings.

induced claims are denied at the initial level (although applicants may still go on to receive benefits if they appeal). However, during the Great Recession, both the way potential claimants responded to economic conditions and the way SSA responded to these claims may have changed (Astrue, 2009). In the next section, we narrow in on the time period surrounding the Great Recession.

IV. Disability Insurance Claiming around the Great Recession

Column 2 of Table 1 presents the same regressions using data for October 2006-December 2012. For the later period, we find that SSDI applications increased by 1.3 percent for each percentage point increase in the unemployment rate—significantly different ($p < 0.01$) from the estimated 3.1 percent effect over the entire 1992-2012 period. However, because the increase in the unemployment rate was so much greater in the Great Recession than in previous recessions (5 percentage points in the Great Recession vs. 2 percentage points in the 2001 recession, for example), the estimated overall increase in SSDI applications was still larger during the Great Recession. Specifically, we estimate that the Great Recession increased SSDI applications by 6.7 percent ($= 5 * 0.0134$) at its peak in October 2009. As in the earlier time

TABLE 1—EFFECT OF UNEMPLOYMENT RATE ON LOG SSDI APPLICATIONS, OVERALL AND BY BASIS OF INITIAL DETERMINATION

Dependent variable	1992-2012	2006-2012
All SSDI claims, excluding technical denials	0.0309*** (0.0095)	0.0134* (0.0075)
<u>By Basis of Initial Determination</u>		
Denied claims	0.0661*** (0.0090)	0.0270*** (0.0080)
Denied, not severe	0.0411 (0.0296)	0.0421*** (0.0137)
Denied, duration < 12 months	0.0190 (0.0155)	0.0115 (0.0216)
Denied, capable of past work	0.0772*** (0.0237)	0.0538*** (0.0164)
Denied, capable of any work	0.0664*** (0.0150)	0.0186** (0.0087)
Allowed claims	-0.0341** (0.0160)	-0.0058 (0.0161)
Allowed, meets/equals listings	-0.0148 (0.0128)	-0.0002 (0.0089)
Allowed, vocational allowances	-0.0484* (0.0252)	-0.0053 (0.0256)
No. observations	12,852	3,825

Notes: Standard errors clustered at the state level and regressions are weighted by state population ages 20-64 from 2010 Census.

*** Significant at the 1 percent level.

** Significant at the 5 percent level.

* Significant at the 10 percent level.

These results suggest that although SSDI applications do indeed increase during economic downturns, virtually all of the

period, we find that the induced claims were virtually all denied at the initial level. Notably, in the later period we no longer find a decrease in allowed claims—either medical listing or vocational allowances.



FIGURE 2. MEDIAN MONTHS BETWEEN ALLEGED ONSET AND FILING

Sources: Time to filing: Authors’ calculations using data from Electronic Disability Collection System; unemployment rate: Bureau of Labor Statistics.

Using the EDCS data, we also find evidence that the composition of the applicant pool changed substantially around the time of the Great Recession. Figure 2 presents the median elapsed time between alleged onset date and filing date (left axis) overlaid with changes in the unemployment rate. The dashed line represents the median times on a monthly basis and the solid line presents a smoothed version of the series using a five-month moving average. The unemployment rate is presented on the right axis. The median disability duration tracks the unemployment rate closely, increasing by 2.5 months from

roughly 8.5 months at the end of 2007 to nearly 11 months by 2011.

TABLE 2—EFFECT OF UNEMPLOYMENT RATE ON MEDIAN TIME TO FILING, 2006-2012

	Months since alleged onset	Months since established onset
Population		
All SSDI claims	0.512*** (0.0662)	n/a
By Basis of Initial Determination		
Denied claims	0.589*** (0.0790)	n/a
Allowed claims	0.114*** (0.0145)	0.056*** (0.00792)
Allowed, meets/equals listings	0.073*** (0.0140)	0.036*** (0.0130)
Allowed, vocational allowances	0.219*** (0.0213)	0.051*** (0.0105)
Months (n)	75	75

Notes: The unit of observation is month for all states pooled. All regressions include calendar month fixed effects.
 *** Significant at the 1 percent level.
 ** Significant at the 5 percent level.
 * Significant at the 10 percent level.

We quantify this observation by estimating median (quantile) regressions of months since alleged and established onset date, respectively, on the national unemployment rate. Table 2 presents the results of these regressions. Consistent with the figure, we find that a one percentage point increase in the unemployment rate is associated with an increase of 0.512 months, or approximately two weeks, in median time between alleged onset and filing.

Not surprisingly, we find that denied applicants’ median time to filing is much more sensitive to the unemployment rate than that of allowed applicants (whose number is not cyclical in the later period). We estimate the median disability duration prior to filing

among denied applicants increases by 0.589 months for each percentage point increase in the unemployment rate, whereas the median disability duration among allowed applicants increases by only 0.114 months. Among allowed applicants, the median duration for medical listing allowances increases only 0.073 months, or 2.2 days, whereas the median duration for vocational allowances increases by 0.219 months (6.7 days).

Notably, this increase in time since *alleged* onset does not translate into longer times since *established* onset among initially allowed applicants, which would have resulted in additional SSDI program costs due to an increase in the total number of months of payments to beneficiaries. Nearly all of the cyclicity of time since alleged onset date is removed by adjusting the alleged onset to the established onset date. Time since established onset date increases by only 0.056 months, or 1.7 days, with a one percentage point change in the unemployment rate. Therefore, the disability determination process removes nearly all of the cyclicity.

V. Discussion and Conclusion

In the aftermath of the Great Recession, SSDI applications reached historically high levels—2.8 million disabled worker claims in 2010, falling only slightly to 2.7 million by

2012. In this paper, we investigate the empirical relationship between the unemployment rate and disability insurance applications since 1992 as well as in the period surrounding the Great Recession.

We estimate that the dramatic increase in unemployment rates immediately following the Great Recession increased SSDI applications by 6.7 percent. This implies that nearly one quarter of the actual 28 percent increase in SSDI applications (excluding technical denials) between 2007 and 2010 can be attributed to unfavorable economic conditions stemming from the Great Recession.

We find that virtually all of the new applications induced by the Great Recession were denied at the initial level, although many of those denied may eventually receive benefits at the appeals level.

Consistent with this, we find that the new applications induced by the Great Recession came from those who had been struggling with their health impairments significantly longer—2.5 months—than those who had applied just before the start of the Great Recession. However, most of the increase in disability durations is among applicants who were initially denied benefits. Among initially allowed applicants, for whom we observe both the alleged and established onset date, we find

that once disability durations are adjusted by the disability examiner assigned to the case, the median time between established onset and filing is much less sensitive to labor market conditions—increasing by only a few days in response to an increase in the unemployment rate.

Future work is needed to assess the total impact of the Great Recession on SSDI caseloads taking into account the outcomes of appeals. However, even if all of the applications induced by the Great Recession are eventually denied, these induced applications can still have adverse long-run economic consequences if withdrawing from actively searching for employment to pursue SSDI benefits harms applicants' chances of eventually returning to work.

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