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The Relationship between Social Security Disability Insurance Wait Times and Applications[1]

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Abstract

For Social Security Disability Insurance (SSDI), the waiting time between filing an application and receiving an initial determination can last several months, while a final determination via the appeals process commonly takes an additional year or more. We use information on SSDI application outcomes at the county level for 1996-2014 to document the variation in wait times, its correlation with socioeconomic characteristics, and how wait times relate to application behavior. We find large differences in both the average and median wait times across counties and over time, and meaningful differences by sex, age, and Census region. Higher wait times in one year is associated with lower applications the following year, suggesting that there may be some feedback effects between the speed of recent applications and individuals' decisions about whether to apply for SSDI.

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I. Introduction

Social Security Disability Insurance (SSDI) provides income payments and medical assistance to over ten million disabled workers and their dependents, or approximately four percent of the working-age population (Social Security Administration (SSA), 2018). The period of time that applicants have to wait before their eligibility is determined can be long and highly variable. For example, in 2005 the average wait time was nearly 14 months, with a standard deviation of 17 months. Some of the variation comes from different outcomes; the wait time is approximately three months for those allowed SSDI via an initial determination, and more than two years for applicants who appeal after their initial denial (Autor, Maestas, Mullen and Strand, 2015).

In this project, we focus on the relationship between recent SSDI wait times and current SSDI applications. We use a panel of county-level data and account for factors that could affect both wait times and SSDI application outcomes, such as measures of economic conditions, living costs and population health. Despite the extensive research on factors affecting application behavior, understanding the role of SSDI wait times limited. Hu, Lahiri, Vaughan and Wixon (2001) and Lahiri Song and Wixon (2008) examine the SSDI application process in the late 1980s and early 1990s using household survey data linked to SSA administrative data. They find that longer wait times reduce the probability making a SSDI application and of being allowed onto SSDI, although the point estimates differ by sex and often lack precision. Recent work has highlighted that SSDI applications can be affected by the availability of SSA field offices (Deshpande and Li, 2017) and online processing systems (Foote, Grosz and Rennane, 2019), and that processing speeds can affect the employment of denied SSDI applicants (Autor, Maestas, Mullen and Strand, 2015). This suggests there may be a more general relationship between differences in wait times and application behavior, which may in turn affect allowances.

We complement this research by examining the geographic variation in wait times over the last two decades. We use the period from 1996-2014, which is interesting because it includes a period of rapid growth in allowances between 1996 and 2010, after which there has been a steady decline. It is also a period over which there has been lots of variation in the processing of applications, including SSA changing to the use of electronic records to manage applications; the transition to many applications being submitted online rather than in person; and both increases

and decreases in the resources allocated to various stages of the application process (Puckett, 2010).

Using SSDI administrative panel data, we first document several facts about the variation in wait times across counties and over time. We find that average time from initial application to final determination increased at the national level from 1999 to 2005, then sharply declined until 2010, and then began to rise again. This national trend was not experienced evenly across different locations. For example, the mean wait times in the most urban counties – representing one-third of SSDI applications – rose by three weeks between 1999 and 2005. Wait times in the remaining, less-urban counties rose by more than eight weeks between 1999 and 2005, or more than five additional weeks. Furthermore, the average increase in wait times over this period was much higher in the South and Midwest than in the Northeast and West Census regions. While men and women both experience similar changes in wait times throughout the 1996-2014 period, women persistently experience wait times that are two to three weeks longer than men.

We then consider how the variation in wait times relates to variation in application rates across counties and over time. We focus on how SSDI wait times in a county in one year relate to SSDI applications in the next year. The idea behind this approach is to measure whether someone contemplating applying for SSDI takes account of recent information about the period of time they will need to wait to learn about their eligibility, where applications filed in the previous year provides a measure of that information. In a simple regression specification controlling for health and economic factors, we find that an increase in a county's SSDI wait times in the previous year is associated with a decline in SSDI applications per county resident. A one standard deviation in the cross-sectional variation (equal to 50 days) in wait times is associated with a decrease in applications by 3.3% in the pooled cross-section of counties and by 4.3% within counties over time. This relationship is also present when we focus on subgroups based on sex and or age (i.e., applicants aged 21-49 or 50-64 years).

In an extension to this analysis, we evaluate the relationship between average wait times and what share of initially denied applicants choose to appeal their decision. Wait times to final determination for applications that are appealed are often several times longer than applications

that are awarded at the initial stage (Autor, Maestas, Mullen and Strand, 2015). One might think that increases in wait times would deter applicants rejected at initial stage from pursuing this lengthy process. We find the opposite relationship at the county level. An increase in wait times by one standard deviation (equal to 50 days) is associated with an increase in the share of initially denied applicants who receive a final determination at the hearings level by two percentage points in the county cross-section and four percentage points in the within-county time series.

We make several contributions to research on the understanding the incentives to apply to SSDI. We document recent trends in SSDI wait times and how these vary by location, time and demographic groups. Our findings also relate to the research studies discussed above that use variation in wait times to final determination in order to understand the impact of SSDI delays on applicant outcomes. We find that these differences in wait times do impact both application rates and the share of initially denied applicants who appeal that denial. This means that, while variation in wait times suggests that there may be different experiences of the SSDI application process in different locations, it could also change the characteristics of the pool of applicants and those who choose to appeal. Our analysis provides suggestive evidence of the importance of how SSA processing interacts with applicant behavior in order to understand both applications and allowances over time and across different locations. We therefore add to research on geographic variation in SSDI (e.g., Strand, 2002; Autor and Duggan, 2003; Coe et al. 2011; Rupp, 2012; Gettens, Lei and Henry, 2016), as well as to a broader set of studies on the relative importance of different factors that may affect SSDI outcomes (e.g., Rupp and Stapleton, 1998; Duggan and Imberman, 2009; Liebman, 2015).

The rest of the paper proceeds as follows. In the next section, we provide an overview of the SSDI application process and the factors that affect wait times. In Section 3, we describe the SSA administrative and other data we use to create a panel of county data over 1996-2014. In Section 4, we describe the trends and variation in SSDI wait times in our data. In Section 5, we estimate the relationship between SSDI wait times and application outcomes. We conclude in Section 7.

2. Factors Affecting Wait Times for Disability Insurance Determinations

For SSDI beneficiaries, the time between an initial application and the ultimate decision can vary widely. The variation depends on the completeness of an application; the number of stages the claim passes through; the time it takes for SSA to complete different processes; and how long passes between when an applicant receives an adjudication and when – and whether – they decide to appeal to the next stage. In this section, we discuss the processes governing SSDI applications and allowances, and their relationship to these factors.

Individuals apply for SSDI in person at an SSA field office, over the phone with a claimants' representative, or online. The application is normally processed by the SSA field office responsible for the ZIP code in which the individual resides, irrespective of the office and method used to file the claim. Research has shown that the ease of applying through the different methods does affects the number of SSDI applications. Deshpande and Li (forthcoming) examine how SSA field offices affect applications. They find that field office closings reduce the number of disability applications in nearby areas by 10% and allowances by 16% for the next two years. Approximately half of the effect comes from increased congestion at alternative offices. Foote, Grosz and Rennane (2019) estimate that a 2009 streamlining of the online application process increased SSDI applications, appeals and allowances.

Once submitted, initial screening on financial criteria is made by staff at the responsible SSA field office. Subsequent criteria are assessed by disability examiners employed at a state Disability Determination Service (DDS). At the end of a multi-step process, applicants are either allowed or denied SSDI benefits.[2] Autor, Maestas, Mullen and Strand (2015) use data on SSA processing times and wait times, and find that the average time to the initial DDS decision is slightly under three months.

If an applicant is denied, they can pursue a sequence of appeals. First, until recently applicants in most states could appeal to the DDS for a reconsideration of their claim by a different disability examiner. Second, they can request a hearing with an Administrative Law Judge. Third, they can

[2] For more details around the criteria and steps used in the SSDI evaluation process, see Lahiri, Vaughan and Wixon (1995) and Wixon and Strand (2013).

appeal their claim to the SSA Appeals Council. Fourth, they can appeal to a federal court. At each level, applicants have 60 days to file the request for appeal after being notified of the determination. Appeals must be determined using the same criteria as those initially used at SSA field offices and by DDS examiners, although new evidence can be added through the appeals process. According to Autor, Maestas, Mullen and Strand (2017), initially denied applicants have an average total processing time of approximately 19 months, and those who appeal their initial denial have an average total processing time of approximately 28 months.

A number of SSA-related factors are correlated with SSDI wait times. Some of these are discussed above: Autor, Maestas, Mullen and Strand (2017) find that there is variation in the speed at which individual disability examiners process claims; Deshpande and Li (forthcoming) find that field office closings increase wait times; and Foote, Grosz and Rennane (2019) use the 2009 introduction of iClaim, which streamlined the online application process and made the application stage quicker for both applicants and SSA staff. There were also major changes in the early 2000s aimed at reducing SSA processing times, including an improvement project initiated in 2003 that included accelerating the transition to electronic recordkeeping; a "Quick Disability Determination" process for DDSs to expedite initial determinations for claimants who are clearly disabled; and improvements to the hearing and appeals processes. Between 2004 and 2006, all state DDSs moved from using paper-based to electronic records, which sped up the way application information was transferred across and within offices (Puckett, 2010). In 2008 and 2009, SSA extended the Quick Disability Determination process and hired more Administrative Law Judges to decrease wait times for appeal hearings. Around the same time, however, some states furloughed DDS staff, even though SSA pays their salaries and all DDS operating costs (Puckett, 2010). All of these factors potentially affected the wait times that applicants experience in different parts of the US at different points in time.

3. Data

We develop a longitudinal panel data set of county-level information on SSDI outcomes and SSDI wait times. We also merge in measures of economic conditions, living costs, population health and demographic characteristics that may be related to SSDI activity. Controlling for these factors is important. For example, labor market activity and other economic conditions have also

been shown to increase applications, by making work harder to find or relatively less attractive (e.g., Black, Daniel and Sanders, 2002; Autor and Duggan, 2003; Autor, Dorn and Hanson, 2014). If similar factors also affect wait times and are not controlled for, then they could create an association between wait times and applications.

Specifically, we merge together data on SSDI applications and allowances; SSDI average processing times; population and demographic characteristics; labor market outcomes; living costs; and health outcomes. The panel contain annual data at the county level, split by sex and age. The observations span 1996 to 2014, which is the period over which all of these data are available.

3.1 Disability Insurance Applications and Outcomes

Our data on SSDI applications and awards come from the SSA Disability Research File (DRF). The DRF is a data file designed to track cohorts of individuals filing for SSDI and SSI through the disability decision and appeal process. It is constructed by drawing on multiple administrative data sources and updated annually. The DRF allows the status of a claim for SSDI to be tracked throughout the adjudicative steps, as well as providing key demographic information about the applicant, including their county and state of residence, as well as their sex and age. It has been used by other researchers to examine different aspects of the SSDI and SSI programs (e.g., Meseguer, 2013; 2018; Costa, 2017; Foote, Grosz and Renanne, 2019; Foote, Grosz and Stevens, 2019).

For this study, we were able to obtain geographically defined counts from the DRF for claims filed from 1995 to 2014. We restrict the data to applicants aged 21 to 64 years, as 65 years was the Full Retirement Age at the beginning of the sample period.[3] All of the outcomes are organized in terms of the date of filing (i.e., we measure allowances by year of application, even if the claim is actually allowed in a subsequent year). We follow the classification system of Wixon and Strand (2013) to organize SSDI determination outcomes.

[3] The Full Retirement Age is higher for more recent birth cohorts, starting with the 1938 (who turned 65 in 2003), extending the age over which SSDI is available. To be able to merge to other data sources and have a consistent sampling frame, we omit applications at age 65.

The data include counts of SSDI applications, that are then divided into allowances and denials. The counts of SSDI allowances and denials consists of four groups: (a) DDS allowances (including reconsiderations); (b) DDS denials that were subsequently allowed upon appeal (including pending cases); (c) DDS denials that were subsequently denied at a higher level; and (d) DDS denials with no further appeal. These data are further divided by sex and into two major age groups: applicants aged 21 to 49 years and applicants aged 50 to 64 years.

To maintain confidentiality, the SSA suppressed any observations with counts smaller than ten. Whenever the suppression of only one group could lead to the identification of a suppressed value, an additional value was suppressed. These confidentiality restrictions informed the way we classified outcomes and ages in our data request. We combined reconsiderations with initial DDS decisions because allowances via a reconsideration typically account for only around three percent of all applicants' outcomes (SSA, 2018). Likewise, pending cases are rare once a claim has been in the system for a couple of years, so we assign those cases as ultimately allowed upon appeal, which is the most common for pending cases (SSA, 2018). The age-based split divides applicants into two groups of roughly equal size, while the decision to separate applicants at ages 50 and over also allows us to identify individuals subject to different vocational grid rules than those at earlier ages (Wixon and Strand, 2013).

3.2 Disability Insurance Processing Times

SSDI processing times are calculated from the same SSA Disability Research File (DRF) as used to generate the data discussed in the previous section. The DRF includes information on the date of filing for SSDI, and the dates at which the initial DDS decisions and final adjudication is made (if these are different). This allows us to calculate the total time to decision for each individual. We calculate the mean and median values of these decision times by county, year and sex. We focus on these values for all SSDI applications within these areas, rather than by allowance outcome. As discussed later in the paper, by doing so we focus on whether overall decision times in the previous year affect current applications, irrespective of the composition of allowance outcomes.

There is also suppression in these data to maintain confidentiality. The number of counties with a full set of observations is smaller, as the suppression of these data occurs at a higher rate than the in the data on SSDI outcomes. For that reason, we focus on measures of overall processing speed in these data (rather than by outcome or age). We have a balanced panel from 1996-2014 of SSDI determinations and mean and median wait times for 363 counties (12% of all counties). This panel of counties represents approximately 60% of all applications in the US during this period, with the higher coverage because more populous counties are retained in the dataset.

3.3 Population Data

We use population and demographic data from the Census Bureau that was compiled by the Surveillance, Epidemiology, and End Results program of the National Cancer Institute. The data includes annual estimated population counts by sex and single years of age. We measure the working-age population as 21 to 64 years, and then calculate the fraction of the population in different age group and by sex when controlling for demographic characteristics in our regression analyses.

3.4 Mortality Data

We use a compilation of mortality data from the Institute for Health Metrics and Evaluation. The mortality rates are created from deidentified death records from the National Center for Health Statistics, who compile data from death certificates lodged with state vital statistics bureaus. These data represent a census of deaths in the United States. The population data described above are used to create mortality rates. We use county-level rates by sex, and consider both mortality rates for all age groups, and for age ranges that are more focused on the working-age population eligible for SSDI (i.e., ages 25 to 64, and also 25 to 44 and 45 to 64).

3.5 Housing Price Index Data

The Federal Housing Financing Agency constructs an index of housing prices that is available at the county level (Bogin, Doerner, and Larson, 2016). The Housing Price Index uses proprietary data held by the Agency on single family homes with roughly constant characteristics throughout the measurement period. It is constructed by regressing the change in log sale price of a home on period fixed effects and then taking the exponential of the fixed effects coefficients.

3.6 Poverty Data

Poverty data come from the Small Area Income Poverty Estimates program, which is a US Census Bureau project estimating median income and the fraction of households whose pre-tax earnings are below poverty thresholds defined by the Census Bureau. These thresholds vary by household composition and location. Thresholds are also adjusted annually by changes in the Consumer Price Index. The poverty estimates are developed using a forecasting model applying an empirical Bayesian framework to predict the aforementioned counts and American Community Survey county poverty counts estimates coupled with predictors coming from Census' data, including its administrative records.

3.7 Labor Market Data

Measures of the labor market and economic conditions come from the Bureau of Labor Statistics' Quarterly Census of Employment and Wages (QCEW). The QCEW tabulates regional employment numbers and establishment counts among workplaces reporting to state unemployment insurance programs. An establishment is defined as a locale where goods and services are produced or provided; this means that a single business can have multiple establishments. The employment counts are the total numbers of paid jobs by the 12th of each month, irrespective of a job's characteristics. QCEW data includes roughly 97% of the US workforce each period, as it excludes self-employed workers as well as military personnel and a small contingency of diverse employment arrangements.

4. Describing Variation in SSDI Wait Times

Average wait times to determination vary both across counties and over time. The average county wait time ranges from 223 to 277 days in our sample years 1996-2014, and the median county wait time ranges from 106 to 128 days. The large difference between the median and the mean indicates a skewness in the distribution of wait times, with a greater dispersion in average wait times across counties.[4]

[4] The average wait time is a bit shorter in our data than in the data used by Autor, Maestas, Mullen and Strand (2015). The difference is not surprising, given that our data differ in terms of underlying administrative data sets, sample period and allowance rates. When we compare wait times conditional on SSDI outcomes, the wait times are

Table 1 describes the variation in wait times across counties and the characteristics of those counties with the longest and shortest mean wait times. Applicants living in counties with the top 10% longest average wait times in 1996 had an average of 60 days longer waiting than applicants living in counties with the 10% shortest average wait times in that year. Average wait times increase for most of the distribution over the sample period, although the differences between the top 10% and bottom 10% of counties becomes more compressed. Between 1996 and 2014, average wait times slowest decile had decreased by about one week, while in the counties in the quickest decile the average wait time increased by approximately ten days. As a result, by 2014 the difference between counties in the top 10% and bottom 10% for wait times decreased to 44 days, a reduction in the range of more than two weeks.

Figure 1 shows that the cross-sectional variance in mean wait times ebbs and flows over the sample period. The increase in overall wait times in the early 2000s was driven by changes in counties with the longest wait times, whereas the decrease in wait times after 2005 affected the entire distribution.

The cross-sectional variation in the median wait times is smaller than that of the means. Applicants with the top 10% slowest wait times face median days to determination that are 27 days higher than those applicants with the top 10% fastest wait times: 150 versus 123 days. Over time, both the overall national median wait time and the cross-county variation in median wait times have been reduced. From 1996 to 2014, the median wait times fell by 14 days for the slowest 10% and three days for the fastest 25%, narrowing the gap to 16 days and again suggesting that SSDI wait times became more compressed over time.

The variation in wait times depends, in part, on which stage the final determinations are reached. Allowances made at the DDS level (initial decisions and reconsiderations) typically take less than half the time as those applications that are appealed. Row 3 in Table 1 shows that the percent of applications allowed at the DDS level increased from 28% in the slowest areas to 37%

much closer (e.g., the average wait times to initial allowance are very similar, as the time to final allowances for those initially denied eligibility.

in the fastest areas at the start of the sample period. However, by 2014 this difference across the distribution of wait times is almost erased: the percent of applications allowed at the DDS level was consistently around 22-24% across the board. The next row shows that the percent of applications determined at the hearings level after an appeal is higher in counties with high wait times. This is consistent with appeals taking longer to process than applications allowed at the DDS level. However, both the level and the cross-distribution difference in the percent of applications determined at the hearing stage has fallen over time by 5-7 percentage points across the board. The difference between applications decided at the DDS level and those at the hearings level are comprised of individuals who do not appeal or are denied for technical reasons. The fifth column in Table 1 shows the appeal rate conditional on being denied at the DDS level. Counties with slow processing times have more applications determined at hearings both because more applicants are denied at DDS and because the denied applicants are more likely to appeal in these counties.

Wait times are also longer in areas with more applications per capita. Both female and male allowances per 1,000 are positively correlated with longer wait times, but the allowance rate per application is relatively consistent across counties with different average wait times. This makes it appear as though applicants in regions where SSA has higher workloads face longer wait times. There are no significant changes in the cross-sectional correlation between wait times and applications over time: both wait times and applications increased across the distribution.

Wait times are not associated with the overall allowance rates per application in the early part of the sample, but they become positively correlated in the later part. By 2104, the 10% fastest counties in terms of wait times have a five percentage point lower allowance rate per application than the slowest 10% of counties.

The state in which a county is in is important, but not the whole story. States account for 29% (22%) of the pooled cross-section variation in average (median) wait times an applicant faces and 71% (66%) of the variation in changes in average (median) wait times over the sample time period.

The last characteristic strongly associated with local wait times is population density. This is particularly true for the later time period. In 2014, the areas with the fastest 10% of determinations were almost ten times as dense as those areas with the slowest 10% of applications. The variation in wage rank and housing prices similarly reflects the association of wait times with population density. Figure 2 shows the time series of average wait time of applicants in areas with <500 people per square mile (sqmi); 500-2000 people per sqmi; and >2000 people per sqmi. Each designation accounts for roughly one-third of overall applications. The differences in wait times across counties that vary in terms of population densities is not stable over time. Prior to 2000, the increase in wait times in more urban areas was only a week or two, but then diverges to a difference of several months from after 2000 through 2013, when this difference diminishes.

Wait times do not only vary geographically, but also in terms of demographic characteristics. For example, women face an average mean (median) wait time of 247 (121) days compared to 229 (114) days for men. This gap is remarkably stable over time, as can be seen in the time series graphs in Figure 3. The longer wait times for women correlate with only one factor common to longer wait times at the county level: allowance rates at the DDS versus hearings levels. At the DDS stage, 33% of male applicants are allowed versus only 27.6% of female applicants. This leads to more female applicants moving to the appeal stage (24% versus 22%), even though the appeal rate conditional on denial at DDS is the same for men and women (i.e., one-third of those denied appeal). The differential application rates in urban and rural areas are also similar across genders: they are approximately 2.5 percentage points higher per person aged 21-64 in rural than in urban areas for both men and women. Both male and female applications are also similarly distributed across the four Census regions: Northeast, South, Midwest, and West.

How are differences in wait times spread geographically? Figure 4 divides our county sample into the four main Census regions. It shows that the differences in average wait times are substantial. However, the differences are not stable across regions: the cross-region differences are the smallest both at the beginning and end of our sample period. The ranking of regions in terms of wait times is also not stable over time. The Northeast region starts out as having the longest average wait time, but finishes with the shortest average wait time. The opposite is true

for the West region, which starts out with two weeks shorter average time than the Northeast, but finishes with higher average wait time. Even more striking is the ten years from 1999-2009. During this time, the Midwest and South significantly increase and then decrease wait time relative to the other two regions. At the peak, in 2005, the Midwest region has an average wait time that is eight weeks longer than the Northeast and West regions.

The granularity of our data allows us to look even more closely at the geographical distribution of wait times and their persistence over time. Table 2 lists the counties most often seen in areas where applicants have the top 5% longest and shortest waits times to final determination in a given year, and the number of years these counties appear in these categories. Two observations are of note. First, there is much higher persistence in the slowest counties. Thirteen of the same counties show up in the top 5% of wait times more than half the years of our sample, whereas only two counties are in the bottom 5% of wait times are present for more than half the years. Second, there is important sub-state variation. For example, the county most often in the fastest 5% of wait times (New York, NY) is in the same state as the county most often in the slowest 5% of wait times (Niagara, NY). This highlights the importance of considering factors and policies below the state level.

Another way to summarize the persistence of wait times within counties is to consider the serial correlation of both the raw wait time and the cross-sectional rank of counties in terms of wait times. The one year auto-correlations of the mean (median) wait time is 0.83 (0.78); and the two year auto-correlations are 0.69 (0.63). An auto-correlation of one would imply that the lagged values perfectly predict the future values and an auto-correlation of zero would imply that changes in the wait times are completely random. The values that we find suggest that changes in the wait times have a considerable random component. For example, these values are much lower than the one- and two-year autocorrelation of application rates, which are 0.94 and 0.97 respectively (i.e., close to one). Autocorrelation in rank is similar to autocorrelation in levels, but tells us something about movement within the distribution of counties. The spearman rank measure of auto correlation for the mean and median wait times is 0.83 (0.79); and the two-year rank auto correlation is 0.69 (0.64). This means that time series variation in wait times is not moving all counties in the distribution symmetrically. Instead, there is some reshuffling in the

distribution of which counties tend to have long versus short wait times, relative to the national median.

5. Estimating the Relationship between SSDI Wait Times and Applications

We examine the relationship between SSDI applications and measures of the speed at which recent SSDI applications are processed through to final determination. It is possible that both are affected by common factors, such as sharp changes in economic activity. We therefore control for a range of local socioeconomic and population health characteristics, as well as using a set of fixed effects to control for permanent differences and common shocks.

We combine SSDI application rates with measures of wait times, economic activity, population health and living costs. We estimate a panel data regression model that takes the form:

$$y_{it} = \delta P_{it-1} + X_{it}\beta + \gamma_{it} + \epsilon_{it} \quad (1)$$

In the primary specification, y_{it} is SSDI applications in county *i* and year *t*. In terms of the independent variables on the right-hand side, the primary variable of interest is the average/median SSDI waiting time in each county in the previous year, P_{it-1}. We control for factors that may affect application rates and wait times in a vector X_{it} of county-level characteristics, that are related to economic activity (employment and wage levels); population health (mortality rates); and living costs (housing price index values). We also include some or all of county-level fixed effects, state-level fixed effects, and state-by-year fixed effects, represented by γ_{it}; these control for either permanent differences in state characteristics or time-varying state-level characteristics, respectively. The final term is an error term.

Our primary coefficient of interest in this regression is δ, which provides us with the conditional correlation between current SSDI applications and the SSDI wait times in the previous year. The other variables control for common shocks (via the time dummy variables), persistent differences across states (via the state dummy variables), or other factors that could jointly affect our outcome and main independent variable (like economic activity measures).

Table 3 presents the results of our regression specification with the dependent variable being applications per 1,000 persons aged 21-64. The four columns present different variations of the

regression with different sets of fixed effects. The first column includes no fixed effects. This lumps together all cross-sectional variation at the county level. The second column includes county-level fixed effects. This shows relationships between the change in the county level regressors over time and the application rate. This relies on variation that is within-DDS and within-ALJ areas, since these units typically include several counties. The third column includes state-level fixed effects. This shows the relationship between variation in the regressors and application rates at the county level, both in the cross-section and over time, that is unique to the county and not shared with the state. The final column shows the relationship between time-series variation in the regressors and application rates that are unique to the county and not shared with the state trend. The final two columns showing results from regressions with state fixed effects more or less control for common levels and trends at the DDS level, since DDS processing is mostly common to states.

The coefficient and standard error for our variable of interest, the mean number of weeks to determination in the prior year, is presented in the first row. As might be expected, the relationship between wait time and the application rate is negative: longer wait times in the previous year are associated with lower application rates. This relationship is both statistically significant and of a meaningful magnitude. An increase in the average wait time by one week is associated with 0.04-0.06 fewer applications per thousand residents in the working-age population. This is true in the pooled cross-section controlling for state-level variation by using state fixed effects; these are presented in column 3. It is also the case in the time series variation within a county (column 2) and within a county after controlling for state trends (column 4). The standard deviation of wait times is 50 days and the median (population-weighted) county has 507,000 people aged 21-64. Therefore, an increase in wait time by one standard deviation is associated with 144 fewer applications in a typical county when applying our coefficient estimate from column 3. This amounts to 3.0% of the 4,800 applications filed annually in the median county in our sample.

Another way to think of the magnitude of the relationship between SSDI wait times and applications is to consider the time trend in aggregated data. From 1997 to 2004, the mean national wait time increased from 223 days to 277 days. The working-age population in the

United States is around 200 million. Therefore, our regression specification in column 2 would predict that the 54-day increase between 1997 and 2004 would be associated with approximately 93,600 fewer applications, which is 4.4% of the 2,137,500 applications filed in 2004.

The remaining coefficients on regressors are in the expected direction. The share of the population aged 50-64 and the mortality risk are both positively related to the prevalence of poor health and should then be related to the work limitations that the SSDI program is designed to insure against. Low wages and poverty prevalence are both measures of poor earnings prospects in the local job market. The inability to earn an income above the "Substantial Gainful Activity" threshold could push applicants with a marginal work limitation towards applying for SSDI.

Table 4 presents similar results to Table 3, but separately for males and females. The difference in the relationship between males and females is not statistically significant, but we can still consider the elasticities of applications relative to wait time. The median county in our sample has 246,000 males and 258,000 females aged 21-64. Annual applications from males and females in the median county are 2466 and 2322, respectively. Our results indicate that a one standard deviation increase in wait times (50 days) would be associated with 111 fewer applications for males and 77 fewer for females in the median county each year. This amounts to 3.3% fewer applications for females and 4.5% fewer applications for males.

Table 5 presents the results of our regression specification separately run on an older age group (ages 50-64 years) and younger age group (ages 21-49 years). Again, the difference is not statistically significant, but we can consider the elasticities implied by column (2) and (4). The median county in our sample has 356,000 persons aged 21-49 and 139,000 persons aged 50-64. The younger group submits 2,782 applications per year and the older group submits 2,064. Our results indicate that a one standard deviation increase in wait times by 50 days would be associated with 125 fewer applications from the younger group and with 70 fewer applications from the older group. This amounts to 4.5% fewer applications from the younger group and 3.4% fewer from the older group.

Finally, we repeat our regression design on our main sample with a different dependent variable: the appeal rate conditional on being rejected at the DDS level. This ranges in value from zero (i.e., none appeal) to one (i.e., all appeal). We do this because the determinations finalized at the hearings level take much longer than awards determined at the DDS level. Thus, we expect that an increase in the average time to determination could deter applicants rejected at the DDS level from appealing. The regression results in Table 6 show that this is not the case. A one standard deviation increase in processing time by seven weeks is associated with a 2-4 percentage point increase in the appeal rate. It appears longer wait times are positively correlated with the likelihood an applicant rejected at the DDS-level appeals. There are potential explanations for this result. The first is that longer wait times at the DDS level could lead to a worsening of the applicant's work limitation. The second is that longer wait times could lead to a worsening of the applicant's work potential, be it through a loss in skills, work networks, or other factors that generally provide duration dependence in non-employment. The coefficients on other regressors are also interesting. A one percentage point increase in the share of the population in poverty is associated with a 0.20-0.56 decline in the appeal rate, whereas mortality risk has no impact.

6. Conclusion

We show that wait times for SSDI determinations vary considerably across counties and over time. There is a strong association that provides suggestive evidence that the amount of time that an applicant expects to wait for a decision, as measured by wait times in the county in the previous year, is an important factor in deciding whether to apply for SSDI. Counties that typically have longer wait times have lower application rates than otherwise predicted. Similarly, an increase in wait times within a county over time lowers the application rates than otherwise predicted. Conversely, the share of applicants rejected at the DDS stage who chose to appeal is increasing in wait times, both in the cross section and longitudinally within a county.

It is important to understand the drivers of disability rates. Many studies have documented that SSDI applications are affected by things like economic conditions, demographics, labor force participation, and the amount of SSDI benefits. Understanding the role of wait times is an important aspect, especially as some of time involved depends on SSA resources and policies. Further exploration is important to understand the potential role of SSA policy parameters in

affecting not only the quantity of SSDI applications and allowances, but also which types of applicants change their application and appeal behavior when wait times change.

Finally, our results motivate future research on the implications of variation in wait times for local labor markets. We have found that longer wait times are associated with fewer applications, but the open question remains as to whether marginal applicants who choose not to apply join the work force or use other welfare programs. Similarly, how does the increase in appeal rates associated with longer wait times affect the future economic activity of ultimately denied applicants? These broader consequences are important to understand whether persistent inequities in wait times across geographies impact cross-geography economic inequality, which in turn could even feedback to SSDI application behavior. It is also important to understand whether variations in wait times over the business cycle amplify or mitigate the effect of recessions on labor markets. In addition to understanding the impacts on individual applicant's welfare, establishing these broader macroeconomic impacts is necessary to complete our understanding of the overall impacts of variation in wait times.

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Figure 1: Mean days to final determination by selected deciles of the mean days to final determination distribution.

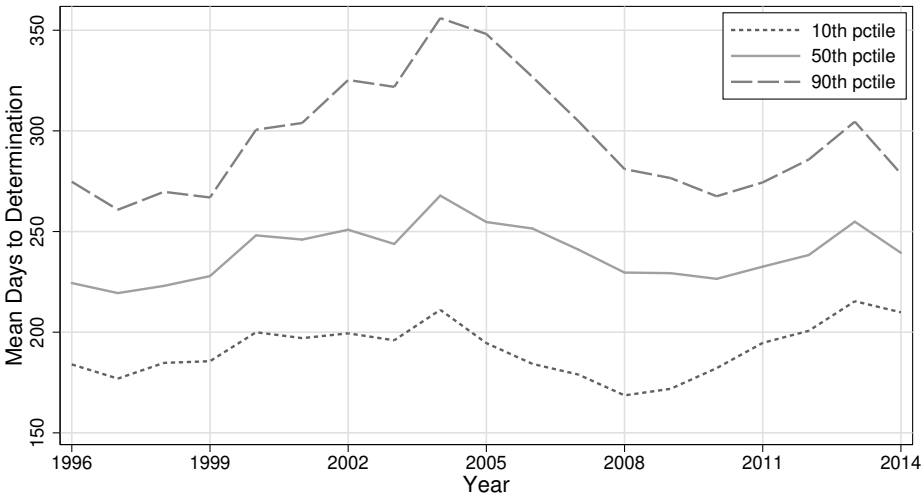

Figure 2: Mean days to final determination by county population density.

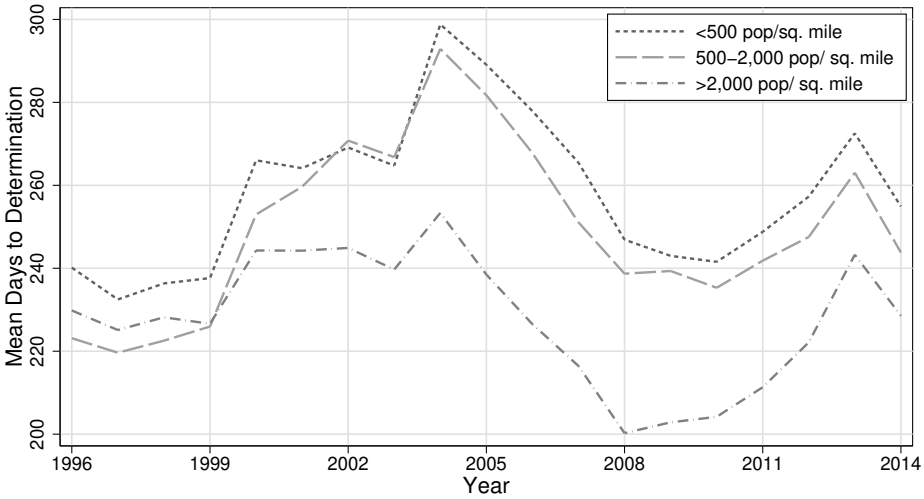

Figure 3: Mean days to determination by sex.

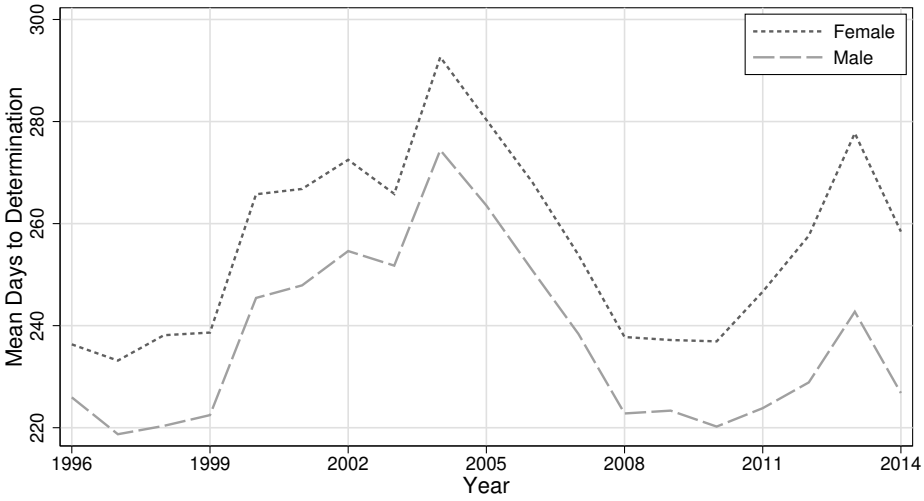

Figure 4: Mean days to determination by census region.

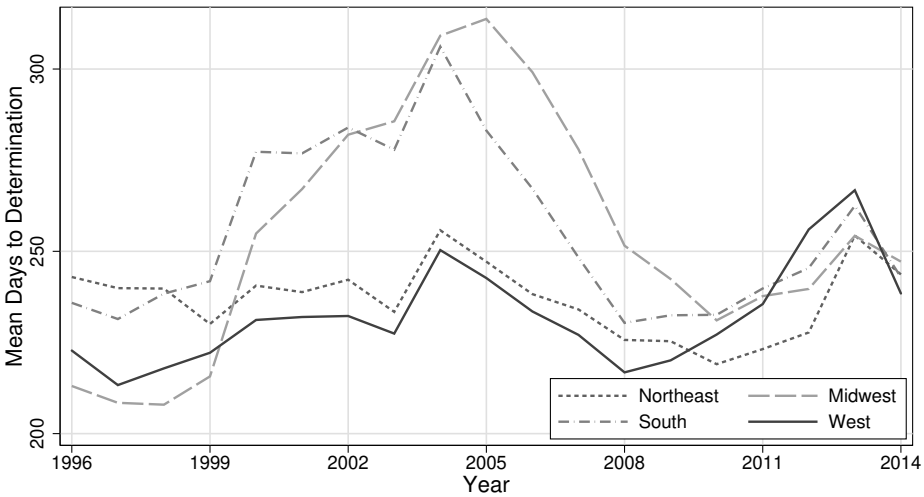

Table 1: County characteristics of applicants with the highest and lowest mean wait times to determination.

	1996				2014			
	Top X%		Bottom X%		Top X%		Bottom X%	
	10%	25%	25%	10%	10%	25%	25%	10%
Mean Days to Determ	305.67	285.81	255.60	246.39	299.97	286.16	261.90	256.11
Median Days to Determ	150.44	140.36	127.76	123.44	136.69	131.79	122.27	120.20
Allow at DDS	0.28	0.30	0.35	0.37	0.22	0.22	0.24	0.24
Det at Hearing	0.34	0.31	0.27	0.27	0.27	0.26	0.23	0.22
Appeal Rate	0.47	0.44	0.40	0.39	0.35	0.34	0.30	0.29
Female Allow	1.46	1.41	1.28	1.17	1.54	1.62	1.24	1.12
Male Allow	2.22	2.02	1.63	1.49	1.77	1.84	1.40	1.23
Allow/Applications	0.52	0.51	0.49	0.50	0.35	0.34	0.31	0.30
Population 50-64	0.25	0.25	0.22	0.22	0.36	0.36	0.32	0.31
Mortality Risk	15.37	15.21	14.89	14.97	12.26	12.20	14.14	14.88
Pop Density	0.76	0.79	0.76	1.04	0.38	0.42	1.99	3.28
House Price Rank	0.50	0.50	0.49	0.49	0.47	0.44	0.61	0.68
Poverty Pct	0.15	0.15	0.11	0.11	0.16	0.16	0.18	0.19
Wage Rank	0.17	0.22	0.36	0.40	0.21	0.23	0.43	0.48

Table 2: Counties frequently in the tails of mean wait time to determination.

Top 5 % Fastest time to Determination		Top 5 % Slowest time to Determination	
Name	# of Years	Name	# of Years
New York, NY	10	Niagara, NY	16
Suffolk, MA	9	Calhoun, AL	14
Caddo, LA	8	Campbell, TN	12
San Francisco, CA	8	Pasco, FL	12
Orleans, LA	7	Sumner, TN	12
Ouachita, LA	6	Etowah, AL	11
San Mateo, CA	6	Hernando, FL	11
		Pueblo, CO	10
		Cobb, GA	10
		Hamblen, TN	10
		Montgomery, TN	10
		Spartanburg, SC	10
		Washington, TN	10

Table 3: Applications per 1,000 persons aged 21-64.

	(1) Applications	(2) Applications	(3) Applications	(4) Applications
Lagged Weeks to Determ	-0.019	-0.060***	-0.040***	-0.059***
	(0.0131)	(0.0119)	(0.0138)	(0.0221)
Population Density /1000	-0.075***	-0.373	-0.060**	-0.060**
	(0.0223)	(0.9526)	(0.0291)	(0.0291)
Percent 50-64	55.425***	61.680***	56.973***	24.941***
	(2.6553)	(4.0850)	(2.8150)	(3.2518)
Mortality Risk	0.830***	-0.219	0.842***	1.032***
	(0.0737)	(0.3749)	(0.0690)	(0.0664)
House Price Index	0.001	-0.003	-0.001	-0.008
	(0.0034)	(0.0037)	(0.0039)	(0.0051)
Log Average Wage	-1.187	-0.175	-1.162*	-3.225***
	(0.7325)	(1.8470)	(0.6866)	(0.8415)
Percent Poverty	34.300***	33.251***	35.037***	17.643***
	(3.6032)	(6.6679)	(3.9421)	(3.7623)
Observations	6300	6300	6300	6300
R^2	0.777	0.888	0.810	0.883
County Effects		Yes		
State Effects			Yes	Yes
State-Year Effects				Yes

Standard errors clustered on county in parentheses.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 4: Applications per 1,000 persons aged 21-64, by sex

	(1)	(2)	(3)	(4)
	Males	Males	Females	Females
Lagged Weeks to Determ	-0.041***	-0.061***	-0.034***	-0.044**
	(0.0143)	(0.0237)	(0.0130)	(0.0178)
Population Density /1000	-0.142**	-0.157***	-0.104*	-0.090
	(0.0583)	(0.0577)	(0.0631)	(0.0651)
Percent 50-64	55.840***	29.231***	57.615***	21.884***
	(2.7693)	(3.2419)	(2.9703)	(3.4059)
Mortality Risk	0.738***	0.884***	0.977***	1.209***
	(0.0645)	(0.0705)	(0.0874)	(0.0746)
House Price Index	0.000	-0.004	-0.002	-0.011**
	(0.0040)	(0.0052)	(0.0039)	(0.0051)
Log Average Wage	-1.115	-2.947***	-1.220*	-3.393***
	(0.6973)	(0.8461)	(0.6988)	(0.8510)
Percent Poverty	36.524***	20.464***	34.289***	16.957***
	(3.8602)	(4.0573)	(4.1006)	(3.7289)
Observations	6300	6300	6300	6300
R^2	0.812	0.878	0.790	0.875
State Effects	Yes	Yes	Yes	Yes
State-Year Effects		Yes		Yes

Standard errors clustered on county in parentheses.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 5: Applications per 1,000 persons, by age group

	(1)	(2)	(3)	(4)
	21-49	21-49	50-64	50-64
Lagged Weeks to Determ.	-0.030**	-0.047**	-0.014	-0.069***
	(0.0126)	(0.0217)	(0.0210)	(0.0261)
Population Density /1000	-0.067**	-0.068**	-0.188***	-0.051
	(0.0266)	(0.0265)	(0.0382)	(0.0420)
Percent 50-64	51.592***	24.925***		-3.190
	(2.5374)	(3.4436)		(3.8375)
Mortality Risk	0.833***	0.978***	0.543***	1.150***
	(0.0724)	(0.0732)	(0.0938)	(0.0865)
House Price Index	-0.004	-0.010*	0.011	-0.004
	(0.0037)	(0.0058)	(0.0071)	(0.0058)
Log Average Wage	-0.907	-2.508***	-2.330**	-4.347***
	(0.6745)	(0.8436)	(0.9551)	(0.9036)
Percent Poverty	26.782***	13.110***	74.641***	31.355***
	(3.9577)	(3.9867)	(5.2809)	(5.2916)
Observations	6300	6300	6300	6300
R^2	0.782	0.859	0.682	0.870
State Effects	Yes	Yes	Yes	Yes
State-Year Effects		Yes		Yes

Standard errors clustered on county in parentheses.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 6: Appeal rate conditional on denial at DDS stage.

	(1)	(2)
	Appeal Rate	Appeal Rate
Lagged Weeks to Determ	0.003***	0.006***
	(0.0003)	(0.0003)
Population Density /1000	-0.002***	-0.002***
	(0.0005)	(0.0005)
Percent 50-64	-0.531***	0.243***
	(0.0543)	(0.0528)
Mortality Risk	0.001	-0.002*
	(0.0013)	(0.0011)
House Price Index	-0.000***	0.000
	(0.0001)	(0.0001)
Log Average Wage	-0.099***	-0.044***
	(0.0130)	(0.0097)
Percent Poverty	-0.562***	-0.204***
	(0.0735)	(0.0726)
Observations	6300	6300
R^2	0.684	0.887
State Effects	Yes	Yes
State-Year Effects		Yes

Standard errors clustered on county in parentheses.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$