Disability Insurance and Life-cycle Labor Supply:
Evidence from a Discontinuity in Disability Eligibility*

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Abstract
In the disability determination process medical factors as well as vocational factors (such as age, education and past employment) are used to determine an applicant’s ability to work. The use of vocational factors can lead to significant discontinuities in the strictness of eligibility criteria for benefits as a function of applicants’ characteristics. For example, in the U.S. Social Security Disability Insurance (DI) program applicants 55 years of age or older face relaxed eligibility criteria and as a consequence the award rate exhibits a discontinuous jump at that age cutoff (Chen and van der Klaauw, 2008). Very little is known how reforming these vocational criteria would affect disability enrollment and labor market participation of applicants. This paper helps to fill this gap by exploiting two reforms in Austria’s DI program, which shares several similarities with the U.S. program. The reforms increased the age cutoff for relaxed access to disability benefits in two steps: from 55 to 57 and from 57 to 58. We find that these reform significantly reduced DI awards among older workers. Most of the reduction is due to a mechanical effect, capturing that fewer applicants qualify for benefits under the stricter rules. However, also the behavioral effect, capturing that less people apply for benefits, is relevant.

Keywords: Disability insurance, screening, policy reform, bunching

JEL Codes: J14; J26; J65.

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1 Introduction

In many countries, the share of individuals receiving Disability Insurance (DI) has increased significantly during the last two decades. For example, in the United States 2.6 percent of individuals in the age group of 20 to 64 were receiving DI benefits in 1992, but by 2012 this fraction had risen to 5.3 percent. The rapid expansion of the beneficiary population has generated substantial interest by policy makers and economists in measures that reduce growth in program caseloads and expenditures.

One potential way to slow program growth is to adapt more rigorous eligibility criteria. Specifically, many DI programs determine eligibility of applicants based on how medical and vocational factors such as age, education, and work experience affect the work capacity. The use of vocational factors can lead to significant discontinuities in the strictness of eligibility criteria for benefits as a function of applicants’ characteristics. For example, in the U.S. applicants 55 years of age or older face relaxed eligibility criteria and as a consequence the award rate exhibits a discontinuous jump at that age cutoff (Chen and van der Klaauw, 2008). In 2010, 42.8 percent of initial DI application decisions were made using vocational factors (Wixon and Strand, 2013). Therefore, changes in the consideration of vocational factors could have important effects on DI caseload and expenditure growth. Yet, there is little empirical evidence on this topic.\footnote{In the United States, revisions to the consideration of these vocational factors are currently subject to intense discussions: the SSA and the Congressional Budget Office proposed to tighten the age criteria (Mann et al., 2014).} This project helps to fill this gap by examining the impact of stricter DI eligibility criteria on disability enrollment and labor market participation in Austria.

Studying the Austrian case has several advantages. First, we can use the Austrian Social Security Administration database (ASSD) which contains the complete labor market and earnings histories of all private-sector workers in Austria dating back to 1972. Additionally, we have detailed information on the various stages of the application process for all DI applications since 2004. Second, we are able to exploit exogenous variation in DI eligibility criteria which is generated by several policy reforms. More specifically, prior to 1996 DI eligibility standards were significantly relaxed for workers above age 55 relative to those below age 55. In 1996 (2000) the Austrian government increased the age threshold for relaxed DI access from age 55 to age 57 for men, followed by an analogous increase for women in 2000.
women) followed by further increases to age 58 in 2013, age 59 in 2015, and age 60 in 2017. In this paper, we restrict attention to the changes up to 2013 because our data end in 2015. The combination of detailed labor market and application data and quasi-experimental policy variation gives us the unique opportunity to study the impact of tighter eligibility criteria on DI enrollment and labor force outcomes. Third, certain features of the Austrian labor market and social protection systems are similar to those of the United States. In particular, as described in more detail below, the Austrian reforms we are exploiting are comparable to reforms that have been proposed in the United States.

Our identification strategy is a regression discontinuity design, which exploits quasi-experimental variation in DI eligibility strictness that was introduced by the different policy reforms based on date of birth. For example, the increase in the age threshold for relaxed DI access from age 57 to age 58 in 2013 tightened eligibility standards at age 57 for individuals born in or after December 1955 relative to those born before. Similar regression discontinuity designs by date of birth can be constructed for earlier increases in the age threshold for relaxed DI eligibility.

The insights from our empirical analysis can be summarized by three broad conclusions. First, DI awards are responsive to changes in DI eligibility criteria. We estimate that tightening DI eligibility standards at a certain age reduces DI awards at that age by 1.5–2.7 percentage points (43–54 percent). Yet, we find a significant increase in DI awards at the later age when eligibility standards are relaxed again, suggesting that many individuals simply postpone their application to the new age threshold for relaxed DI access. Second, using data on DI applications we can decompose the reduction in DI awards into a behavioral effect, capturing that less people apply for benefits, and a mechanical effect, capturing that fewer applicants qualify for benefits under the stricter rules. We find that the bulk of the reduction in awards is due to the mechanical effect (between 50 and 67 percent depending on gender) while the behavioral effect is less important (accounting for 33 to 50 percent of the reduction in awards). Third, a one-year increase in the age threshold for relaxed DI access did not increase employment among affected individuals. Rather, they substituted the loss of DI benefits with either unemployment or sickness insurance benefits.

There is a growing empirical literature studying the effects of DI on labor market outcomes (e.g. Autor and Duggan, 2003; de Jong, Lindeboom, and van der Klaauw, 2011; Staubli, 2011; Maestas, Mullen, and Strand, 2013; Moore, 2015; Gelber, Moore,
and Strand, 2016)) but empirical evidence on the effect of eligibility criteria on DI application behavior is scarce. Also, from a theoretical perspective relatively little is known about how imperfect information on disability status should be used to solve the incentive-insurance trade-off in the DI program. Diamond and Sheshinski (1995) and Parsons (1996) discuss medical screening in a static environment. More recently, Denk and Michau (2013) and Low and Pistaferri (2015) assess the optimal screening stringency in a dynamic environment and both conclude that screening stringency is too strict in the U.S. This paper builds on this literature and adds to it by exploring how changes in eligibility criteria affect DI application behavior and labor market outcomes of applicants. In particular, we are able to examine the relative impact of stricter eligibility criteria on DI enrollment due to more people being denied benefits under the stricter rules as opposed to more people self-screening, i.e. seeking DI benefits.

The paper is organized as follows. In the next section we review the institutional background of Austria. In particular, we discuss the disability insurance program and the different reforms to the eligibility criteria for disability benefits. In Section 3 we describe our data and provide some preliminary descriptive evidence of the impact of relaxed eligibility criteria for DI benefits. Section 4 lays out our identification strategy. In Section 5 we discuss our main results. Section 6 draws some policy conclusions.

2 Institutional Background and Policy Reforms

We begin with a short discussion of the Austrian disability insurance (DI) program. We then describe the different policy reforms to the disability determination process. These changes generate quasi-random variation in disability screening among similar individuals which we use in our research design to estimate the labor market consequences of stricter disability screening.

The Austrian DI Program

The Austrian DI program is part of the larger social security system that is financed by a payroll tax on earned income and provides partial earnings replacement to workers below the full retirement age who have accumulated at least 5 insurance years within the last 10 years. Insurance years include both contribution years (i.e., periods of employment, including sick leave) and non-contributory periods of labor
force participation (e.g., unemployment). The required insurance years to be eligible for DI benefits increase by one month for every two months above age 50 up to a maximum of 15 insurance years. The insurance years requirement does not apply if the disability is job-related; for each occupation there exists an explicit list of qualifying impairments. DI benefits are subject to income and payroll taxation and replace approximately 70 percent of pre-disability net earnings up to a maximum of about €4,500. The level of DI benefits received are based on an individual’s earnings history and age. Younger applicants with limited work experience qualify for a special increment to supplement their benefits. DI beneficiaries may continue work, but those earning more than 485 Euros per month lose up to 50 percent of their benefits, depending on their earnings.2

To apply for DI benefits, an individual must submit an application to the local DI office. Employees at the DI office first check whether the applicant has not reached the full retirement age and meets the prior contribution requirement. DI eligibility is not conditioned on earnings, so applicants are not required to stop working in order to apply for benefits. In a second step, a team of disability examiners and physicians assesses the severity of the medical impairment and the applicant’s earnings capacity. An impairment is considered to be severe if it lasts at least six months and limits the applicant’s mental or physical ability to engage in substantial gainful activity. The assessment of the applicant’s residual earnings capacity depends on the vocational factors age and work experience. Unskilled applicants below age 58 are awarded benefits if the earnings capacity has been reduced to less than half of the earnings capacity of a healthy person in any occupation in the economy the individual could be expected to carry out. Eligibility standards are less strict for semi-skilled and skilled applicants below age 58, whose set of occupations is more limited.3 They are awarded benefits if their earnings capacity has been reduced to less than half of the earnings capacity of a healthy person with comparable education in any occupation in the same occupational group.

For applicants who have worked in a similar occupation for 10 years in the last 15 years, eligibility criteria are substantially relaxed at age 58 by changing the comparison from a healthy worker performing any type of work in the economy to a healthy worker in a similar occupation. An occupation is considered similar

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2Ruh and Staubli (2016) show that this policy induces DI beneficiaries to keep their earnings below the exempt threshold in order to retain benefits.

3To be classified as semi-skilled or skilled, an applicant must have worked in a semi-skilled or skilled occupation for 7.5 years or more in the most recent 15 years.
if the following requirements are identical: manual and mental demands, amount of responsibility, posture, concentration, endurance, required care, and stress level (Wörister, 1999). Thus, older applicants are significantly more likely to be awarded benefits, as they are only compared to healthy workers in their occupation. As a consequence of this relaxation, disability enrollment rises significantly beginning at the age threshold.\footnote{Access to disability insurance is also relaxed in other countries at older ages, including Australia, Canada until 1995, Denmark, Sweden until 1997 (Karlström et al., 2008), and the United States (Chen and van der Klaauw, 2008).}

According to official statistics, the acceptance rate for initial DI applications in 2014 was just below 40 percent. About 60 percent of rejected applicants appeal, of whom 20 percent are ultimately awarded benefits, implying an ultimate award rate of 47 percent. Once benefits are awarded, DI beneficiaries receive monthly payments until their return to work, medical recovery or death. DI benefits can be granted for a temporary period if the beneficiary’s health condition is expected to improve. However, very few claimants (fewer than 4 percent) ever leave the DI rolls.

**Reforms of Eligibility for Relaxed DI Screening**

The age threshold for relaxed screening in the disability determination process has been modified several times in the past, as illustrated in Table 1. As a response to deteriorating labor market conditions for older workers, the Austrian government first relaxed DI eligibility standards for unskilled workers above age 55 in January 1981. In January 1984 the relaxation in eligibility standard above age 55 was extended to all workers. On September 1, 1996, as part of an effort to reduce expenditures in the public pension systems and foster employment among older workers, the Austrian government increased the age for relaxed DI access by two years. This increase applied only to men and not to women. However, on May 23, 2000, the European Court of Justice ruled that different DI eligibility criteria for men and women would violate EU law and mandated that the pre-reform age threshold of 55 would apply for men, effective immediately. In response, the government decided on May 24 to increase the age threshold for relaxed DI access to age 57 for men and women for all applications filed after June 2, 2000. This decision was widely discussed in the media and triggered a surge in DI applications; between May 24 and June 1, 2000 as many applications were filed as would normally be filed in a period of four months (Rudda, 2001). In March 2012, the Austrian government...
announced the 2nd Stability Act, which generally reduced the generosity of old age pension benefits. The only change in the DI program was a gradual increase in the age threshold for relaxed DI access. More specifically, the age threshold was increased to age 58 in 2013, followed by further increases to age 59 in 2015 and age 60 in 2017. We restrict attention to the changes up to 2013 because our data end in 2015.

In addition to being above the age threshold, workers also need to have enough insurance or contribution years for their application to be assessed under the relaxed eligibility criteria. As Table 1 shows, workers above the age threshold initially needed 15 insurance years or more to qualify for relaxed screening. However, the government altered the insurance/contribution years requirements in 1993, 1996, 1998, and 2000, making it generally more difficult for applicants above the age threshold to qualify for relaxed screening. Since July 2000 only applicants who have worked in a similar occupation for 10 years within the last 15 years are eligible for relaxed screening above the age threshold.

3 Data and Descriptive Evidence

The empirical analysis is based on administrative data from two different sources. First, the Austrian Social Security Database (ASSD) contains very detailed longitudinal information for the universe of workers in Austria since 1972. At the individual level the data include gender, nationality, month and year of birth, blue- or white-collar status, and labor market history. Labor histories are summarized in spells; all employment, unemployment, disability, sick leave, and retirement spells are recorded. Spells before 1972 are available for individuals who have claimed a public pension by the end of 2008. Since we observe individuals entire work history, we can precisely calculate who satisfies the insurance/contribution years requirements to qualify for relaxed screening above the age threshold. The ASSD also contains some firm-specific information: geographic region, industry affiliation, and firm identifiers that allow us to link both individuals and firms. See Zweimüller et al. (2009) for a detailed description of the data. Second, we use data on all DI applications since 2004 which contain detailed information on the date of the application, the date of the decision, the decision itself (i.e. reject or accept), the
Table 1: Reforms to eligibility for relaxed eligibility

<table>
<thead>
<tr>
<th>Period</th>
<th>Age threshold</th>
<th>Required insurance (iy)/contribution years (cy)</th>
<th>Other requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jan 1981 - Dec 1983</td>
<td>55 unskilled</td>
<td>15iy</td>
<td>none</td>
</tr>
<tr>
<td>Jan 1984 - Jun 1993</td>
<td>55 everyone</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Jul 1993 - Aug 1996</td>
<td></td>
<td>12iy last 24yr/15cy/25iy</td>
<td>2cy last 3yr/3cy last 15yr</td>
</tr>
<tr>
<td>Sep 1996 - Dec 1997</td>
<td>57 men/55 women</td>
<td>15cy last 30yr/20cy</td>
<td></td>
</tr>
<tr>
<td>Jan 1998 - May 2000</td>
<td></td>
<td></td>
<td>6cy last 15yr</td>
</tr>
<tr>
<td>Jun 2000 - Dec 2012*</td>
<td>57</td>
<td>10cy last 15yr in similar occupation</td>
<td>none</td>
</tr>
<tr>
<td>Jan 2013 - Dec 2014</td>
<td>58</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Jan 2015 - Dec 2016</td>
<td>59</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Jan 2017 -</td>
<td>60</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Notes: *The age threshold for relaxed disability screening was age 55 for applications filed between May 24 and June 1, 2000. See text for definition of insurance and contribution years.

Source: Bundesgesetzbücher

reported medical impairment of the applicant, and the stage of the application (first application, appeal etc.). Combining these two datasets allows us to track the career of each DI applicant in great detail both before and after the application decision.

Our main sample includes all private sector workers who are covered by the same pension system and hence face the same eligibility restrictions for DI benefits. We exclude self-employed and civil service workers who are covered by a different pension system. Since we can observe complete work histories, we can precisely calculate whether an individual satisfies the insurance and contribution year requirements needed to qualify for relaxed DI screening. In the analysis, we primarily focus on individuals who are eligible for relaxed screening based on their work history, but we use the sample of ineligible individuals for placebo tests; these individuals should not respond to the changes in the age threshold for relaxed DI screening. The first outcome variable of interest is whether an individual is receiving disability insurance benefits within a certain age range. For example, the 2013 increase in the age threshold for relaxed screening from 57 to 58 is likely to reduce DI receipt.
between ages 57 to 58, but we also examine whether the policy change affected DI receipt before age 57 as well as after age 58. We then examine the impact of raising the age threshold for relaxed DI screening on DI applications and allowances. Here the outcome variable is an indicator for an application or an allowance. The overarching goal of the different reforms was to foster employment among older workers. Therefore, the third outcome variable of interest is whether an individual is working within a certain age range. The fourth set of outcome variables measures whether individuals receive benefits from other social insurance programs such as the unemployment or sickness insurance program. Estimating the magnitude of such spillover effects is important to understand the fiscal and welfare effects of stricter eligibility criteria for disability benefits.

Preliminary evidence for behavioral responses at the age threshold for relaxed DI access is provided in Figure 1, which shows the DI award rate (= the number of DI awards relative to the population) for men and women by age (measured in months) in 2012 and 2014. In 2012, there is clear bunching in DI inflow just to the right of age 57, while for the year 2014 there is bunching just above age 58. These patterns suggest that relaxed eligibility criteria lead to a significant increase in DI inflow. Moreover, the large surge in inflow in the first month after which eligibility criteria are relaxed indicates that individuals are well aware of this rule. For men the magnitude of the spikes at age 57 in 2012 and age 58 in 2014 is very similar while for women the spike at age 58 in 2014 is only half as big as the spike at age 57 in 2012. The reason for this difference is that many women become eligible for early retirement benefits at age 58 (as opposed to age 62 for men) and exit the labor market through this pathway.\footnote{However, the spike at age 58 in 2014 does not completely disappear because only women with a long contribution history are eligible for early retirement benefits.}

## 4 Identification Strategy

The goal of our paper is to explore the impact of tighter screening for disability benefits on DI awards, DI application behavior and labor market participation. To study this question, we use a regression discontinuity design (RDD), which exploits quasi-experimental variation in DI eligibility strictness that was induced by the
Figure 1: DI awards by age and gender for different time periods

(a) DI award rate, men 2012
(b) DI award rate, men 2014
(c) DI award rate, women 2012
(d) DI award rate, women 2014

Notes: Figure shows DI award rates in 2012 and 2014 by age and gender. Age is measured in months. The figure shows that there is a surge in the DI award rate in the first month after individuals become eligible for relaxed DI screening.
Source: Own calculations, based on Austrian Social Security Data.

different policy changes based on date of birth (DOB). We focus primarily on the changes implemented in 2013 and 1996.\footnote{Isolating the effects of the 2000 changes in disability eligibility is more challenging because these changes coincided with an increase in the early retirement age from 55 to 56.5 for women and from 60 to 61.5 for men (see Staubli and Zweimüller, 2013). This problem is more pronounced for women because the same cohorts were affected by both changes. In contrast, for men the cohorts affected by the changes in disability eligibility were born later than those affected by the increase in...}
The 2013 reform tightened disability screening between at age 57 for all individuals born in or after December 1955. These men turned 57 years old in or after December 2012 and their applications would be assessed under the new rules, effective January 1, 2013, because applications are assessed using the rules of the first of the month after filing. In contrast, men born in or before November 1955 could still apply for disability benefits under the old, less stringent rules. Thus, our empirical strategy effectively tests whether we observe a sharp change in DI enrollment (and other outcome variables) at the DOB cutoff between November and December 1955. Similarly, the 1996 reform tightened disability screening at ages 55 and 56 for individuals born in or after August 1941 relative to those born before.

Specifically, we estimate regressions of the following type:

\[
y_i = \alpha + \beta D_i + \gamma_0 (1 - D_i) f(DOB_i - c) + \gamma_1 D_i f(DOB_i - c) + \varepsilon_i,
\]

where \(i\) denotes individual, \(y_i\) is the outcome variable of interest (such as a dummy for DI application, a dummy for DI enrollment, and labor supply measures such an indicator for working), \(D_i\) is a dummy for DOBs in or after a certain year-month (December 1955 for the 2013 reform and August 1941 for the 1996 reform), \(f\) is a function of the difference between the DOB and the cutoff DOB \(c\) at which the new screening rules become effective. The main coefficient of interest is \(\beta\) which measures the change in the outcome variable at the DOB cutoff. We interpret this parameter as an average treatment effect of the change in disability screening, estimated among those at the DOB cutoff. We use robust standard errors throughout the paper.

The main identification assumption is that other factors that could have affected the outcome variable such as health or macroeconomics factors would trend smoothly in DOB, as opposed to the sharp change in DI eligibility at the DOB cutoff. To shed light on the validity of this assumption, we carefully examine the distribution of co-variates of individuals born around the cutoff DOB \(c\). We find no evidence of a significant change in the means of these background variables at the DOB cutoff; all estimates of \(\beta\) are insignificant. Validity of the RD design also requires that affected individuals cannot manipulate the assignment variable, here the DOB (Lee and Lemieux (2010)). Clearly, affected individuals or their parents could not change the DOB in anticipation of the policy change.

The early retirement age. However, it is important to note that the increases in the early retirement age was phased-in very gradually; each quarter of birth the early retirement age was raised by 2 months, while the changes in disability eligibility by birth cohort were more drastic.
In addition to the changes to the disability eligibility criteria, both the 1996 and the 2013 reform reduced the generosity of disability benefits, which could have changed labor force participation and disability enrollment of older workers. However, neither of these changes had a discontinuous effect on benefit generosity around the DOB cutoffs and therefore should not confound our identification strategy. To examine the effect of these other changes, we test whether there are significant discontinuities at the DOB cutoff among individuals who are not eligible for relaxed DI screening based on their work history. Hence, these individuals are only affected by the reduction in benefit generosity, but should not respond to the stricter DI eligibility rules.

5 Main Results

5.1 DI Awards and Applications

We first examine how the increase in the age threshold for relaxed screening from age 57 to 58 affected the probability of a DI award. Figure 2 shows the probability of a DI award at age 57 by DOB for men (left panel) and women (right panel) born between 1954 and 1955. All individuals born to the right of the DOB cutoff, denoted by the vertical line, are only eligible for relaxed screening at age 58 while those born to the left are still eligible for relaxed screening at age 57. Both panels show a sizeable drop in the probability of a DI award at the DOB cutoff, suggesting that the increase in the age threshold for relaxed screening reduced DI awards at age 57.

Figure 3 displays the effect on the probability of a DI award at different ages; each dot represents an estimate of $\beta$ in equation (1) using a linear trend in DOB on both sides of the cutoff. We find that the probability of a DI award at age 57 declines by 2.7 percentage points among men and 1.5 percentage points among women. The policy appeared to have effects beyond age 57 because the probability of a DI award is significantly higher at age 58 for both men and women. This pattern is consistent with a re-timing effect: many men and women who would have been awarded DI benefits at age 57 under the pre-reform rules, now enter the DI program at age 58 under the post-reform rules. On the other hand, estimates for the ages prior to age 57 are very small and statistically insignificant in most cases.
Figure 2: Effect of 2013 change on the probability of a DI award at age 57

(a) Men

(b) Women

Notes: cutoff birth date is December 1955

Figure 3: RD estimates of 2013 change on the probability of a DI award

(a) Men

(b) Women

Notes: Figure shows estimate of the parameter $\beta$ in equation (1) for the probability of a DI award at different ages. Specifications include separate linear trends on both sides of the cutoff.

We next examine whether the effects on the probability of a DI award are similar for the 1996 change. This comparison is interesting because the 1996 change was
more drastic; the eligibility age for relaxed screening was increased by two years as opposed to one year only. We restrict the analysis to men because the increase in the age threshold applied only to men. Figure 4 shows that the probability of a DI award at age 55 is significantly lower for men eligible for relaxed screening only at age 57 (born after the cutoff) relative to those already eligible at age 55 (born before the cutoff). The magnitude of the drop is larger (7.1 percentage points) compared to the 2013 increase, as illustrated in Figure 5. On the other hand, we estimate that the probability of a DI award is positive at the ages 56 to 58, suggesting that some individuals who would have been awarded benefits at age 55 before the policy change now seek benefits at a later age instead.

Figure 4: Effect of 1996 change on time spent on DI at age 55, men

![Graph showing the effect of 1996 change on time spent on DI at age 55, men.](image)

Notes: cutoff birth date is August 1941

To highlight the channels through which stricter eligibility criteria affect the award rate, it is useful to write the probability of an award as follows $Pr(Award) = Pr(Award|Apply) * Pr(Apply)$. Taking the total derivative gives the following expression:

$$\frac{dPr(Award)}{dEligibility} = \frac{dPr(Apply)}{dEligibility} Pr(Award|Apply) + \frac{dPr(Award|Apply)}{dEligibility} Pr(Apply)$$  (2)

13
Notes: Figure shows estimate of the parameter $\beta$ in equation (1) for the share of time spent on DI at different ages. Specifications include separate linear trends on both sides of the cutoff.

Equation (2) shows that the net effect of stricter eligibility criteria on the probability of an award operates through a behavioral and a mechanical effect. The behavioral effect captures that individuals are less inclined to apply for benefits under stricter eligibility criteria; it is equal to the change in the probability of applying times the probability of an award conditional on applying. The mechanical effect captures that even if there is no behavioral effect awards decline simply because fewer applicants qualify for benefits under the stricter rules; it is equal to the probability of an award conditional on applying times the probability of applying. Disentangling these two effects is also important to assess the welfare implications of stricter eligibility criteria. If the behavioral effect is large relative to the mechanical effect, then stricter eligibility criteria may help to reduce moral hazard cost by deterring non-disabled individuals from applying. Yet, if the behavioral effect is small relative to the mechanical effect, then stricter eligibility criteria may reduce the insurance value by increasing the likelihood of rejecting deserving applicants who are severely work limited.

Our setting allows us to separately identify the behavioral and the mechanical effect. We first examine how the 2013 reform affected the probability to apply for benefits. Figure 6 shows the fraction of men (left panel) and women (right panel) born around the DOB cutoff for the 2013 reform who apply for DI benefits at age 57. There is a clear, albeit small drop in the probability to apply at the DOB.
cutoff, suggesting that there is a behavioral effect. The RD estimates of equation (1) for the probability to apply for DI benefits at different ages are displayed in Figure 7. We estimate that the one year increase in the age threshold reduces the probability to apply for DI benefits at age 57 by 1.2 percentage points for both men and women. Interestingly, for men we also estimate a 1.4 percentage point increase in the probability to apply at age 58, suggesting that men who would have applied at age 57 before the policy change now re-time their application to age 58, the new age threshold for relaxed DI access.

Figure 6: Effect of 2013 change on the probability to apply for DI benefits at age 57

(a) Men

(b) Women

Notes: cutoff birth date is December 1955

Next we examine how the 2013 reform affected the probability of an award conditional on applying. Figure 8 shows the probability of an award at age 57 conditional on applying of men (left panel) and women (right panel) born around the DOB cutoff for the 2013 reform. Not surprisingly, we find that the increase in the age threshold for relaxed screening from 57 to 58 significantly reduced the probability of being awarded benefits at age 57 (conditional on applying). The RD estimates plotted in Figure 9 indicate that the probability of an award conditional
Figure 7: RD estimates for probability to apply for DI benefits, 2013 change

(a) Men

(b) Women

Notes: Figure shows estimate of the parameter $\beta$ in equation (1) for the share of time spent on DI at different ages. Specifications include separate linear trends on both sides of the cutoff.

on applying at age 57 declined by 21.6 percentage points for men and 16 percentage points for women.

Figure 8: Effect of 2013 change on the probability of an award conditional on applying at age 57

(a) Men

(b) Women

Notes: Figure shows estimate of the parameter $\beta$ in equation (1) for the share of time spent on DI at different ages. Specifications include separate linear trends on both sides of the cutoff.
Figure 9: RD estimates for probability of an award conditional on applying, 2013 change

Notes: Figure shows estimate of the parameter $\beta$ in equation (1) for the share of time spent on DI at different ages. Specifications include separate linear trends on both sides of the cutoff.

Based on the estimates of stricter eligibility criteria on the probability of applying and the probability of an award conditional on applying, we can now decompose the net effect on DI awards into a behavioral and a mechanical effect. More specifically, to calculate the behavioral effect, we take the point estimate at age 57 from Figure 7 and multiply it with the pre-reform probability of being awarded benefits at age 57 conditional on applying. To calculate the mechanical effect we multiply the point estimate at age 57 from Figure 9 and multiply it with the pre-reform probability of applying for benefits at age 57. As illustrated in column (1) of Table 2, for men we find that the behavioral effect reduces the probability of an award by 0.9 percentage points while the mechanical effect reduces DI awards by 1.7 percentage points. In other words, the behavioral (mechanical) effect accounts for 33% (66%) of the reduction in DI awards. For women we find that the behavioral and mechanical effect each accounts for 50% of the observed reduction in DI awards, i.e. each effect reduces DI awards by 0.7 percentage points (column (3) of Table 2). Table 2 also reports estimates for individuals who are not eligible for relaxed DI screening.
because they do not satisfy the insurance or contribution years requirement (see Table 1). As expected, we do not find any significant impacts of the 2013 reform for this group.

Table 2: Decomposition of change in DI awards into a behavioral and a mechanical effect

<table>
<thead>
<tr>
<th></th>
<th>Men</th>
<th></th>
<th>Women</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Eligible  Non-eligible</td>
<td></td>
<td>Eligible  Non-eligible</td>
<td></td>
</tr>
<tr>
<td>P(award)</td>
<td>-0.027*** 0.001</td>
<td>-0.015***-0.001</td>
<td></td>
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<tr>
<td></td>
<td>(0.003) (0.004) (0.002) (0.001)</td>
<td></td>
<td>(0.003) (0.002)</td>
<td></td>
</tr>
<tr>
<td>pre-reform mean</td>
<td>0.063 0.024</td>
<td>0.028 0.012</td>
<td></td>
<td></td>
</tr>
<tr>
<td>P(apply)</td>
<td>-0.012*** 0.001</td>
<td>-0.012***-0.000</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.004) (0.004) (0.003) (0.002)</td>
<td></td>
<td>(0.003) (0.002)</td>
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<tr>
<td>pre-reform mean</td>
<td>0.080 0.024</td>
<td>0.042 0.027</td>
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<td></td>
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<tr>
<td>P(award</td>
<td>apply)</td>
<td>-0.213*** -0.018</td>
<td>-0.167***-0.008</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.038) (0.048) (0.047) (0.032)</td>
<td></td>
<td>(0.047) (0.032)</td>
<td></td>
</tr>
<tr>
<td>pre-reform mean</td>
<td>0.678 0.257</td>
<td>0.590 0.205</td>
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<td></td>
</tr>
<tr>
<td>Behavioral effect</td>
<td>-0.009</td>
<td>-0.007</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Mechanical effect</td>
<td>-0.017</td>
<td>-0.007</td>
<td>-</td>
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</table>

Another way to shed light on the welfare implications is to study the targeting efficiency of stricter eligibility criteria (Parsons (1991); Gruber and Kubik (1997)). We focus on one aspect of targeting efficiency: the differential effects on DI inflow of more and less healthy workers. Since an individual’s health is unobserved, we approximate the underlying health status using subsequent mortality. More specifically, we group individuals depending on how many years after age 55 they die: within 5 years, 6-8 years, 9-11 years, 12-14 years, and 15 or more years. We restrict the analysis to the 1996 policy change because we need to observe individuals for a sufficiently long time horizon after the policy change. The RD estimates displayed in Figure 10 show that for men who die within 5 years the increase in the age threshold to age 57 had no effect on the share of time spent on DI at ages 55-56. Presumably, this group of men are the least healthy and their utility gains from receiving DI benefits are large. Hence, they should not be screened out in the disability determination process even under strict eligibility criteria. The estimates become negative
and statistically significant for healthier groups of men who continue to live for at least 12 or more years after age 55.

Figure 10: Effect of 1996 change on time spent on DI at ages 55-56 by life expectancy, men

![Figure 10](image)

Notes: Figure shows estimate of the parameter $\beta$ in equation (1) for the share of time spent on DI at different ages. Specifications include separate linear trends on both sides of the cutoff.

5.2 Employment and Benefit Substitution

One of the government’s goals by tightening disability eligibility was to encourage employment among older workers. However, DI is only one of several transfer programs in Austria and individuals may substitute towards these other programs rather than continue to work. Figure 11 plots RD estimates for the time spent in employment, unemployment, and on sick leave at different ages using the DOB cutoff of the 2013 policy change. We find that this change had no impact on employment and other transfer receipt before age 57, except for an increase (decrease) in unemployment (employment) at age 53. These findings suggest that individuals did not change their labor supply behavior in anticipation of the policy change, which is not surprising given that the policy was only announced three months before it became effective. In contrast, at age 57 we find a significant increase in the share of time spent on unemployment and sick leave for both men and women. On the other hand, we do not find any significant effect on employment, though the estimates are
not very precise. The increase in unemployment and sick leave (for men) persist at age 58, but the effects on employment are insignificant.

Figure 11: RD estimates for employment, unemployment, and sick leave absence, 2013 change

Notes: Figure shows estimate of the parameter $\beta$ in equation (1) for the share of time spent on DI at different ages. Specifications include separate linear trends on both sides of the cutoff.

The RD estimates using the DOB cutoff of the 1996 policy change are displayed in Figure 12. Not only increased the 1996 change the age threshold more drastically compared to the 2013 change, it also offers an opportunity to examine labor supply effects at more advanced ages because the post-reform data span a longer time horizon. As for the 2013 change, there are no significant labor supply effects before age 55, the pre-reform age threshold for relaxed screening. On the other hand, we find a large increase in the share of time spent on unemployment at ages 55-56, the age range between the old and the new age threshold for relaxed screening. In contrast to the 2013 change, we also estimate a significant increase in the employment rate at ages 55-56, although the effect is significantly smaller compared to the increase in unemployment. Interestingly, this policy change affected labor supply even after men reached the new age threshold for relaxed screening. More specifically, we find that at ages 57 and 58 unemployment is still significantly higher. All estimates turn insignificant at ages 59 and beyond, except for a decline in unemployment and employment at age 61.
Figure 12: RD estimates for employment, unemployment, and sick leave absence, 1996 change

Notes: Figure shows estimate of the parameter $\beta$ in equation (1) for the share of time spent on DI at different ages. Specifications include separate linear trends on both sides of the cutoff.

6 Conclusion

A large body of literature has found that reducing disability benefits will slow the rate at which workers exit the labor force and enter the DI program. Another policy tool to slow program growth that has received less attention is to adapt more rigorous eligibility criteria for disability benefits. In this paper, we seek to understand how stricter eligibility criteria affect disability enrollment and labor market outcomes by exploiting several reforms in the Austrian DI program that tightening DI eligibility criteria for older workers. More specifically, before 1996 eligibility criteria for disability benefits were significantly relaxed at age 55. Workers above this age threshold would be awarded benefits if they could not perform work in a similar occupation as their last occupation, while workers below the threshold would only qualify for benefits if they could not perform any type of work in the economy. The age threshold for relaxed DI eligibility was increased to age 57 in 1996 for men and in 2000 for women, followed by a further increase to age 58 in 2013. These reforms generated sharp discontinuities by date of birth in the strictness of DI eligibility criteria at certain ages.

We find that the 2013 increase in the age threshold from 57 to 58 reduced the
probability of a DI award at age 57 by 2.7 percentage points among men and 1.5 percentage points among women. The net effect of stricter eligibility criteria on DI awards can be decomposed into a behavioral effect, capturing that less people apply for benefits, and a mechanical effect, capturing that fewer applicants qualify for benefits under the stricter rules. We find that the increase in the age threshold to 58 reduced the probability to apply for benefits at age 57 by 1.2 percentage points for both men and women, while the probability of an award conditional on applying decreased by 21.3 percentage points for men and 16.7 percentage points for women. Together these estimates imply that the mechanical effect accounts for the majority of the reduction in DI inflow (50-67 percent) while the behavioral effect is somewhat less important (34-50 percent).

Overall, our findings suggest that tightening eligibility criteria is an effective tool to reduce DI entry, but whether such a policy is desirable from a welfare perspective is less clear. The fact that the behavioral effect is smaller than the mechanical effect may suggest that moral hazard cost of relaxing eligibility standards might be less important compared to the welfare gains from providing better coverage. In future research, we are planning to make this argument sounder by deriving a sufficient statistics that allows for welfare statements using the estimated reduced-form parameters.
References


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