The Impact of Stricter Criteria for Disability Insurance on Labor Force Participation

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Abstract

This paper studies the effect of a large-scale policy change in the Austrian disability insurance program, which tightened eligibility criteria for men above a certain age. Using administrative data on the universe of Austrian private-sector employees, the results of difference-in-difference regressions suggest a substantial and statistically significant decline in disability enrollment of 6 to 7.4 percentage points and an increase in employment of 1.6 to 3.4 percentage points. The policy change had important spillover effects into the unemployment and sickness insurance program. Specifically, the share of individuals receiving unemployment benefits increased by 3.5 to 3.9 percentage points, and the share receiving sickness insurance benefits, by roughly 0.7 percentage points.

Jel–Classification: H53, H55, J21, J64, J68

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1 Introduction

The Disability Insurance (DI) program is the largest social insurance program in most industrialized countries. In OECD countries, total expenditures on disability benefits account for approximately 2.5 percent of GDP on average (OECD (2009)). The DI program is designed to provide income replacement in the case of a permanent loss of earnings capacity due to poor or deteriorating health, but there are concerns that DI distorts work incentives and is used as a gateway to early retirement. Understanding the incentive effects of the DI program is an important factor in assessing the value of the insurance provided and evaluating the costs and benefits of policy measures that try to reduce disincentives to work.

There is a substantial U.S.-based literature on the work disincentives of the DI program.[1] Behavioral responses to changes in disability insurance have been difficult to estimate, however, because all workers face identical program rules, which makes suitable counterfactuals difficult to find. This paper adds to the literature by exploiting a policy change in the Austrian DI program that tightened DI eligibility criteria for older workers close to retirement age. Since the change in law affected only a subset of workers, the impact of stricter eligibility criteria for DI benefits can be estimated using a difference-in-difference estimation strategy.

The first objective of this paper is to determine how stricter eligibility criteria for DI benefits affect employment and enrollment in the DI program. A second key question is whether tighter eligibility rules lead to enrollment increases in other programs.[2] These spillover effects should be taken into account in designing effective DI policies. The positive employment effect of more rigorous eligibility criteria may be small, to the extent that individuals can claim unemployment

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[1] For an excellent overview of the literature see Bound and Burkhauser (1999) and Autor and Duggan (2006).

[2] Spillover effects between government programs haven been examined in other contexts by Garrett and Glied (2000), Schmidt and Sevak (2004), Bound et al. (2004), and Duggan et al. (2007).

insurance (UI) or sickness insurance (SI) benefits instead.

Since the early 1980s the fraction of the working-age population receiving DI benefits in Austria has remained relatively constant at 8 percent, which is approximately twice as high as in the U.S. The high rate of disability receipt in Austria is due mainly to a relaxation in DI eligibility criteria starting at age 55. Below that age threshold, an individual is generally considered disabled if a medically determinable impairment reduces the ability to work by more than 50 percent relative to a healthy person with comparable education in any type of work in the economy. Above the age threshold of 55 the same individual qualifies for disability benefits if the ability to work is reduced by more than 50 percent relative to a healthy person with comparable education in a similar occupation. As older workers are compared only to the set of workers in their occupation, disability enrollment accelerates dramatically beginning at age 55.

In an effort to improve the fiscal health of the public pension system, on September 1, 1996, the Austrian government implemented the Structural Adjustment Act, which restricts eligibility for early retirement benefits and introduces a bonus/malus system to penalize early retirement and encourage continued labor force participation. The most important change of all, however, was an increase in the age at which conditions for DI benefits are relaxed, from 55 to 57. Because DI enrollment has been particularly high among older men, this increase took effect only for men. Eligibility conditions for women were left unchanged.

Using administrative data from all private sector workers in Austria, the empirical analysis suggests that enrollment in the disability insurance program responded significantly to the tightening in eligibility criteria. The change in law was followed by a lasting decrease of 6 to 7.4 percentage points in the share of disability recipients among 55-56 year old men. The drop in disability enrollment was accompanied by a substantial increase in employment of 1.6 to 3.4 percentage points after the change in law went into effect. On the other hand, the estimates also that the policy change led to an increase in unemployed status

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of 3.5 to 3.9 percentage points and to an increase in sickness insurance receipt of 0.7 percentage points.

The magnitude of any work disincentives created by the disability insurance program depends on the accessibility and generosity of DI benefits. Earlier studies in the literature relied on cross-sectional variation in potential DI benefits relative to previous earnings to estimate the elasticity of labor force participation with respect to benefit generosity (see, e.g., Parsons (1980)). Because the potential DI replacement rate decreases with respect to past earnings, the finding that workers with higher potential DI replacement rates are more likely to seek benefits may simply reflect differences in underlying tastes for work. More recent studies have therefore tried to estimate the behavioral impact of DI benefits using other methodologies. Bound (1989) uses the labor supply behavior of rejected applicants as an upper-bound estimate of the work capacity of DI beneficiaries. His primary finding is that at most one third of DI recipients would have worked had they not received DI benefits. Chen and van der Klaauw (2008) confirm this estimate using more recent data. Exploiting regional variations in DI benefits across Canadian provinces, Gruber (2000) estimates an elasticity of labor force non-participation with respect to DI benefits of 0.28 to 0.36. In this study the level of benefits remains largely constant over the sample period; what changes is the access to disability benefits.

Because disability status can only be observed imperfectly, determining whether program claimants are truly disabled is difficult. Under stricter screening of applicants and tighter eligibility rules, seeking DI benefits is a less attractive option. The effect of screening stringency on labor force participation has been estimated for the U.S. by Gruber and Kubik (1997) and Autor and Duggan (2003). Using variations in denial rates across states as a proxy for screening stringency, Gruber and Kubik (1997) find that stricter screening leads to a significant reduction in labor force non-participation among older men. Autor and Duggan (2003) use the liberalization of the disability determination process in 1984 and

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an unforeseen increase in the earnings replacement rate to explore the impact of the supply of disability benefits on the labor force participation of low-skilled workers. They estimate that the sum of these forces doubles the propensity of high school dropouts to leave the labor force. More recently, De Jong et al. (2010) use a controlled experiment in which some regional DI offices in the Netherlands were instructed to screen applicants more intensively. They find a significant reduction in DI applications in the regions with more intensified screening. Unlike this paper, they find that long-term absenteeism due to sickness decreases with intensified screening. This result is driven by the fact that long-term absenteeism due to sickness is a precondition for DI benefits. Therefore, in the Dutch system as opposed to the Austrian one, the SI program acts as a complement to the DI program rather than as a substitute.

There have been two recent papers estimating the labor supply impact of changes in eligibility criteria for DI benefits. Chen and van der Klaauw (2008) focus on a subset of DI applicants in the U.S. whose disability determination is based on the applicant's age and conclude that the DI program has only a modest impact on labor force participation. This paper estimates a much larger labor supply response, which may reflect differences in the profile of the marginal enrollee in the U.S. as opposed to Austria, and builds on their work by providing evidence that stricter access to DI benefits increases enrollment in other social insurance programs. Furthermore, because the policy change studied in this paper tightens eligibility criteria for all applicants in a certain age group, the empirical analysis is not restricted to applicants only.

Karlström et al. (2008) examine a policy change in Sweden that tightened DI eligibility rules for older workers. As the new eligibility rules were announced 2 years prior to their implementation, there was a large anticipation effect, which causes an upward bias in the estimates. To address this issue, they exclude all observations between the time the policy was announced and the time it was implemented. Because the policy change studied here was announced only a few

months before it was implemented, the anticipation effect was small. Unlike this investigation, Karlström et al. (2008) find that stricter eligibility criteria led to only a small decline in DI enrollment and had no effect on employment. Again this difference could be attributed to differences in the profile of the marginal DI applicant in Sweden as opposed to Austria. In particular, because the reform studied by Karlström et al. (2008) applied only to workers 60 and over, affected individuals were older and potentially less healthy on average.

This paper proceeds as follows. Section 2 describes Austria's social insurance programs and the 1996 reform in the DI program. Section 3 summarizes the data and presents descriptive statistics. Section 4 outlines the empirical strategy. Section 5 presents the results. Section 6 draws conclusions.

2   Background

2.1   Social Insurance Programs in Austria

There are three main social insurance programs in Austria that provide income replacement in the case of a separation from the labor market for economic or health reasons: disability insurance (DI), sickness insurance (SI), and unemployment insurance (UI). Austria's DI program covers all active labor market participants, although different rules apply for the self-employed and civil servants. Once benefits are awarded, DI beneficiaries receive monthly payments until their return to work, medical recovery or death. DI claimants may continue work provided that their earnings fall below a certain threshold (360 Euros per month in 2010). About 15 percent of DI recipients continue to work. Because criteria for disability classification are relaxed for the elderly, the DI program has played an important role in early retirement. Because men first become eligible for old-age pensions at age 60 as opposed to 55 for women, disability enrollment is disproportionately high among older men. In 2008 61 percent of new male DI recipients

and 31 percent of new female DI recipients were older than 55.

DI benefits are subject to income and payroll taxation. The calculation of DI benefits is identical to that of retirement benefits and depends on the assessment basis and the pension coefficient. The assessment basis is determined by the average earnings of the best 15 years after an earnings cap is applied to earnings in each year. The pension coefficient corresponds to the percentage of the assessment basis that is received in the disability pension. The pension coefficient increases with the number of insurance years, which comprise both contributing years (periods of employment, including sickness, and maternity leave) and qualifying years (periods of unemployment, military service, or secondary education). Because older applicants have had more time to accumulate insurance years, DI replacement rates tend to increase with age. As shown in the first column of Table 1, the average net replacement rate for males in the age group 49-50 is 54.5 percent compared to 62.9 percent in the age group 55-56. Younger workers therefore have less of an incentive to seek DI benefits, although applicants under age 50 (age 57 since 1993) qualify for a special increment if their pension coefficient is below 60 percent.

In case of a temporary illness, the employer continues to pay 100 percent of earnings for up to 12 weeks, depending on the length of service. Once the right to full benefits paid by the employer has expired, individuals may claim benefits from the Austrian sickness insurance system, which covers private-sector employees and individuals receiving unemployment benefits. Continued wage payments and sickness benefits are both subject to taxation. As shown in the second column of Table 1, sickness benefits replace 64 percent of the most recent net wage up to the same maximum that applies to disability benefits. Additionally, family allowances are paid. The benefit duration is 52 weeks. However, depending on regulations on funds, sickness benefits may be extended up to 78 weeks.

The Austrian unemployment insurance system covers all employees except for the self-employed, who may choose whether or not to participate. Regular

unemployment benefits depend on previous earnings and may be claimed for a limited period based on previous work history. Specifically, individuals with at least 1 year of employment in the past 2 years receive benefits for 20 weeks, while those who have paid unemployment insurance contributions for 3 years or more in the last 5 years receive benefits for 30 weeks. Individuals aged 50 and older who have worked for 9 years or more of the last 15 receive benefits for 52 weeks. Unemployment benefits are not taxed and replace roughly 55 percent of the prior net wage (column 3 of Table 1). Individuals who exhaust their regular unemployment benefits may apply for unemployment assistance. These means-tested transfers last indefinitely and may be at most 92 percent of regular unemployment benefits.

Table 1

2.2 The 1996 Reform to DI Eligibility Criteria

To be eligible for DI benefits, applicants must suffer a health impairment that will last for at least 6 months and, depending on age, must have accumulated between 5 and 15 insurance years. Because applicants currently in the labor force are eligible for DI benefits, the opportunity cost to seek DI benefits is lower in Austria than in the U.S. system, where non-employment is a precondition of applying for DI. As a result, DI applications may be more responsive to the business cycle in Austria than in the U.S., although labor market conditions play no direct role in the award decision.[3] Approximately 50 percent of benefit applications are rejected. Among those who reapply approximately 15 percent are awarded benefits (OECD (2003)).

As illustrated in Table 2, health eligibility criteria for DI benefits depend on age and whether the applicant is classified as a blue- or white-collar worker.

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[3]See Autor and Duggan (2003) for the success rate of DI applications relative to the business cycle in the U.S.

Blue-collar workers below age 55 are generally eligible for benefits if a medically determinable impairment causes more than 50 percent of a reduction in ability to work relative to that of a healthy person with comparable education in any reasonable occupation that the individual is able to carry out. According to the law, an occupation is reasonable if there exist at least 100 jobs in the field (vacant or occupied) in Austria (Wörister (1999)). In other words, individuals are expected to be completely flexible as to changes in residence. Eligibility criteria are less stringent for white-collar workers below age 55 because the set of changes in occupation applicants must consider is more limited. Specifically, provided they have worked in a similar occupation for 7.5 years or more in the most recent 15 years, white-collar workers are classified as disabled if their ability to work has been reduced to less than 50 percent relative to that of a healthy person with comparable education in any occupation in the same occupational group.

To eliminate legal differences with respect to the self-employed, the Austrian government relaxed DI eligibility criteria for private-sector workers older than 55 in 1981. Specifically, older applicants are classified as disabled if their ability to work has been reduced to less than 50 percent that of a healthy person with comparable education in a similar occupation. An occupation is considered similar if the core requirements are identical: manual and mental demands, amount of responsibility, posture, concentration, endurance, required care, and stress level must be comparable (Wörister (1999)). Because older workers are compared only to the set of workers in their occupation, it is substantially easier for them to qualify for benefits. As an example, consider a server who is unable to carry dishes due to arthritis. Below the age threshold her disability application will be rejected, given that she could still work as a cashier, for example. Above the age threshold, however, she will be awarded a disability pension. As a direct consequence, disability enrollment rises significantly beginning at the age threshold.

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As part of an effort to improve fiscal health and foster employment among older workers, significant changes to the Austrian Pension System went into effect in 1993, 1996, and 2000. While the 1993 and 2000 reforms had little impact on DI eligibility, the 1996 reform reduced disability enrollment among the elderly substantially by increasing the age threshold for easy access to DI benefits from 55 to 57.

The 1993 pension reform, which became effective on July 1, introduced a bonus for retirement after the early retirement age and changed the assessment basis from the most recent 15 years of earnings to the highest 15 years of earnings. Given that wages generally rise with age, the latter change had no effect on disability or retirement pension benefits for most individuals.

In May 1996 the Austrian government enacted the Structural Adjustment Act (Strukturanpassungsgesetz), which became effective on September 1, 1996. The primary objective was to reduce expenditures in the public pension system in order to satisfy the criteria for accession to the European Economic and Monetary Union (see Mairhuber (2003)). Specifically, the reform increased the number of contribution years required for the early retirement pension from 15 to 20, introduced a penalty for claiming benefits before the early retirement age and raised the bonus for retirement after the early retirement age. Although the new penalty for early retirement depended on the applicant's age, the pension coefficient did not vary substantially with retirement age and did not represent a significant change to the pension coefficient in effect before the 1996 reform.

Figure 1

The most important change of all, however, was the two-year increase in the age at which conditions for DI benefits are relaxed. Because disability enrollment is particularly high among older men, this increase only applied to men. Eligibility conditions for women were left unchanged. The consequences of this policy

change are seen in Figure 1, which plots the share of newcomers to the disability rolls by age for men (left panel) and women (right panel) before and after the policy change. As the Figure shows, in the period from January 1994 to August 1996 disability inflow peaked at age 55 for men and women. Following the 1996 reform, the inflow rate for men at age 55 fell by 6 percentage points and increased by 3 percentage points at age 57. For men of other ages and for women there is no significant change in the age distribution of newcomers to the disability rolls, providing informal evidence that the other elements of the reform had no effect on disability enrollment.

On May 23, 2000, the European Court of Justice ruled that different DI eligibility criteria for men and women would violate EU law. In response, on July 1, 2000, the Austrian government set the age at which conditions for disability benefits are relaxed to 57 for both men and women. The 2000 pension reform also gradually increased the minimum retirement age from 55 to 56.5 for women and from 60 to 61.5 for men and raised the penalty for early retirement and the bonus for retirement after the statutory retirement age.

2.3   Hypothesis

By tightening eligibility criteria, the 1996 Structural Adjustment Act decreased the supply of disability benefits for older male workers aged 55 and 56. The basic theory of how eligibility criteria for disability affect labor supply is presented in Diamond and Sheshinski (1995) and Autor and Duggan (2003). Stricter eligibility criteria affect the labor supply behavior of individuals by reducing the fraction of the population who are eligible for disability benefits. As a result, the total share of individuals who seek benefits should decrease because (1) fewer people are awarded benefits and (2) the number of applicants declines due to self-screening (see Parsons (1991)).

The UI and SI program provide further income replacement options in the

event of separation from the labor market for economic or health reasons. These programs may influence the way individuals respond to changes in the DI program. In particular, employed workers who would have qualified for DI benefits under the relaxed eligibility criteria but do not under the stricter criteria may seek UI or SI benefits instead. Moreover, affected individuals need wait only two years (one year for men aged 56) before they reach the new eligibility age at which conditions for disability classification are relaxed. Therefore, UI or SI benefits may be used to bridge the gap until the new eligibility age is reached.

As a result of these forces, the UI and SI enrollment rate should increase after the policy reform because (1) there are fewer transitions from these programs into DI and (2) more transitions from employment into these programs. There should also be an increase in employment because employed workers are less likely to seek DI benefits. However, the positive effect on employment may be small if most employed workers who are no longer eligible for DI benefits claim UI or SI benefits instead.

3 Data

The data come from the Austrian Social Security Database (ASSD), which is described in detail by Zweimüller et al. (2009). The data contains information on all private sector workers in Austria and has two advantageous features. First, the data records all periods of employment, unemployment, sickness, disability and retirement back to 1972, which makes it possible to trace individuals over time and reconstruct an individual's entire labor market history. Second, even when very specific subgroups are considered, sample sizes are large and effects can be estimated with a high degree of precision. At the individual level the data provides information on gender, age, experience, tenure, blue-collar or white-collar status, and the number of contribution and insurance years. The data also contains some firm-specific information such as region and industry affiliation.

Information on applications for DI benefits, regrettably, is not recorded in the data. Therefore, it is impossible to examine the reform's relative impact on DI enrollment due to more people being denied benefits under the stricter rules as opposed to self-screening, i.e. fewer people seeking DI benefits. Similarly, the data does not permit an analysis of the reform's impact on the composition of the beneficiary population since the qualifying impairment of DI awardees is not known.

The main sample consists of all men aged 49-56 working in Austria over the period 1991 to 2002. Individuals are observed on a quarterly basis for approximately 5 1/2 years before the implementation of the Structural Adjustment Act (January 1991 to August 1996) and for roughly 6 1/2 years (September 1996 to December 2002) after the reform takes effect. In light of the significant policy reforms with the potential to affect labor supply which went into effect in 1993 and 2000, the analysis focuses primarily on the years 1994 to 1999.

The sample restrictions are as follows. From the initial sample with 307,572 individuals 2,201 individuals who spent more than one year as public servants are excluded, as they are covered by a separate pension system. Public employees have relaxed eligibility conditions for disability benefits at all ages, which results in a high level of disability enrollment even at lower ages. For the same reason 60,404 individuals who spent more than one year in self-employment are excluded. In order to isolate the effects of stricter eligibility criteria, 8,749 individuals with fewer than five contribution years are also excluded, as they are unlikely to satisfy the non-medical eligibility criteria for disability benefits. The final sample comprises 236,218 individuals.

Table 3 summary statistics by age group before (January 1994 to August 1996) and after the reform (September 1996 to December 1999). Except for the number of insurance years (and therefore the level of disability benefits), there are only minor differences in observable characteristics between the different age groups. A comparison of the fraction of individuals in different labor market states before

and after the 1996 reform provides the first evidence on the impact of the policy change. Specifically, in the treatment group relative to the comparison groups, the rate of disability enrollment declines considerably after the Structural Adjustment Act becomes effective. This decline is accompanied by a substantial rise in registered unemployment. Similarly, the sickness and employment rate increases after the reform, while the residual category remains virtually unchanged.[4]

Table 3

4   Identification Strategy

The empirical strategy to evaluate the 1996 policy reform relies on a difference-in-difference approach. The first difference is over time, as access to disability benefits became stricter after 1996. The second difference is across groups; only men aged 55 and 56 were directly affected by the new eligibility rules for disability. These individuals define the treated group. The definition of the comparison group is crucial, as it should capture counterfactual labor market trends in the absence of the policy change.

One potential comparison group would be all women aged 55 and 56. This group is an inadequate comparison group because over the period under consideration the labor force participation of older women generally increased. Thus, even in the absence of the policy change, trends in employment differ by gender. Moreover, because the early retirement age for women is 55, the labor supply behavior of older women is affected by changes in the early retirement rules. Specifically, the 1996 pension reform raised the number of contribution years

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[4]Unemployment is defined here as being registered at an unemployment office, without necessarily receiving regular unemployment benefits or unemployment assistance. The residual category comprises individuals who are neither employed, registered as unemployed, disabled, nor receiving sickness benefits.

needed to qualify for early retirement from 15 to 20, thereby restricting access to early retirement benefits.

A better comparison group are men aged 53-54. Individuals in this age group are a close substitute for the individuals directly affected by the 1996 reform. On the other hand, forward-looking men in the age group 53-54 could potentially adjust their labor supply behavior as a consequence of the policy change. For example, 53 and 54 year olds who lose a jobs might increase their search effort in light of the fact that after the reform they need to wait at least three years before they reach the new age at which eligibility criteria for DI benefits are relaxed. The empirical analysis will therefore also use men aged 49-50 and men aged 51-52 as comparison groups because they are less likely to change their labor supply behavior.

Alternatively, the stricter eligibility conditions for DI benefits for the age group 55-56 could feed back to the labor demand for the the age group 49-54 via general equilibrium effects. Specifically, the demand for workers below age 55 may decline if workers in the age group 55-56 remain in employment longer after this policy change is in effect. Such spillover effects are likely to be small because the age group 55-56 is much smaller in size than the age group 49-54. To shed light on this concern, it will be instructive to compare labor supply trends in the comparison groups before and after this policy change.

The difference-in-difference comparison is implemented by estimating regressions of the following type:

$$y_{it} = \alpha + \beta \, Treat_{it} + \gamma \, (Post_t \times Treat_{it}) + \lambda_t + X'_{it}\delta + \varepsilon_{it} \qquad (1)$$

where i denotes individual, t time, and y_{it} is the outcome variable of interest. The variable $Treat$ is a dummy for treatment group (1 if treatment, 0 if comparison) to control for group-specific trends; $Post$ is a dummy which is 0 before September 1996 and 1 after September 1996; λ_t is a time fixed effect to control for changes in macroeconomic conditions. The vector X_{it} is a set of individual or region spe-

cific characteristics to control for any observable differences that might confound the analysis (blue-collar status, experience, number of insurance years, previous annual earnings, average earnings over the best 15 years, industry and region dummies, and regional GDP growth rate). The coefficient of interest is γ which measures the effect of stricter DI eligibility criteria on the treated group relative to the comparison group, using variation over time. To explore the impact of the policy reform over time, equation (1) is generalized by replacing $(Post_t \times Treat_{it})$ with a full set of treatment times year interaction terms:

$$y_{it} = \alpha + \beta\, Treat_{it} + \sum_{l=1991}^{2002} \gamma_l\, (d_l \times Treat_{it}) + \lambda_t + X'_{it}\delta + \varepsilon_{it} \qquad (2)$$

where d_l is a dummy that is 1 in year l and 0 otherwise. The pre-1996 interaction terms provide pretreatment specification tests, although they may capture possible anticipation effects. Equation (1) and (2) are estimated for men aged 49-50, 51-52, and 53-54 as comparison groups. The identifying assumption is that there are no unobserved age-group-specific changes that (1) are correlated with the policy change and (2) are correlated with age-group-specific changes in the outcome variable. All observations are clustered at the individual level to account for correlation within observations across time, which may result in an underestimation of standard errors.

5 Results

5.1 Descriptive Evidence

To assess the impact of the change in eligibility criteria for disability graphically, Figure 2 plots labor supply trends in men for the age groups 49-50, 51-52, 53-54, and 55-56 over time. As shown in the top left subfigure, after the change in law the fraction of disabled individuals in the age group 55-56 declines by almost 10 percentage points and then stays fairly constant at the new level of 15 percent.

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As shown in the top right subfigure, in the years following the policy change the unemployment rate of the treatment group begins to rise by roughly 5 percentage points. A similar pattern can be observed for the SI rate (lower left panel). For the age group 55-56 enrollment into the SI program starts growing by around 1 percentage point after the reform. Finally, the lower right panel suggests that despite the large absorption effects by the UI and SI programs, employment in the treatment group clearly increases after the policy change takes effect.

Figure 2

There is evidence of an anticipation effect in the fact that in the year of the reform the disability rate increases for the age group 55-56 while employment and enrollment in the SI program decreases. However, because the reform was made public only in May 1996, individuals had little time to adjust their behavior, so the magnitude of the anticipation effect is relatively small. For the comparison groups, trends in different labor market states are relatively stable over the whole time period. This pattern suggests that the stricter eligibility criteria for the treatment group had no indirect effect on the comparison groups.

Figure 3 reports DI enrollment by age for the years 1994 and 1999. Clearly, after the reform fewer people receive disability benefits at ages 55 and 56. At age 57 disability enrollment starts to catch up and returns roughly to the pre-reform level at ages 58 and 59. Hence, although the Structural Adjustment Act permanently reduces disability enrollment at ages 55 and 56, it seems that most people merely postpone their application for disability benefits until they reach the new age at which conditions to be classified as disabled are relaxed.

Figure 3

5.2 Baseline Results

The first set of results is summarized in Table 4, which shows the OLS estimates of equation (1). The dependent variable is a dummy, which is equal to 1 if an individual is in the state in question and 0 otherwise. The pre-period in the base specification is January 1994 to August 1996 and the post-period is September 1996 to December 1999. These estimates are likely to be biased due to the anticipation effect shown in Figure 2 and because most of the 56 year olds in 1997 still could access disability benefits under the relaxed rules at age 55 in 1996. The last three columns of Table 4 therefore contain the results for an alternative specification that excludes the years 1996 and 1997. All estimates include controls for blue-collar status, experience, insurance years, annual earnings, average earnings over the best 15 years, number of days spent in sick leave through age 49, industry and region dummies, and regional GDP growth rate. Annual earnings and average earnings over the best 15 years are measured at age 49 and adjusted for inflation.

The first row shows that in the base specification the share of disability recipients declined by 4.3 to 5.3 percentage points after this policy change, depending on the comparison group. The decline is more pronounced and varies between 5.98 and 7.44 percentage points if the years 1996 and 1997 are excluded. As shown in Table 4, one direct consequence of the decline in disability enrollment was an increase in unemployment rate by 2.44 to 2.93 percentage points in the base specification and 3.45 to 3.92 percentage points in the specification without the years 1996 and 1997. Similarly, there is a significant increase in the SI rate of roughly 0.47 to 0.70 percentage points after the Structural Adjustment Act is implemented. In spite of the spillover effects to the UI and SI program, employment increased by 1.04 to 2.34 percentage points in the base specification and 1.61 to 3.37 percentage points in the specification without the years 1996 and

1997.[5]

Classifying individuals receiving SI or UI benefits as part of the labor force, the results in the last three columns of Table 4 suggest that this policy change increased labor force participation of 55-56 year old men by 6.1 to 7.5 percentage points. This estimate is considerably larger compared to existing studies. Chen and van der Klaauw (2008) estimate that a relaxation in eligibility criteria at age 55 in the U.S. decreases labor force participation by 5 to 11 percentage points for a group of "marginal" applicants whose disability determination is based on vocational factors and age. However, since this group is relatively small, the overall labor force participation of 55 year olds decreases much less. Karlström et al. (2008) study a similar policy change in Sweden and find no effect on DI inflow nor employment. These differences could be attributed to the difference in characteristics of the marginal DI enrollee across countries.

Table 4

The estimates presented in Table 4 will be biased if the treatment group and the comparison group have different labor supply tendencies. To shed light on this concern, Figure 4 plots the estimated coefficients of the interaction terms (equation (2)) for each of the three comparison groups over the full sample period 1991–2002. Each dot on the solid line is the coefficient of the interaction between an indicator variable for year and treatment (a 95-percent confidence interval is shown by dotted lines). As shown in the top left panel, coefficients for disability enrollment turn significantly negative after the reform is in effect. The estimated decrease is persistent over time and comparable across different comparison groups. There is some evidence for an anticipation effect in 1996. The top right and lower left panels indicate that the decline in disability enrollment

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[5]Equation (1) has also been estimated for the residual category (comprising those who are not employed, unemployed, disabled, nor receiving SI). These results are not presented because the estimated effects are not significant independent of the comparison group.

led to a large increase in the UI and, to a lesser extent, in the SI rate. This finding suggests that these programs act partly as substitutes for the DI program. In spite of these absorption effects, there is a substantial increase in employment, as shown in the lower right panel of Figure 4. In all four panels the estimated coefficients fluctuate around 0 before 1996 thereby providing evidence that the empirical strategy is not simply picking up long-run trends in differences between comparison and treatment groups.

Figure 4

The overall effects shown in Table 4 can result either from changes in the inflow into a certain state, or changes in the persistence in a certain state, or both. To shed light on the importance of these two effects, transitions from and persistence in employment, unemployment, and sickness are examined separately. Disability is considered an absorbing state, given that only a small number of disability beneficiaries return to the labor force.

Figure 5 plots the estimated coefficients on the year treatment interaction terms of equation (2) for transitions from and persistence in employment for all three comparison groups. A 95-percent confidence interval is plotted with dotted lines. The top left subfigure suggests that the 1996 reform led to a decrease in direct exits from the labor market. There is evidence for an anticipation effect, given that the estimated probability of a transition from employment to disability is positive and significant just prior to the reform. As shown in the top right subfigure, there is an increase in transitions from employment to unemployment. Similarly, employed workers are more likely to seek SI benefits after the reform in effect (lower left panel). Finally, the lower right panel suggests that persistence in employment increased after this policy change.

Figure 5

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The estimated interaction term coefficients for transitions from and persistence in unemployment are summarized in Figure 6. The top left subfigure suggests a substantial and significant decline in the probability of a transition from unemployment to disability after the policy reform is in effect, with little evidence of a preexisting trend. However, as in the case of employment, there is an increase in the number of transitions from unemployment to disability just prior to the reform, suggesting some anticipatory behavior. The drop in the number of transitions from unemployment to disability is persistent over time and larger in magnitude than the estimated decline for employment. This finding is consistent with Autor and Duggan (2003) who show that the response to changes in DI eligibility criteria is more elastic for the unemployed because they face low opportunity costs of exiting the labor force to seek benefits than the employed.

Figure 6

The top right subfigure shows that after the change in the law the persistence in unemployment increased in the treatment group relative to the comparison groups. On the other hand, as shown in the lower panels, the stricter eligibility rules for disability benefits had no effect on transitions from the UI to the SI program or into employment. The drop in the number of transitions from unemployment to disability and the increased persistence in unemployment highlight the role of the DI program in reducing measured unemployment.

The last set of results, summarized in Figure 7, explores transitions from sickness into other states. The probability of a transition from sickness to disability drops after the Structural Adjustment Act becomes effective (top left panel). On the other hand, as displayed in the top right subfigure, there is a sizable increase in transitions to unemployment. Similarly, the lower left panel indicates that the change in law increased persistence in sickness. However, this effect is not significantly different from 0 in most cases. Lastly, the lower right panel suggests that the change in law had no effect on transitions to employment.

5.3 Sensitivity Analysis

Tables 5-7 present estimates of the effects from the policy change for different subsamples of individuals. Because health eligibility criteria for disability benefits below the age threshold are less restrictive for white-collar workers than for blue-collar workers, it is instructive to examine the impact of the Structural Adjustment Act on these two groups separately. OLS estimates of equation (1) for blue- and white-collar workers are reported in Table 5. The first row indicates that the reduction in disability status was disproportionately large among blue-collar workers. For this group disability enrollment decreased by 8.01 to 11.20 percentage points, compared to a decline of 1.26 to 1.62 percentage points for white-collar workers.

Interestingly, the pre-reform rate of DI receipt among 55-56 year old blue-collar workers averaged 4.5 times that of white-collar workers of the same age. The ratio is similar for workers younger than 55, in spite of the fact that eligibility criteria are less strict for white-collar workers. For white-collar workers the decline in disability status is completely absorbed by an increase in the inflow into the UI and SI programs but had no effect on employment. Although for blue-collar workers there is also a sizable substitution effect from disability into unemployment and the sickness insurance program, employment increases by 2.68 to 5.95 percentage points after the reform takes effect.

Table 5

Health plays an important role in the determination process for DI benefits. Table 6 presents estimates of effects of the policy change broken down by health status. Health is measured here by the time spent in sick leave in the 15 years prior to age 49. An individual is defined as healthy if he or she has not spent

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any time in sick leave through age 49 (roughly 60 percent of the sample). An individual is defined as unhealthy if the time spent on sick leave in the 15 years prior to age 49 is greater than the median time for individuals with positive sick leave days.

As shown in the first row of Table 6, the reduction in DI enrollment is about three times as large in absolute terms for unhealthy individuals as for healthy individuals. The estimates in the remaining rows suggest that for unhealthy individuals the policy change led to a substantial increase in employment despite large spillover effects into the UI and SI programs. For healthy individuals the decline in DI enrollment is completely absorbed by an increase in unemployment and sick leave.

<center>*Table 6*</center>

To further explore heterogeneity in the effects of the policy change, individuals are grouped into quintiles based on their lifetime earnings at age 49 (as measured by average earnings of the best 15 years). Then equation (1) is estimated separately for each of the five quintiles of the lifetime earnings distribution. The results of this estimation using men aged 51-52 as a comparison group are presented in Table 7. The first row shows that for the lowest quintile of the lifetime earnings distribution disability enrollment decreased by 11.97 percentage points after the policy change. This is a sizable decline which amounts to one quarter of the baseline DI rate. The magnitude of the estimate decreases in absolute terms for higher quintiles, but is constant in relative terms.

This finding is consistent with the evidence that the incentives to seek DI benefits are higher with more generous income replacement rates (see, e.g., Autor and Duggan (2003). In particular, because the DI benefit formula is concave in past earnings and given that maximum DI benefits are truncated at a cap of roughly 2,500 euros per month, high-wage workers replace a lower share of income.

<center>23</center>

The remaining rows of Table 7 consider the effect of the reform on unemployment, sickness, and employment for different quintiles of lifetime earnings. The estimated coefficients indicate a significant increase in the unemployment and sickness rate that is substantially greater among the lower quintiles of the earnings distribution. The decline in disability is associated with a significant increase in employment at the bottom of the lifetime earnings distribution.

<div align="center">

Table 7

</div>

5.4 Financial Implications

The primary objective of the Structural Adjustment Act was to reduce expenditures in the public pension system by encouraging older male workers to increase their labor force participation. The reform tightened the eligibility criteria for disability benefits for older male workers aged 55 and 56, DI having been the main channel for early retirement among elderly men. The results of the empirical analysis presented in the previous sections suggest that the reform succeeded only partially in achieving this goal, given that the positive effect on employment was eroded by large spillover effects into the unemployment and sickness insurance programs.

Based on the estimation results it is possible to estimate the net budgetary savings of the Structural Adjustment Act, as shown in Table 8. Because of the differential impact of the reform on blue- and white-collar workers, these two groups are considered separately. The change in the status of individuals in Table 8 is based on the estimates from Table 5 for the comparison group men aged 51-52. According to the first row in Table 5 the share of blue-collar disability recipients in the age group 55-56 decreased by 9.88 percentage points relative to the rate in the age group 51-52 after the reform became effective. Combining this estimate with the average cohort size of 55-56-year-old blue-collar individuals in the period 1998-1999 implies a drop of 2,008 blue-collar disability recipients each

year (first column of Table 8). Given that in the period after the reform the average blue-collar DI beneficiary received 160 euros per week in benefits for a period of 47.7 weeks per year, the reduction in government expenditure was 15.4 million euros per year. A similar calculation for white-collar individuals yields an additional 2.7 million euros in averted pension payments. Moreover, as a result of the increase in employment, the reform generated additional tax revenues of 4.6 million euros per year from blue-collar workers (column four). Because white-collar employment decreases slightly after the policy change, tax revenues from this group decline by 0.9 million euros.

The savings in government expenditures, however, are offset by additional expenditures in the UI and SI programs due to spillover effects. In particular, the number of blue-collar UI recipients increased by 1,008 and the number of white-collar UI recipients by 362, as shown in column 2 of Table 8. Multiplying these numbers by the average level of UI benefits and the average duration of unemployment implies that the policy change created additional expenditures in the UI program of 6 million euros per year for blue-collar men and 3.2 million euros per year for white-collar men. In addition, as shown in column 3, total SI expenditures increased by 0.5 million euros per year after the reform was put in place. Overall the stricter criteria for disability insurance reduced the government budget deficit by 12.1 million euros per year.

Table 8

6   Conclusion

Relying on a large policy change in Austria, this paper analyzed the impact of a tightening in DI eligibility rules on the labor supply of older workers. As in other industrialized countries, the disability insurance program in Austria is an important gateway to early retirement, especially because conditions to be

classified as disabled are substantially relaxed for older workers aged 55 and above. To further the goal of improving the fiscal health of the public pension system, in 1996 the Austrian government enacted the Structural Adjustment Act. The most significant change brought about by this legislation was a two-year increase in the age at which eligibility rules for disability benefits are relaxed. Because disability enrollment is particularly high among older men, this increase applied only to men.

Relying on a difference-in-difference approach and using data on the universe of Austrian private-sector workers, the empirical analysis suggests that stricter eligibility rules have a significant impact on disability enrollment. Specifically, the share of disability recipients in the affected age group decreased by 6 to 7.2 percentage points after the reform was implemented. The empirical analysis also suggests that any change in the disability insurance program may affect enrollment in other government programs which provide income replacement in the event of separation from the labor market for economic or health reasons. In this case, the share of individuals receiving unemployment benefits increased by 3.2 to 3.9 percentage points and the share receiving sickness insurance benefits, by roughly 0.7 percentage points. On the other hand, the estimates indicate that employment increased by 1.7 to 3.4 percentage points after this policy change. The estimates also suggest that the impact of the reform varies with the characteristics of individual workers, with blue-collar, unhealthy, and low-earning workers showing larger responses than white-collar, healthy and high-earning workers.

The DI program is a large and growing social insurance program in most industrialized countries. Understanding how changes in DI program parameters affect labor supply is extremely important for policy makers. One way to control the size and growth of the DI program is through stricter access to benefits. The estimates presented in this paper suggest that tighter eligibility criteria have a large effect on DI enrollment and are effective in increasing employment, despite large absorption effects by the UI and SI programs.

There is evidence that the demand for DI benefits depends crucially on labor-market conditions (Autor and Duggan (2003)). An examination of workers' records prior to enrollment into disability insurance highlights that a large fraction is unemployed before claiming disability benefits. Thus, the large increases in the unemployment and sickness rate after the change in eligibility rules may also be the consequence of poor labor market prospects for older workers who are still capable of working. The employability of older workers is an important topic for further research.

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Table 1: Net replacement rates in different social insurance programs among males by age groups

Age group	Disability Insurance	Sickness Insurance	Unemployment Insurance
49-50	54.5	64.1	54.6
51-52	57.3	64.1	55.1
53-54	59.8	64.1	55.6
55-56	62.9	64.0	55.3

Source: Own calculations, based on Austrian Social Security Data

Table 2: Health-related eligibility criteria for DI benefits for different groups

Age	Blue collar	White collar
Age < 55	50% reduction in work ability in any reasonable occupation	50% reduction in work ability in any occupation belonging to the same occupational group
Age ≥ 55	50 % reduction in work ability in a similar occupation	50% reduction in work ability in a similar occupation

Table 3: Sample statistics by age groups before and after the 1996 reform

| | Ages 49-50 | | Ages 51-52 | | Ages 53-54 | | Ages 55-56 | |
	Before	After	Before	After	Before	After	Before	After
Labor market states (%)								
Disability	5.20	5.71	7.22	7.68	10.51	10.37	23.24	18.19
Unemployment	8.20	9.48	9.95	10.98	11.93	12.97	10.03	14.04
Sickness	1.20	1.22	1.27	1.34	1.42	1.53	1.04	1.59
Employment	84.04	82.52	79.68	78.34	74.04	73.21	63.32	64.03
Residual	1.36	1.07	1.88	1.66	2.10	1.92	2.37	2.15
Background characteristics								
Blue collar	0.549	0.573	0.534	0.562	0.547	0.545	0.579	0.547
Sick days	46.02	50.49	41.10	47.42	37.88	42.77	39.66	38.33
Experience	13.39	13.31	13.32	13.15	13.22	12.96	12.97	12.71
Insurance years	13.40	13.55	15.03	15.08	16.79	16.55	18.19	18.05
Annual earnings	31,064	31,582	30,769	31,299	30,233	31,008	29,194	30,631
Average earnings	22,340	21,777	22,593	22,144	22,428	22,536	21,752	22,592
Number of observations	261,611	300,613	311,487	305,028	355,443	330,207	335,010	386,340

Notes: "Before" refers to the period from January 1994 to August 1996. "After" denotes the period from September 1996 to December 1999. "Experience" denotes experience in the last 15 years, "sick days" is the sum of days spent in sick leave prior to age 49, and "average earnings" is the average annual earnings over the best 15 years. Annual earnings and average earnings are measured at age 49 and adjusted for inflation.

Table 4: Impact of reform on disability, unemployment, sickness, and employment

	Base specification			Without transition years		
	49-50	51-52	53-54	49-50	51-52	53-54
Disability						
Post×Treat	-5.30***	-5.00***	-4.30***	-7.44***	-6.58***	-5.98***
	(0.22)	(0.24)	(0.22)	(0.27)	(0.30)	(0.26)
Treat	14.38***	12.53***	10.25***	13.96***	12.06***	9.82***
	(0.18)	(0.18)	(0.16)	(0.20)	(0.20)	(0.18)
R^2	0.293	0.293	0.293	0.289	0.289	0.290
Mean		23.29			22.63	
Unemployment						
Post×Treat	2.44***	2.91***	2.93***	3.45***	3.79***	3.92***
	(0.20)	(0.22)	(0.20)	(0.25)	(0.27)	(0.24)
Treat	0.15	-1.56***	-3.10***	0.27	-1.47***	-2.97***
	(0.16)	(0.15)	(0.13)	(0.18)	(0.17)	(0.15)
R^2	0.143	0.143	0.149	0.150	0.151	0.155
Mean		10.04			9.93	
Sickness						
Post×Treat	0.60***	0.57***	0.47***	0.70***	0.68***	0.57***
	(0.06)	(0.06)	(0.06)	(0.07)	(0.07)	(0.07)
Treat	-0.33***	-0.41***	-0.48***	-0.34***	-0.41***	-0.46***
	(0.05)	(0.04)	(0.04)	(0.05)	(0.05)	(0.05)
R^2	0.015	0.013	0.013	0.017	0.014	0.015
Mean		1.04			1.10	
Employment						
Post×Treat	2.34***	1.60***	1.04***	3.37***	2.21***	1.61***
	(0.22)	(0.24)	(0.21)	(0.28)	(0.30)	(0.26)
Treat	-14.64***	-10.55***	-6.70***	-14.39***	-10.27***	-6.48***
	(0.20)	(0.19)	(0.15)	(0.23)	(0.21)	(0.18)
R^2	0.483	0.484	0.494	0.484	0.483	0.494
Mean		63.29			63.94	
Observations	1,283,574	1,337,865	1,407,000	824,286	881,394	914,166

Notes: This table reports coefficients from a linear probability model. Standard errors, in parentheses, are clustered at the individual level. Coefficient estimates and standard errors are multiplied by 100 and should be interpreted as percentage points. Details on the specifications are provided in the main text. The time period is 1994-1999 for the base specification. "Without transition years" excludes observations from 1996 and 1997. Reported means are for the age group 55-56 over the pre-reform period. Significance levels: *** = 1%, ** = 5%, * = 10%.

Table 5: Impact of reform for blue collar and white collar workers

	Blue collar			White collar		
	49-50	51-52	53-54	49-50	51-52	53-54
Disability						
Post×Treat	-11.20***	-9.88***	-8.91***	-1.62***	-1.55***	-1.26***
	(0.42)	(0.46)	(0.40)	(0.27)	(0.30)	(0.27)
Treat	19.57***	17.21***	14.10***	4.85***	4.13***	3.17***
	(0.32)	(0.30)	(0.27)	(0.20)	(0.20)	(0.18)
R^2	0.308	0.304	0.298	0.151	0.153	0.157
Mean		33.31			7.45	
Unemployment						
Post×Treat	4.11***	4.96***	5.46***	2.29***	2.00***	1.60***
	(0.37)	(0.40)	(0.36)	(0.31)	(0.33)	(0.30)
Treat	-0.63**	-3.00***	-5.07***	2.60***	1.35***	0.29
	(0.27)	(0.26)	(0.23)	(0.23)	(0.22)	(0.19)
R^2	0.134	0.131	0.134	0.186	0.192	0.200
Mean		11.46			7.75	
Sickness						
Post×Treat	1.17***	1.08***	0.93***	0.13**	0.21***	0.14**
	(0.12)	(0.12)	(0.12)	(0.06)	(0.06)	(0.05)
Treat	-0.66***	-0.72***	-0.78***	-0.02	-0.10***	-0.08**
	(0.09)	(0.08)	(0.07)	(0.04)	(0.04)	(0.03)
R^2	0.015	0.013	0.014	0.009	0.007	0.006
Mean		1.63			0.35	
Employment						
Post×Treat	5.95***	3.82***	2.68***	-0.77**	-0.48	-0.42
	(0.41)	(0.44)	(0.37)	(0.37)	(0.38)	(0.34)
Treat	-18.84***	-13.48***	-8.29***	-8.08***	-5.74***	-3.69***
	(0.33)	(0.31)	(0.25)	(0.29)	(0.27)	(0.23)
R^2	0.474	0.463	0.469	0.407	0.417	0.432
Mean		51.40			81.74	
Observations	463,373	491,165	509,886	360,913	390,229	404,280

Notes: The Table reports coefficients from a linear probability model. Standard errors, in parentheses, are clustered at the individual level. Coefficient estimates and standard errors are multiplied by 100 and should be interpreted as percentage points. All estimates include controls for experience, insurance years, annual earnings, average earnings over the best 15 years, number of days spent in sick leave through age 49, industry and region dummies, and regional GDP growth rate. Annual earnings and average earnings are measured at age 49 and adjusted for inflation. The pre-period is 1994-1995 and the post period is 1998-1999. Reported means are for the age group 55-56 over the pre-reform period. Significance levels: *** = 1%, ** = 5%, * = 10%.

Table 6: Impact of reform for unhealthy and healthy individuals

	Unhealthy			Healthy		
	49-50	51-52	53-54	49-50	51-52	53-54
Disability						
Post×Treat	-12.39***	-10.87***	-9.70***	-3.94***	-3.49***	-3.28***
	(0.87)	(0.94)	(0.77)	(0.27)	(0.29)	(0.27)
Treat	22.65***	18.83***	15.49***	7.99***	7.20***	6.02***
	(0.62)	(0.57)	(0.49)	(0.21)	(0.21)	(0.19)
R^2	0.297	0.304	0.309	0.190	0.180	0.180
Mean		43.54			12.00	
Unemployment						
Post×Treat	4.13***	4.65***	5.31***	2.65***	2.74***	2.67***
	(0.76)	(0.82)	(0.69)	(0.26)	(0.29)	(0.27)
Treat	-4.80***	-5.21***	-6.05***	1.97***	0.19	-1.36***
	(0.51)	(0.48)	(0.41)	(0.20)	(0.20)	(0.18)
R^2	0.125	0.124	0.119	0.157	0.162	0.179
Mean		12.85			8.02	
Sickness						
Post×Treat	1.14***	1.25***	1.17***	0.46***	0.45***	0.30***
	(0.27)	(0.24)	(0.23)	(0.07)	(0.07)	(0.07)
Treat	-2.42***	-1.69***	-1.38***	0.13***	-0.05	-0.10**
	(0.19)	(0.16)	(0.14)	(0.05)	(0.05)	(0.04)
R^2	0.012	0.012	0.013	0.013	0.012	0.013
Mean		1.76			0.70	
Employment						
Post×Treat	7.05***	5.11***	3.29***	0.77**	0.34	0.38
	(0.73)	(0.73)	(0.61)	(0.33)	(0.36)	(0.32)
Treat	-15.81***	-12.07***	-8.16***	-10.57***	-7.41***	-4.62***
	(0.57)	(0.51)	(0.41)	(0.27)	(0.26)	(0.22)
R^2	0.466	0.485	0.502	0.398	0.394	0.414
Mean		40.31			76.49	
Observations	163,940	172,853	178,202	492,909	532,948	553,882

Notes: This table reports coefficients from a linear probability model. Standard errors, in parentheses, are clustered at the individual level. Coefficient estimates and standard errors are multiplied by 100 and should be interpreted as percentage points. All estimates include controls for blue-collar status, experience, insurance years, annual earnings, number of days spent in sick leave through age 49, industry and region dummies, and regional GDP growth rate. Annual earnings are measured at age 49 and adjusted for inflation. The pre-period is 1994-1995 and the post period is 1998-1999. Reported means are for the age group 55-56 over the pre-reform period. Significance levels: *** = 1%, ** = 5%, * = 10%.

Table 7: Impact of reform by quintiles of earnings over the best 15 years

	1st Quintile	2nd Quintile	3rd Quintile	4th Quintile	5th Quintile
Disability					
Post×Treat	-11.97***	-8.12***	-5.70***	-4.07***	-0.59***
	(0.91)	(0.72)	(0.63)	(0.52)	(0.20)
Treat	20.66***	15.48***	10.86***	7.80***	1.47***
	(0.57)	(0.49)	(0.43)	(0.36)	(0.14)
R^2	0.267	0.283	0.274	0.222	0.073
Mean	43.40	30.43	22.35	14.86	2.10
Unemployment					
Post×Treat	6.51***	4.91***	3.45***	1.91***	-0.08
	(0.82)	(0.62)	(0.59)	(0.52)	(0.29)
Treat	-6.35***	-2.25***	-0.12	1.76***	1.53***
	(0.48)	(0.40)	(0.40)	(0.36)	(0.19)
R^2	0.120	0.130	0.155	0.171	0.089
Mean	14.22	10.39	11.53	10.53	2.98
Sickness					
Post×Treat	1.17***	0.80***	0.72***	0.61***	0.10*
	(0.22)	(0.19)	(0.16)	(0.14)	(0.06)
Treat	-1.39***	-0.63***	-0.16	-0.15*	0.06**
	(0.16)	(0.12)	(0.10)	(0.09)	(0.03)
R^2	0.011	0.013	0.013	0.013	0.009
Mean	1.70	1.55	1.24	0.86	0.14
Employment					
Post×Treat	4.45***	2.62***	1.61**	1.98***	0.83**
	(0.80)	(0.72)	(0.66)	(0.59)	(0.39)
Treat	-12.65***	-12.70***	-10.60***	-9.87***	-3.89***
	(0.54)	(0.52)	(0.49)	(0.44)	(0.26)
R^2	0.402	0.424	0.463	0.459	0.286
Mean	39.92	55.93	62.09	70.22	92.52
Observations	176,264	176,289	176,273	176,239	176,329

Notes: The Table reports coefficients from a linear probability model using men aged 51-52 as a comparison group. Standard errors, in parentheses, are clustered at the individual level. Coefficient estimates and standard errors are multiplied by 100 and should be interpreted as percentage points. All estimates include controls for blue-collar status, experience, insurance years, annual earnings, number of days spent in sick leave through age 49, industry and region dummies, and regional GDP growth rate. Annual earnings are measured at age 49 and adjusted for inflation. The pre-period is 1994-1995 and the post period is 1998-1999. Reported means are for the age group 55-56 over the pre-reform period. Significance levels: *** = 1%, ** = 5%, * = 10%.

Table 8: Cost-benefit analysis

	ΔDI expenses (A)	ΔUI expenses (B)	ΔSI expenses (C)	Δtax revenues (D)	Δbudget deficit (A+B+C-D)
Blue collar					
Δindividuals	-2,008	1,008	219	776	
Avg. duration (weeks)	47.7	36.0	11.1	42.0	
Weekly avg. transfer (2002 euros)	160	165	165	142	
Annual Δtotal (million euros)	-15.4	6.0	0.4	4.6	-13.7
White collar					
Δindividuals	-280	362	38	-87	
Avg. duration (weeks)	46.9	41.7	9.4	48.6	
Weekly avg. transfer (2002 euros)	202	213	230	204	
Annual Δtotal (million euros)	-2.7	3.2	0.1	-0.9	1.5
					-12.2

Notes: "Δ Individuals" is calculated based on the estimates in Table 5 for the comparison group men aged 51-52 and the average cohort size of 55-56 year olds in the period 1998-1999 with blue-collar and white-collar status, respectively. DI benefits, UI benefits, and SI benefits are net of taxes.
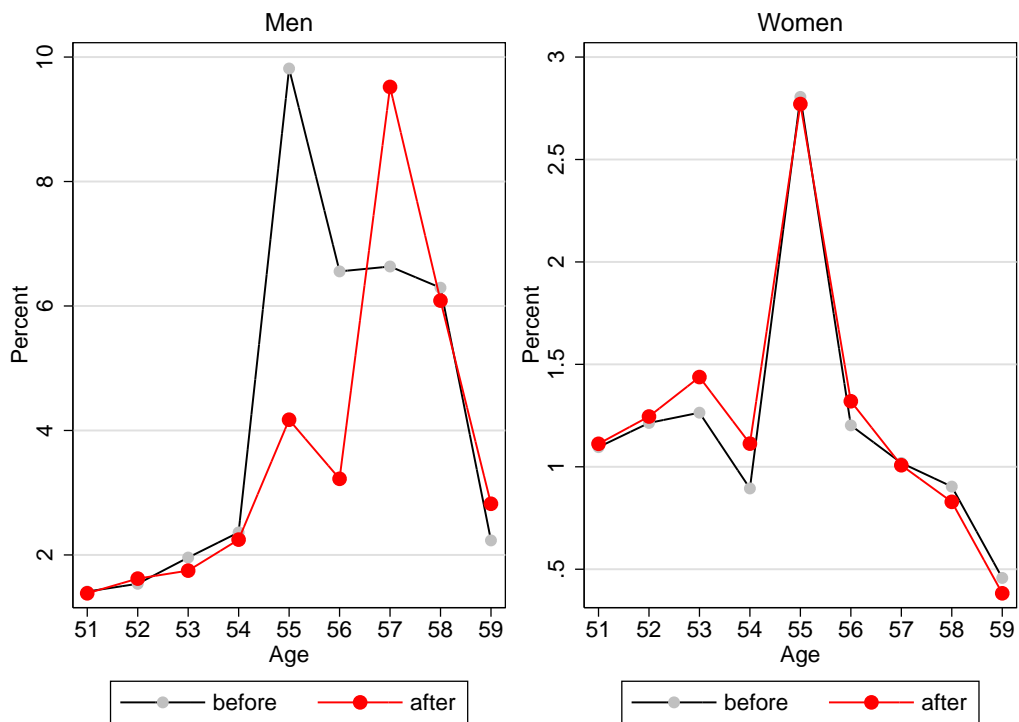
Figure 1: New enrollees in the DI program by age and gender before (Jan 1994-Aug 1996) and after (Sep 1996-Dec 1999) the reform takes effect.

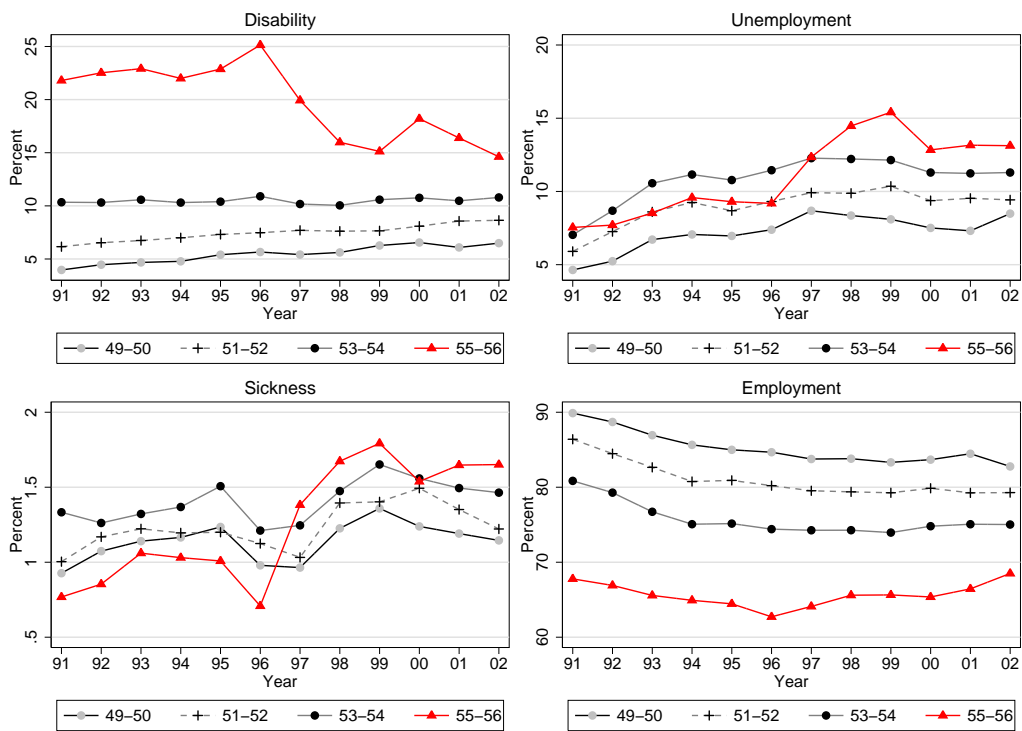Source: Own calculations, based on Austrian Social Security Data.

Figure 2: Trends in disability, unemployment, sickness, and employment over the period 1991-2002 among males in different age groups.

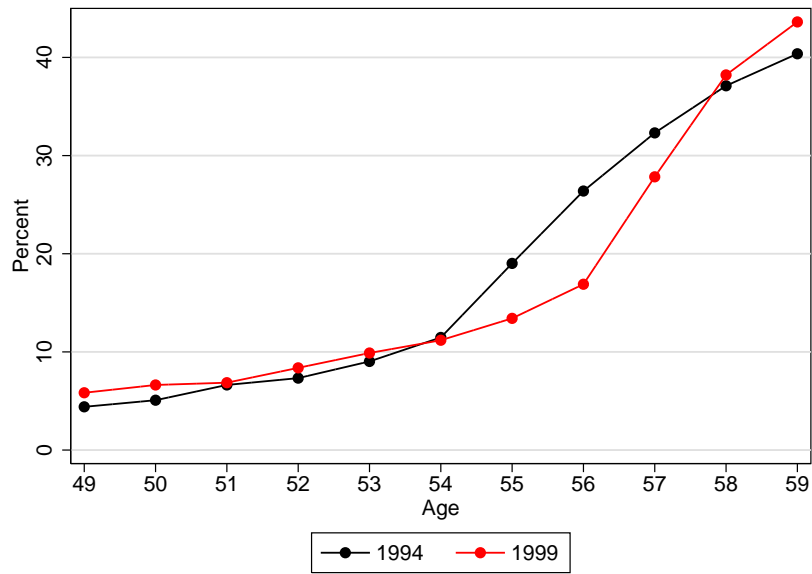Source: Own calculations, based on Austrian Social Security Data.

Figure 3: Percentage of men receiving DI benefits by age, 1994 and 1999.
Source: Own calculations, based on Austrian Social Security Data.
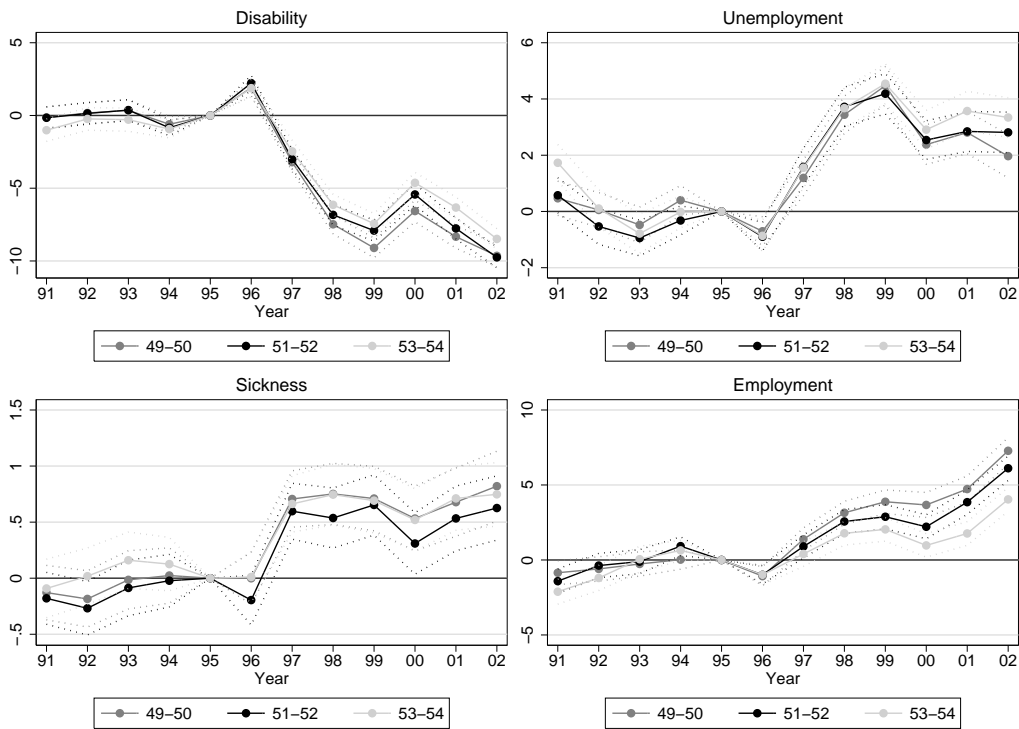
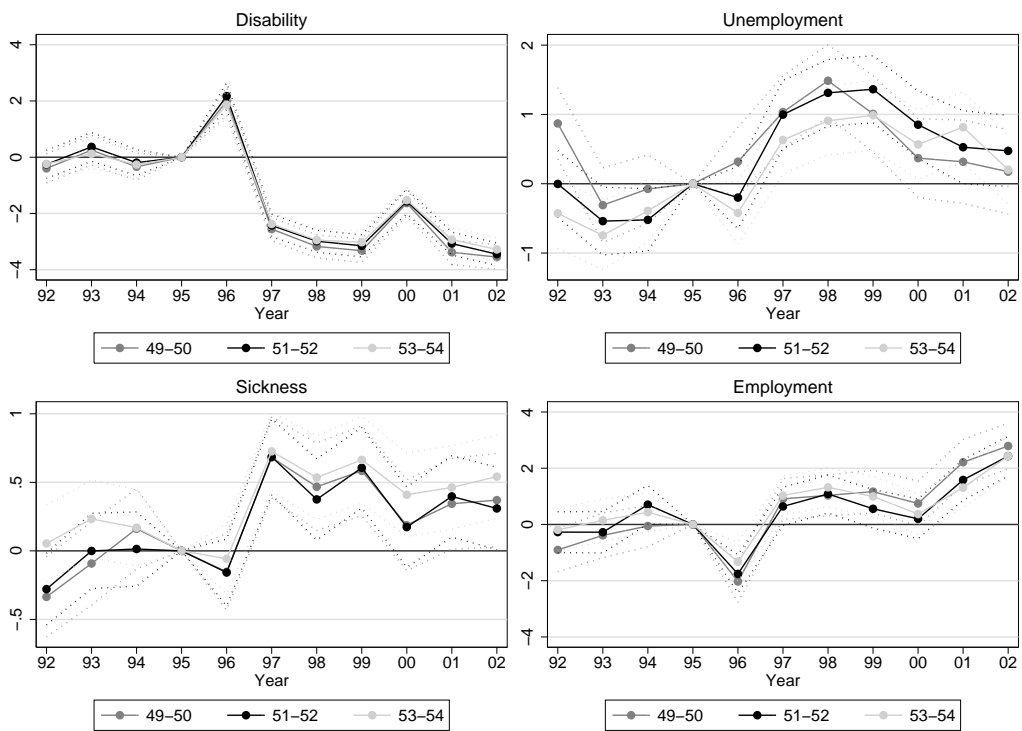Figure 4: Coefficients of the interaction year $\times$ treatment in equation (2) for different states, with 95-percent confidence interval

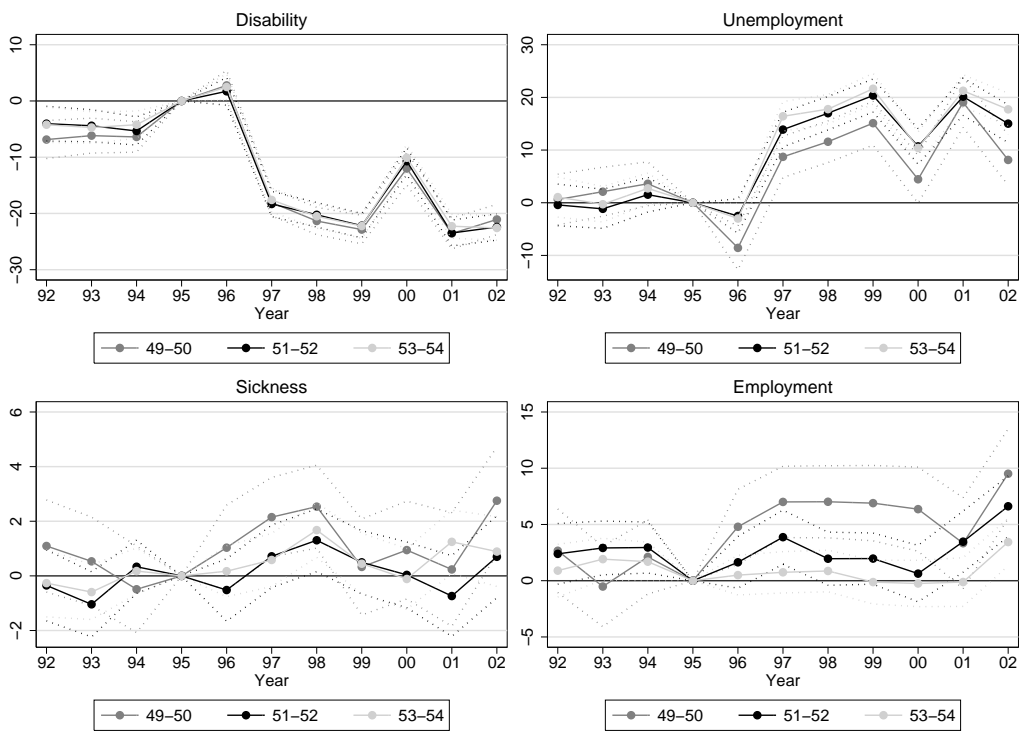Figure 5: Coefficients of the interaction year × treatment in equation (2) for transitions from employment, with 95-percent confidence interval

Figure 6: Coefficients of the interaction year × treatment in equation (2) for transitions from unemployment, with 95-percent confidence interval
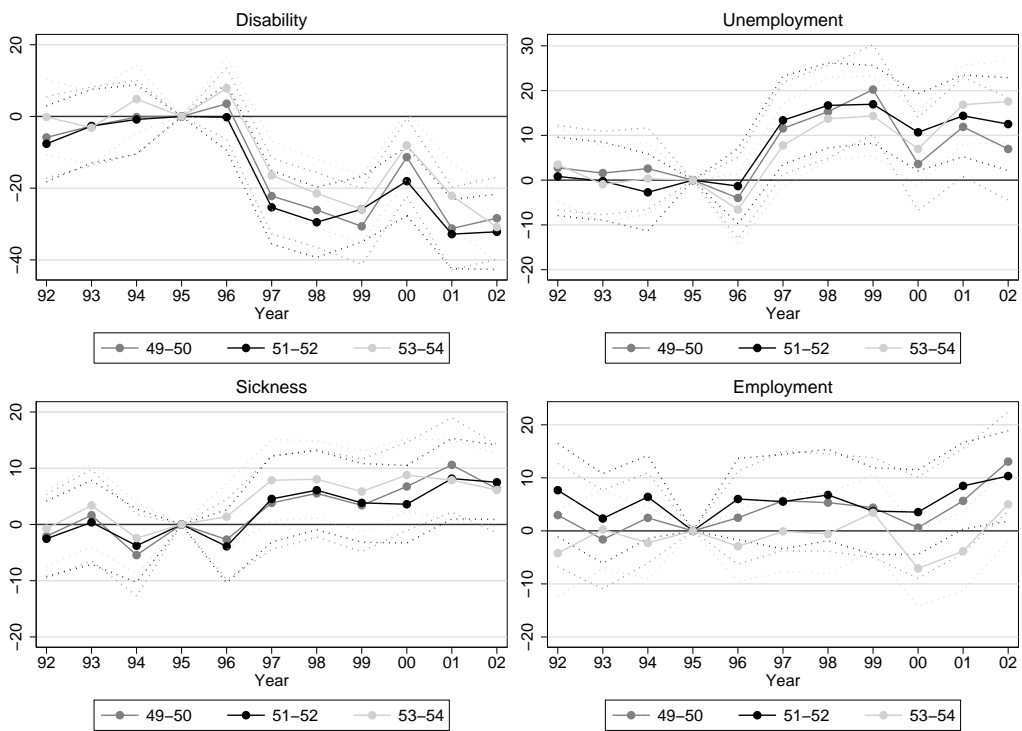
Figure 7: Coefficients of the interaction year $\times$ treatment in equation (2) for transitions from sickness, with 95-percent confidence interval