Does Disability Insurance Receipt Discourage Work?
Using Examiner Assignment to Estimate Causal Effects of SSDI Receipt

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SSDI Growth Has Sharpened Focus on Constraining Costs

*New evidence on key policy questions*

- Do SSDI recipients have work capacity?
- Who is the marginal SSDI entrant?
- Do long application processing times erode human capital?
- Does the program process cases consistently and efficiently?
Labor Force Participation of SSDI Applicants
2005 Decisions

% earning ≥ $1,000/year

Years after initial decision

Initially Allowed
Initially Denied, Allowed on Appeal
Initially Denied, Denied on Appeal
Initially Denied, No Appeal
Empirical Strategy

- Based on idea that there is an examiner-specific component to allowance thresholds
  - All else equal, cases sent to lower-threshold examiners more likely allowed

- Cases randomly assigned to DDS examiners
  - Creates “as-good-as random” variation in SSDI receipt
  - Instrument for individual’s ultimate award decision with their DDS examiner’s allowance propensity

- First causal estimate of work disincentive effect based on entire population of SSDI applicants
Data

• Disability Operational Data Store (DIODS)
  – Universe of SSDI applications, 2005-2006
  – Workload management database
  – Contains alphanumeric examiner codes

• Master Beneficiary Record (MBR)
  – Link to determine ultimate outcome

• Detailed Earnings Record (DER)
  – Uncapped earnings (Medicare box on W-2)
Summary Statistics

- 2,380,255 disabled worker applications
- 7,193 DDS examiners with 10+ cases
- 37% for musculoskeletal impairments, 22% for mental disorders
- Mean age at application = 47 years
- Mean earnings 3-5 years prior = $22K/year
# System Treats Mental and Musculoskeletal Cases Differently

<table>
<thead>
<tr>
<th>Body System</th>
<th>Obs.</th>
<th>Initial</th>
<th>On Appeal</th>
<th>Ultimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>All</td>
<td>2,380,255</td>
<td>33.5%</td>
<td>31.0%</td>
<td>64.5%</td>
</tr>
<tr>
<td>Musculoskeletal</td>
<td>881,069</td>
<td>23.5%</td>
<td>37.7%</td>
<td>61.2%</td>
</tr>
<tr>
<td>Mental Disorders</td>
<td>513,884</td>
<td>42.5%</td>
<td>24.2%</td>
<td>66.7%</td>
</tr>
</tbody>
</table>

## Key Findings

1/2 of all allowances granted on appeal, 2/3 of musculoskeletal allowances
Deviations from the Mean Allowance Rate by DDS Disability Examiner Raw and Adjusted for Case Mix

Source: DIODS
Data for 2005 and 2006
Examiners with 10 - 900 decisions only
Nearly 1 in 4 SSDI Entrants is Marginal

<table>
<thead>
<tr>
<th>Sample</th>
<th>1st-Stage Coefficient</th>
<th>Relative Likelihood</th>
</tr>
</thead>
<tbody>
<tr>
<td>All</td>
<td>0.234***</td>
<td>1.00</td>
</tr>
<tr>
<td>Musculoskeletal</td>
<td>0.162***</td>
<td>0.69</td>
</tr>
<tr>
<td>Mental Disorder</td>
<td>0.350***</td>
<td>1.49</td>
</tr>
<tr>
<td>Ages 25-29</td>
<td>0.365***</td>
<td>1.56</td>
</tr>
<tr>
<td>Ages 55-59</td>
<td>0.148***</td>
<td>0.63</td>
</tr>
<tr>
<td>Low Past Earnings</td>
<td>0.071***</td>
<td>1.75</td>
</tr>
<tr>
<td>High Past Earnings</td>
<td>0.158***</td>
<td>0.68</td>
</tr>
</tbody>
</table>

Pooled 2005-06 sample.

Key Findings

- Nearly one-quarter of entrants are on the margin of initial allowance.
- The marginal entrant has a mental disorder, is younger, and has low prior earnings.
Causal Effect of SSDI Receipt on Labor Supply Two Years after Initial Decision

<table>
<thead>
<tr>
<th>Mean</th>
<th>OLS</th>
<th>IV</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Allowed</td>
<td>Denied</td>
</tr>
<tr>
<td>LFP: Earnings &gt;=$1000</td>
<td>0.154</td>
<td>0.516</td>
</tr>
<tr>
<td>LFP: Earnings &gt;=SGA</td>
<td>0.052</td>
<td>0.286</td>
</tr>
<tr>
<td>Earnings</td>
<td>$2,012</td>
<td>$8,671</td>
</tr>
</tbody>
</table>

Sample: 2005 initial decisions; control variables include diagnosis codes, age group dummies, avg. previous earnings, DDS dummies and month dummies.

Key Findings

On average, SSDI receipt causes a 21 pp reduction in LFP and $1,600 loss in earnings for the marginal entrant.
Key Finding
LFP among those with high severity impairments would be at most ~10pp higher limited work capacity

Key Finding
LFP among those with low severity impairments would be ~60pp higher significant work capacity
Do Long SSDI Application Processing Times Erode Human Capital?

<table>
<thead>
<tr>
<th>Level</th>
<th>% of cases</th>
<th>Average time to decision</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial</td>
<td>100</td>
<td>131 days (0.37 years)</td>
</tr>
<tr>
<td>Reconsideration*</td>
<td>27</td>
<td>279 days (0.76 years)</td>
</tr>
<tr>
<td>Administrative law judge (ALJ)</td>
<td>36</td>
<td>811 days (2.22 years)</td>
</tr>
<tr>
<td>Appeals council</td>
<td>&lt;5</td>
<td>1,053 days (2.88 years)</td>
</tr>
<tr>
<td>Federal court</td>
<td>&lt;1</td>
<td>1,720 days (4.71 years)</td>
</tr>
</tbody>
</table>


* In 1999, 10 states eliminated reconsideration stage; they are Alabama, Alaska, California (Los Angeles North and West areas), Colorado, Louisiana, Michigan, Missouri, New Hampshire, New York (Brooklyn and Albany areas), and Pennsylvania.
Empirical Strategy

• Based on observation that some DDS examiners are fast while others are slow

• Instrument for applicant’s total waiting time with examiner’s average processing time

Source: 2005 DIQDS Data
Examiners with 10 - 900 decisions only.
Caseload characteristics includes age, diagnosis, concurrent status and application month.
Applicants Lose Human Capital While They Wait

**Preliminary Key Findings**

Each month of waiting time

- Reduces LFP two years after the initial decision by ½ pp
- Reduces annual earnings two years after the initial decision by $86
- Appeals add 22 months waiting time on average → 11 pp reduction in LFP, loss of $1,900 annual earnings
Summary of Key Findings

• The marginal entrant is 21pp (40-140%) less likely to work if he receives SSDI
• But the effect varies with the severity of the impairment
  – Entrants with the least severe impairments are 60 pp less likely to work, while those with most severe impairments are only 10 pp
• Marginal entrant has mental impairment, is young and has low prior earnings
  – Greater expected program duration and medical costs
• 1/2 of all allowances granted by a judge, 2/3 of all musculoskeletal awards
• Long processing times impose significant losses in LFP and earnings on applicants
Backup slides
Figure 1. Five-Step Review Process

Step 1: Engaging in SGA?
- No ➔ Denial
- Yes ➔ Step 2: Severe Impairment?
  - No ➔ Denial
  - Yes ➔ Step 3: Impairment Meet Listing?
    - No ➔ Denial
    - Yes ➔ Step 4: Capacity for Past Job?
      - No ➔ Denial
      - Yes ➔ Allow
    ➔ Step 5: Capacity for Any Job?
      - No ➔ Denial
      - Yes ➔ Allow

- Yes ➔ Allow
Figure 2. SSDI Applications, 1999-2008

First stage using “leave body system out” measure of EXALLOW

<table>
<thead>
<tr>
<th>Body system</th>
<th>No. obs.</th>
<th>Coeff. on EXALLOW</th>
<th>t-stat.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Musculoskeletal</td>
<td>881,058</td>
<td>0.098</td>
<td>11.13</td>
</tr>
<tr>
<td>Mental disorders</td>
<td>513,884</td>
<td>0.251</td>
<td>21.48</td>
</tr>
<tr>
<td>Cardiovascular</td>
<td>195,183</td>
<td>0.166</td>
<td>10.99</td>
</tr>
<tr>
<td>Neurological</td>
<td>194,148</td>
<td>0.207</td>
<td>16.10</td>
</tr>
<tr>
<td>Endocrine system</td>
<td>98,801</td>
<td>0.065</td>
<td>2.78</td>
</tr>
</tbody>
</table>
Unemployment rate (seasonally adjusted)

Note: Cross-hatched area represents recession.

Heterogeneity: First stage

By Age

<table>
<thead>
<tr>
<th>Age group</th>
<th>No. obs.</th>
<th>Allowance rate</th>
<th>Coeff. on EXALLOW</th>
<th>t-stat.</th>
<th>Relative likelihood</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Initial</td>
<td>Ultimate</td>
<td></td>
<td></td>
</tr>
<tr>
<td>18-24</td>
<td>78,946</td>
<td>25.6%</td>
<td>40.2%</td>
<td>0.328***</td>
<td>13.61</td>
</tr>
<tr>
<td>25-29</td>
<td>136,461</td>
<td>23.0%</td>
<td>42.6%</td>
<td>0.365***</td>
<td>21.03</td>
</tr>
<tr>
<td>30-34</td>
<td>156,838</td>
<td>22.8%</td>
<td>48.2%</td>
<td>0.332***</td>
<td>18.98</td>
</tr>
<tr>
<td>35-39</td>
<td>211,452</td>
<td>22.4%</td>
<td>52.9%</td>
<td>0.278***</td>
<td>17.61</td>
</tr>
<tr>
<td>40-44</td>
<td>295,526</td>
<td>21.5%</td>
<td>56.6%</td>
<td>0.222***</td>
<td>16.63</td>
</tr>
<tr>
<td>45-49</td>
<td>370,632</td>
<td>22.4%</td>
<td>62.7%</td>
<td>0.195***</td>
<td>16.08</td>
</tr>
<tr>
<td>50-54</td>
<td>399,274</td>
<td>32.0%</td>
<td>72.9%</td>
<td>0.181***</td>
<td>18.56</td>
</tr>
<tr>
<td>55-59</td>
<td>413,497</td>
<td>50.1%</td>
<td>81.6%</td>
<td>0.148***</td>
<td>17.59</td>
</tr>
<tr>
<td>60-64</td>
<td>317,629</td>
<td>57.1%</td>
<td>72.5%</td>
<td>0.279***</td>
<td>24.74</td>
</tr>
</tbody>
</table>

Pooled 2005-06 sample.
## Heterogeneity: First stage

### By Prior Earnings Quintile

<table>
<thead>
<tr>
<th>Quintile</th>
<th>No. obs.</th>
<th>Allowance rate</th>
<th>Coeff. on EXALLOW</th>
<th>t-stat.</th>
<th>Relative likelihood</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Initial</td>
<td>Ultimate</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 (bottom)</td>
<td>476,051</td>
<td>22.1%</td>
<td>44.2%</td>
<td>0.409***</td>
<td>30.62</td>
</tr>
<tr>
<td>2</td>
<td>476,051</td>
<td>27.2%</td>
<td>59.0%</td>
<td>0.254***</td>
<td>25.08</td>
</tr>
<tr>
<td>3</td>
<td>476,051</td>
<td>31.8%</td>
<td>66.9%</td>
<td>0.199***</td>
<td>20.85</td>
</tr>
<tr>
<td>4</td>
<td>476,051</td>
<td>38.4%</td>
<td>73.3%</td>
<td>0.181***</td>
<td>19.76</td>
</tr>
<tr>
<td>5 (top)</td>
<td>476,051</td>
<td>48.0%</td>
<td>79.3%</td>
<td>0.158***</td>
<td>19.84</td>
</tr>
</tbody>
</table>

Pooled 2005-06 sample.
Initial and final processing times

Source: DIODS data for 2005 and 2006. Examiners with 10 - 900 decisions only. Confidence intervals shown with dashed lines. Final processing times are measured through the appeals stage.
Appeals processing time

Source: DIODS data for 2005 and 2006. Examiners with 10 - 900 decisions only. Confidence intervals shown with dashed lines. Final processing times are measured through the appeals stage.
Disability and labor supply

• Social Security Disability Insurance (SSDI) intended to replace lost wages due to onset of long-term, severe impairment that prevents work
• But dramatic rise in SSDI rolls and changing case mix have led many to question whether SSDI beneficiaries could work if they wanted
• Questions
  – Are SSDI beneficiaries capable of working?
  – Are we letting the “right” beneficiaries in?
• Important policy parameter = effect of SSDI on labor supply & earnings
Our contributions

• We use workload management database that allows us to match applicants to DDS examiners
• We exploit variation in allowance propensities among DDS examiners at initial point in process
• Our strategy allows us to estimate local average treatment effect, i.e., effect for marginal entrant
• We examine characteristics of marginal entrant
• Finally, we estimate heterogeneous treatment effects – on both observed & unobserved dimensions
Brief history of this estimate

• Bound (AER 1989)
  – Proposed using denied applicants as control group for beneficiaries; upper bound (34pp)

• Chen & van der Klaauw (JOE 2008)
  – Exploited discontinuity in probability of allowance at age 55 (RD design) (20pp)

• French and Song (2011)
  – Use variation in allowance rates of judges at hearings level of appeals process (14pp)
Empirical strategy

Two important assumptions:

1. Conditional random assignment of examiners to applicants

2. Monotonicity
   - Implies cases allowed by “strict” examiners will be allowed by “lenient” examiners
   - Examiners who are strict on, say, mental also strict on musculoskeletal cases
Figure 5. DI Receipt and Labor Supply by Initial Allowance Rate

Residualized initial allowance rate
Estimated Effects of SSDI Receipt on Labor Force Participation

2005 decisions - OLS
2005 decisions - IV
2006 decisions - OLS
2006 decisions - IV
## First stage results

<table>
<thead>
<tr>
<th>Dep. var. = ALLOW</th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
<th>(7)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coefficient on EXALLOW</td>
<td>0.338***</td>
<td>0.330***</td>
<td>0.294***</td>
<td>0.235***</td>
<td>0.234***</td>
</tr>
<tr>
<td></td>
<td>(50.14)</td>
<td>(53.13)</td>
<td>(42.74)</td>
<td>(37.97)</td>
<td>(38.42)</td>
</tr>
</tbody>
</table>

**Covariates**

- 3-digit zip codes: X
- Body system codes: X
- Diagnosis codes: X X
- Age, previous earnings, month-year dummies: X

2005-06 decisions pooled. All regressions include DDS dummies; mean dependent variable is 0.65, mean EXALLOW is 0.37; t-statistics in parentheses. Std errors clustered on examiner.
Computing the MTE

Following Heckman, Urzua and Vytlacil (ReStat 2006)

1. Estimate probit of DI receipt on residualized EXALLOW

2. Estimate local quadratic regression of LFP on predicted DI receipt

3. Take numerical derivative
## Heterogeneity: Second stage

### Top Five Impairment Types

<table>
<thead>
<tr>
<th>Body system</th>
<th>No. obs.</th>
<th>Mean LFP</th>
<th>OLS</th>
<th>IV</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Allowed</td>
<td>Coeff.</td>
<td>t-stat.</td>
</tr>
<tr>
<td>Musculo-skeletal</td>
<td>881,069</td>
<td>0.13</td>
<td>-0.35***</td>
<td>303.13</td>
</tr>
<tr>
<td>Mental disorders</td>
<td>513,884</td>
<td>0.19</td>
<td>-0.32***</td>
<td>204.78</td>
</tr>
<tr>
<td>Cardio-vascular</td>
<td>195,183</td>
<td>0.12</td>
<td>-0.32***</td>
<td>131.96</td>
</tr>
<tr>
<td>Neurological</td>
<td>194,148</td>
<td>0.12</td>
<td>-0.37***</td>
<td>140.74</td>
</tr>
<tr>
<td>Endocrine system</td>
<td>98,801</td>
<td>0.13</td>
<td>-0.31***</td>
<td>101.82</td>
</tr>
</tbody>
</table>

Outcome is LFP 2 years later for pooled 2005-06 sample.
Continuous instrument allows us to estimate marginal treatment effect (MTE)

\[
\frac{\partial E[Y | P(Z)]}{\partial P(Z)}
\]

Margin = examiner’s allowance propensity

Applicants on margin for “strict” (“lenient”) examiner have higher (lower) severity

Thus, MTE traces labor supply effect as function of unobserved severity