How do Economic Conditions Affect Earnings and Return to Disability Programs for Beneficiaries whose Benefits were Terminated?

Jeffrey Hemmeter
Social Security Administration

Kathleen Mullen
University of Oregon

Stephanie Rennane
RAND

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Abstract

We explore how economic conditions affect the labor supply and subsequent program participation of Social Security Disability Insurance (SSDI) beneficiaries and Supplemental Security Income (SSI) recipients whose benefits were ceased due to medical improvement after a Continuing Disability Review (CDR). We link publicly available data on economic conditions (specifically, the unemployment rate) to administrative records from the Social Security Administration (SSA) and leverage variation in economic conditions across states and over time to explore the association between economic conditions at the time of benefit cessation and labor supply outcomes. While a large body of prior work has examined the effect of economic conditions on *entry* into disability programs, little is known about how economic conditions affect outcomes of those who involuntarily *exit* SSDI or SSI due to medical improvement. This information could be useful to SSA in developing policy solutions to support individuals who leave SSDI or SSI due to medical improvement in their re-entry into the labor market. We find that economic conditions have a modest impact on post-cessation outcomes. For former SSI-only recipients, a one percentage point increase in the unemployment rate reduces annual earnings by approximately 4 percent during first three years after benefit cessation, increases the likelihood of re-applying to any disability benefit program by 1 percentage point, and increases the likelihood of returning to SSI by 0.6 percentage points (or 2.5 percent). We find a similar pattern of results for former SSDI-only and former concurrent beneficiaries, though we interpret those results as suggestive due to concerns about selection.

1. Introduction

The Social Security Disability Insurance (SSDI) and Supplemental Security Income (SSI) programs (together, Disability programs) provide protection to working-age Americans against the permanent loss of their ability to engage in substantial gainful activity (i.e., work) due to a medical condition or impairment. When a new participant is determined to be medically eligible for disability benefits, a date (called a diary date) is set in the future to examine whether the individual is still medically eligible for Disability benefits or whether her condition has improved sufficiently that she is now able to re-engage in substantial work. Medical eligibility is revisited periodically through Continuing Disability Reviews (CDRs) until the beneficiary exits the program.

Prior research has shown that disabled workers whose benefits have been terminated for medical improvement tend to fare poorly after termination. Hemmeter and Stegman (2013) tracked participation outcomes of SSDI-only disabled worker beneficiaries and SSI-only recipients whose benefits were terminated for medical improvement between 2003 and 2008. The authors found that 20 percent of former SSDI-only beneficiaries returned to the SSDI program within 8 years, and 30 percent of former SSI-only recipients returned to SSI within 8 years. Notably, 11 percent of former SSDI-only workers successfully applied for SSI benefits within 8 years, suggesting they experienced a significant reduction in wealth and income in the years following termination. They also found that the likelihood of program return was substantially higher among those whose last CDR diary determination was "medical improvement not expected" and among older workers (ages 40+ and especially 50+). In a follow-up study using administrative earnings data, Hemmeter and Bailey (2016) found that, while more than half of those who exited due to medical improvement had positive earnings in

the five years after termination, only 20 percent consistently earned more than the SGA threshold. More recently, Anderson et al. (2022) found that 14-16 percent of former SSDI beneficiaries whose benefits were terminated due to medical improvement between 2005 and 2014 returned to DI within five years and fewer than half of former SSDI beneficiaries had average post-termination earnings above the poverty threshold.

Unlike those whose benefits were terminated because they were engaging in SGA, individuals whose benefits were terminated via a CDR were generally not actively engaging in SGA at the time of termination.[12] The ability to *find* work after termination of DI benefits depends on the availability of jobs, which may be depressed during economic downturns. In this paper, we link CDR determination dates to unemployment rates at the state and month level and leverage variation in the unemployment rate across states and over time between 2000 and 2015 (before and after the Great Recession) to examine the effect of economic conditions on subsequent outcomes for individuals whose DI benefits are terminated after a CDR finding evidence of medical improvement. We examine outcomes up to five years after benefit cessation (through 2020). We examine how variation in economic conditions at the time of cessation affects subsequent earnings and program outcomes, including appeals, re-application, and re-entry to SSI or SSDI.

We find that economic conditions at the time of benefit cessation can have a modest impact on post-cessation outcomes for some groups. For former SSI-only recipients, a one percentage point (pp) increase in the unemployment rate reduces annual earnings by approximately 4

[1] Even among those whose benefits were terminated due to work, substantial numbers—32 percent of former DI-only beneficiaries and 50 percent of former concurrent beneficiaries—returned to DI within five years (Anderson et al., 2022).

[2] Beneficiaries engaging in SGA are excluded from medical CDRs while participating in SSA's Ticket to Work program. As a result, those selected for medical CDRs are disproportionately less likely to have labor market activity.

percent during first three years after benefit cessation, increases the likelihood of re-applying to any disability benefit program by 1 pp, and increases the likelihood of returning to SSI by 0.6 pp (or 2.5 percent). We find a similar pattern and magnitude of results for former SSDI-only and former concurrent beneficiaries, though we do not interpret those results as causal due to some concerns about selection, which we discuss below.

While a large body of prior work has documented the negative relationship between economic conditions and *entry* into Disability programs (see e.g., Black, Daniel and Sanders, 2002; Autor and Duggan, 2003; Liebman, 2015; Maestas, Mullen and Strand, 2015; Lindner, Burdick and Meseguer (2017); Charles, Li and Stephens (2018); Maestas, Mullen and Strand, 2021), little is known about the effect of economic conditions on those who (involuntarily) *exit* the Disability programs. In other words, how do post-termination earnings compare between beneficiaries whose benefits are terminated during favorable and unfavorable economic conditions? Do economic conditions affect the rate at which individuals may appeal negative CDR decisions and/or attempt to re-enter Disability programs? Anderson et al. (2022) examined the association between a number of characteristics, including county unemployment rate at the time of termination, and successful re-entry into the labor market (defined as not participating in SSDI and earning more than the poverty threshold) and found that a higher unemployment rate was negatively associated with earning more than the poverty threshold (though not statistically significantly differentially associated with returning to SSDI, conditional on earnings) among beneficiaries whose benefits were terminated due to either work or medical improvement. Our paper focuses on estimating the effect of local (state-level) economic conditions on subsequent outcomes of those individuals whose benefits were involuntarily terminated due to a determination of medical improvement during a CDR.

The effects of economic conditions on new entrants to the labor force have been explored in other settings. For example, college graduates who start their careers during economic recessions have lower initial employment and earnings, and these effects are persistent over their careers (e.g., Kahn et al. 2010, Oreopoulos et al. 2012). There are also negative effects on high schoolers who graduate during recessions (Hershbein 2012). While both high and low skilled entrants in economic recessions suffer worse employment outcomes than their counterparts in economic expansions, the effects are not equal: the negative consequences of economic recessions have been found to be larger for African Americans, Hispanics, and those with lower predicted wages (e.g., Oreopoulos et al. 2012, Aaronson et al. 2019).

In the next section, we describe the institutional background necessary to understand how Disability beneficiaries' program participation may be terminated due to medical improvement. In Section 3 we describe our data, and in Section 4 we outline our estimation strategy to estimate the effect of state-level unemployment rate at the time of benefit cessation on subsequent labor supply and program participation outcomes. We present our findings in Section 5. Section 6 concludes.

2. Institutional Background

To ensure that Disability beneficiaries continue to meet the medical criteria to be eligible for benefits, all beneficiaries undergo periodic medical continuing disability reviews, or CDRs. Each beneficiary is assigned a future "diary date" at the time they begin receiving benefits. The diary date sets the first time that the individual's medical condition and history will be re-assessed to determine if the individual continues to meet the medical criteria for benefits, or if medical improvement has occurred. The diary date is set based on the expected likelihood of medical improvement. Beneficiaries are grouped into three diary types: 1) those for whom medical

improvement is expected (MIE) have a diary date within three years of when their benefits were awarded or their last CDR occurred; 2) beneficiaries for whom medical improvement is possible (MIP) have their diary date set at three years since the last favorable event; and 3) beneficiaries for whom medical improvement is not expected (MINE) have a diary date set between five and seven years since the last favorable event.[3]

Figure 1 provides a visual timeline of a typical CDR process resulting in cessation of benefits. The Social Security Administration (SSA) uses a predictive model to score (i.e., rank) the likelihood of medical improvement; beneficiaries whose score exceeds a given threshold and who are therefore most likely to experience medical improvement are automatically selected (or "released") for a Full Medical Review (FMR), while beneficiaries below the threshold satisfy the CDR requirement by responding to a mailer which asks about their current condition.[4] Each month, the SSA mails CDR information to those due for a CDR. The date when an individual is released for an FMR or has a mailer sent is known as the "mailer date." Mailer dates can be quite close to the diary date, but at times administrative delays or backlogs can delay the mailer date: in our sample, the median time from diary date to mailer date is 9 months.

Once initiated, SSA provides an initial decision fairly quickly, typically within three months on average (the initial decision date). Beneficiaries have an opportunity to appeal the initial decision, and benefits can continue during the appeal process (which can involve several levels of appeal). Appeals are quite common: in 2016 approximately two-thirds of adult beneficiaries with initial decisions of benefit cessation appealed the decision (SSA 2020). Among all initial cessations in 2016, approximately 70 percent were upheld (SSA 2020). After any appeals, beneficiaries with a final decision of benefit cessation see benefits stop two months after the final

[3] See OIG (2018) for a full description of the CDR process.
[4] Based on the responses to the mailer, some of these individuals may eventually undergo an FMR.

decision. Unlike SSDI beneficiaries whose benefits are terminated for work, those whose benefits are terminated due to medical improvement are no longer eligible for Medicare or expedited reinstatement. SSI recipients similarly lose Medicaid benefits. Overall, the median time from diary date to final decision, conditional on cessation, in our sample is 25 months.

Each year, SSA receives a directive from Congress about the amount of funding to allocate to "program integrity" activities, which includes CDRs, to conduct in a given year. However, at times in the past, changes in funding and budgetary constraints have limited the number of CDRs that were conducted, introducing backlogs in the system (OIG 2018). Additionally, CDRs are prioritized for certain groups, including low birthweight infants and youth receiving SSI reaching age 18. In fact, the majority of FMRs conducted and final decisions of cessation are for SSI children (SSA 2020). Field offices and state Disability Determination Services (DDS) offices process paperwork for CDRs and are also responsible for many other functions in the SSDI and SSI processes, including processing initial applications. Additionally, state DDS offices conduct the medical evaluations for both CDRs and initial applications (and the first level of appeals). Therefore, at times when the volume of applications is particularly high or in months where there are many child CDRs to be conducted, capacity constraints may limit the number of CDRs conducted for working age adults. We return to this point below when describing our empirical strategy.

3. Data

We use administrative data from the SSA for this analysis. In particular, we use the CDR "Waterfall File" to identify beneficiaries who underwent a CDR and had benefits ceased. This file includes information on whether and when the beneficiary underwent an FMR, the initial

decision, any appeals of the decision, and the final decision, as well as diary, mailer, FMR, decision and appeal dates. The file also includes the individual's CDR profile score and an indicator for whether the beneficiary was classified as MIE, MIP, or MINE (see above for details). It also includes basic demographic and disability characteristics and identifies the beneficiary type (SSDI Worker, SSI Adult, or Concurrent Worker). We linked data on program outcomes after cessation (new applications and awards) using the Disability Research File, which includes records from Master Beneficiary Record (MBR) for SSDI and Supplementary Security Record (SSR) for SSI. Finally, we linked these data to the Master Earnings File to observe annual earnings both before and after benefit cessation.

Our primary sample includes any adult beneficiary between the ages of 18 and 56 who had benefits ceased due to medical improvement between 2000 and 2015.[5] We include ceased SSI recipients, and SSDI and concurrent beneficiaries in the sample. Our primary outcomes of interest are earnings, re-application to SSDI or SSI, and award to SSDI or SSI after cessation. We examine these outcomes up to five years after the final decision of cessation. Additionally, we linked the SSA data to public data on monthly state unemployment rates obtained from the Bureau of Labor Statistics. As described in Section 4, we measure unemployment at two different points in time during the CDR process in our empirical design.

Table 1 displays demographic characteristics of the analysis sample of workers whose benefits were ceased in 2000-2015, overall (column 1), by program (columns 2-4) and by whether the cessation occurred during a period of above- or below-median unemployment (columns 5-6). Approximately 80 percent of the sample had their benefits ceased during their

[5] We exclude beneficiaries whose benefits were ceased after age 56 to avoid sample attrition during the five years after cessation if these former beneficiaries transition into OASI. We do not remove deaths. As implied by our age restriction, we exclude all CDRs for child SSI recipients, including age 18 redeterminations.

first CDR, and 77 percent of beneficiaries with benefits ceased had high profile scores, in the Medical Improvement Expected category. Approximately 50 percent of the cessation sample were former SSDI-only beneficiaries, 28 percent were former SSI-only recipients, and 21 percent were former concurrent beneficiaries. Ceased beneficiaries tend to be young: 92 percent are under the age of 50 at the diary date. Ceased beneficiaries are also slightly more likely to be male: 52 percent of the sample are men. Mental disorders are the most common impairment type among ceased beneficiaries: 21 percent have depression, 7 percent have schizophrenia, and 7 percent have another mental disorder. Additionally, 11 percent of ceased beneficiaries have musculoskeletal disorders, and 10 percent were diagnosed with neoplasms.

Columns 2-4 compare characteristics of former beneficiaries of SSDI-only beneficiaries, SSI-only recipients, and concurrent beneficiaries. Former SSDI-only beneficiaries are more likely to have had their benefits ceased in their first CDR (82 percent compared to 78 and 81 percent for former SSI-only recipients and concurrent beneficiaries, respectively). At the same time, former SSI-only recipients are more likely to have a high priority score (in the MIE category; 82 percent compared to 77 and 75 percent for former SSDI-only and concurrent beneficiaries, respectively). Former SSDI-only tend to be older, and former SSI-only recipients tend to be younger, on average than all former Disability beneficiaries: the modal age range at diary date for former SSDI-only beneficiaries is age 40-49 vs. under age 30 for former SSI-only recipients. Former SSDI-only beneficiaries are more likely to be male (56 percent, compared to 47 and 51 percent for former SSI-only recipients and concurrent beneficiaries, respectively). The distribution of impairments is generally similar across the different types of former beneficiaries, though there are still some notable differences. For example, 5 percent of former SSDI-only beneficiaries have other mental disorders, compared to 11 and 7 percent of former SSI-only

recipients and concurrent beneficiaries, respectively, and 15 percent of former SSDI-only beneficiaries have musculoskeletal disorders, compared to 5.5 and 10 percent of former SSI-only recipients and concurrent beneficiaries. Approximately 14 percent of former SSDI-only beneficiaries have neoplasms, compared to 5 and 8 percent of former SSI-only recipients and concurrent beneficiaries.

Our research design compares economic outcomes of former beneficiaries whose benefits were ceased during unfavorable vs. favorable economic conditions at the state level. Columns 5-6 in Table 1 display demographic characteristics of former Disability beneficiaries separately for those whose cessation occurred during a period of above-median vs. below-median unemployment rate. There are some differences are worth noting. Cessations during periods of high unemployment are 2 pp more likely to be on their first CDR and 3.5 pp more likely to be in the high priority score group. They are also more likely to be ceased from SSDI. These patterns are generally consistent with workers who may have higher potential work capacity being more likely to have their benefits ceased during periods of high unemployment. If there are capacity constraints during periods of high unemployment (due to competing workloads from initial applications) that limit the number of working-age CDRs that could be conducted, it makes sense that the CDRs would be more likely to be prioritized among this group. Impairment patterns look generally similar, though those ceased during periods of high unemployment are approximately 3 pp more likely to have had a neoplasm.

4. Methods

We seek to identify the extent to which economic conditions at the time that Disability benefits are ceased affect subsequent program participation and labor supply outcomes. The

simplest way to examine this relationship would be with an OLS regression of the outcome of interest (either post-cessation earnings or program participation in a given year) on the unemployment rate at the time of benefit cessation, with state and time (month of cessation) fixed effects to isolate idiosyncratic variation in the unemployment rate at the state-month level, as well as controls for demographic and disability characteristics to capture persistent state differences or (national) time trends in case characteristics:

$$y_{ic+j} = \alpha + \beta U_{sc} + X_i\theta + \delta_c + \sigma_s + \varepsilon_{im+j}$$

where y_{ic+j} is the outcome of interest (either earnings, re-application, or award post-cessation) for individual i, j years after cessation in month-year c, U_{sc} measures the unemployment rate at in the state s where the individual resided when their benefits ceased. Individual characteristics X_i are included in the regression, as well as month of cessation (δ_c) and state (σ_s) fixed effects.

Conceptually, the thought experiment is to take two individuals who are otherwise identical in their disability, demographic characteristics, prior labor force participation and future labor force prospects, but who have their benefits ceased in different economic conditions (good or bad labor market) and compare their subsequent labor market outcomes. In other words, the assumption in the OLS model above is that conditional on individual characteristics in X_i, the economic conditions at the time that benefits are ceased are as good as randomly assigned. In practice, this may be violated if *unobservable* characteristics of individuals whose benefits are ceased change over the course of the business cycle, which may happen if the population of ceased beneficiaries changes over the business cycle.

Specifically, since FMRs are prioritized among adult beneficiaries based on their score (expected likelihood of medical improvement), this means that those most likely to improve are the ones most likely to undergo an FMR in periods of limited capacity. If capacity constraints

limit the number of CDRs that can be conducted during economic downturns, then in practice this means that the effective threshold for being released for an FMR may be correlated with the business cycle. If we think that having a higher likelihood of improvement means that these individuals could have better labor market outcomes after cessation, it could mean that those ceased during periods of high unemployment could have better labor market prospects – introducing an upward/conservative bias in our regression results (assuming the causal effect of higher unemployment on labor market outcomes is weakly negative).

Figure 2 presents a time series of the number of CDR determinations for SSDI beneficiaries (Panel A) and the cessation rate (Panel B) against the average national unemployment rate from 2000 to 2020, using publicly available data from the State Agency Monthly Workload Data from SSA and Bureau of Labor Statistics, respectively.[6] For both determinations and cessation rate, there is a seasonal pattern, with peaks that seem to coincide with the end of the fiscal year in September. Early in the 2000s, the number of CDR determinations was relatively high, when the unemployment rate as low, and dropped as the unemployment rate increased. However, CDR determinations continued decreasing as the unemployment rate improved and stayed low during the very large increase in unemployment during the Great Recession, increasing only slightly during the long economic recovery. There is no obvious pattern between the unemployment rate and the cessation rate; however, it is notable that the cessation rate remained low at around 10 percent from FY2009 through FY2011, the period where the unemployment rate peaked during the Great Recession.

[6] We exclude SSI determinations from this figure because, as discussed, many SSI CDRs are for children and the SSA monthly workload data do not separately report child vs. adult cessations. The seasonality for SSI determinations and cessations is similar, though the overall cessation rate is higher.

In addition to capacity constraints which vary with the business cycle, there are other possible sources of bias. For example, health (primarily measured by mortality) is found to improve for most individuals during economic downturns (e.g., Ruhm 2000, 2003, 2008; Miller et al. 2009), though the effect may be reversed for workers at older ages (Coile et al. 2014). The most likely mechanisms for this relationship between economic conditions and health are changes in individual behavior when individuals stop working during economic downturns (e.g., reductions in motor vehicle accidents, lifestyle changes) (Ruhm 2008, Miller et al. 2009). If the health of Disability beneficiaries changes with the business cycle, this could also affect the composition of beneficiaries undergoing an FMR. However, because Disability program beneficiaries in our sample are already out of the labor force and receiving benefits during the years prior to their CDR, it is unlikely that economic conditions would have a large impact on their behavior through these mechanisms. It is also unlikely that the leniency of evaluations would change, as the *criteria* for benefit cessation does not change over the business cycle: each beneficiary is evaluated based solely on whether their medical condition still meets the eligibility standards for benefits. Therefore, we view potential capacity constraints which may vary with the business cycle as the most probable source of potential bias.

The most likely source for selection in the pool of ceased beneficiaries is based on mechanisms which occur earlier in the process, prior to benefit cessation (see Figure 1). To account for the fact that economic conditions could alter the composition of the pool of beneficiaries who undergo an FMR, we also include the unemployment rate at the time of FMR mailer (when the beneficiary is notified that they will be undergoing a full medical review and therefore SSA has decided to conduct a full review) as an additional control variable in the model:

$$y_{ic+j} = \alpha + \beta U_{sc} + \lambda U_{sm} + X_i\theta + \delta_c + \sigma_s + \varepsilon_{ic+j}$$

In our main specification, we include the profile score as an additional control, since in principle FMRs are triaged using the priority score. Including the score could also help to absorb any lingering effects of differences in beneficiaries' health. In effect, these additional controls further limit our comparison to two individuals with the same score (or likelihood of medical improvement) and unobserved factors at the time SSA decided to conduct an FMR, but whose benefits were ceased for idiosyncratic reasons at different points over the business cycle.

In Table 2, we regress individual characteristics separately on the unemployment rate at the time of cessation, controlling for unemployment at mailer date, priority score and state- and time-fixed effects, overall and by beneficiary type. Our hypothesis is that, conditional on these controls, case characteristics are as good as random with respect to the unemployment rate. Unfortunately, there do appear to be some characteristics systematically correlated with the unemployment rate at the time of cessation. In particular, as the unemployment rate increases (i.e., economic conditions worsen) the chances that a former beneficiary is ceased in her first CDR also increases; this relationship is statistically significant among SSDI beneficiaries but not for SSI-only recipients (though it is positive in all cases). Former beneficiaries whose benefits were ceased during periods of high unemployment are more likely to have a mental or intellectual disorder and less likely to have cancer. There is no obvious relationship between the unemployment rate at the time of cessation and the age or gender of the beneficiary. We include all of these observable characteristics in X_i; however, preliminary models without these observable characteristics showed similar results.

5. Results

We first examine the relationship between earnings over time and the unemployment rate at the time of cessation, separately for former SSDI-only beneficiaries, SSI-only recipients and concurrent beneficiaries. Figure 3 plots the coefficient on unemployment rate in a series of event study regressions of earnings from five years before to five years after cessation, on the unemployment rate at the time of cessation, controlling for unemployment at the time of FMR mailer, priority score, state and month fixed effects and demographic characteristics. Panels A, B and C show the event study for former SSDI-only beneficiaries, SSI-only recipients and concurrent beneficiaries, respectively. Table 3 presents the results for the period after benefit cessation in table format.

Contrary to our expectations, the event studies show that beneficiaries ceased during periods of high unemployment tend to have *lower* earnings prior to cessation than those ceased during periods of low unemployment. The effect of unemployment rate on pre-cessation earnings is statistically significant in the three years *prior* to cessation for SSDI-only beneficiaries and at least five years prior to cessation for concurrent beneficiaries. The effect of unemployment rate on pre-cessation earnings is close to zero and statistically insignificant for former SSI recipients.

The fact that there is a relationship between earnings *prior* to benefit cessation and the unemployment rate at the time of benefit cessation for former SSDI-only and concurrent beneficiaries is surprising. First of all, it is unusual for there to be a relationship between earnings and a *future* unemployment rate. Second, if ceased beneficiaries were positively selected during periods of high unemployment (as we hypothesize above), then one might expect there to be a positive relationship between earnings prior to benefit cessation and the unemployment rate; instead, we find a negative relationship. The specification already includes

several strategies to account for possible selection, including the unemployment rate at the mailer date, the priority score, and a control for the number of years on the program (to account for beneficiaries who may have been working at various points during the five years prior to cessation, if they were ceased during their first FMR.) We also explored whether correlated unemployment rates during the years around the time of the Great Recession could be driving the pre-trend in Figure 3 but did not find any notable results. We are left to conclude that there is an unobserved pattern in the way the characteristics of ceased beneficiaries changes over the business cycle which leads to the negative selection in earnings. However, because we do not observe any pre-trend in earnings outcomes for former SSI recipients, the results can be interpreted as causal for this subgroup.

Among SSI-only recipients, earnings in years 1, 2 and 3 after cessation are significantly lower than before cessation, reducing earnings by approximately $200 per year in each of those three years. Compared to mean earnings of approximately $5,000 per year, this change corresponds to a 4 percent decline. Because we do not observe any statistically significant changes in earnings prior to cessation for SSI recipients, this impact on earnings can be interpreted as a causal impact of economic conditions at the time of benefit cessation. But the effects also fade out within five years. Thus, we find little evidence unemployment rate at the time of cessation has a lasting effect on post-cessation earnings of former beneficiaries.

Former SSDI-only who have benefits ceased when the unemployment rate is 1 pp higher have earnings that are approximately $800 lower one year after benefit cessation. Former concurrent beneficiaries who have benefits ceased when the unemployment rate is 1 pp higher have earnings that are approximately $500 lower one year after benefit cessation. The effect of the business cycle on post-cessation earnings also fades out within five years for these groups.

However, since the pre-trend in Figure 3 indicates that SSDI-only and concurrent beneficiaries whose benefits were ceased during periods of high unemployment tend to have lower pre-cessation earnings than those ceased during periods of low unemployment, it is not clear whether this reduction in earnings is due to selection or (causally) to economic conditions at the time of cessation.

In Table 3, we provide some robustness checks on our specification. Specifically, we vary how we account for the priority score in our regression. Panel A shows the coefficients from our primary specification which includes the priority score; these coefficients are identical to the ones shown in Figure 3. Panels B and C show coefficients from models where we do not include the score and include indicators ranking the score by ventiles, to allow for nonlinearities in the relationship between the score and the outcome of interest. The results are nearly identical across all three specifications. One possible explanation for this similarity is that the priority score may capture similar effects as other observable characteristics included in the regression.

Table 4 presents results for reapplication and program outcomes up to five years after cessation, separately by beneficiary type. For SSDI-only former beneficiaries, we find that being ceased in periods of high unemployment are associated with the likelihood of reapplication and return to both disability programs. Former SSDI-only beneficiaries whose benefits are terminated when the unemployment rate is 1 pp higher are 1 pp more likely to re-apply for SSDI, and 0.58 pp more likely to return to SSDI within five years. Former SSDI-only beneficiaries whose benefits are terminated when the unemployment rate is 1 pp higher are 0.65 pp more likely to re-apply for SSI, and 0.44 pp to return to SSI within five years. The results are relatively similar for concurrent beneficiaries. Given the trend in earnings prior to benefit cessation shown in Figure 3, we stress that these effects should be interpreted as associations rather than causal evidence, as

they may include some effects of selection in the characteristics of beneficiaries whose benefits were ceased during periods of high unemployment.

The earnings event study pre-trends give us more confidence that the program participation outcomes regressions for former SSI recipients are uncovering causal effects of economic conditions at the time of cessation. Among former SSI recipients, we find that having one's benefits ceased during a period with an unemployment rate that is one point higher leads to a 0.89 pp increase in the probability of reapplying for SSI, or a 1 pp increase in the probability of re-applying for either SSDI or SSI. A one-point increase in the unemployment rate also leads to a 0.6 pp increase in being awarded SSI within five years of cessation. Former SSI-only recipients ceased during periods of high unemployment are not statistically significantly more likely to apply for or be awarded SSDI.[7]

6. Conclusion

In this paper we explored the relationship between economic conditions at the time of benefit cessation and post-cessation outcomes, including earnings and subsequent disability program participation. We find suggestive evidence that economic conditions at the time of benefit cessation (as measured by the unemployment rate) affect post-termination outcomes: increases in the unemployment rate are associated with declines in earnings during the first few years after program exit, and increases in re-application and re-awards to disability programs up to five years after benefit cessation.

[7] If anything, former SSI recipients ceased during periods of high unemployment are slightly *less* likely to become future SSDI beneficiaries than those ceased during periods of low unemployment.

Importantly, however, our analysis raises some concerns that for many reasons, the characteristics of individuals whose benefits are ceased changes over the course of the business cycle. This selection could come from the fact that workloads vary across DDSs and the capacity to review CDRs for adult beneficiaries could be more limited during economic downturns. Despite several attempts to account for these changing characteristics, we find evidence of a statistically significant pre-trend relationship between earnings prior to cessation and economic conditions for former SSDI beneficiaries and concurrent beneficiaries. As a result, we interpret the results for those groups primarily as association. For former SSI recipients, however, there is no statistically significant pre-trend, so we interpret the relationship as causal.

Among SSI-only recipients, we find that a one-point increase in the unemployment rate reduces annual earnings by approximately $200 per year (4 percent) during years 1, 2 and 3 after cessation. The relatively modest effect size on earnings is consistent with the fact that SSI recipients tend to have less stable attachment to the labor market, perhaps making them less sensitive to business cycle changes. Increases in the unemployment rate at cessation also lead to increases program re-application and award: for former SSI-only recipients, a one-point increase in the unemployment rate leads to approximately 1 pp increase in the probability of re-applying to either SSI or SSDI within five years after benefit cessation, and a 0.6 pp increase in the likelihood of returning to SSI. The likelihood of return for former SSI recipients is driven by an increase in the likelihood of returning to SSI (0.6 pp) rather than SSDI. Hemmeter and Stegman 2013 found that approximately 24 percent of former SSI recipients were estimated to have returned to SSI five years after the FMR; this means that a 1 pp increase in the unemployment rate would lead to a 2.5 percent increase in the likelihood of returning to SSI. The results for

SSDI-only and concurrent beneficiaries show a similar pattern in direction and magnitude, though we interpret these results with caution due to the selection concerns noted above.

In sum, our results find evidence that economic conditions at the time of benefit cessation can have a modest affect an individual's post-cessation outcomes. While the impact on earnings appears to be temporary, the impacts on re-application and return to disability programs could have more lasting effects on the individuals and on the disability programs themselves. Policies to mitigate the impacts of this effect could include providing additional employment supports to individuals whose benefits are ceased during periods of recession, or adjustments in the timing of reviews and cessations.

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Figure 1. Timeline of Typical Continuing Disability Review Resulting in Cessation

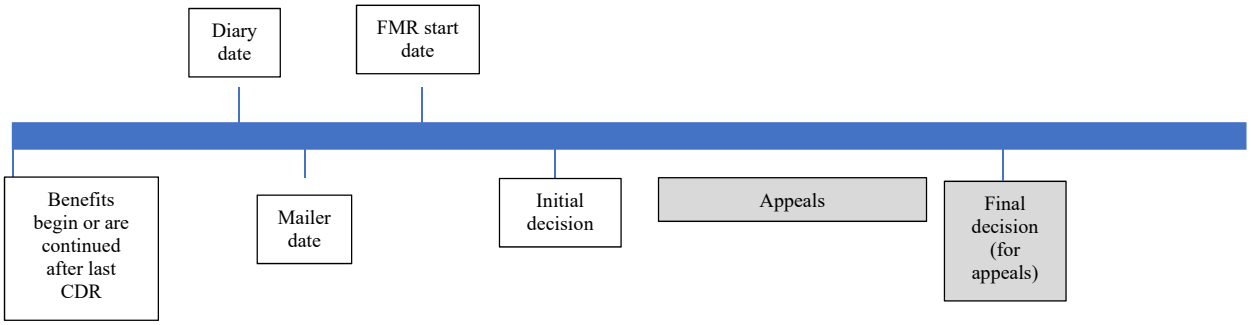
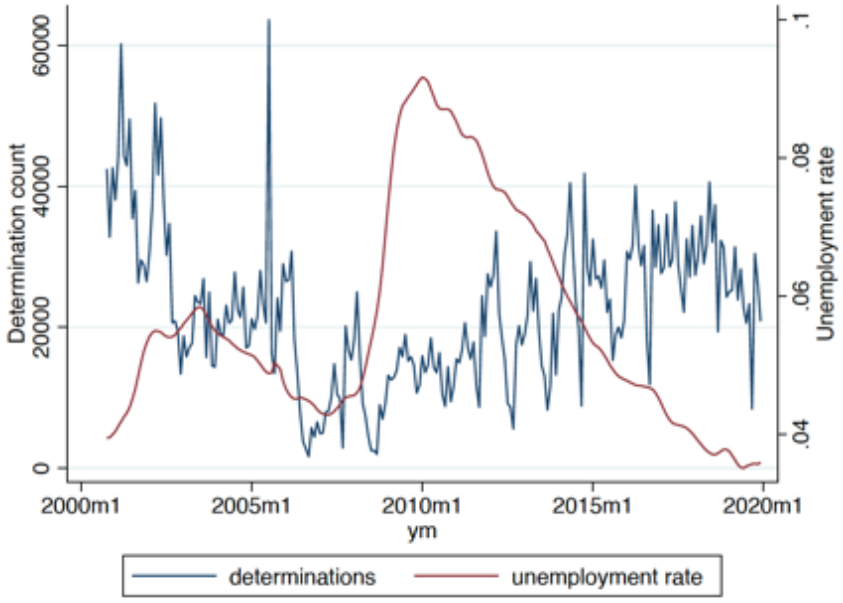
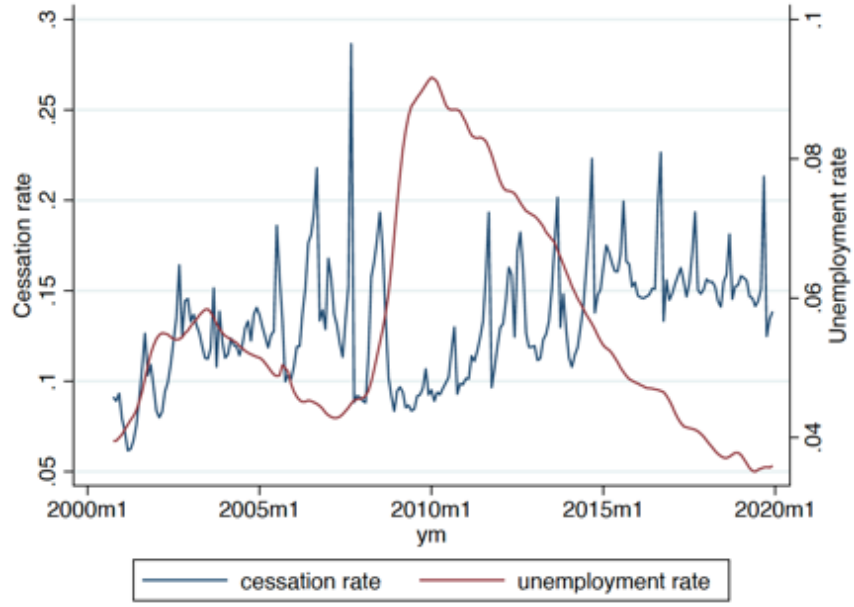


Figure 2

A. Number of CDR Determinations for SSDI Beneficiaries and Unemployment Rate by Month, 2000-2020



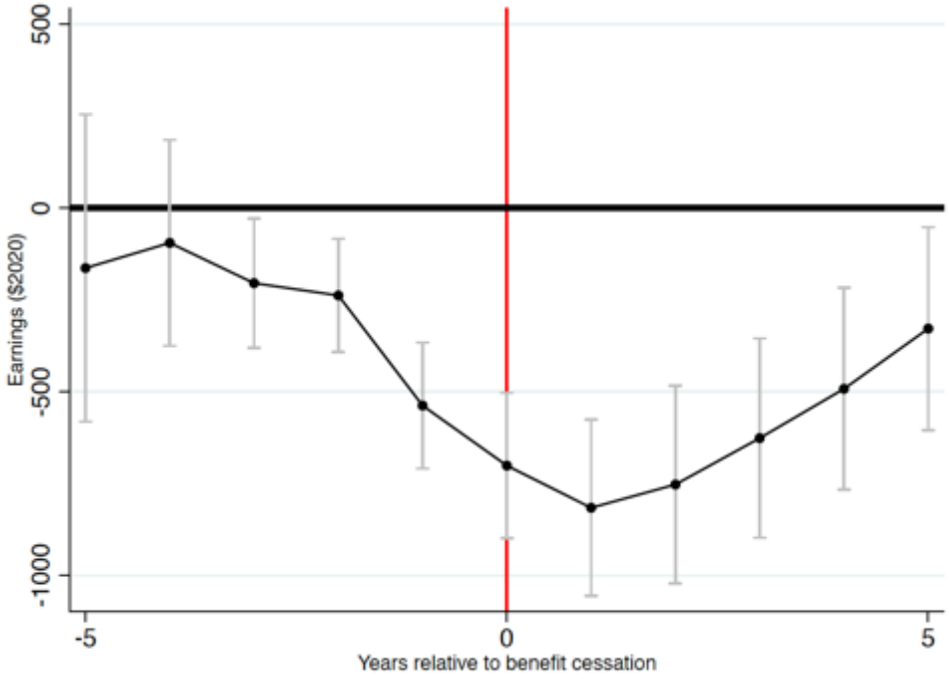
B. CDR Cessation Rate and Unemployment Rate by Month, 2000-2020



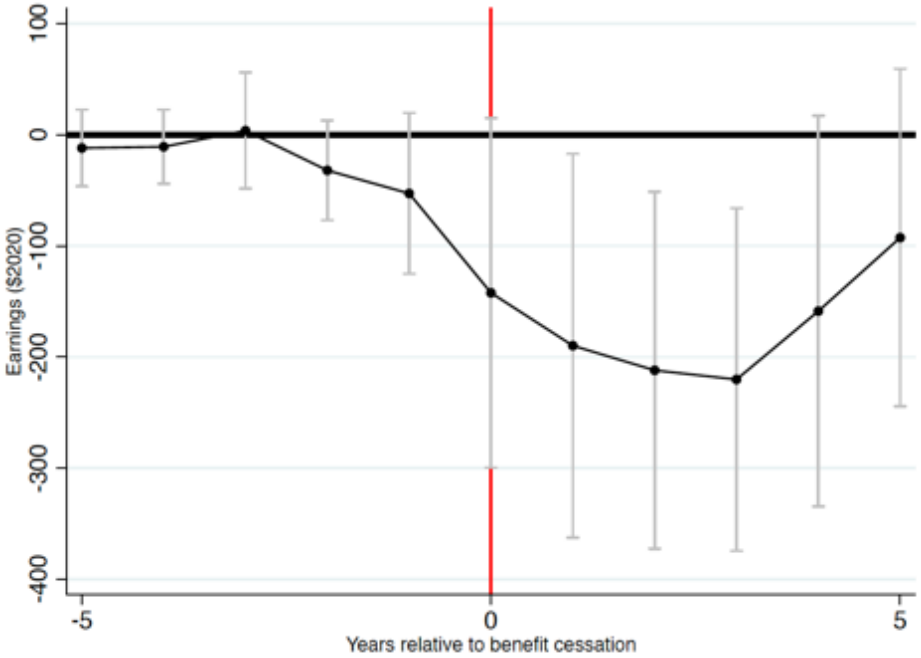
Source: SSA State Agency Monthly Workload Data and Bureau of Labor Statistics, 2000-2020.

Figure 3. Effect of the Unemployment Rate at the time of Benefit Cessation on Earnings, Five Years Before and Benefit Cessation

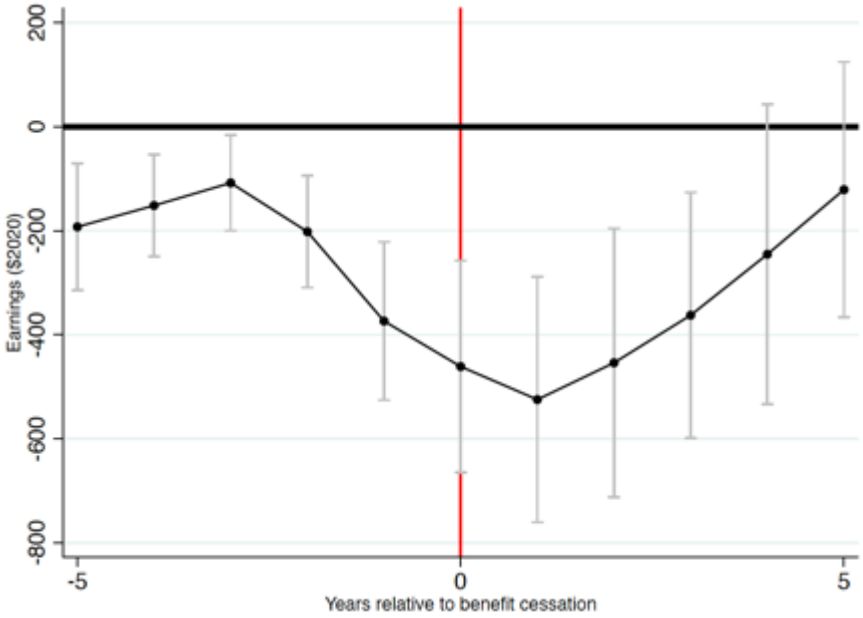
A. Former SSDI-only Beneficiaries



B. Former SSI-only Recipients



C. Former Concurrent Beneficiaries



Source: SSA Disability Analysis File, 2000-2015; SSA Master Earnings Records, 2000-2020 and Bureau of Labor Statistics, 2000-2020. Each point on the graph represents the coefficient from a regression of annual earnings in the year of interest (up to 5 years before or after benefit cessation) on the state-month unemployment rate at the time of benefit cessation. Additional regression controls include unemployment rate at the mailer date, number of years on the program prior to benefit cessation, priority score, number of prior CDRs, impairment and demographic characteristics, and state and month (of cessation) fixed effects.

Table 1: Summary Statistics

	Overall	SSDI Only	SSI Only	Concurrent	Cessations, above-median urate	Cessations, below-median urate
Program Information						
No Prior CDRs	0.803	0.816	0.779	0.805	0.814	0.792
	(0.398)	(0.387)	(0.415)	(0.396)	(0.389)	(0.406)
Score: Low	0.075	0.080	0.065	0.077	0.072	0.078
	(0.264)	(0.271)	(0.247)	(0.266)	(0.259)	(0.269)
Score: Medium	0.147	0.155	0.117	0.169	0.133	0.162
	(0.355)	(0.362)	(0.322)	(0.375)	(0.340)	(0.369)
Score: High	0.777	0.765	0.817	0.754	0.795	0.759
	(0.416)	(0.424)	(0.386)	(0.431)	(0.404)	(0.428)
SSDI Only	0.504				0.519	0.489
	(0.500)				(0.500)	(0.500)
SSI Only	0.282				0.274	0.290
	(0.450)				(0.446)	(0.454)
Concurrent	0.214				0.207	0.220
	(0.410)				(0.405)	(0.414)
Demographics						
Under Age 30 at Diary Date	0.276	0.137	0.489	0.322	0.278	0.273
	(0.447)	(0.344)	(0.500)	(0.467)	(0.448)	(0.446)
Age 30-39 at Diary Date	0.335	0.365	0.257	0.367	0.338	0.332
	(0.472)	(0.482)	(0.437)	(0.482)	(0.473)	(0.471)
Age 40-49 at Diary Date	0.309	0.386	0.207	0.262	0.304	0.315
	(0.462)	(0.487)	(0.405)	(0.440)	(0.460)	(0.464)
Age 50-56 at Diary Date	0.068	0.094	0.039	0.043	0.067	0.068
	(0.251)	(0.292)	(0.195)	(0.202)	(0.251)	(0.252)
Age 55-56 at Diary Date	0.012	0.016	0.008	0.007	0.012	0.012
	(0.109)	(0.127)	(0.089)	(0.083)	(0.111)	(0.107)
Female	0.478	0.444	0.532	0.488	0.481	0.475
	(0.500)	(0.497)	(0.499)	(0.500)	(0.500)	(0.499)
Male	0.522	0.556	0.468	0.512	0.519	0.525
	(0.500)	(0.497)	(0.499)	(0.500)	(0.500)	(0.499)
Primary Impairment Type						
Depressive, bipolar, and related disorders	0.210	0.194	0.209	0.249	0.211	0.209
	(0.407)	(0.396)	(0.407)	(0.432)	(0.408)	(0.407)
	0.071	0.053	0.087	0.091	0.071	0.071

Schizophrenia spectrum and other psychotic disorders	(0.256)	(0.224)	(0.282)	(0.288)	(0.256)	(0.257)
Other mental disorders	0.072	0.050	0.109	0.074	0.067	0.077
	(0.258)	(0.218)	(0.312)	(0.261)	(0.249)	(0.267)
Musculoskeletal system	0.114	0.153	0.055	0.099	0.109	0.118
	(0.318)	(0.360)	(0.227)	(0.299)	(0.312)	(0.323)
Neoplasms	0.101	0.135	0.058	0.078	0.119	0.083
	(0.302)	(0.342)	(0.234)	(0.268)	(0.323)	(0.276)
Injuries	0.075	0.089	0.047	0.080	0.075	0.074
	(0.263)	(0.284)	(0.211)	(0.271)	(0.264)	(0.263)
Intellectual disorders	0.061	0.012	0.155	0.052	0.056	0.066
	(0.239)	(0.107)	(0.362)	(0.223)	(0.230)	(0.248)
Nervous System	0.057	0.059	0.052	0.061	0.057	0.058
	(0.233)	(0.235)	(0.222)	(0.239)	(0.231)	(0.234)
N	245,316	123,735	69,151	52,430	125,517	119,799

Notes: SSA Disability Analysis File, 2000-2015. Standard deviation in parentheses.

Table 2: Effect of unemployment rate on observable characteristics of cessations

	All	SSDI	SSI	Concurrent
No Prior CDRs	0.0129***	0.0103***	0.0075	0.0095***
	(0.0033)	(0.0034)	(0.0054)	(0.0029)
Ages 0-29	0.0038	-0.0034*	0.0060	0.0027
	(0.0035)	(0.0018)	(0.0053)	(0.0029)
Ages 30-39	-0.0034*	0.0007	-0.0020	-0.0017
	(0.0020)	(0.0026)	(0.0034)	(0.0029)
Ages 40-49	0.0008	0.0033	-0.0028	0.0012
	(0.0033)	(0.0031)	(0.0056)	(0.0025)
Ages 50-54	-0.0010	-0.0010	-0.0010	-0.0012
	(0.0009)	(0.0014)	(0.0010)	(0.0012)
Ages 55-59 (56)	-0.0001	0.0004	-0.0002	-0.0009
	(0.0003)	(0.0005)	(0.0007)	(0.0006)
Female	-0.0003	-0.0014	-0.0037	0.0004
	(0.0016)	(0.0019)	(0.0044)	(0.0031)
Male	0.0003	0.0014	0.0037	-0.0004
	(0.0016)	(0.0019)	(0.0044)	(0.0031)
09 Depressive, bipolar, and related disorders	0.0025	0.0003	0.0001	-0.0028
	(0.0025)	(0.0033)	(0.0029)	(0.0043)
11 Schizophrenia spectrum and other psychotic disorders	0.0028***	0.0017*	0.0023	0.0019
	(0.0009)	(0.0009)	(0.0021)	(0.0013)
12 Other Mental disorders	0.0029***	0.0021*	0.0024	-0.0004
	(0.0010)	(0.0011)	(0.0019)	(0.0015)
18 Musculoskeletal system	-0.0015	-0.0021	0.0005	-0.0035*
	(0.0017)	(0.0017)	(0.0022)	(0.0020)
13 Neoplasms	-0.0087***	-0.0035**	-0.0083***	-0.0045***
	(0.0017)	(0.0015)	(0.0027)	(0.0013)
04 Injuries	-0.0021*	-0.0008	-0.0018	0.0040**
	(0.0010)	(0.0013)	(0.0020)	(0.0018)
08 Intellectual disorders	0.0043**	0.0012***	0.0056	0.0029*
	(0.0017)	(0.0004)	(0.0038)	(0.0017)
19 Nervous System	-0.0002	-0.0009	0.0001	0.0009
	(0.0008)	(0.0012)	(0.0014)	(0.0017)
Observations	245,316	123,735	69,151	52,430

Note: Authors' calculations using SSA Disability Analysis File, 2000-2015. Each cell is from a separate regression of the characteristics on the unemployment rate at the time of cessation, the unemployment rate at the time of mailing, state fixed effects, month fixed effects, and score (continuous measure). Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 3: Effect of unemployment rate at the time of cessation on earnings up to five years post-cessation

	t	t+1	t+2	t+3	t+4	t+5
Panel A: Include Priority Score						
DI						
Coef: Urate	-700.81	-815.50	-752.20	-625.97	-491.93	-328.08
se	100.92	122.13	137.25	138.29	140.06	140.82
p-value	0.00	0.00	0.00	0.00	0.00	0.02
SSI						
Coef: Urate	-142.31	-189.82	-211.97	-220.23	-158.75	-92.62
se	80.16	88.06	81.89	78.63	89.74	77.53
p-value	0.08	0.04	0.01	0.01	0.08	0.24
Concurrent						
Coef: Urate	-461.18	-524.59	-453.95	-362.50	-245.42	-121.13
se	103.86	120.33	131.92	120.49	147.17	125.27
p-value	0.00	0.00	0.00	0.00	0.10	0.34
Panel B: Include Ventiles of Priority Score						
DI						
Coef: Urate	-695.93	-811.40	-747.56	-622.45	-489.70	-325.91
se	100.49	122.03	137.64	139.12	141.42	142.30
p-value	0.00	0.00	0.00	0.00	0.00	0.03
SSI						
Coef: Urate	-117.66	-161.85	-184.26	-192.58	-133.64	-67.77
se	81.84	90.53	84.39	81.31	91.82	80.07
p-value	0.16	0.08	0.03	0.02	0.15	0.40
Concurrent						
Coef: Urate	-464.67	-530.71	-463.26	-371.89	-252.32	-127.13
se	103.98	120.91	132.20	121.36	147.96	125.60
p-value	0.00	0.00	0.00	0.00	0.09	0.32

Table 3, con't: Effect of unemployment rate at the time of cessation on earnings up to five years post-cessation

	t	t+1	t+2	t+3	t+4	t+5
Panel C: Do not include score						
DI						
Coef: Urate	-713.21	-828.22	-765.47	-639.89	-506.28	-342.90
se	102.38	126.01	140.83	142.25	143.87	144.29
p-value	0.00	0.00	0.00	0.00	0.00	0.02
SSI						
Coef: Urate	-127.76	-174.81	-194.25	-201.45	-138.46	-70.99
se	78.14	86.60	82.35	79.60	90.98	79.67
p-value	0.11	0.05	0.02	0.01	0.13	0.38
Concurrent						
Coef: Urate	-473.40	-542.71	-475.24	-385.52	-271.50	-149.15
se	105.04	123.69	135.75	124.55	151.28	130.03
p-value	0.00	0.00	0.00	0.00	0.08	0.26

Notes: Analysis using the SSA Disability Analysis File, 2000-2015; SSA Master Earnings Records, 2000-2020 and Bureau of Labor Statistics, 2000-2020. In each panel, estimates are the marginal effects of the state-month unemployment rate at the time of cessation. All year-outcome estimates are from the same regression fully-interacted with beneficiary type. Standard errors and p-values shown directly below the coefficient in each column. Additional covariates include: the unemployment rate at the time of mailing, state fixed effects, month of cessation fixed effects, whether there was prior CDR, disability type, age group at time of medical CDR diary, sex, and time receiving benefits. Panels show various methods for including the score: continuous (linear), in ventiles, or no inclusion of the score.

Table 4: Effect of unemployment rate on re-application and return to SSDI or SSI

	Former SSDI Benes									
	Year 1		**Year 2**		**Year 3**		**Year 4**		**Year 5**	
Reapply SSI	0.0074	**	0.0095	***	0.0107	***	0.0109	***	0.0112	***
	0.0030		0.0032		0.0035		0.0036		0.0037	
	0.0171		0.0044		0.0038		0.0039		0.0044	
Reapply DI	0.0034	**	0.0062	***	0.0073	***	0.0079	***	0.0065	**
	0.0016		0.0020		0.0023		0.0025		0.0025	
	0.0438		0.0031		0.0030		0.0027		0.0118	
Reapply - either	0.0042	**	0.0069	***	0.0085	***	0.0087	***	0.0076	***
	0.0017		0.0021		0.0024		0.0026		0.0025	
	0.0174		0.0018		0.0007		0.0014		0.0033	
Return SSI	0.0007		0.0009		0.0023	**	0.0040	***	0.0058	***
	0.0006		0.0008		0.0011		0.0010		0.0012	
	0.1958		0.2745		0.0468		0.0002		0.0000	
Return DI	0.0002		0.0001		0.0013		0.0034	**	0.0044	***
	0.0008		0.0014		0.0017		0.0015		0.0014	
	0.8096		0.9155		0.4523		0.0300		0.0027	
Return - either	0.0005		0.0005		0.0022		0.0046	***	0.0064	***
	0.0009		0.0013		0.0017		0.0016		0.0016	
	0.5577		0.7143		0.2162		0.0052		0.0002	
Observations	123,735		123,735		123,735		123,735		123,735	

Table 4, con't: Effect of unemployment rate on re-application and return to SSDI or SSI

	Former SSI Recipients									
	Year 1		**Year 2**		**Year 3**		**Year 4**		**Year 5**	
Reapply SSI	0.0036	**	0.0060	***	0.0087	***	0.0091	***	0.0089	***
	0.0014		0.0020		0.0022		0.0022		0.0023	
	0.0112		0.0035		0.0002		0.0002		0.0003	
Reapply DI	0.0034		0.0044		0.0030		0.0032		0.0060	
	0.0026		0.0032		0.0032		0.0035		0.0037	
	0.1959		0.1861		0.3467		0.3628		0.1153	
Reapply - either	0.0076	**	0.0087	***	0.0088	***	0.0091	***	0.0102	***
	0.0030		0.0032		0.0032		0.0033		0.0035	
	0.0146		0.0085		0.0077		0.0084		0.0052	
Return SSI	0.0000		0.0005		0.0012		0.0027		0.0060	**
	0.0011		0.0013		0.0019		0.0023		0.0029	
	0.9957		0.6802		0.5244		0.2561		0.0444	
Return DI	-0.0002		-0.0005		-0.0017	***	-0.0026	***	-0.0017	*
	0.0002		0.0004		0.0006		0.0007		0.0009	
	0.4616		0.2358		0.0096		0.0007		0.0587	
Return - either	-0.0002		-0.0003		0.0000		0.0008		0.0044	*
	0.0011		0.0012		0.0018		0.0021		0.0025	
	0.8357		0.7980		0.9974		0.7123		0.0902	
Observations	69,151		69,151		69,151		69,151		69,151	

Table 4, con't: Effect of unemployment rate on re-application and return to SSDI or SSI

	Former Concurrent Benes				
	Year 1	**Year 2**	**Year 3**	**Year 4**	**Year 5**
Reapply SSI	0.0048	0.0102 **	0.0105 **	0.0088 *	0.0095 *
	0.0029	0.0040	0.0049	0.0050	0.0051
	0.1098	0.0150	0.0381	0.0829	0.0695
Reapply DI	0.0038	0.0074	0.0090	0.0074	0.0070
	0.0031	0.0048	0.0057	0.0060	0.0057
	0.2265	0.1325	0.1219	0.2191	0.2282
Reapply - either	0.0050	0.0094 **	0.0110 **	0.0094 *	0.0093 *
	0.0032	0.0044	0.0055	0.0055	0.0054
	0.1248	0.0363	0.0482	0.0915	0.0943
Return SSI	-0.0007	-0.0015	0.0019	0.0024	0.0060 ***
	0.0009	0.0017	0.0021	0.0023	0.0022
	0.4495	0.3708	0.3592	0.2932	0.0077
Return DI	-0.0014 *	-0.0016	-0.0008	-0.0017	-0.0003
	0.0008	0.0014	0.0021	0.0027	0.0030
	0.0689	0.2712	0.6978	0.5355	0.9297
Return - either	-0.0006	-0.0010	0.0026	0.0029	0.0064 **
	0.0009	0.0017	0.0022	0.0029	0.0030
	0.5094	0.5524	0.2311	0.3215	0.0345
Observations	52,430	52,430	52,430	52,430	52,430

Note: Authors' calculations using SSA administrative data. Estimates are the marginal effects of the state-month unemployment rate at the time of cessation. All year-outcome estimates (e.g., reapply SSI-year 1, return SSI-year 1, etc.) are from the same regression fully interacted with beneficiary type. Additional covariates include: the unemployment rate at the time of mailing, state fixed effects, month of cessation fixed effects, whether there was prior CDR, disability type, age group at time of medical CDR diary, sex, time receiving benefits, and score.