

The Employment Effect of Stricter Rules for Eligibility to DI: Evidence from a Natural Experiment in Sweden*

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Abstract

We study the effect of a reform of the Swedish disability insurance (DI) program whereby the special eligibility rules for workers in the age group 60 to 64 were abolished. We first use a differences-in-differences approach to study changes in the disability take-up compared to the age group 55 to 59. We then use a similar approach to study to what extent the employment effect of the reform is “crowded out” by an increase in the utilization of the sickpay insurance (SI), contributing to the well known increase in spending in the SI program, and/or the unemployment insurance (UI). In an extended analysis we study the effect of firm closure on employment and utilization of different labor market insurance programs in different age groups before and after the reform.

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1 Introduction

As most other industrialized countries, Sweden has experienced a trend towards earlier exit from the labor market since the early 1960s. The most common path of exit before the normal retirement age at 65 is through the Disability Insurance (DI). Between 35 and 40 percent of each birth cohort receives DI and, although the general health status has improved, the share of the population receiving DI is increasing. One of the main reasons behind this development is, beside a generally higher income level and more generous benefits, a gradual transformation of the eligibility rules for DI from a strict application of health reasons in the 1960s to also awarding DI benefits for labor market reason or a combination of health and labor market grounds. This change can be described as a transformation from a US type of Disability Insurance system to a European type of Disability Insurance, or Early Retirement scheme.

In recent years it has, however, been a development towards reversing the DI back to an insurance against loss of income from labor due to permanent health deficiencies. DI eligibility for pure labor market reasons for worker aged between 60 and 64 was abolished in 1991. In a subsequent reform, implemented in 1997, the eligibility to DI for labor market reasons in combination with health reasons as well as the special eligibility rules for the age-group 60-64 were abolished. The special rules for workers older than age 60 implied that the medical requirements were lower and there were lower requirements to change residence or occupation. In addition, they were not required to or take part in retraining or rehabilitation programs.

As is shown in Figures 1 and 2, since 1997 there has been a rapid increase in the labor force participation rate in the age group 60-64. There may be several possible explanations for this development. In this paper we study the effect on labor force participation and employment of the 1997 reform. In particular, we study the decrease of the inflow to disability pension and to what extent this decrease is “crowded out” by increases in utilization of the other main public labor market insurance programs: the sick pay insurance program (SI), which replaces labor earnings due to temporary health problems, and the unemployment insurance (UI). We primarily rely on differences-in-differences as our empirical strategy in that we compare the outcome of the age group affected by the reform - aged 60-64 - with that of the group aged 55-59. In an extended analysis we study the effect of firm closure on employment and utilization of different labor market insurance programs in different age groups before and after the reform.

The paper is organized as follows. Section 2 describes Sweden’s income security system and the 1997 reform of eligibility to DI. It also discusses likely effects of the reform on transitions between different states on the labor market, i.e., possible mechanisms for “crowding out”. Section 3 presents our data set and provides descriptive statistics. Section 4 describes the empirical strategy and Section 5 presents the results. Section 5.1 describes our main results on DI take up and employment for both sexes, for males only and for displaced workers (males and females). Sections 5.2 and 5.3 describes effects on the UI and SI take up and persistence, respectively. In this case only for male workers. Finally, Section 6 concludes.

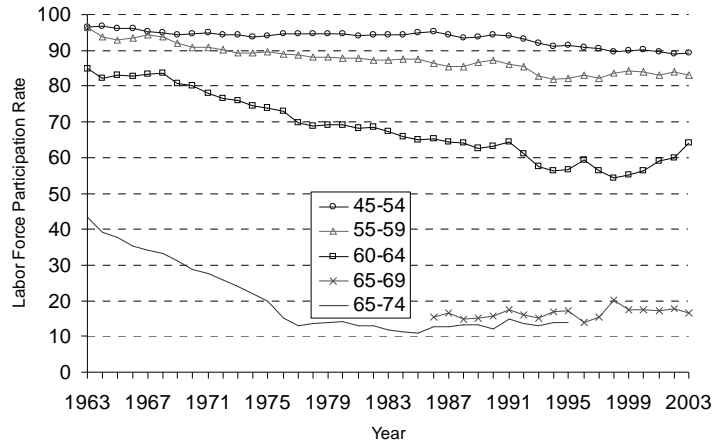


Figure 1: Labor force participation rates in Sweden 1963-2003. Males by different age groups.

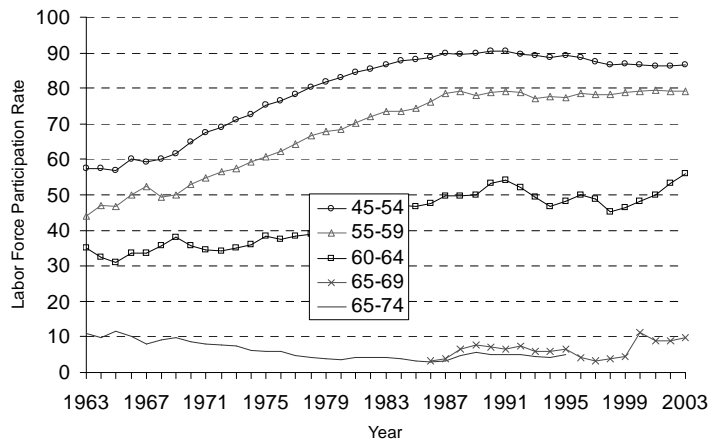


Figure 2: Labor force participation rates in Sweden 1963-2003. Females by different age groups.

2 Sweden's Income Security System and the 1997 Reform of the DI program

2.1 Sweden's Income Security System

The income security system in Sweden consists of two main parts: the public old-age pension system and the compulsory labor market insurance programs. Both these parts are, to about the same extent, used for financing exits from the labor market. In this sub-section we give a brief description of how these programs are constructed.¹ We start with the public old-age pension programs. We then describe the disability, sickness and unemployment insurance programs.

2.1.1 The Public Old-age Pension System

Sweden's public old-age pension system consisted of two main parts during the period studied:² a basic pension and the supplementary pension (ATP). Workers with no, or low, supplementary pension receive a special supplement to the basic pension. All Swedish citizens are entitled to the basic pension which is unrelated to previous earnings. The normal retirement age for this pension is 65, but it can be claimed from age 61 with a permanent actuarial reduction of 0.5 percent for each month of early withdrawal. If the pension is claimed beginning after age 65, the level is permanently increased by 0.7 percent for each month of delayed withdrawal up to age 70.

¹For a more complete description, see Palme and Svensson (1999 and 2001).

²The description is based on the rules pertaining for persons covered in the study. Sweden has successively introduced a reform of the public old-age pension system in the 1990s. The first cohort affected are those born in 1938 who reached the normal retirement age in 2003.

All social insurances in Sweden are indexed by the basic amount (BA), which follows the CPI closely. The level of the basic pension is 96 percent of a BA for a singled pensioner and 78.5 percent for married. In the year 2001 the level of one BA was 36,900 SEK.³

The supplementary pension is related to the worker's previous earnings. The amount of the benefit is calculated using the following formula

$$Y_i = 0.6 \cdot AP_i \cdot \min\left(\frac{N_i}{30}, 1\right) \cdot BA,$$

where AP_i is individual average pension points, BA is the basic amount, N_i is the number of years the individual has recorded covered income greater than zero. The average of pension points is calculated as the average of annual earnings below the social security ceiling of 7.5 BA of the worker's fifteen best years. The normal retirement age for the supplementary pension is 65. The actuarial adjustment for early and delayed withdrawal are the same as for the basic pension.

2.1.2 Labor Market Insurances

There are three important labor market insurances: disability insurance (DI), sickness insurance (SI) and unemployment insurance (UI). Eligibility for *disability insurance* requires that the individual's capacity to work is permanently reduced by at least 25 percent. Full compensation requires that the capacity is completely lost. Medical conditions pertaining to work capacity is in general assessed by several physicians, and eligibility for disability insurance is finally determined by the local social insurance administration.

³In 2001 the exchange rate was 1\$ \approx 10 SEK.

Between 1970 and 1991 disability insurance could be granted for labor market reasons.

The disability benefits consists of a basic pension and a supplementary pension (ATP). The level of the basic pension is the same as for the old-age scheme and the supplementary pension is determined in the same way as for the old-age scheme with no actuarial reduction for early retirement. "Assumed" pension points are calculated for each year between the date of retirement and age 64. The special supplement for Disability pensioners is higher than for old-age pensioners.

Sickness insurance replaces a share of lost earnings due to temporary illnesses up to the social security ceiling. The replacement level in the insurance has been changed on several occasions during the time period covered by this study. In a reform in 1987 the replacement level was set to 90 percent of the worker's insured income. Since then, the replacement has been decreased on several occasions. The first time was in a reform in 1991. In 1996 it was set to 75 percent of the insured income for long sickness spells and in 1998 it was raised to 80 percent.

The *unemployment insurance* benefit consists of two parts: one basic part, which is unrelated to the worker's insured income, and one part which requires membership in an unemployment benefit fund and is related to the worker's insured income. Unemployed workers who actively search for a new job are eligible for compensation. The main difference between the benefit level in the unemployment and sickness insurance is the ceiling. The ceiling of the latter is the same as for other parts of the social insurance system, while that of the former is subject to discretionary changes, and is lower than

the ceiling for the sickness benefit. The replacement rate for unemployment insurance has also been changed on several occasions during the time period analyzed in this empirical example. These changes have roughly followed the changes in the sickness insurance.

2.2 The 1997 Reform of Eligibility to DI

Until January 1, 1997 the requirements for being granted a disability pension were lower for individuals aged 60 to 64 than for those below age 60. When working ability was assessed, the medical requirements were lower and there were lower requirements to change residence or occupation. Workers above age 60 were not required to or take part in retraining or rehabilitation programs. The local labour market conditions were consequently important for the possibilities to receive a disability pension. However, some non-trivial medical condition affecting working ability was necessary. The possibility to receive a disability pension for purely labour market reasons was earlier abolished October 1, 1991.

These favorable rules for older workers remained in force for individuals who reached age 60 before July 1, 1997 if the application for a disability pension was made before January 1, 1997.

There were also other changes of the law coming into force on January 1, 1997 which affected all ages. The new law stipulated that disability pension as well as sickness benefit should be used only if there was a reduction of working ability for medical reasons. The scope to take non-medical criteria into account was reduced.

2.3 Possible Effects of the Reform on Transition between Different Labor Market States

Figure 3 illustrates the transition from employment and each of the three main insurance programs on the Swedish labor market: the Disability Insurance (DI), the Unemployment Insurance (UI) and the Sickness Insurance (SI). We define two states in addition to the states considered in Figure 3 as “Combination” and “Other”. Between two consecutive years, it is then possible to study the transition probabilities between each of these states as well as the probability to remain in the same state.

A change in the eligibility rules for the Disability Insurance has a direct effect on the transition probabilities between work and DI, the transition marked with 3 in Figure 3, as well as between each of the two other labor market insurance programs, Sickpay Insurance and Unemployment Insurance, and Disability Insurance, the transitions marked 2 and 7, respectively. The change in the eligibility rules may, however, also generate several indirect effects in the transitions between the states considered in Figure 3. The most obvious ones are the transitions from work to the Sickpay or Unemployment Insurance programs: if a worker is no longer eligible to DI for labor market reasons or as a result of the favorable rules for older workers, he or she may instead try to be eligible for the other two labor market insurance programs. In addition to an effect on each of the transitions marked with arrows in Figure 3, it may also affect the persistence in each of the states considered. For example, since eligibility to DI for older workers was abolished in the reform, the transition between UI and DI may be affected and, as a result, persistence in UI as well.

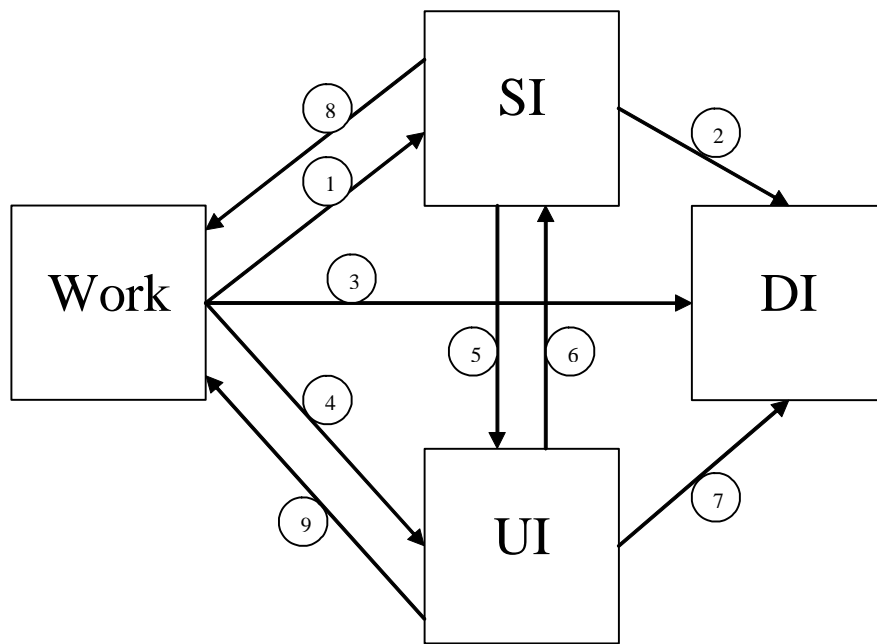


Figure 3: The different transitions between gainful employment UI, SI and DI.

We focus on two overall effects of the reform: the transition out from employment to different income security programs and the persistence in non-employment and support from these programs. Together, these effects make up for the overall effect of the reform on labor force participation and employment. For the effect on the transition from employment, the difference between the direct effect on the transition to DI, marked with 3 in Figure 3, and the total effect on transition from employment - the sum of the transitions marked with 1, 3 and 4 - is characterized as "crowding out" in the overall effect. Correspondingly, the direct effect on persistence is measured by the sum of the transitions 2 and 7, while the total effect is measured by these transitions plus the transitions between UI and SI, marked with 5 and 6, and the persistence within each state of non-employment.

In addition to these overall transitions, there are several indirect transitions of particular interest that, which are measured in this study. First, the transition in and out from UI. Since the reform did have a direct effect on unemployed workers, we expect the transition from UI to decrease. This effect may be "crowded out" by an increased persistence in unemployment and an increased transition to the Sickpay Insurance scheme. The reasoning can be applied for the effect on the transitions from the Sickpay Insurance scheme. The reform may have a direct effect on the abolition of the favorable rules for DI eligibility of elderly workers, reflected in a change in the direct transition (2). Again, this effect may be crowded out by changes in persistence in SI as well as transitions to UI.

3 Data and Descriptive Statistics

We use an extract from the panel data set LISA, containing information on all individuals permanently living in Sweden. LISA contains data from three main sources:

- Income and wealth register (Inkomst- och förmögenhetsstatistiken, IoF/IoT). This register consists of tax return data on all people registered as taxpayers in Sweden. LISA contains data from this register for each year between 1990 and 2004.
- The Enterprise and Workplace register compiled by Statistics Sweden. This register contains information on employer and workplace for all individuals permanently living in Sweden.
- The National Insurance Board registers. These contain data from the Swedish social insurance system, including the number of days of absence compensated by the compulsory sickness insurance.

In addition to data from LISA we use data from FAD (*Företagens och arbetsställdenas dynamik*), which is a refined register produced by Statistics Sweden from the basic Enterprise and Workplace registers.

Students and individuals on parental leave are excluded from the study. These categories are not large in the age group 55-64.

The detailed information on income components in our data are used to classify individuals into one of the six states: working (Work), Disability Insurance (DI), Sickness insurance (SI), Unemployment Insurance (UI), a combination of DI, SI and/or UI (Combined) and others (Others). In the

| | Combined | DI | Other | SI | UI | Work | All states |
|------|----------|---------|---------|--------|---------|-----------|------------|
| 1991 | 252,698 | 123,411 | 187,087 | 76,707 | 58,040 | 1,762,810 | 2,460,753 |
| 1992 | 161,884 | 132,385 | 229,960 | 67,088 | 114,321 | 1,743,572 | 2,449,210 |
| 1993 | 152,292 | 144,888 | 234,894 | 58,858 | 170,464 | 1,687,592 | 2,448,988 |
| 1994 | 146,308 | 152,607 | 231,793 | 54,127 | 193,209 | 1,697,988 | 2,476,032 |
| 1995 | 134,399 | 155,262 | 214,870 | 51,255 | 194,035 | 1,752,926 | 2,502,747 |
| 1996 | 113,944 | 157,060 | 207,011 | 42,623 | 205,723 | 1,784,263 | 2,510,624 |
| 1997 | 103,329 | 156,790 | 204,786 | 40,411 | 213,588 | 1,802,858 | 2,521,762 |
| 1998 | 107,279 | 155,168 | 196,511 | 48,158 | 188,319 | 1,798,995 | 2,494,430 |
| 1999 | 97,380 | 155,317 | 187,157 | 59,097 | 160,204 | 1,793,151 | 2,452,306 |
| 2000 | 84,559 | 159,112 | 180,069 | 73,362 | 119,163 | 1,790,561 | 2,406,826 |
| 2001 | 67,849 | 164,704 | 171,597 | 83,959 | 90,116 | 1,774,510 | 2,352,735 |

Table 1: The number of individuals by state. Age 31-54.

last state is included people on early retirement pension from, in most cases, the occupational pension schemes.

Transition probabilities are calculated for each pair of consecutive years during the period 1991 to 2002, for individuals which are in one of the six states both years. Tables 1-3 show the number of individuals in each state during year one, i.e. before the transition.

4 Empirical Strategy

We use three different methods to estimate the effect of the reform on the transitions between different labor market states. The first one is a traditional Differences-in-Differences model, i.e., we use the following regression model

$$S_{it} = X'_{it}\beta + \lambda_t + \delta AGE6064_{it} + \gamma AGE6064_{it} * POST_{it} + \varepsilon_{it},$$

| | Combined | DI | Other | SI | UI | Work | All states |
|------|----------|--------|--------|--------|--------|---------|------------|
| 1991 | 37,309 | 65,684 | 38,010 | 13,763 | 4,433 | 259,830 | 419,029 |
| 1992 | 20,357 | 70,338 | 48,321 | 11,969 | 9,347 | 269,757 | 430,089 |
| 1993 | 18,199 | 75,777 | 48,471 | 10,166 | 16,413 | 275,045 | 444,071 |
| 1994 | 17,621 | 78,477 | 46,435 | 10,002 | 21,128 | 282,584 | 456,247 |
| 1995 | 16,019 | 79,066 | 45,275 | 9,916 | 22,968 | 295,839 | 469,083 |
| 1996 | 13,947 | 79,756 | 43,978 | 8,590 | 25,682 | 319,777 | 491,730 |
| 1997 | 12,093 | 80,928 | 44,380 | 8,653 | 28,989 | 345,447 | 520,490 |
| 1998 | 12,233 | 81,906 | 44,382 | 12,129 | 29,551 | 373,188 | 553,389 |
| 1999 | 11,948 | 85,443 | 44,561 | 16,393 | 28,185 | 402,237 | 588,767 |
| 2000 | 11,749 | 91,316 | 44,794 | 21,146 | 24,189 | 427,356 | 620,550 |
| 2001 | 10,584 | 97,597 | 43,864 | 24,545 | 19,380 | 442,222 | 638,192 |

Table 2: The number of individuals by state. Age 55-59.

| | Combined | DI | Other | SI | UI | Work | All states |
|------|----------|---------|--------|--------|--------|---------|------------|
| 1991 | 45,489 | 124,079 | 58,364 | 13,352 | 5,070 | 167,975 | 414,329 |
| 1992 | 30,183 | 125,478 | 69,145 | 10,103 | 8,987 | 162,461 | 406,357 |
| 1993 | 28,485 | 125,826 | 72,577 | 7,023 | 14,992 | 154,091 | 402,994 |
| 1994 | 25,703 | 122,957 | 71,486 | 6,313 | 19,702 | 154,037 | 400,198 |
| 1995 | 22,037 | 119,339 | 70,614 | 6,186 | 22,069 | 161,973 | 402,218 |
| 1996 | 16,191 | 116,846 | 69,010 | 5,227 | 23,521 | 175,287 | 406,082 |
| 1997 | 11,260 | 120,796 | 71,544 | 4,747 | 25,562 | 182,960 | 416,869 |
| 1998 | 9,553 | 117,615 | 72,546 | 7,354 | 30,958 | 192,438 | 430,464 |
| 1999 | 9,265 | 115,404 | 70,997 | 10,874 | 32,737 | 202,105 | 441,382 |
| 2000 | 9,230 | 116,573 | 70,928 | 13,853 | 32,206 | 211,112 | 453,902 |
| 2001 | 8,695 | 121,465 | 69,697 | 16,939 | 25,149 | 234,402 | 476,347 |

Table 3: The number of individuals by state. Age 60-64.

where S is a dummy variable for the state under study, X is a vector of personal characteristics, λ is a vector of year fixed effects, $AGE6064$ is a dummy variable for being in the age group affected by the 1997 policy change and $POST$ is a dummy variable for the post reform period. The γ parameter measures the effect of the policy change, i.e., the differential effect on the group affected by the policy change relative to the age group 55-59 used as control group.

This approach for identifying the effect of a policy intervention has been criticized in several recent paper (see e.g. Bertrand et al., 2004, or Donald and Lang, 2004). In particular, the presence of group effects and auto-correlation causes problems in the inference in these models. The identification relies on parallel trends for the group affected by the intervention and the control group, both before and after the policy intervention.

To make the analysis more transparent, we also show graphs of the differences-in-differences for the transition probabilities. To estimate the transition probabilities we construct two-year panels. We define these probabilities as

$$P_{State,t/t+1, Age-group} = \frac{N_{State,t+1}}{N_{Risk,t}},$$

where $N_{State,t+1}$ is the number of individuals in the state under study the second year and $N_{Risk,t}$ is the number of individuals at risk the first year. We then define the differences-in-differences parameter as

$$\widehat{\gamma}_{State,t/t+1} = (\widehat{p}_{State,t/t+1,60-64} - \widehat{p}_{State,t-1/t,60-64}) - (\widehat{p}_{State,t/t+1,55-59} - \widehat{p}_{State,t-1/t,55-59}).$$

Finally, we apply the two-step method suggested by Wooldridge (2003) to account for the group effects and the downward bias of the standard error

estimates in the differences-in-differences estimator. In the first step, we estimate group effects, i.e.,

$$S_{it} = X'_{it}\boldsymbol{\beta} + c_g + u_{it},$$

where c_g is the set of group and time specific effects. In the second step, we regress these estimates on the $AGE6064$, $POST$ and $AGE6064 * POST$. Following Wooldridge (2003) we use the inverse of the estimated standard errors for the group effects as weights in order to obtain efficient estimates.

To estimate different transition probabilities we construct two-year panels, i.e., a transition is recorded if an individual changes state between the two consecutive years included in the panel. To estimate the effect of the reform of the Disability Insurance program we use a differences-in-differences approach. We use the age group 60-64 as the treated group and the ages 55-59 as a control group. Throughout we use the transition between 1995 and 1996 as the reference year. That is, as an example, the reform effect for the transition between the years 1998 and 1999 is calculated as

$$\hat{\gamma}_{98/99} = (\hat{p}_{98/99,60-64} - \hat{p}_{94/95,60-64}) - (\hat{p}_{98/99,55-59} - \hat{p}_{94/95,55-59}),$$

where \hat{p} is the estimated transition probabilities by year and the different age groups. The reason for using 1994/95 as a reference year is that the reform was announced in 1995 and there is a well known effect from anticipation of the reform.

The first set of results will be presented in three steps. The first step measures the *direct* effect of the reform of DI eligibility. That is, the transitions to DI from Work, SI and UI, respectively. These transitions are represented

by the arrows 2, 3 and 7 in Figure 3. The second step measures the transition from gainful employment to *any* of the three labor market insurance programs and back to employment from SI to UI (the transition from DI to employment can be disregarded). These transitions corresponds to the arrows marked by 1, 3, 4, 8, and 9 in Figure 3. The sum of these transitions measures the overall effect of the reform on the share actually employed, i.e., the difference between the transitions measured in the first step and those measured in the second step measures the “crowding out” from increased net transition to UI and SI, respectively. Finally, the transitions between UI and SI (arrow 5 and 6 in Figure 3) measures to what extent unemployed workers who before the reform exited from the labor market through DI use SI after the reform.

5 Results

We start this Section by presenting the results of the over all effect of the reform on transition out from employment and persistence in different non-employment states. We then discuss the results on Unemployment and utilization of the Sickpay insurance programs, the main alternatives to the DI programs in Sweden.

5.1 Effects on Labor Force Participation and Transition from Employment

Table 4 shows three sets of results for the over all effect of the reform. First, it shows conventional differences-in-differences results for the entire population from two-year panels using 1995/94 as a “base year” for the years 1995/96

to 1998/99. The age-group 60-64 is used as the “treated” group and aged 55-59 as control group. Second, it shows the corresponding estimates for the sub-set of displaced workers. Finally, it shows the results from the two-stage estimator described in Section 4 for male workers.

The over all effect of the reform on labor force participation and employment can be divided into effects on transition out from the labor force or employment and persistence in being out of the labor force or in non-employment. The transition to DI measures the gross effect of the reform and the transition out from employment the net effect. Conversely, the transition from all programs to DI and persistence in all Non-employment states measures the gross and net effect, respectively, on persistence. The upper panel Table 4 shows the estimates of the transitions out from the labor force and/or out from employment and the lower panel persistence in different income security programs.

The results on the change in transition to DI varies somewhat between different groups in the population. The effect in the entire population is around 0.5 percent of the entire age-group. The change in the male population corresponds to about 1 percent of the entire age-group. This effect is, however, not significantly different from zero, due to the fact, as we explained in Section 4, that the two-step estimator is less efficient, but more robust, than the conventional DD estimator. Finally, it can be seen that the result is not primarily attributed to displaced worker.

The apparent “spike” in the transition to DI in 1996 is due to the fact that the new eligibility rules were announced more than two year before they were implemented. That is, workers who believed they would pass the pre-reform

| | All workers | | | | Displaced Workers | | | | All males |
|--|-------------|----------|----------|----------|-------------------|----------|----------|----------|-----------------------|
| | 1995 | 1996 | 1997 | 1998 | 1995 | 1996 | 1997 | 1998 | Two-step Estimates |
| Transition out from the Labor Force or out from employment | | | | | | | | | |
| All states \rightarrow DI | 0.0000 | 0.0176 | -0.0056 | -0.0048 | 0.0012 | 0.0219 | -0.0038 | -0.0019 | -0.0104 |
| | (0.0006) | (0.0006) | (0.0006) | (0.0005) | (0.0038) | (0.0041) | (0.0033) | (0.0040) | (0.0056) |
| Employment \rightarrow | -0,0209 | 0,0083 | -0,0009 | -0,0070 | | | | | -0.0074 |
| All programs | (0.0015) | (0.0014) | (0.0015) | (0.0014) | | | | | (0.0116) |
| Persistence in different income security programs | | | | | | | | | |
| All programs \rightarrow DI | -0,0059 | 0,0053 | 0,0059 | -0,0087 | | | | | -0.0270 |
| | (0.0026) | (0.0027) | (0.0026) | (0.0026) | | | | | (0.0176) |
| All programs \rightarrow | -0.0055 | -0.0228 | 0.0070 | 0.0129 | | | | | 0.0100** |
| All programs | (0.0014) | (0.0014) | (0.0013) | (0.0013) | | | | | (0.0036) |

Table 4: Point estimates of the differences-in-differences results of the effect of the DI reform on different transitions on the labor market.

eligibility rules, but not the post-reform ones, applied under the pre-reform regime. This anticipation effect corresponds to almost 2 percent of the labor force.

The results on the transition out from employment show a very erratic pattern. This can be interpreted as an effect of dominating group effects. This is also reflected in the large standard errors for the two-step estimator, which does not give any significant result. This means that we maintain the hypothesis of no effect on employment from the reform and it is not possible to make any conclusive inference on the degree of “crowding out” from the reform.

Figures 2 and 3 show these results graphically. The upper panel of Figure 2 shows the transition probabilities into DI from all other states by age-group

and the lower panel the differences-in-differences in the transition probabilities between the affected age group and each of the other ones using 1994 as a base year. The decrease in the transition probabilities between 1991 and 1994 is likely to be a delayed effect of the 1991 reform of eligibility to DI. The reform was implemented in October 1991 and a decreasing share of the applications were made under the pre-reform regime. The “spike” following the anticipation of the reform is very apparent in Figure 3. Finally, we can see that the transition rate to DI decreases relative to the other groups. The effect *vis-à-vis* the oldest control group, aged 55-59, is smaller than the other ones. A possible explanation to this outcome is that the abolition of the favorable treatment for eligibility to DI of older workers also affected this group partially.

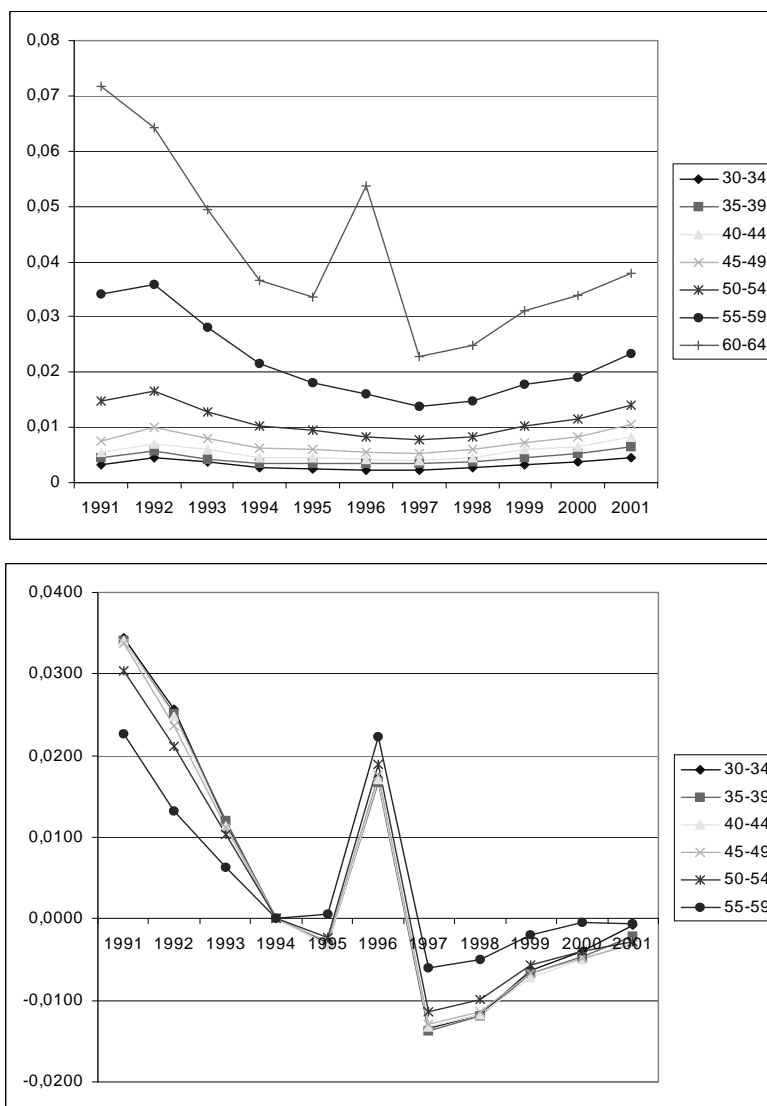


Figure 2. Upper panel: transition to DI from all other states by age-group. Lower panel: differences-in-differences estimates for the age-group 60-64 relative to all other age-groups using 1994 as base year. Males. Figure 3 shows the overall effect on the transition out from employment.

There is a comparatively large decrease on about 8 percentage points in the exit rates for the age group 60-64 between 1991 and 1995. The spike from the anticipation of the 1997 reform can also be seen for the transition out

from employment. Finally, as opposed to the effect on the transition to DI, there is no apparent effect on the transition from employment during the years between 1997 to 1999. During the years 2000 and 2001 there is a comparatively large decrease in the exit rate from employment in the 60-64 age group compared to the other groups. The results in Figure 3 confirms the difficulties in making any conclusive inference on the effect of the 1997 reform, as discussed above.

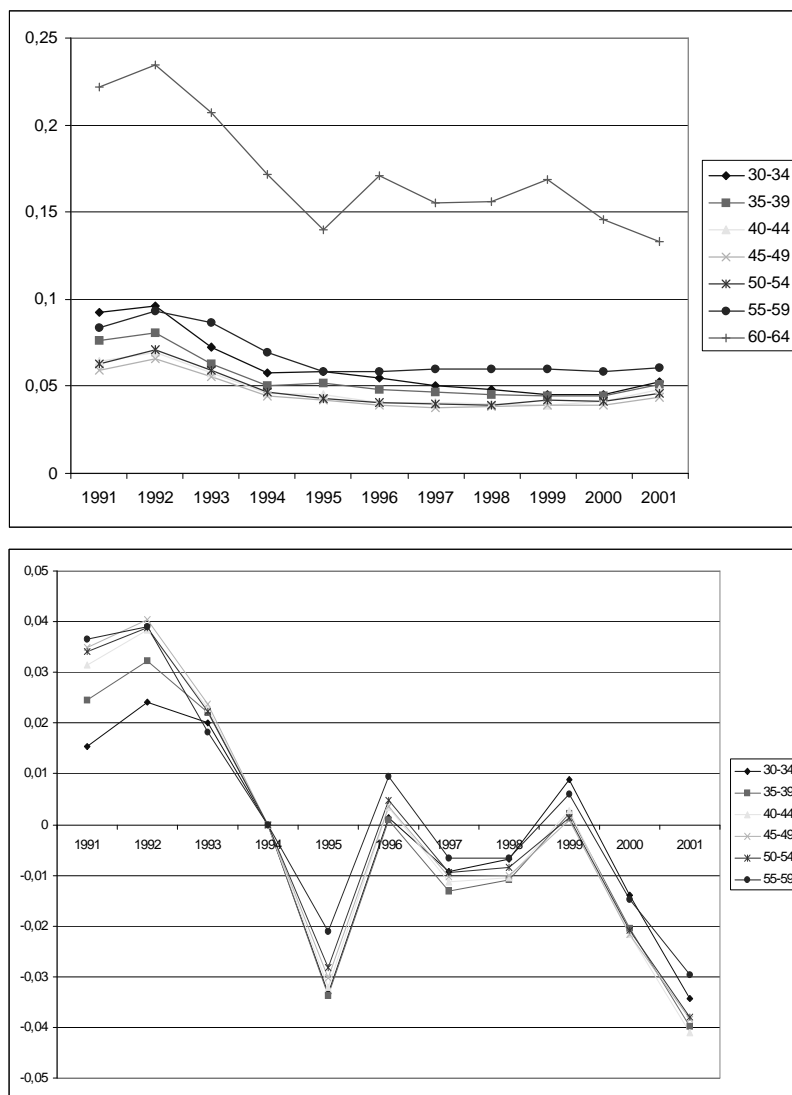


Figure 3. Upper panel: transition from employment to all other states by age-group. Lower panel: differences-in-differences estimates for the age-group 60-64 relative to all other age-groups using 1994 as base year. Males.

We now turn to the results on the effect of the reform on over all persistence in non-employment. As we discussed in Section 4, DI has traditionally been seen as an absorbing state, one of the aims of the reform was thus to in-

crease the probability of return to employment. The direct effect could thus be assessed on the transition probabilities from all non-employment states to DI. The next question is to what extent this direct effect of the reform is reflected in the overall persistence in non-employment and to what extent it is crowded out by an increased persistence in other programs.

Figure 4 shows the direct effect of the reform, i.e., the development in the transition probabilities from all non-employment states to DI. The results show an apparent effect as the curves for the 60-64 age group converge with that of the 55-59 group after the reform in 1997 and coincides by the end of the period. A similar pattern can be seen relative to all other age-groups also shown in Figure 4.

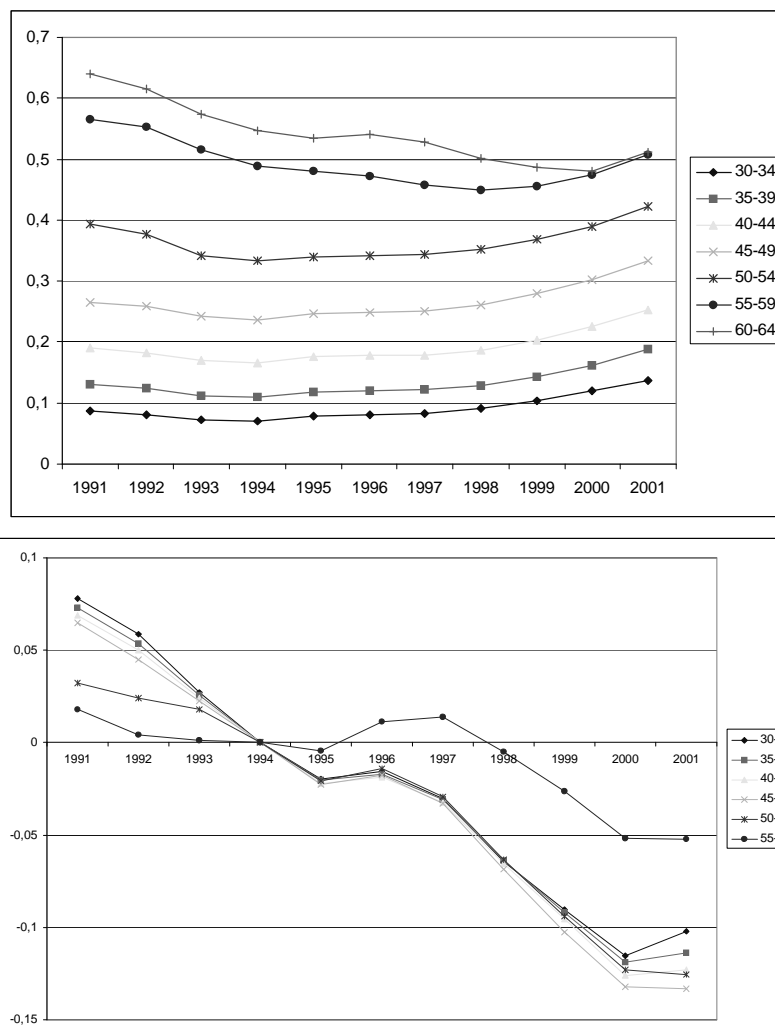


Figure 4. Upper panel: transition from all non-employment to DI by age-group. Lower panel: differences-in-differences estimates for the age-group 60-64 relative to all other age-groups using 1994 as base year. Males.

Figure 5 shows the over all persistence in non-employment. It is not possible to detect any effect of the reform. If anything, the persistence in non-employment of the affected group increases relative to that in the 55-59 age-group. This result indicates that the entire direct effect of the reform on persistence in non-employment was crowded out by increased persistence in

other non-employment states.

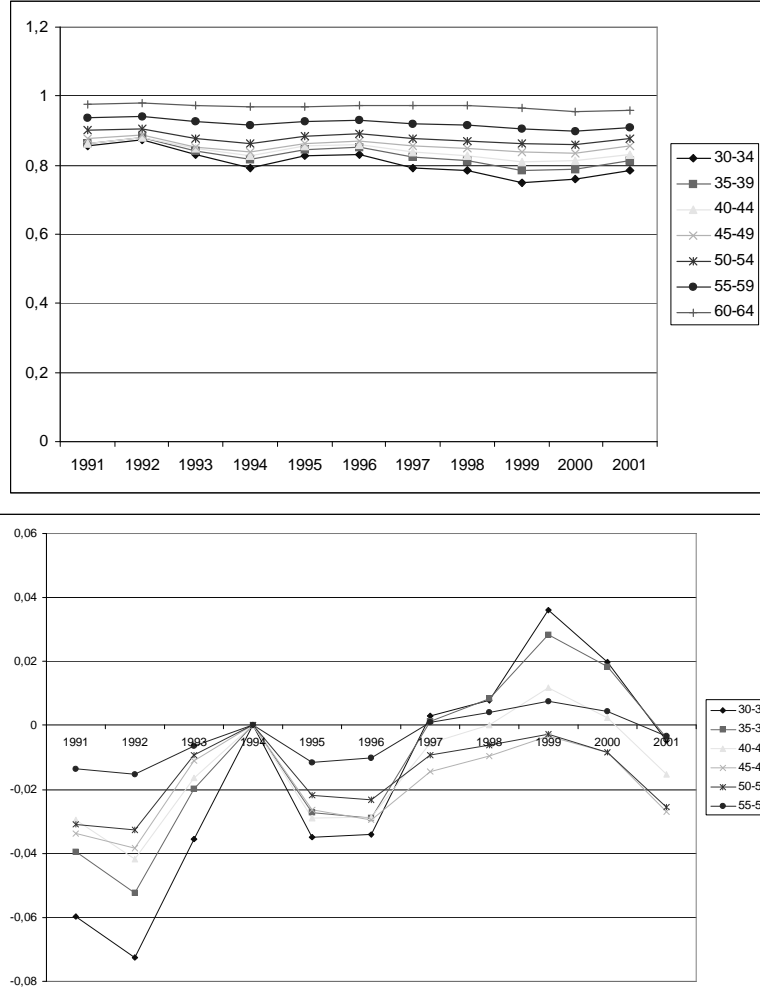


Figure 5. Upper panel: transition from all non-employment states to all non-employment states by age-group. Lower panel: differences-in-differences estimates for the age-group 60-64 relative to all other age-groups using 1994 as base year. Males.

5.2 Effect on Unemployment

There are several reasons to why the 1997 policy change may have an effect on the unemployment rate in the affected age group. These effects could

operate both through the inflow to unemployment as well as persistence in the unemployment state. Let us first investigate the inflow to unemployment. Since the policy change restricted the inflow into DI for workers experiencing problems of finding a job, it may have, indirectly, increased the inflow from employment into unemployment. Figure 6 shows the development of the transition probabilities from employment to unemployment. It is an apparent increase in the transition probabilities in the year of the reform in 1997. Since this change could only be seen in the age group affected by the reform, it is very likely to be attributed to the policy change. However, the change were reverted to the pre-reform level in the years 2000 and 2001.

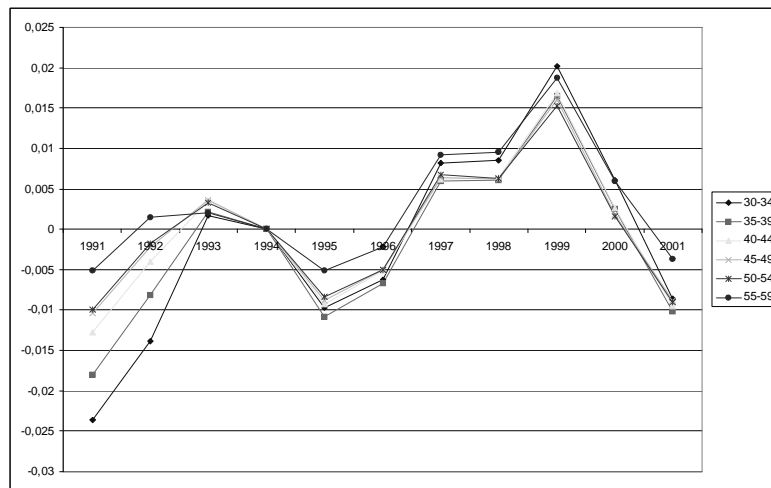
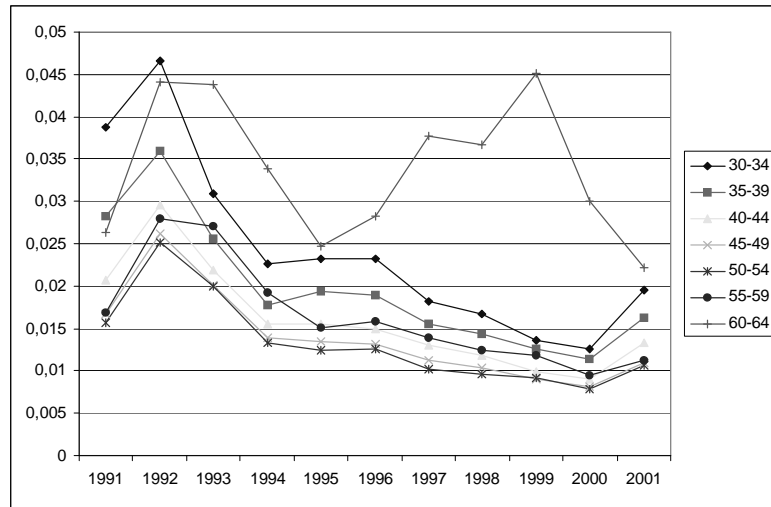


Figure 6. Upper panel: transition probabilities from Employment to Unemployment by age-group. Lower panel: differences-in-differences estimates for the age-group 60-64 relative to all other age-groups using 1994 as base year. Males.

The change in persistence of the rate of non-employed workers contains several elements. The direct effect is on the transition from Unemployment to DI. Figure 7 shows the development of this transition probability and reveals three very clear results. First, there is a large decrease from about 0.3 to

around 0.05 of the employed population in the age-group 60-64 following the 1991 abolition of eligibility to DI for labor market reasons. Second, there is anticipation effect in 1996, where the transition from Unemployment to DI almost doubled. Finally, it is a clear decrease in the transition to DI following also the 1997 reform. As opposed to the effect on transition from employment, this effect persists over the entire period under study.

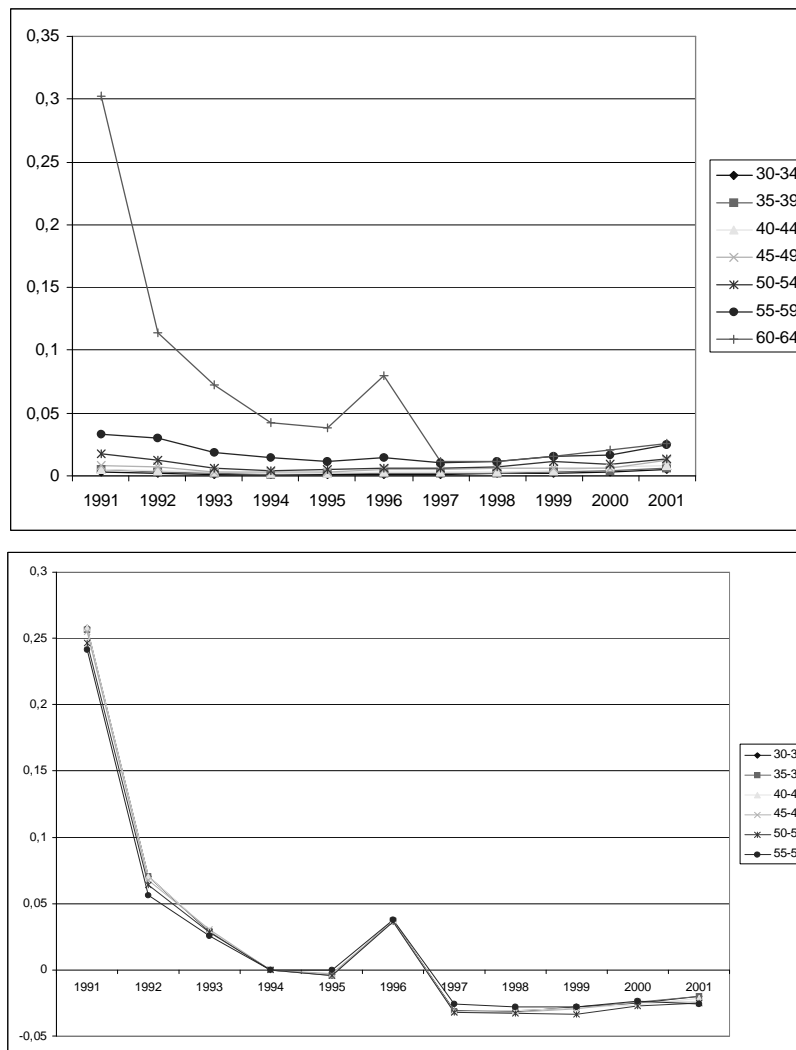


Figure 7. Upper panel: transition probabilities from Unemployment to DI by age-group. Lower panel: differences-in-differences estimates for the age-group 60-64 relative to all other age-groups using 1994 as base year. Males.

Figure 8 shows the estimates of the persistence in the unemployment state, i.e., the probability of remaining unemployed. Again, there is an obvious and expected effect of the reform in the increased probability to remain in Unemployment for the age group 60-64 immediately after the reform. However, this effect was reversed to the pre-reform level by the end of the period

under study.

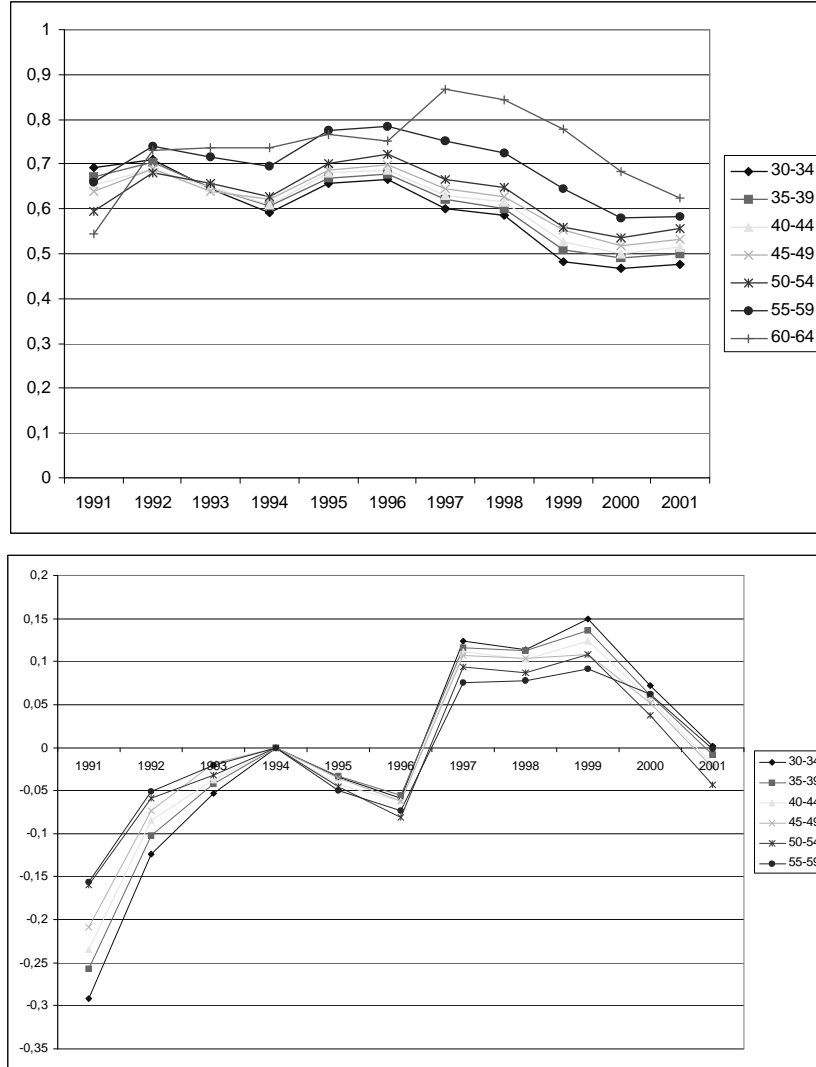


Figure 8. Upper panel: probabilities of persistence in Unemployment by age-group. Lower panel: differences-in-differences estimates for the age-group 60-64 relative to all other age-groups using 1994 as base year. Males.

Finally, Figure 9 shows the change in the probability of moving from unemployment to employment. Although it can be seen that there is a development towards increased transition back to employment in the affected

group, the increase is faster in the other groups. This means that the intended effect of a faster transition back to employment, when the chances of being eligible for DI were altered, did not happen.

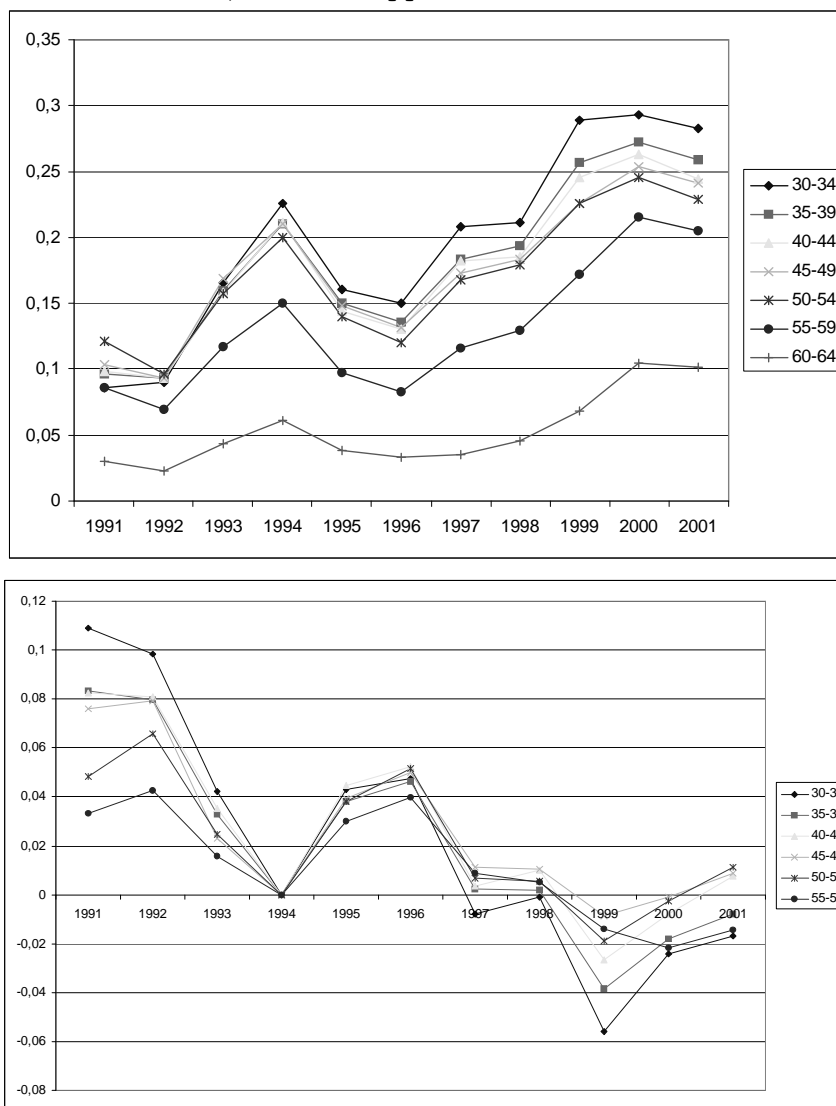


Figure 9. Upper panel: transition probabilities from Unemployment to Employment by age-group. Lower panel: differences-in-differences estimates for the age-group 60-64 relative to all other age-groups using 1994 as base year. Males. Table 5 summarizes the results on the effect on Unemployment by giving

| | All males | | Displaced Workers | |
|---|-----------|-----------------------|-------------------|-----------------------|
| | DD | Two-step Estimates | DD | Two-step Estimates |
| <i>Transition out from the Labor Force or out from employment</i> | | | | |
| Employment → UI | | 0.0104* | | (0.0049) |
| <i>Persistence in different income security programs</i> | | | | |
| UI → DI | | -0.0387*** | | (0.0093) |
| UI → UI | | 0.1022*** | | (0.0269) |
| UI → Employment | | -0.0306** | | (0.0118) |

Table 5: Point estimates of the differences-in-differences results of the effect of the DI reform on different transitions on the labor market.

the point estimates for the effect of the reform on different transitions. These results essentially confirm our conclusions in the discussion above on an initially higher transition into Unemployment and an increased persistence in this state as indicated by the significant coefficient estimates. It should, however, be noted that the only persistent effect of the reform was estimated for the transition from Unemployment to DI.

5.3 Effects on Probability of Transition to and Persistence in Sickpay Insurance

Figure 10 shows the development of probability of transition to the Sickpay insurance program. As is evident from the upper panel, it was a rapid increase in transition to this program in all age-groups starting in 1997. However, the

probability of transition increased more rapidly in the age-group affected by the reform. The lower panel shows that the increase in the difference vis-à-vis the age-group 55-59 was around 0.5 percent compared to the difference in 1994, or about half of the transition probability of these age-groups in 1996. The difference in transition probabilities decreases towards the end of the period under study.

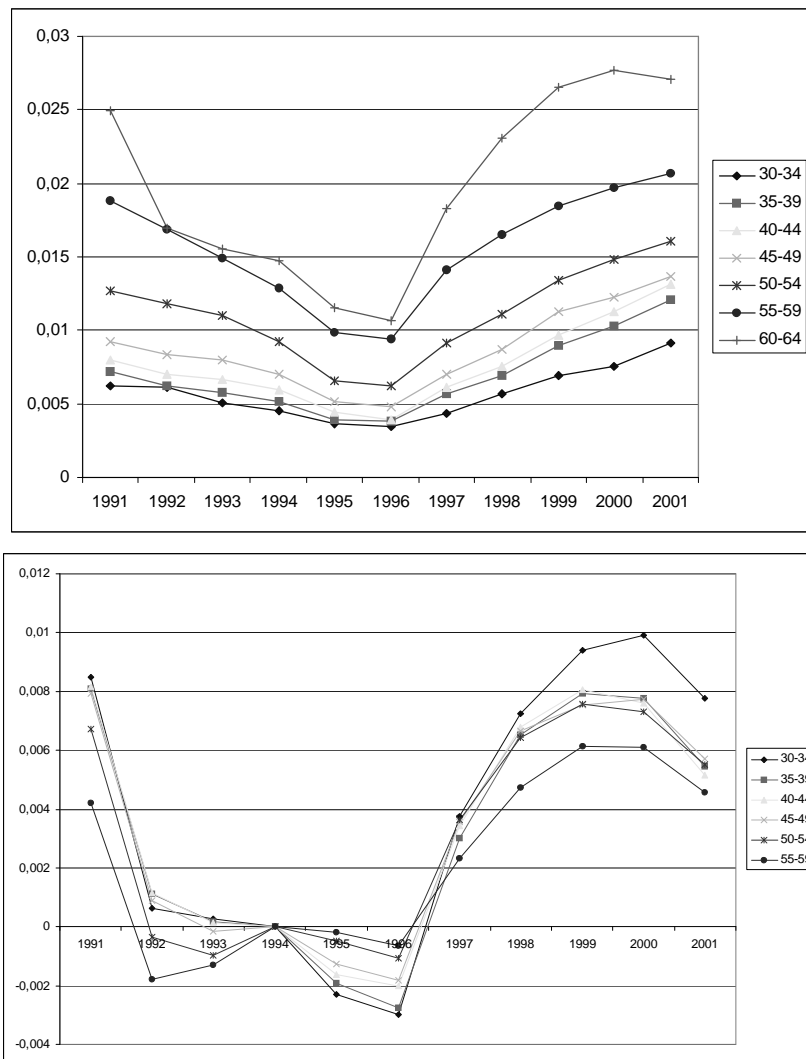


Figure 10. Upper panel: transition probabilities from Employment to Sickpay insurance by age-group. Lower panel: differences-in-differences estimates for the age-group 60-64 relative to all other age-groups using 1994 as base year. Males.

Figure 11 shows the development in the transition probabilities from the Sickpay insurance program to DI. The graph for the 60-64 age-group shows a marked 0.1 decrease in this probability in 1997. There is also a slight decrease in this transition for the age-group 55-59, making the decrease compared to this control group somewhat smaller. It is, however, obvious that this change

can be attributed to the reform, since it happened all at once in 1997 and have been constant ever since.

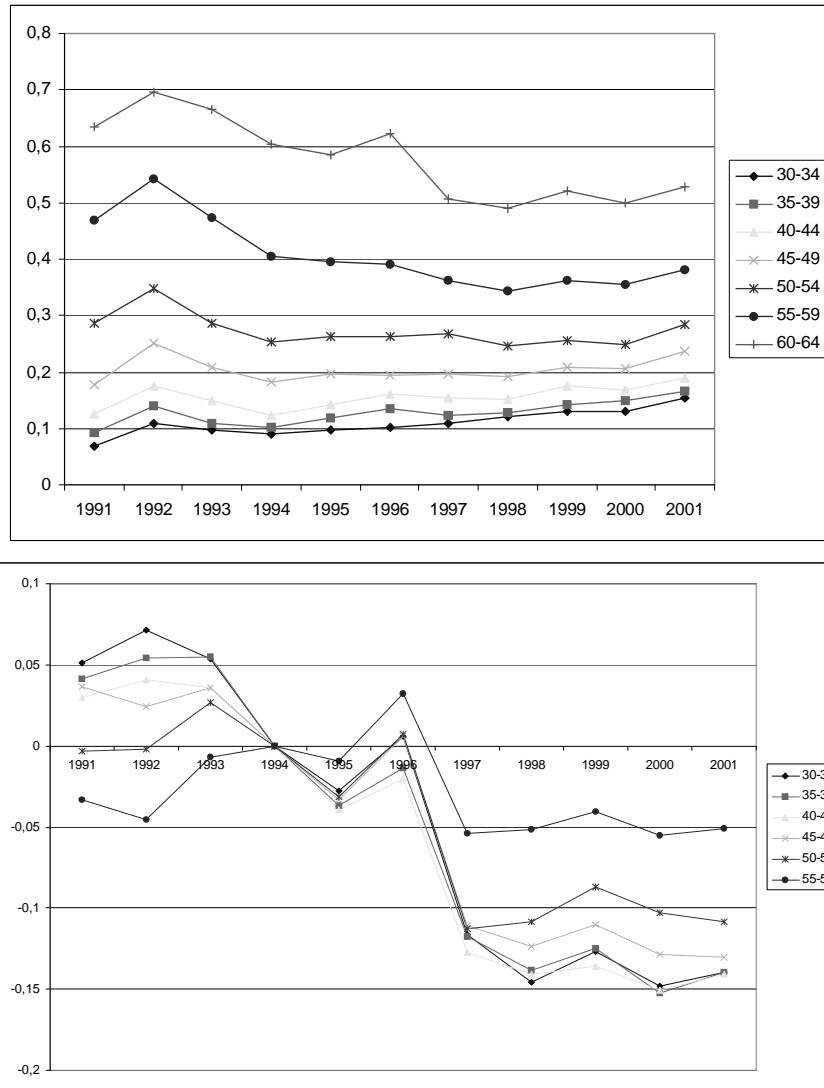


Figure 11. Upper panel: transition probabilities from Sickpay insurance to DI by age-group. Lower panel: differences-in-differences estimates for the age-group 60-64 relative to all other age-groups using 1994 as base year. Males.

Finally, Figure 12 shows to what extent the decrease in the transition to from the Sickpay insurance program to DI really led to an increased transition back to employment from this program by displaying the transition probabilities between the Sickpay insurance and all Non-employment states. The rapid decrease in these transitions compared to all control groups in 1997 can be interpreted as an effect of the reform. However, the results also show that it was a rapid reversion of the transition probabilities compared to all groups by the end of the period under study, implying that the effect was very transitory.

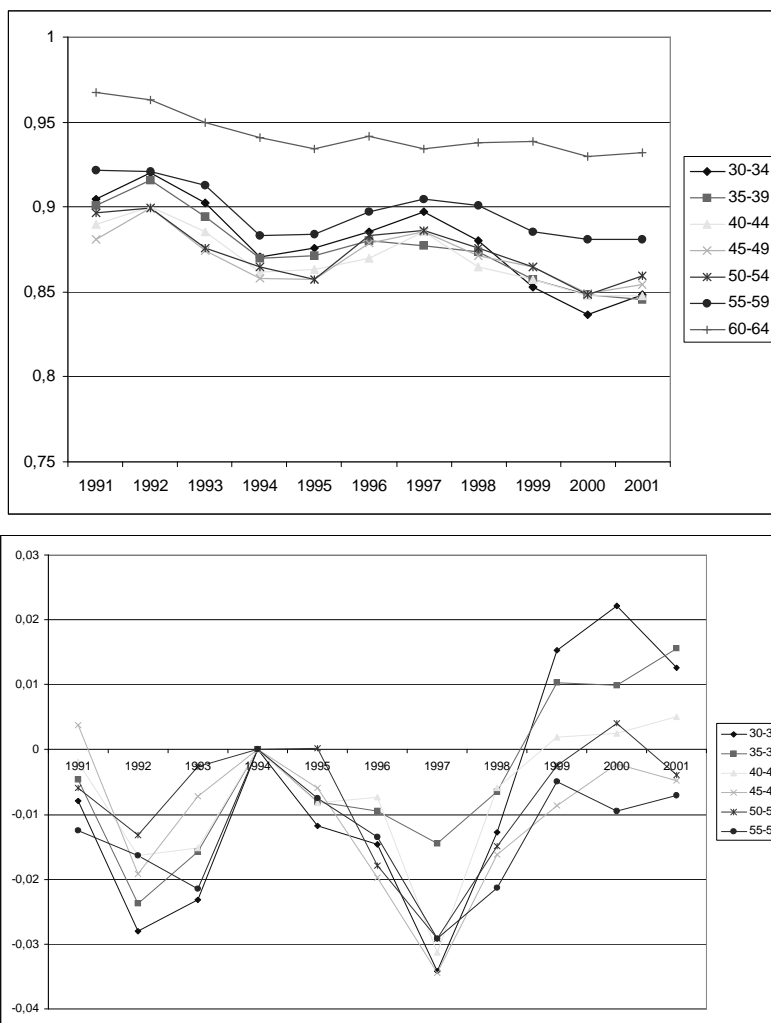


Figure 12. Upper panel: transition probabilities from Sickpay insurance to all Non-emp states by age-group. Lower panel: differences-in-differences estimates for the age-group 60-64 relative to all other age-groups using 1994 as base year. Males.

Table 6 summarizes the results on the effects on the Sickpay insurance program and highlights two significant effects of the reform: the higher transition from employment to the Sickpay insurance program and the decreased transition from DI to the Sickpay insurance. Finally, the results show that the latter effect did not translate into an increased transition back to em-

| | All | Displaced Workers |
|---|------------|-------------------|
| | DD | DD |
| | Two-step | Two-step |
| | Estimates | Estimates |
| <i>Transition out from the Labor Force or out from employment</i> | | |
| Employment → SI | 0.0104* | |
| | (0.0049) | |
| <i>Persistence in different income security programs</i> | | |
| SI → DI | -0.0578*** | |
| | (0.0098) | |
| SI → All programs | -0.0075 | |
| | (0.0068) | |

Table 6: Point estimates of the differences-in-differences results of the effect of the DI reform on different transitions on the labor market.

ployment, since there was no significant effect on persistence in different non-employment states for workers initially in the Sickpay insurance program.

6 Conclusions

Did the 1997 abolition of the special eligibility rules for the age-group 60-64 in Sweden's Disability Insurance program lead to the intended increased in employment in the this age-group? In this study we find no empirical support for this being the case, at least not up to 2 or 3 years after the reform. Instead, we find that the different labor market insurance programs worked like communicating vessels in absorbing workers who did not qualify for DI

under the post-reform eligibility rules. We find that both the unemployment rate and utilization of the Sickpay insurance system increased in the affected age-group as a result of the reform.

It could, however, be argued that it takes more time than 2 or 3 years for potentially positive effects on employment to show up, since the alternative labor market insurance programs to a less extent than DI are “absorbing states” and it takes time for employees, employers and labor unions to adjust to the post-reform rules. We find some support for such reasoning in our results. By the end of the period under study we find a decreased transition out from employment in the affected age-group, as well as a lowered persistence in the combined Non-employment states, including Unemployment.

The empirical result obtained in this study also reveals a very large anticipation effect of the reform in a radically increased transition to the DI program the year before the reform was implemented. This increase corresponds to 2 percent of the work force in the affected age-group. It is not likely that such large effect was initiated solely by the insured workers, but rather, as indicated by anecdotal evidences, also by the social security administration itself.

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