Unemployment Insurance and Departures from Employment: Evidence from a German Reform

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Abstract

In 2004 Germany announced an unemployment insurance (UI) reform that involved reductions to the maximum period over which workers could collect UI benefits. The reductions varied by age and were quite substantial; workers in their 50s and above stood to lose up to 14 months of benefits. The effects of this reform differed dramatically by age and time period. Just before the announced reforms took effect, older workers left their jobs to take up UI at rates roughly five times greater than their pre-announcement levels. After the reforms were in place, older workers reduced their exit rates. Prime-age workers hardly responded at all. We show that these heterogeneous responses are consistent with a simple model that views UI as a precursor to retirement rather than as insurance against unemployment. We estimate that the reform saved Germany roughly 5 billion Euros through the end of 2007, although roughly 20 percent of the savings that are attributable to behavioral responses to the reform were offset by higher costs due to the spike in anticipatory exit rates.

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I. Introduction

In mid-2004 Germany announced a reform to its Unemployment Insurance (UI) system that was intended to reduce its roughly 28 billion Euro cost. The reform, which was to take effect in February 2006, reduced the maximum benefit period (MBP). Under the German UI system, the MBP depends on the worker's age and work history. Before the reform, the MBP was at least 12 months for all workers with a sufficiently lengthy work history (which we define below). As depicted by the square symbols in Figure 1, it rose with age in several steps such that, at age 57, the MBP was 32 months. These MBP's are quite generous compared to the US system, but are in line with other developed countries (Andersen and Svarer 2007).

Post-reform, workers with sufficient work histories under age 55 could collect at most 12 months of UI payments, as depicted by the triangular symbols in Figure 1. Workers 55 and older could collect at most 18 months. Changes in MBP's due to the policy reform, depicted by the black line in Figure 2, were substantial. For the oldest workers, the MBP was reduced by 14 months. Other workers over age 44 faced MBP reductions of at least six months.

We analyze how the UI reform affected exits from employment onto UI among workers with lengthy work histories. We find that their responses were quite heterogeneous. Once the reform took effect, exit rates among the oldest workers fell substantially. However, workers in their early 50s, who stood to lose the same 14 months of coverage, hardly changed their behavior.

The anticipatory response was quite different. Just before the reform became effective, exit rates among older worker rose markedly, with some differences between men and women. Again, no such change took place among younger workers who stood to lose the same amount of coverage. The departure of the older workers partially undermined policy makers' intentions to reduce costs.

Our work is related to a voluminous literature that analyzes the effects of the UI system. However, most studies focus on incentives in the UI system that affect transitions from unemployment to employment, often finding such incentives to be sizeable (see the surveys by Meyer 1995 and Krueger and Meyer 2002). More recent studies show that they can be attributed to a mix of liquidity constraints and substitution effects (Chetty 2008; Schmieder, von Wachter, and Bender 2012).

Our analysis is different, focusing on the link between the UI system and exits from employment to UI. This has been the topic of a smaller literature. One branch of this literature has focused on links between the financing of UI benefits and the firm's incentive to lay off workers (Bailey, 1977; Feldstein 1978; Topel 1983; Anderson and Meyer 1993; Card and Levine 2000). As important as this is in the American context, there is no experience rating in the German UI system (as well as in many other developed countries).

Another branch of this literature is closer to our work here. It considers more generally how UI incentives affect transitions from employment into unemployment (Green and Riddell 1993, Winter-Ebmer 2003, and Inderbitzin, Staubli, and Zweimueller 2011). At the same time, our analysis differs from these studies in several ways. First,

we focus on age heterogeneity in the response to the UI reforms explicitly, whereas the earlier studies generally focus only on older workers. Second, we estimate both anticipatory and steady-state responses to the UI reform, whereas other analysts have focused on steady-state changes. Finally, we develop a very simple theoretical model that explains the heterogeneous responses that we observe.

The key feature of the model is that it treats UI as a bridge to retirement rather than insurance against the risk of becoming unemployed. Treating UI as a precursor to retirement explains the age variation in the responses to the reform. It also explains why the anticipatory and steady-state responses move in opposite directions. Interactions between the UI program and the German pension system explain differences in anticipatory behavior between men and women.

Because of the retirement perspective, the paper contributes to the vast literature on retirement incentives as surveyed by Feldstein and Leibman (2002). It also contributes to the literature on the use of non-retirement transfer programs as a route to early exit from the workforce (Bound and Weidman 1992; Bound and Burkhauser 1999; Gruber 2000; Autor and Duggan 2003, 2006; Duggan, Singleton, Song 2007; Chen and van der Klaauw 2008). The link to retirement also requires us to deal with changes in legal retirement ages that were taking place during our sample period.

In the next section we describe our data and discuss the patterns mentioned above in more detail. Section 3 provides background on Germany's UI and pension systems, and interactions between the two. Section 4 develops a theoretical model to explain the observed data. Section 5 discusses estimation issues. Section 6 presents estimates and

tests of hypotheses generated by the model. In future versions of the paper, Section 7 will present estimates of the cost-savings of the policy change and the expense associated with the anticipatory responses. Section 8 concludes.

II. Data

We use social insurance records of German employees that have been merged with unemployment insurance records and the job-seeker register of the public employment service. The database we have at our disposal is a 2% random sample of all employees that have been subject to social insurance at least once during the period 1990 to 2008. Since every employee who is not a civil servant is subject to social insurance, the database is representative for all German workers in that period who are covered by UI. For all individuals included in this database we observe labor market histories from 1990 to 2008. They are recorded as spells with exact beginning and end dates.

We focus on the period 2004 to 2006. We construct monthly cross-sections of workers who are employed in a regular, unsubsidized job in a given calendar month and satisfy the following UI eligibility criteria in that month: (i) they must have been employed 12 out of the last 24 months, which makes them eligible for UI under both the pre- and post-reform regimes; and (ii) they must have sufficiently lengthy work histories, that is, they must have been employed 64 out of the last 84 months, which qualifies them for the MBP independent of age both before and after the reform. Thus we are focusing on workers with strong labor force attachment and relatively stable work histories.

Figure 3 provides a preliminary look at our data. Panel A summarizes the monthly rate at which male workers exit employment for UI by age and year. Panel B

does the same for females. We depict age-exit profiles separately for 2004, which is essentially pre-reform; 2005, which we might term the anticipation period; and 2006, after the reform took effect. Although one might be concerned that the 2004 data mixes data from before and after the announcement (July 2004), below we show that there was essentially no response to the announcement until well after 2004.

Figure 3 has several prominent features. One is that the UI reform appears to have had essentially no effect on prime-age workers. Exits from employment are lower in 2006 than in earlier years, but this may be attributable to improvements in the labor market. There are no noticeable changes at ages 45, or 47, where workers lost between 6 and 10 months of benefits due to the reform.

The second point shown by Figure 3 is that workers facing the same reduction in MBP's responded very differently to those changes. Both workers aged 52 to 54 and workers aged 57 and over faced a reduction of 14 months of UI (see Figure 2). For 52- to 54-year olds, employment exits hardly changed over our sample period. Yet for workers 57 and older, employment exits fell substantially between 2004, when the policy change was announced, and 2006, after it took effect.

The third prominent feature of Figure 3 is the appearance of announcement effects. Exit rates rose sharply, particularly among the oldest workers, in 2005. This suggests that workers who were nearing retirement when the policy reform was announced in mid-2004 exercised their option to claim 32 months of UI benefits before that option expired in early 2006. At the same time, these apparent announcement effects raise questions of their own. First, why were they so much larger among 60- to 62-year olds than among

57- to 59-year olds, when all of those workers faced the same MBP reduction? Second, why didn't we see larger increases in 2005 exit rates among 52- to 54-year-olds, who like their older counterparts, also faced a 14-month loss of UI coverage? Finally, and somewhat more subtly, why do the peak 2005 exit rates occur at somewhat younger ages for women than for men?

In section IV we write down a model that answers these questions. Before we do this, we require further background on the UI system, Germany's pension system, and interactions between the two.

III. Background

A. More on German UI

In Germany, UI is compulsory for all employees except civil servants. This covers about 85% of the German workforce. Workers who have been laid off immediately qualify for UI if they satisfy the work history requirement. Before the February 2006 reform, the worker must have worked at least 12 out of the 36 months preceding unemployment. After the reform this was changed to 12 out of the last 24 months. Workers who quit their job are also eligible for UI if they satisfy the work history requirement, but a waiting period of up to three months can be imposed, which reduces the benefit period by the same amount.

As mentioned above, the benefit period for UI receipt is a function of the worker's age and work history at the time of the claim. To qualify for the MBP's in effect before February 2006, the worker must have worked during the previous seven years for a number of months equal to at least two times the MBP. The February 2006

reform changed this requirement. To qualify for the post-reform MBP's, the worker must have worked during the previous 3 years for a number of months equal to at least two times the MBP. Regardless of the MBP, workers cannot collect UI after reaching the statutory retirement age.

The reform did not affect the replacement rate that determines the level of benefits. Now as before, a covered worker with no dependents receives an amount equal to 60 percent of his previous average after-tax salary. A covered worker with dependents receives 67 percent of his previous salary.

B. The German pension system[1]

As with UI, public pension insurance in Germany is compulsory for all employees except civil servants. According to Boersch-Supan and Wilke (2004), the German public pension system provides essentially all of the retirement income of German retirees. It involves a statutory retirement age (SRA), which historically varied by sex, and what we will call a statutory benefit level. It also provides workers with various ways to retire early, in some cases receiving reduced benefits. Both statutory and early retirement ages have increased in recent years, although they have changed differently for men and women.

For men born during or before 1946, the statutory retirement age was 65. It has since begun to increase, and will eventually reach 67 for the 1963 birth cohort. However, as shown in Table 2, age 65 was the SRA for men throughout our sample period.

[1] This subsection draws heavily from www.deutsche-rentenversicherung.de.

For women who were born in 1939 or earlier, the statutory retirement age was 60. For women born after 1939 and before 1945, the SRA rose by one month of age per calendar month. The bottom panel of Table 2 shows how the SRA for women changed during our sample period. In 2004, 62 was the SRA, whereas in 2005 and 2006, the SRA was 63.

The German pension system also offers several routes to early retirement. One of the most important for our purposes is the so-called unemployment pension. Persons born before 1946 who were unemployed when they applied for their pension and had been unemployed for at least 12 months after turning 58-and-a-half years old could begin to draw a pension at age 60. However, their pension benefits were reduced from the statutory benefit level by 0.3 percentage points for each month they retired before the SRA. This penalty applied for the entire duration of pension receipt. Table 2 shows that this early retirement regime applied to all men turning 60 during our sample period.

Another important route to early retirement was through the pension program for women. Women born between 1945 and 1951 inclusive could draw their pensions as early as age 60, subject to a penalty of 0.3 percent for each month it was drawn prior to reaching the SRA. By means of either this program or the somewhat more restrictive unemployment pension, all women turning 60 during our sample period were eligible for early retirement.

Although men and women both could potentially qualify for early retirement at age 60, early retirement would have different effects on the retirement benefits. The reason is that early retirement penalties rose with the difference between which the

recipient claimed early retirement and his or her SRA. Because the SRA for men was higher, a man claiming early retirement would enjoy lower retirement benefits than a woman with the same statutory benefit who claimed early retirement at the same age.

C. Interactions between UI and the pension system

For our purposes, the UI and pension system rules interact in two important ways. First, for workers exiting employment before the statutory retirement age, drawing (and exhausting) one's UI benefits before one begins to draw pension benefits raises one's ultimate pension payment. The reason is that each month that the worker draws UI raises the age at which he begins to draw retirement by one month, reducing the discount applied to the statutory benefit level. This gives workers seeking to exit employment before the SRA an incentive to draw UI first. This interaction plays a role in the theoretical model developed in the next section.

The second interaction involves the oldest workers. UI benefits cannot be drawn once the worker reaches the statutory retirement age. This modifies the effective benefit loss that these workers faced in February 2006. Rather than facing the statutory MBP reduction depicted by the black line in Figure 2, older male workers faced the lesser reduction shown by the blue line. Sixty-three year-old men effectively faced a loss of only 6 months' benefits, since they were 24 months away from the SRA of 65. Sixty-four-year-olds faced no loss of benefits, since they were eligible for UI for only 12 months in any case. Since the SRA was two years earlier for women (three years in 2004), their effective benefit reduction is shifted two years to the left.

III. A simple model of UI incentives and exits from employment

The institutional detail discussed above is incorporated into our model, which is based on the worker's lifetime budget constraint, along the lines of Burtless (1986, 1999), Fields and Mitchell (1984), and Mitchell and Fields (1984). The lifetime budget constraint relates the present value of the worker's income from earnings, UI, and pension benefits to the age at which he exits employment. This treats the worker's exit from employment to UI as tantamount to retiring. There are more general approaches one could take (e.g., Mortenson 1977), but treating UI as a pre-retirement program helps explain why workers of different ages respond differently to the same UI reform.

The worker earns w when he is employed. He receives UI benefits $\gamma_0 w$ if he exits employment for UI, where γ_0 is the UI replacement rate. The worker is eligible to receive UI benefits for a maximum benefit period of m. When he begins to draw his pension, he receives $\gamma_1 w$, where γ_1 is the effective replacement rate for the pension system. Rather than explicitly model the manner by which drawing UI benefits raises the pension benefit, we assume that $\gamma_0 > \gamma_1$. This implies that the worker will draw UI for the full MBP before drawing his pension, as he would in an environment where drawing UI raised his eventual pension benefit. It is also empirically plausible for a worker with strong labor force attachment under the German UI system.

Denote the worker's exit age by R, his rate of time preference by r, his planning horizon by T, and the earliest age at which he may retire (albeit with penalties) by R_1. Let the present value of his future income as a function of the age at which he exits employment be V(R). V(R) consists of two segments, given by

$$V(R) = \int_0^R we^{-rt}\,dt + \int_R^{R+m} \gamma_0 we^{-rt}\,dt + \int_{R_1}^{T} \gamma_1 we^{-rt}\,dt \qquad \text{for } 0 < R < R_1\text{-m, and}$$

$$V(R) = \int_0^R we^{-rt}\,dt + \int_R^{R+m} \gamma_0 we^{-rt}\,dt + \int_{R+m}^{T} \gamma_1 we^{-rt}\,dt \qquad \text{for } R_1\text{-m} \le R < \text{T-m.}$$

In Figure 5 we plot V(R). For ease of exposition, we discuss the case where r=0, but our conclusions hold for general r.

For R < R_1-m, the opportunity cost of leisure (i.e., earlier exit from employment) is the worker's wage w. The reason is that if the worker exits before R_1-m, he will experience a spell during which he receives neither earnings nor public support (between the month when UI ends and the month when he may first claim his pension). Thus delaying exit will raise his wealth by his wage. For R > R_1-m, the opportunity cost of leisure is (1- γ_1)w, reflecting the effective replacement rate of the pension system. Thus V(R) has a kink at R_1-m. The UI replacement rate does not affect the slope of the lifetime budget constraint on either side of the kink, because under the assumptions made, the worker will always enter UI before drawing his pension and receive UI for the full MBP. The worker's optimal exit age R* is determined by the point of tangency between the worker's lifetime budget constraint and his highest achievable indifference curve.

Consider now how a reduction in the MBP from m to m' affects behavior. For the moment we abstract from anticipatory effects, assuming that the policy change takes effect as soon as it is announced. This lets us focus for now on steady-state changes.

Reducing the MBP from m to m' shifts the kink in the worker's lifetime budget constraint to the right by m-m'. It is no longer feasible for the worker to exit employment

at age R*, which would have been optimal before the policy change. He faces a higher price for leisure, encouraging a later exit date. If leisure is a normal good, the wealth effect reinforces the substitution effect, with the result that he exits at age R'. Post-reform steady-state exit rates fall for workers in the vicinity of R*.

This helps explain why 2006 exit rates are lower than 2004 exit rates in Figure 3. Peak 2004 exit rates for men occur between the ages of roughly 58 to 62. Post-reform, exit rates in that portion of the age distribution fall, consistent with the predicted effect of the reform. For women, peak 2004 exit rates occur between the ages of 57 and 61, consistent with the lower SRA for women. Exit rates in that age range fall after the reform takes effect.

The model also helps explain age heterogeneity in the effects of the reform. It predicts that, in the period following the reform, we should see reductions in exit rates among workers in the vicinity of R*. It does not predict immediate reductions in exit rates among younger workers. Based on the pre-reform exit rates in Figure 3, we surmise that the mass of the distribution of R* lies between 58 and 62 for men and 57 and 61 for women. There was little pre-reform exit behavior among 52- to 54-year-olds before the reform, which explains why there was little change in their behavior after the reform, even though they stood to lose the same 14 months of UI coverage as workers age 57 and older.

Now consider anticipatory effects. The policy reform was announced roughly 1.5 years before it took effect. Denote the workers' age in February 2006 by $\bar{R}$. If $\bar{R}$-1.5 $\leq$

$R^* \leq \bar{R}$, the worker will attain his optimal pre-reform exit age before the policy change takes place and exit at age R* as planned.

However, if $\bar{R} < R^*$, he will not be able to exit at R* under the pre-reform UI rules. In other words, by the time he reaches age R*, his pre-reform budget constraint will no longer be feasible. He faces the choice of either exiting at his post-reform optimum R', or exiting before the policy change takes effect.

He will exit before the policy change takes effect if $\bar{R} > \tilde{R}$, where $\tilde{R}$ is the age at which the consumer would be indifferent between exiting under the pre-reform policy and waiting to exit at R' after the reform takes place. If $\bar{R} > \tilde{R}$, then the worker can essentially work his way up the pre-reform budget constraint to some point to the right of $\tilde{R}$, then exit before the reform takes effect and achieve a utility level that is higher than that which he would receive by waiting to exit under the new regime at R'. He would maximize his utility along these lines by waiting to exit until just before the reform becomes effective, because doing so would put him as far to the right as possible along the pre-reform budget constraint. Workers for whom $\bar{R} < \tilde{R}$ would optimize by waiting to exit at age R' under the post-reform regime.

Thus the model makes two predictions about announcement effects. The first is that workers should work until just before the policy change on February 2006, since doing so will yield them the greatest utility along the pre-reform budget constraint. The second is that the increase in exit rates just before February 2006 should be greatest for older workers, since at the time of the policy change, they are closer to their pre-reform

optimal exit age R*. The exception involves workers who are old enough that the policy reform had no effect on their MBP, as depicted in Figure 2.

V. Estimation issues

A. The Sample period

We focus on the 2004-2006 period to ensure that all of the workers in the sample face the same post-UI environment. Workers who exhaust UI but do not yet qualify for a pension may be eligible for so-called UI II benefits. These benefits were reformed in January 2005, generally becoming less generous than they had been previously (Rudolph and Blos 2005). If we were to extend our estimation period back beyond 2004, some of the youngest workers potentially could have qualified for UI II benefits under the earlier, more generous regime.

Workers who satisfy our sample inclusion criteria in more than one month may appear in more than one monthly cross-section. However, we do not make any explicit use of this aspect of the data. We do cluster our standard errors at the level of the worker to avoid overstating the precision of our estimates.

B. Identification and Estimation

Our objective is to estimate both the announcement effects and the steady-state effects of the UI reform in a manner that varies by age. To estimate announcement effects, we compare exit rates during the pre-announcement period, before July 2004, to those during what we call the announcement period, July 2004 to January 2006. To estimate the equilibrium effects, we compare exit rates during the pre-announcement

period to those during the post-enactment period, which began when the reform took effect in February 2006. The challenge is to disentangle the effects of the policy change from those of changes in retirement ages, which vary by birth cohort, and from those of other time-varying factors, such as the state of the labor market, which may have independently affected exit rates during our sample period.

We analyze the pooled monthly cross sections of exit rates discussed in Section II. We focus on monthly exit rates to pick up the announcement effects, which are a relatively high-frequency phenomenon. We stratify the sample by age and sex to allow for age and gender variation in the effect of the UI reform. Letting τ denote the implementation date, February 2006, our estimating equation takes the form:

$$(1)\quad y_{it}^{a} = \beta_{p}^{a}\text{post}_{t} + \sum_{j=1}^{18}\beta_{j}^{a}1(t=\tau-j) + \delta^{a}R_{i} + \gamma^{a}U_{it} + \sum_{j=1}^{11}\theta_{j}^{a}1(\text{month}_{t}=j) + \sum_{j=1}^{11}\lambda_{j}^{a}1(\text{birthmonth}_{it}=j) + X_{it}\alpha^{a} + \varepsilon_{it}^{a}$$
$$i=1,\ldots,N_{t}^{a};\ t=1,\ldots,T;\ a=41,\ldots,64.$$

Each worker in the month-t cross-section for group a is a years old in month t. He also is employed in month t and satisfies the work-history requirements necessary to qualify for the maximum UI benefit period. The dependent variable y_{it}^{a} equals one if he exits employment for UI in months t+1, t+2, or t+3 (to capture UI entries following quits) and equals zero otherwise. The variable post_t equals one if month t+1 (the earliest possible month of exit) falls in the post-enactment period and equals zero otherwise. Thus β_{p}^{a} estimates the steady-state effect of the UI reform on workers of age a. Letting the function 1(A)=1 if A is true and 1(A)=0 otherwise, the next group of variables picks

up the announcement effects of the reform, that is, the effects of the reform on exit rates during each of the 18 months between the announcement and the enactment of the reductions to the UI MBPs.[2] The next term R_i is worker i's retirement age. With our notation, it varies by i because it is specific to birth cohorts defined by calendar month of birth. The next term, U_{it}, is the unemployment rate. It varies over time and between counties (hence by i). The next two sets of terms capture monthly seasonality in exit rates and birth month effects, the latter of which are related to time-to-retirement age within our samples that are defined by year of age. The last term, X_{it}, controls for covariates such as region, earnings, type of job, education, nationality, occupation, and industry. All regression coefficients vary freely by age and sex.

According to our model, we expect $\beta_p^a=0$ for young workers, that is, workers for whom a is well short of their optimal exit age under the old UI regime. For workers closer to their optimal pre-reform exit age, we expect $\beta_p^a<0$. Our model makes two predictions regarding the announcement effects. First, we expect $\beta_j^a=0$ for high (absolute) values of j, that is, for months well in advance of the date of the policy change. For low values of j, we expect $\beta_j^a>0$. Moreover, for j close to zero, we expect β_j^a to be higher for workers closer to their optimal pre-reform retirement age than for younger workers. The exception is for male workers age 63 and 64, and female workers age 61 and over, whose use of UI benefits was restricted and who therefore stood to lose little as a result of the policy change.

[2] In practice, we impose the restriction $\beta_{-18} = \ldots = \beta_{-13}$ based on results from preliminary analyses.

Our identification strategy can be viewed as an attempt to solve the age-cohort-period effect problem that we face in our data. There is no non-parametric solution to this problem, so one must impose some sort of restrictions. We impose two. The first is that the cohort effects are a linear function of the worker's retirement age. Linearity is made more plausible by stratifying the sample by age, so that variation in the retirement age is fairly limited within each age-specific sample. Our second restriction is that period effects other than the effect of the discrete UI change are a linear function of the smoothly varying unemployment rate. Distinguishing the discrete change in the UI program from the continuously changing unemployment rate is aided by regional variation in the unemployment rate, which sharpens identification of the effect of the unemployment rate.

Equation (1) can be thought of as a before-and-after estimator that controls parametrically for time trends that may affect workers' exit behavior. The controls are restrictive in that they assume such trends to follow a linear function of the unemployment rate. They are flexible in that they allow the effect of the unemployment rate to vary freely by age.[3]

V. Results

A. Regression estimates

Estimates from our regression model (1) are reported in graphical form in Figure 6 and in tabular form in Table 3. In each panel of Figure 6, we report for various ages

[3] In results not reported here, we have included quadratic terms in the unemployment rate, without any material effect on our findings.

estimates of β_j^a, for j=-12,…,-1 and β_p^a against time in months measured from the data of the policy change. The estimate of β_p^a, the steady-state effect of the MBP reduction, is plotted for values of t=0,…, 10. Thus Figure 6 depicts the age-specific effects of the reform, both anticipatory and steady-state, over a two-year period roughly centered on the date of the policy change. Ninety-five percent confidence intervals are represented by light dotted lines. Results for males appear in panels (a) through (d); results for females appear in panels (e) through (h).

Workers age 45 to 54, results for whom are shown in panels (a), (b), (e), and (f), show little response to the MBP reduction. The estimated anticipatory effects are close to zero, as are the estimated steady-state effects. Almost all of these coefficients are insignificant, despite the large sample sizes (see Table 3). The only significant coefficients occur in the month or two immediately before the date of the policy change. Even in these cases, though, the magnitude of the coefficients is minuscule.

Men age 58 to 62 are more responsive to the policy change, as our model predicts. For the most part, the reform had little anticipatory effect on exit rates until the third or fourth month before the policy change took effect. Exit rates rose thereafter. With the exception of 58-year-olds, the peak in the exit rates took place the month before the policy change became effective. Most of the peak exit rate estimates are statistically significant; some are quite sizeable. The reform raised the January 2006 exit rate for 59-year-old men by 1.9 percentage points, or 380 percent of the 0.5 percent exit rate in January 2004. Among both 60- and 61-year-old men, the UI change increased January

2006 exit rates by about 2.5 percentage points. This amounts to roughly a five-fold increase over the January 2004 exit rate of about 0.5 percent.

For women, the peak anticipatory responses to the reform occur between ages 57 and 60. This is slightly younger than the peak age range for men, consistent with younger statutory retirement ages for women. As with men, their anticipatory responses generally peaked in January 2006. The largest effect, at age 57, was 2 percentage points, or 1000 percent of the January 2004 exit rate of 0.2 percent.

The regression estimates also indicate that the policy change reduced steady-state exit rates among these age groups, although these effects are not as strong as the anticipatory effects. Two of the five estimates for 58- to 62-year-old men are significantly negative, compared to two of the 13 estimates for 45-to-57-year-olds. Three of the five estimates for 57- to 61-year-old women are significantly negative compared to three out of 12 among 45- to 56-year-olds.

Results for 63- and 64-year-old men appear in panel (d). Their anticipatory response to the MBP reduction was quite muted compared to that of slightly younger workers. The same is true for 62-year-old women, shown in panel (h). This is consistent with the observation that the UI reform did little to change these workers' lifetime budget constraints due to interactions between the UI and pension systems. Similarly, these oldest workers show no evidence of lower steady-state exit rates post-reform.

For the most part, these results conform with the predictions from our model above. The reform had essentially no effect on workers below age 55, but reduced steady-state exit rates among older workers. Anticipatory exits among older workers

generally peaked in the month before the UI reform took effect, and they were highest among those closest to the peak exit ages in the pre-reform distribution of exit rates.

B. Fiscal implications

As mentioned in the introduction, one of the key rationales of the UI reform was to reduce the cost of the program. Here we present estimates of the cost reductions attributable to the reform over a two-year horizon. We also estimate the cost increase due to the anticipatory response.

To estimate these magnitudes we make use of regressions along the lines of equation (1), but change the dependent variable and/or the sample. To estimate the total change in UI expenditures due to the reform, we estimate (1) over the full sample, but change the dependent variable. Rather than being coded as 1 for an exit and 0 otherwise, we replace the 1's with the monetary value of total UI benefits paid over the two years following exit. The two-year window is chosen because the data ends in December 2008 and the last cross section of workers in our sample is December 2006. To obtain results that are interpretable the two-year window has to be applied symmetrically to all cross sections of workers in our sample (Jan 2004-Dec 2006).

As before, the regressions are run separately by sex and age. The coefficients on the post-reform dummy and the anticipation-period dummies directly provide the total average steady state and anticipatory effects. To quantify the total savings we multiply these numbers by the sex and age-specific sample size divided by 0.02 to account for the fact that our estimates are based on a 2% sample from the total population of insured workers.

The total steady state effect comprises both the mechanical effect due to truncating at 18 months spells that could have lasted up to 32 months prior to the reform, and what we call the behavioral effect which is due to reduced UI entry. To isolate the latter effect we multiply the estimated effect on exit by the average amount of UI benefits paid over the two years following exit after the reform. This yields the average behavioral steady state effect. As before, to quantify the total savings we multiply these numbers by the sex and age-specific sample size divided by 0.02.

Our estimates are summarized in Table 3 which displays the changes in expenditures added for females and males as well as ages 45-64. We estimate steady-state savings of 4.75 billion (year 2000 constant) Euros in total. Not surprisingly, most of this effect was mechanical, due to truncating at 18 months spells that could have lasted up to 32 months prior to the reform. Roughly 30 percent was behavioral, attributable to reductions in the exit rate among workers who prior to the reform would have exited employment for UI prior to drawing a pension.

Of course, anticipatory responses due to the reform work to reduce these savings. We estimate that the sharp spike in exit rates just before the reform took effect in February 2006 raised UI outlays by 236 billion Euros. This amounts to only about 5 percent of the total steady state savings due to the reform, but to about 20 percent of the savings due to behavioral responses to the reform. Accounting for both the steady state and anticipatory effects, we estimate that the reform reduced German UI outlays by about 4.5 billion Euros over a two-year period.

VII. Conclusions

The cost of entitlement programs has become a policy issue throughout much of the world. We analyze the consequences here of the effect of a German UI reform designed to reduce the cost of the program. Unlike most analyses of UI incentives, we focus on the link between the UI program and exits from employment.

The reform involved a reduction in the maximum benefit period over which workers could draw UI. Just before the reform took effect, exit rates jumped sharply among older workers. Once the reform was in effect, exit rates fell. Although the anticipatory effects of the program actually raised it cost, the net effect was to reduce costs fairly substantially.

Our model, which views the UI program as a precursor to retirement rather than insurance against unemployment, explains both the anticipatory increase in exit rates and the reduction in exit rates that occurred once the reform took effect. For workers approaching their pre-reform optimal exit age, exiting just before the reform takes effect with their pre-reform UI benefits intact can be utility maximizing. Younger workers, in turn, optimize by waiting to exit until their post-reform optimal exit age, which by virtue of reinforcing income and substitution effects, is later than their pre-reform optimum.

The behavioral responses to the reform were quite large. Among men roughly 60 years old, exit rates in January 2006, the month before the reform took place, were roughly five times greater than in January 2004, before the reform was announced. The steady-state effects were smaller but also substantial. For example, post-reform exit rates of 60-to-61-year-old workers were 30-70 percent lower than the pre-announcement exit rate.

Would these effects be so large in other environments? There are some special features of Germany which makes us think that similar reforms would have smaller effects in the United States. The maximum duration of UI benefits is much lower in the US, which leads us to think that the anticipatory effects of any reduction would be lower than in Germany. Moreover, private savings accounts for a larger share of Americans' retirement income, which could dampen steady-state responses relative to what we see in Germany. At the same time, many other countries offer lengthy UI benefits and generous public pensions. Responses to UI reforms in those countries may be more similar to what we observe in Germany.

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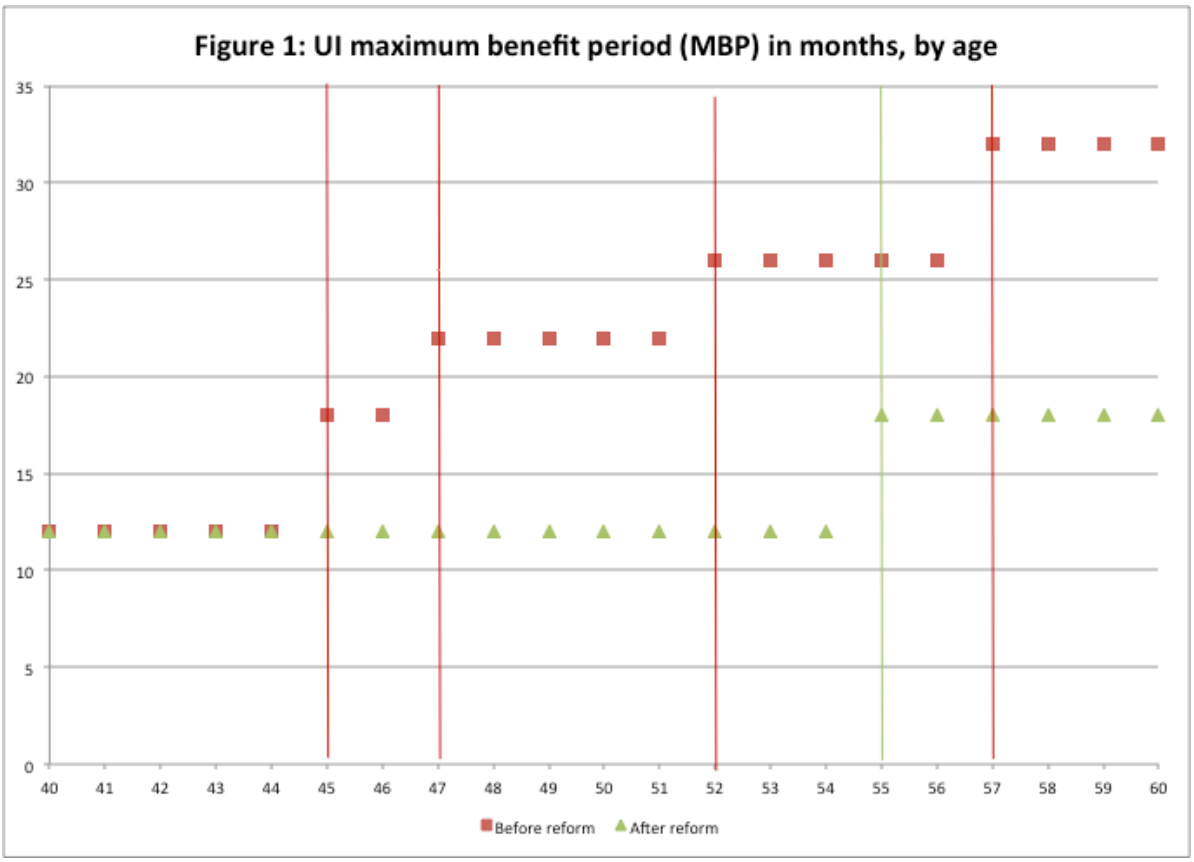


Figure 1: UI maximum benefit period (MBP) in months, by age
35
30
25
20
15
10
5
0
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60
Before reform
After reform

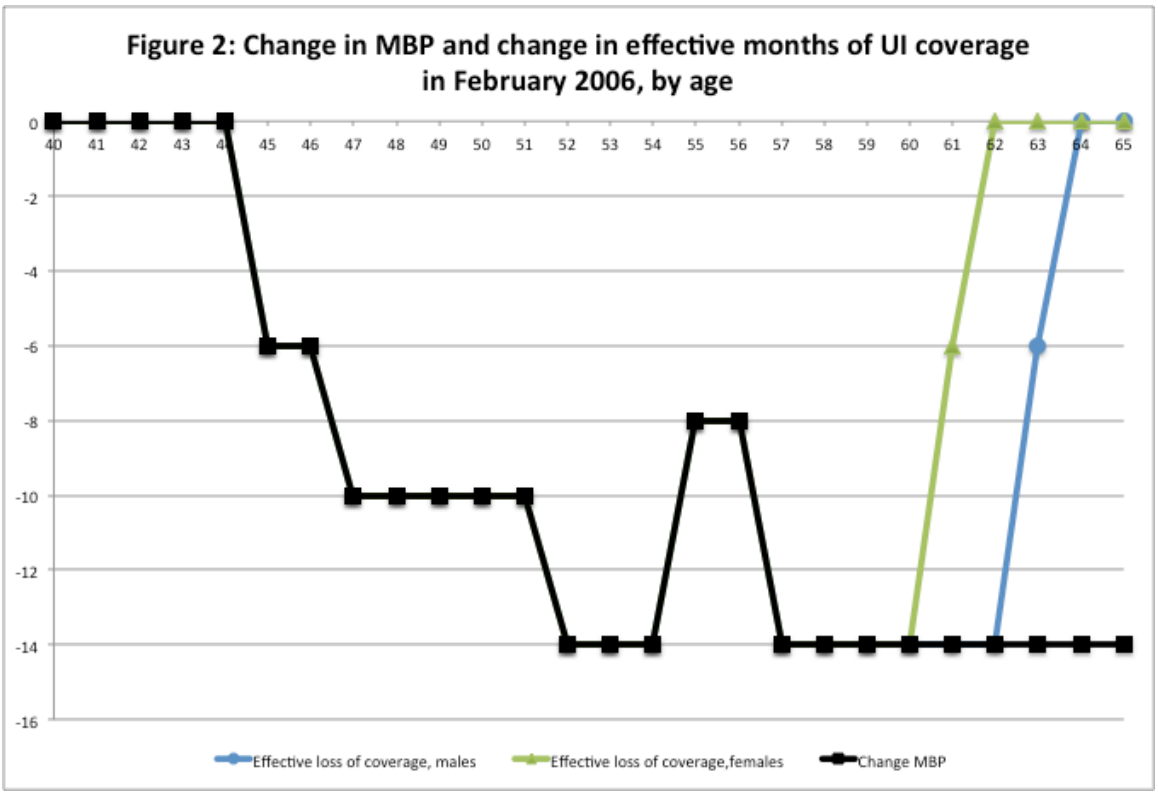


Figure 2: Change in MBP and change in effective months of UI coverage in February 2006, by age
0
-2
-4
-6
-8
-10
-12
-14
-16
40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65
Effective loss of coverage, males
Effective loss of coverage,females
Change MBP

Figure 3
Monthly rate of exit from employment to UI, by sex, age, and year

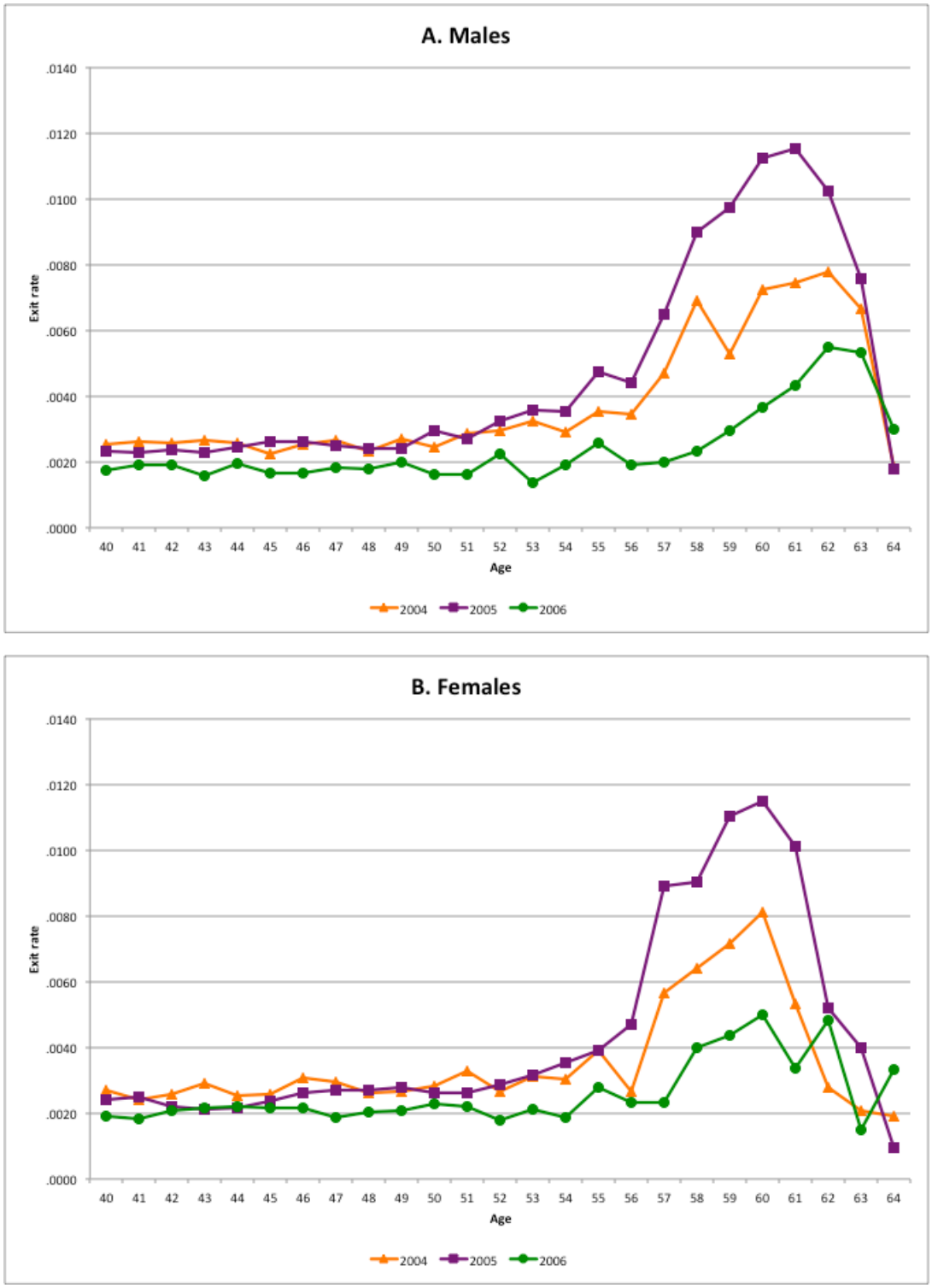


Figure 4
The worker's lifetime budget constraint and the effects of the policy reform

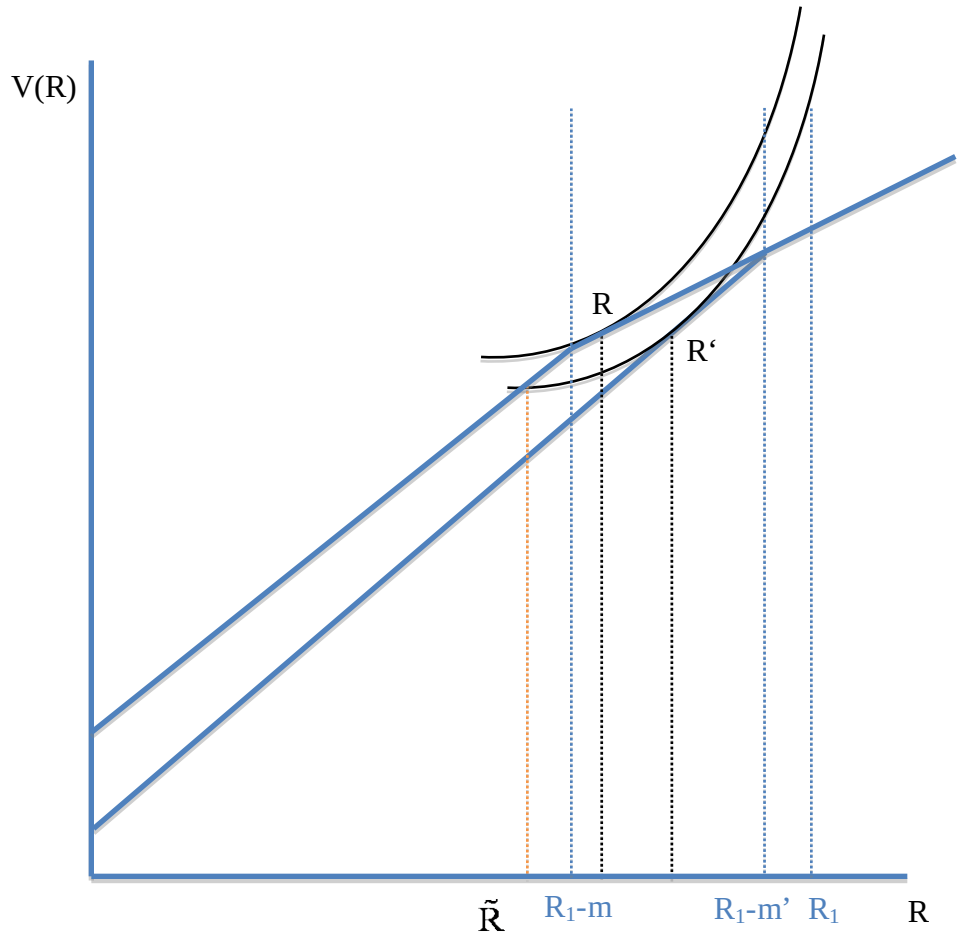
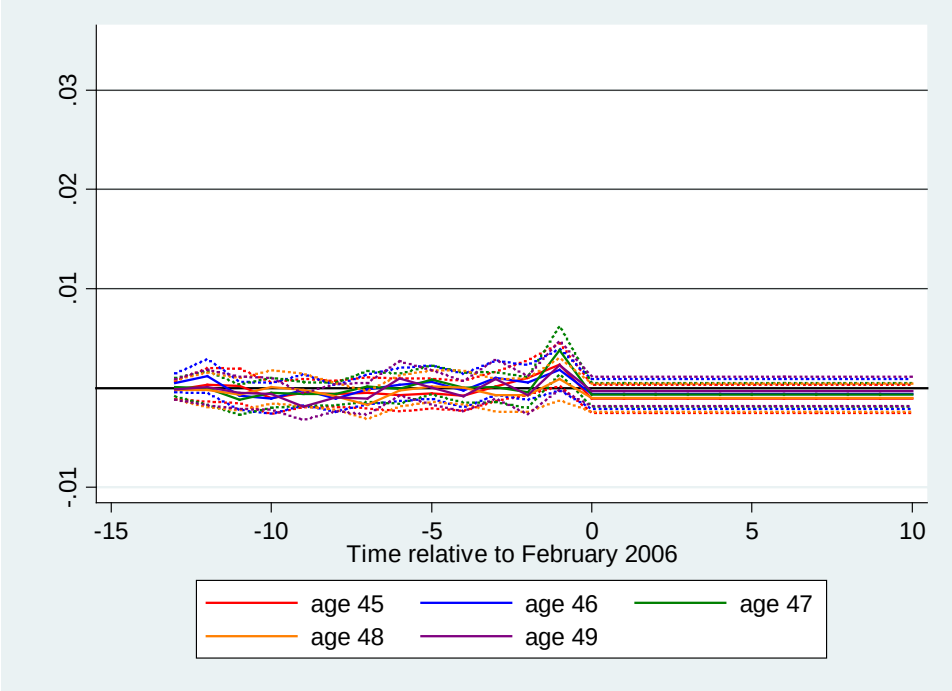
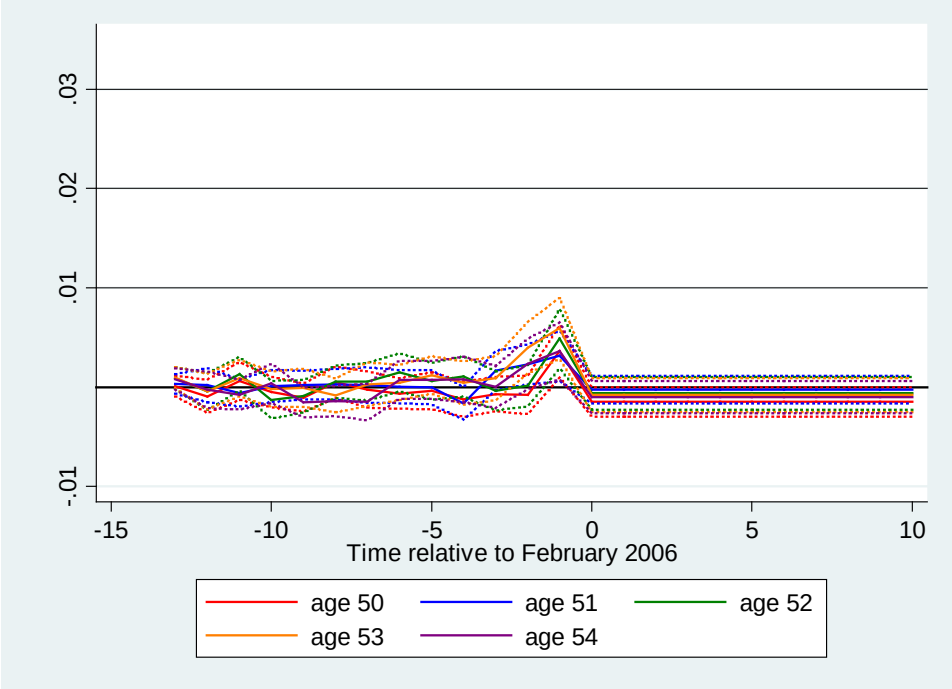


Figure 5
Regression estimates of the effects of the UI reform on rates of exit from employment to UI, by age and time (se clustered at person level)

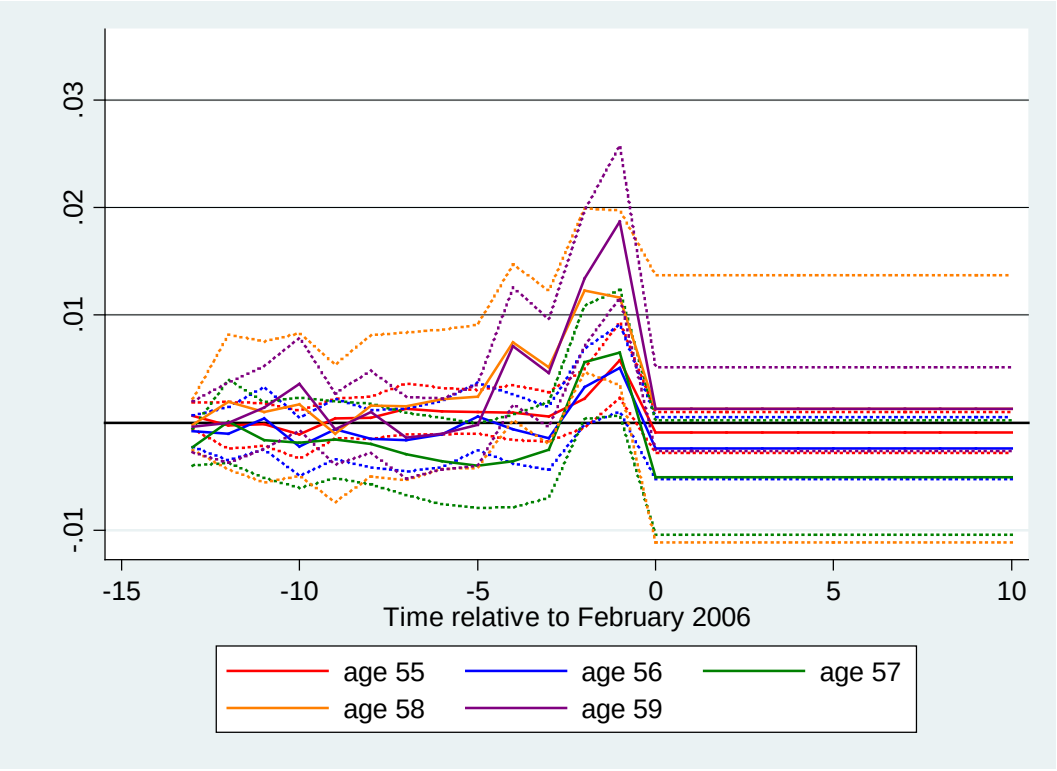
(a) Males 45-49



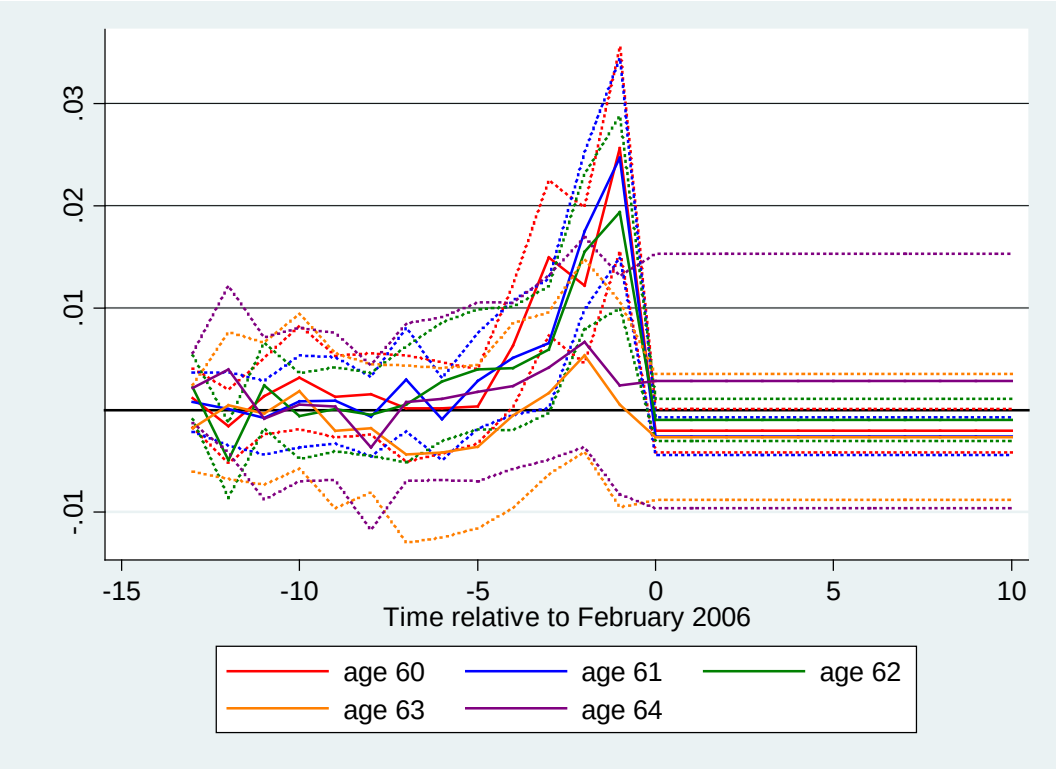
(b) Males 50-54



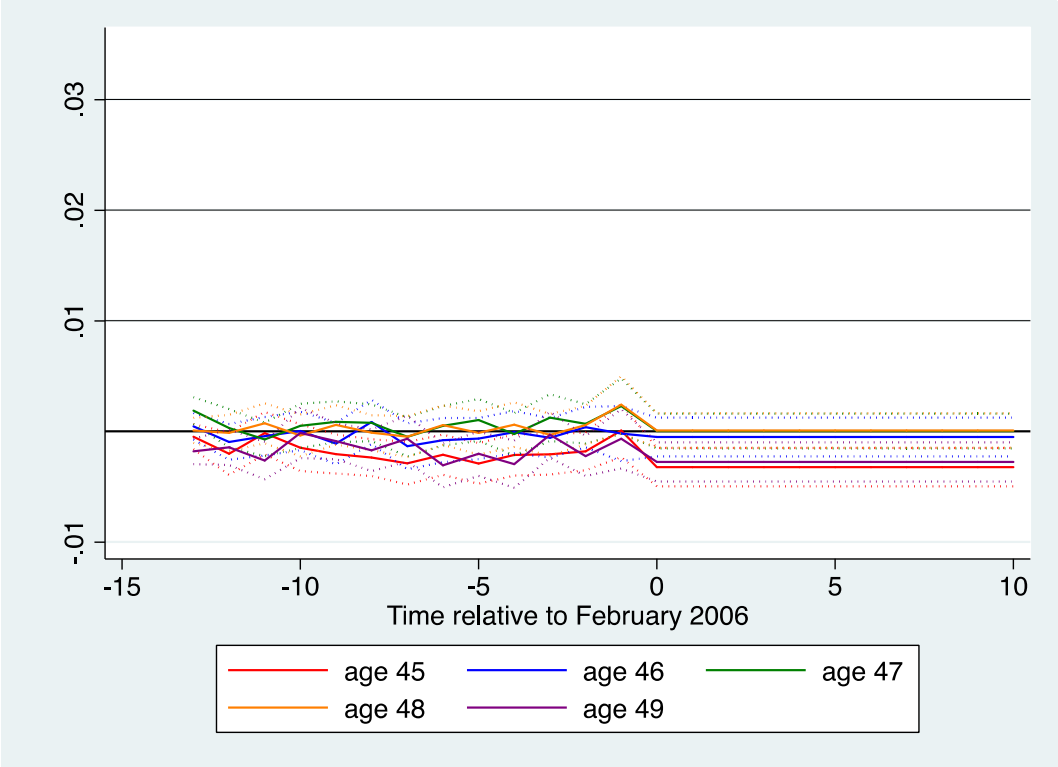
(c) Males 55-59



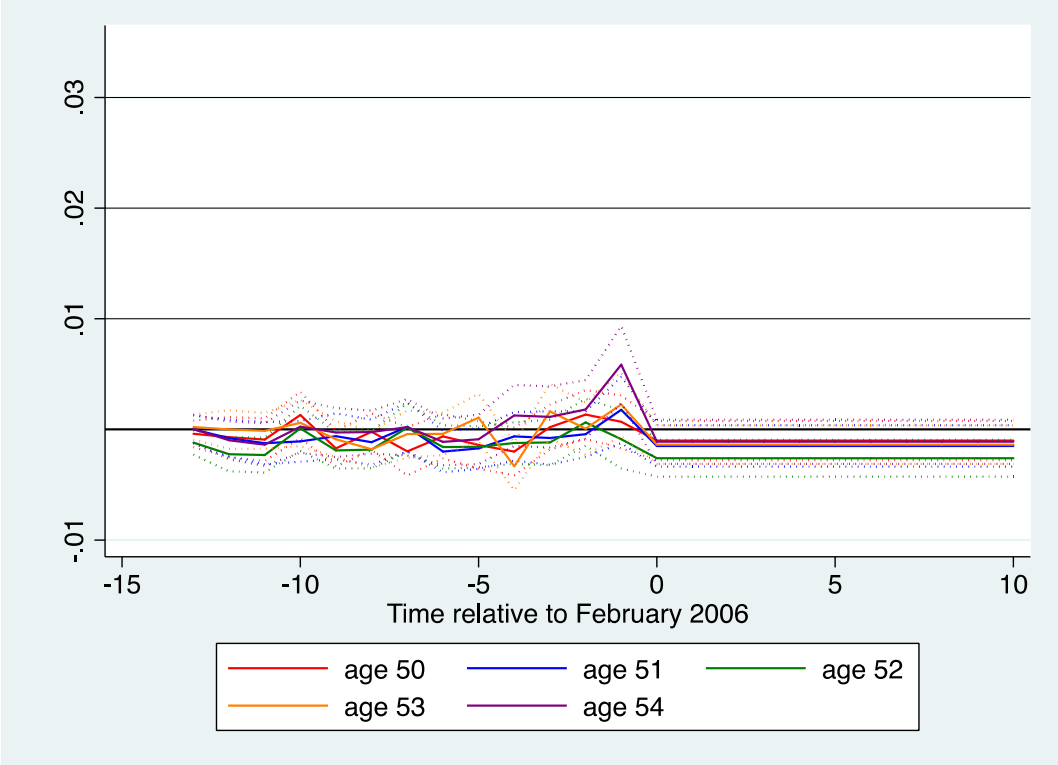
(e) Males 60-64



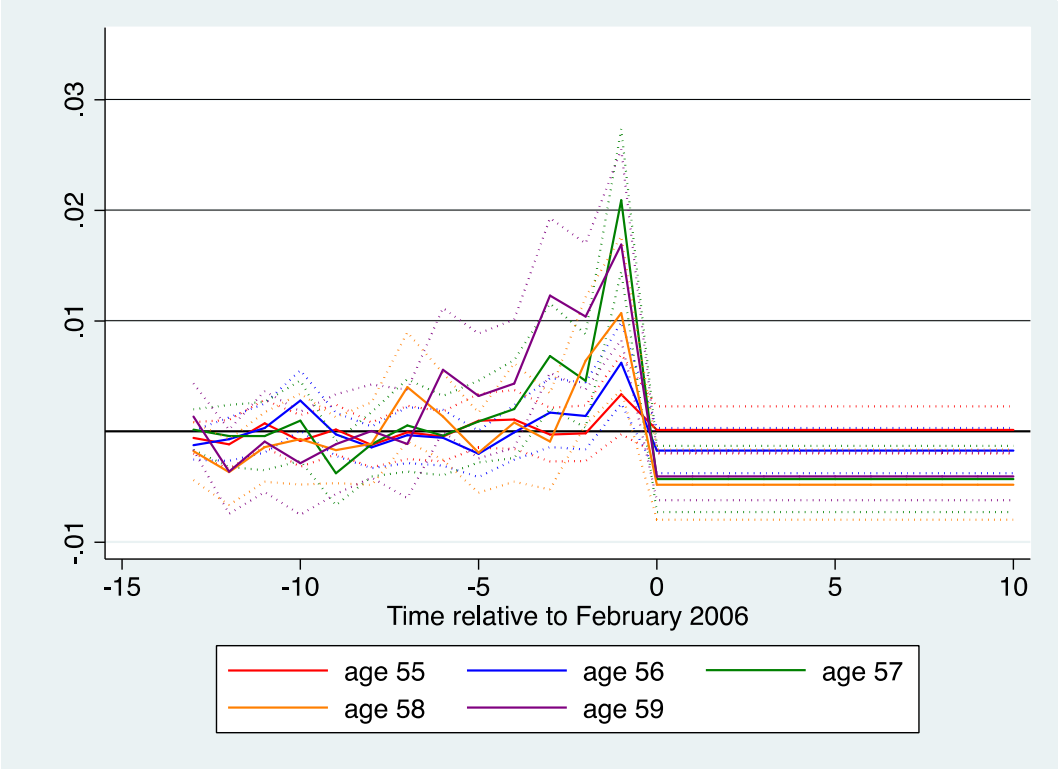
(e) Females 45-49



(f) Females 50-54



(g) Females 55-59



(h) Females 60-62

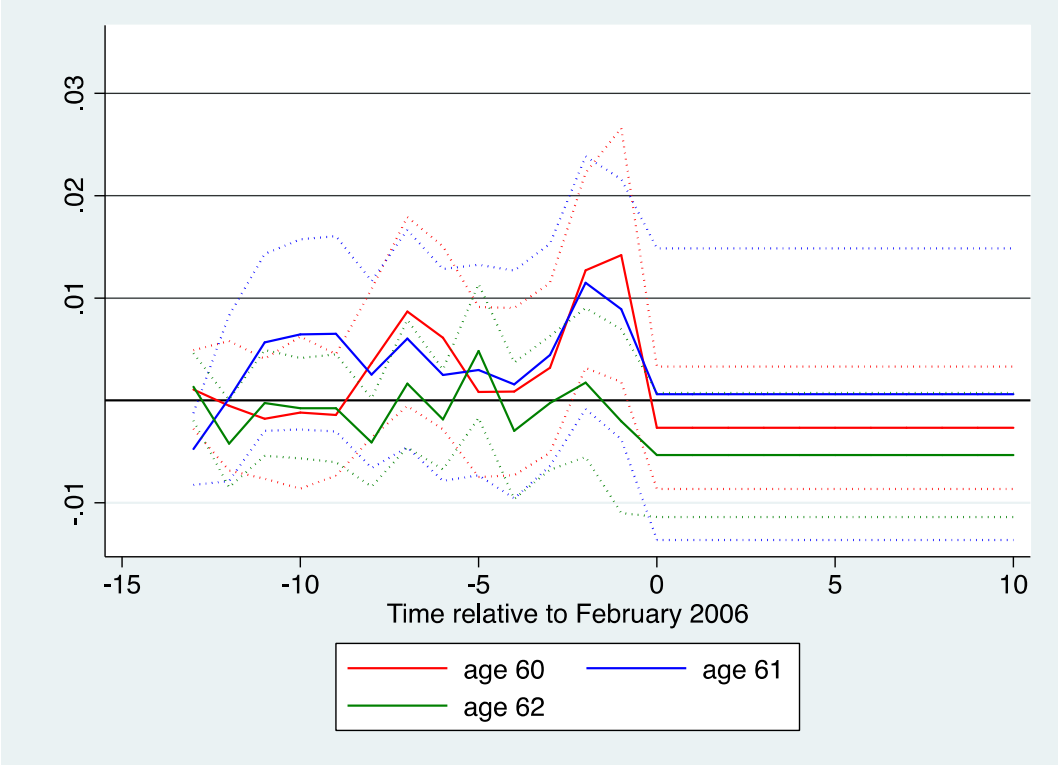


Table 1
Retirement eligibility by sex, age, year, and birth cohort

A. Men

AGE/YEAR	2004	2005	2006
55	1949	1950	1951
56	1948	1949	1950
57	1947	1948	1949
58	1946	1947	1948
59	1945	1946	1947
60	1944	1945	1946
61	1943	1944	1945
62	1942	1943	1944
63	1941	1942	1943
64	1940	1941	1942
65	1939	1940	1941

B. Women

AGE/YEAR	2004	2005	2006
55	1949	1950	1951
56	1948	1949	1950
57	1947	1948	1949
58	1946	1947	1948
59	1945	1946	1947
60	1944	1945	1946
61	1943	1944	1945
62	1942	1943	1944
63	1941	1942	1943
64	1940	1941	1942
65	1939	1940	1941

Legend		
	yellow	eligible for SRA
	green	eligible for ER with penalties

Table 2
Regression estimates of steady-state and anticipatory effects of the UI reform, by sex and age
A. Males

VARIABLES	(1) Age 41	(2) Age 42	(3) Age 43	(4) Age 44	(5) Age 45	(6) Age 46	(7) Age 47	(8) Age 48	(9) Age 49	(10) Age 50
Post-reform	6.15e-05	-0.000724	-8.03e-05	1.79e-05	-0.00108	-0.000598	-0.000669	-0.000980	-0.000337	-0.00148**
	(0.000547)	(0.000669)	(0.000675)	(0.000701)	(0.000727)	(0.000761)	(0.000601)	(0.000727)	(0.000763)	(0.000750)
Pre-reform, 1 month	0.00136	-0.000172	0.00290***	0.00218**	0.00236**	0.00184*	0.00382***	0.000902	0.00231*	0.00362***
	(0.00104)	(0.000964)	(0.00105)	(0.00101)	(0.00109)	(0.00107)	(0.00123)	(0.00109)	(0.00125)	(0.00135)
Pre-reform, 2 months	-0.000173	0.000123	-0.000420	0.000985	0.00105	0.000559	-0.000456	-0.000700	-0.000724	-0.000788
	(0.000796)	(0.000822)	(0.000688)	(0.000928)	(0.000889)	(0.000892)	(0.000789)	(0.000863)	(0.000978)	(0.000986)
Pre-reform, 3 months	-9.17e-05	-0.000189	0.00142*	0.000167	0.000170	0.00103	8.77e-05	-0.000739	0.000909	-0.000694
	(0.000825)	(0.000724)	(0.000861)	(0.000764)	(0.000756)	(0.000884)	(0.000772)	(0.000830)	(0.00101)	(0.000880)
Pre-reform, 4 months	2.04e-05	0.000165	-0.000109	0.000469	-0.000789	-0.000268	3.41e-05	5.79e-05	-0.000815	-0.00122
	(0.000880)	(0.000816)	(0.000761)	(0.000817)	(0.000773)	(0.000863)	(0.000773)	(0.000868)	(0.000773)	(0.000910)
Pre-reform, 5 months	0.000591	0.000122	0.000345	0.000112	-0.000554	0.000593	0.000825	0.000176	6.29e-05	-0.000356
	(0.000842)	(0.000771)	(0.000758)	(0.000801)	(0.000765)	(0.000855)	(0.000747)	(0.000811)	(0.000885)	(0.000942)
Pre-reform, 6 months	0.000109	0.000817	0.000244	0.000314	-0.000695	0.000353	-6.89e-05	-0.000279	0.000972	-0.000641
	(0.000760)	(0.000823)	(0.000738)	(0.000749)	(0.000846)	(0.000850)	(0.000765)	(0.000799)	(0.000876)	(0.000790)
Pre-reform, 7 months	0.000396	0.000162	-0.000496	0.000257	-0.000492	-0.000139	0.000143	-0.00172**	-0.00108	-0.000252
	(0.000744)	(0.000763)	(0.000723)	(0.000698)	(0.000797)	(0.000764)	(0.000796)	(0.000720)	(0.000817)	(0.000928)
Pre-reform, 8 months	-0.000234	-0.00122*	0.000652	-0.000192	-0.000588	-0.00105	-0.000599	-0.000834	-0.000959	0.000492
	(0.000653)	(0.000661)	(0.000664)	(0.000591)	(0.000664)	(0.000676)	(0.000576)	(0.000681)	(0.000704)	(0.000812)
Pre-reform, 9 months	-0.000163	-0.00146**	-0.000227	-0.000619	-0.000494	-0.000190	-0.000610	-0.000191	-0.00188***	-0.00105
	(0.000645)	(0.000573)	(0.000728)	(0.000710)	(0.000733)	(0.000798)	(0.000612)	(0.000831)	(0.000684)	(0.000723)
Pre-reform, 10 months	0.000262	-0.000827	0.000329	-0.000227	-0.00103	-0.00105	-0.000473	0.000118	-0.000584	-0.000491
	(0.000757)	(0.000716)	(0.000797)	(0.000871)	(0.000813)	(0.000791)	(0.000769)	(0.000852)	(0.000821)	(0.000790)
Pre-reform, 11 months	0.000505	0.000213	0.000389	-0.000198	0.000216	-0.000771	-0.00117	-0.000641	-0.000491	0.000614
	(0.000661)	(0.000790)	(0.000743)	(0.000819)	(0.000882)	(0.000724)	(0.000774)	(0.000827)	(0.000828)	(0.000967)
Pre-reform, 12 months	0.00202**	-0.000743	-0.000760	-2.92e-05	0.000324	0.00120	4.89e-06	-0.000180	7.10e-05	-0.000931
	(0.000848)	(0.000759)	(0.000759)	(0.000829)	(0.000863)	(0.000875)	(0.000864)	(0.000891)	(0.000910)	(0.000856)
Pre-reform, 13-18 months	0.000594	0.000336	0.000531	0.000594	-0.000207	0.000514	8.13e-05	-0.000187	-0.000140	0.000106
	(0.000465)	(0.000441)	(0.000443)	(0.000488)	(0.000456)	(0.000484)	(0.000480)	(0.000504)	(0.000537)	(0.000531)
Observations	277,267	275,038	268,182	258,262	250,495	241,312	232,708	223,073	216,064	205,745
R-squared	0.002	0.002	0.002	0.003	0.002	0.002	0.003	0.002	0.003	0.003

Note: Robust standard errors, clustered by person, in parentheses. *** p<0.01, ** p<0.05, * p<0.1. In addition to the variables shown, the regressions include legal retirement age (statutory, earliest without discount, earliest with discount), local unemployment rate, earnings, as well as dummy variables for month of birth, calendar month, region, type of job, education, nationality, occupation and industry.

Table 2 (cont.)
Regression estimates of steady-state and anticipatory effects of the UI reform, by sex and age
A. Males

VARIABLES	(11) Age 51	(12) Age 52	(13) Age 53	(14) Age 54	(15) Age 55	(16) Age 56	(17) Age 57	(18) Age 58	(19) Age 59	(20) Age 60
Post-reform	-0.000254	-0.000609	-0.000786	-0.00100	-0.000910	-0.00237	-0.00509*	0.00129	0.00128	-0.00202*
	(0.000712)	(0.000846)	(0.000877)	(0.000835)	(0.000980)	(0.00146)	(0.00270)	(0.00634)	(0.00198)	(0.00109)
Pre-reform, 1 month	0.00314**	0.00489***	0.00594***	0.00365**	0.00582***	0.00508**	0.00650**	0.0116***	0.0187***	0.0256***
	(0.00129)	(0.00153)	(0.00157)	(0.00146)	(0.00181)	(0.00207)	(0.00298)	(0.00414)	(0.00361)	(0.00511)
Pre-reform, 2 months	0.00228**	0.000129	0.00396***	0.00234*	0.00225	0.00332*	0.00562**	0.0123***	0.0134***	0.0122***
	(0.00102)	(0.00105)	(0.00132)	(0.00130)	(0.00139)	(0.00181)	(0.00268)	(0.00388)	(0.00321)	(0.00389)
Pre-reform, 3 months	0.00167*	-0.000367	0.000896	3.18e-05	0.000551	-0.00145	-0.00253	0.00514	0.00460*	0.0149***
	(0.00101)	(0.00101)	(0.00113)	(0.00108)	(0.00117)	(0.00149)	(0.00227)	(0.00363)	(0.00256)	(0.00387)
Pre-reform, 4 months	-0.00163*	0.00106	0.000421	0.000770	0.000934	-0.000589	-0.00355	0.00748**	0.00714***	0.00632**
	(0.000835)	(0.00103)	(0.00111)	(0.00117)	(0.00130)	(0.00164)	(0.00220)	(0.00369)	(0.00277)	(0.00306)
Pre-reform, 5 months	-1.84e-05	0.000606	0.00122	0.000717	0.00102	0.000589	-0.00398**	0.00245	-0.000221	0.000353
	(0.000879)	(0.000943)	(0.000963)	(0.000973)	(0.00103)	(0.00160)	(0.00200)	(0.00339)	(0.00192)	(0.00186)
Pre-reform, 6 months	3.75e-05	0.00149	0.000470	0.000753	0.00108	-0.00106	-0.00357*	0.00218	-0.00104	0.000193
	(0.000844)	(0.000980)	(0.000902)	(0.000979)	(0.00110)	(0.00157)	(0.00205)	(0.00330)	(0.00168)	(0.00228)
Pre-reform, 7 months	0.000211	0.000549	0.000295	-0.00149	0.00129	-0.00161	-0.00290	0.00152	-0.00140	0.000149
	(0.000913)	(0.000966)	(0.00112)	(0.000942)	(0.00121)	(0.00149)	(0.00195)	(0.00350)	(0.00193)	(0.00266)
Pre-reform, 8 months	0.000288	0.000539	-0.000833	-0.00140*	0.000466	-0.00149	-0.00198	0.00156	0.00102	0.00156
	(0.000794)	(0.000830)	(0.000869)	(0.000776)	(0.000994)	(0.00136)	(0.00191)	(0.00335)	(0.00195)	(0.00203)
Pre-reform, 9 months	0.000205	-0.000916	-5.78e-05	-0.00154**	0.000390	-0.000586	-0.00158	-0.00100	-0.000582	0.00132
	(0.000735)	(0.000831)	(0.000981)	(0.000763)	(0.000940)	(0.00143)	(0.00182)	(0.00326)	(0.00169)	(0.00204)
Pre-reform, 10 months	0.000120	-0.00127	-0.000191	0.000392	-0.00111	-0.00223	-0.00186	0.00169	0.00358	0.00319
	(0.000827)	(0.000971)	(0.000904)	(0.00101)	(0.00114)	(0.00138)	(0.00214)	(0.00338)	(0.00220)	(0.00259)
Pre-reform, 11 months	-0.000579	0.00134	0.000914	-0.000758	-0.000152	0.000422	-0.00160	0.000997	0.00142	0.00134
	(0.000706)	(0.000864)	(0.000935)	(0.000764)	(0.00101)	(0.00148)	(0.00180)	(0.00334)	(0.00196)	(0.00190)
Pre-reform, 12 months	0.000200	-0.000438	-0.000434	-0.000270	-0.000251	-0.00102	0.000128	0.00192	6.04e-06	-0.00160
	(0.000876)	(0.000948)	(0.000919)	(0.000939)	(0.00111)	(0.00126)	(0.00197)	(0.00320)	(0.00190)	(0.00184)
Pre-reform, 13-18 months	0.000318	0.000920*	0.000967*	0.000818	0.000643	-0.000780	-0.00225**	-0.000164	-0.000390	0.00116
	(0.000502)	(0.000552)	(0.000541)	(0.000544)	(0.000628)	(0.000749)	(0.000876)	(0.00122)	(0.00121)	(0.00148)
Observations	199,073	192,762	188,798	184,652	176,873	154,616	130,928	99,473	80,911	70,155
R-squared	0.002	0.003	0.003	0.003	0.003	0.003	0.005	0.007	0.007	0.010

Note: Robust standard errors, clustered by person, in parentheses. *** p<0.01, ** p<0.05, * p<0.1. In addition to the variables shown, the regressions include legal retirement age (statutory, earliest without discount, earliest with discount), local unemployment rate, earnings, as well as dummy variables for month of birth, calendar month, region, type of job, education, nationality, occupation and industry.

Table 2 (cont.)
Regression estimates of steady-state and anticipatory effects of the UI reform, by sex and age
A. Males

VARIABLES	(21) Age 61	(22) Age 62	(23) Age 63	(24) Age 64
Post-reform	-0.00257***	-0.000978	-0.00264	0.00284
	(0.000938)	(0.00105)	(0.00315)	(0.00636)
Pre-reform, 1 month	0.0247***	0.0194***	0.000549	0.00244
	(0.00499)	(0.00481)	(0.00513)	(0.00546)
Pre-reform, 2 months	0.0175***	0.0155***	0.00537	0.00666
	(0.00391)	(0.00387)	(0.00482)	(0.00524)
Pre-reform, 3 months	0.00652**	0.00591*	0.00164	0.00416
	(0.00323)	(0.00317)	(0.00405)	(0.00460)
Pre-reform, 4 months	0.00513*	0.00408	-0.000522	0.00238
	(0.00286)	(0.00308)	(0.00462)	(0.00415)
Pre-reform, 5 months	0.00284	0.00399	-0.00357	0.00179
	(0.00239)	(0.00300)	(0.00408)	(0.00446)
Pre-reform, 6 months	-0.000899	0.00277	-0.00418	0.00112
	(0.00204)	(0.00296)	(0.00423)	(0.00407)
Pre-reform, 7 months	0.00299	0.000565	-0.00431	0.000795
	(0.00259)	(0.00290)	(0.00443)	(0.00393)
Pre-reform, 8 months	-0.000636	-0.000432	-0.00178	-0.00366
	(0.00198)	(0.00207)	(0.00320)	(0.00412)
Pre-reform, 9 months	0.000946	8.78e-05	-0.00201	0.000349
	(0.00216)	(0.00210)	(0.00387)	(0.00367)
Pre-reform, 10 months	0.000835	-0.000591	0.00186	0.000553
	(0.00230)	(0.00214)	(0.00387)	(0.00383)
Pre-reform, 11 months	-0.000752	0.00241	-0.000355	-0.000822
	(0.00184)	(0.00214)	(0.00355)	(0.00405)
Pre-reform, 12 months	0.000120	-0.00490***	0.000458	0.00401
	(0.00183)	(0.00187)	(0.00367)	(0.00417)
Pre-reform, 13-18 months	0.000760	0.00223	-0.00178	0.00218
	(0.00147)	(0.00160)	(0.00216)	(0.00175)
Observations	64,800	55,917	39,268	24,625
R-squared	0.011	0.008	0.005	0.005

Note: Robust standard errors, clustered by person, in parentheses. *** p<0.01, ** p<0.05, * p<0.1. In addition to the variables shown, the regressions include legal retirement age (statutory, earliest without discount, earliest with discount), local unemployment rate, earnings, as well as dummy variables for month of birth, calendar month, region, type of job, education, nationality, occupation and industry.

Table 2 (cont.)
Regression estimates of steady-state and anticipatory effects of the UI reform, by sex and age
B. Females

VARIABLES	(1) Age 41	(2) Age 42	(3) Age 43	(4) Age 44	(5) Age 45	(6) Age 46	(7) Age 47	(8) Age 48	(9) Age 49	(10) Age 50	(11) Age 51
Post-reform	-0.000410	-0.000661	-0.00223**	-0.000666	-0.00324***	-0.000515	3.85e-05	8.35e-05	-0.00275***	-0.00102	-0.00150
	(0.000686)	(0.000766)	(0.000867)	(0.000821)	(0.000884)	(0.000893)	(0.000802)	(0.000793)	(0.000905)	(0.000906)	(0.000957)
Pre-reform, 1 month	-0.000455	-6.39e-05	-0.00198*	-0.000400	6.98e-05	-0.000207	0.00229*	0.00241*	-0.000659	0.000676	0.00176
	(0.00118)	(0.00107)	(0.00120)	(0.00108)	(0.00123)	(0.00127)	(0.00128)	(0.00132)	(0.00137)	(0.00122)	(0.00153)
Pre-reform, 2 months	0.000867	-0.00124	-0.00131	-8.88e-05	-0.00182**	0.000384	0.000679	0.000577	-0.00222**	0.00133	-0.000446
	(0.00105)	(0.000803)	(0.000903)	(0.000908)	(0.000870)	(0.000937)	(0.000908)	(0.000888)	(0.000924)	(0.00113)	(0.00105)
Pre-reform, 3 months	0.000326	-0.000390	-0.00302***	-0.000176	-0.00209**	-0.000590	0.00124	-0.000304	-0.000298	0.000198	-0.000779
	(0.00111)	(0.000901)	(0.000999)	(0.000975)	(0.000930)	(0.000910)	(0.00108)	(0.000961)	(0.00106)	(0.00103)	(0.00123)
Pre-reform, 4 months	0.000571	0.000727	-0.000403	-0.000974	-0.00214**	-7.36e-05	-0.000249	0.000615	-0.00296***	-0.00201*	-0.000634
	(0.00114)	(0.00109)	(0.00106)	(0.00106)	(0.000951)	(0.000975)	(0.000976)	(0.00103)	(0.00109)	(0.00110)	(0.00112)
Pre-reform, 5 months	0.00120	-0.00115	-0.00186*	0.000235	-0.00291***	-0.000654	0.00103	-0.000135	-0.00201**	-0.00141	-0.00173*
	(0.000981)	(0.000884)	(0.000985)	(0.000918)	(0.000938)	(0.000948)	(0.000969)	(0.00100)	(0.00102)	(0.00110)	(0.000942)
Pre-reform, 6 months	-0.000770	-0.000589	5.35e-05	-2.42e-05	-0.00212**	-0.000796	0.000508	0.000568	-0.00307***	-0.000631	-0.00201**
	(0.000896)	(0.000916)	(0.00106)	(0.000927)	(0.000928)	(0.00102)	(0.000913)	(0.000908)	(0.00101)	(0.00102)	(0.000955)
Pre-reform, 7 months	-0.000325	-8.30e-05	-0.00190*	-0.000454	-0.00289***	-0.00135	-0.000497	-0.000474	-0.000654	-0.00199*	0.000224
	(0.000943)	(0.000937)	(0.00104)	(0.000997)	(0.000984)	(0.00106)	(0.000903)	(0.000944)	(0.00106)	(0.00111)	(0.00114)
Pre-reform, 8 months	-0.000867	-0.000790	-0.00119	-0.000130	-0.00238***	0.000847	0.000780	-0.000117	-0.00170*	-0.000217	-0.00117
	(0.000805)	(0.000836)	(0.000862)	(0.000697)	(0.000849)	(0.00102)	(0.000849)	(0.000808)	(0.000960)	(0.000845)	(0.00104)
Pre-reform, 9 months	0.000482	-0.00115	-0.00156*	-0.00121	-0.00206**	-0.00111	0.000859	0.000589	-0.000872	-0.00173**	-0.000629
	(0.000897)	(0.000719)	(0.000902)	(0.000825)	(0.000901)	(0.000958)	(0.000945)	(0.000907)	(0.000832)	(0.000825)	(0.00106)
Pre-reform, 10 months	0.000615	-0.00117	-0.00276***	-0.00145	-0.00148	3.56e-05	0.000498	-0.000361	-0.000135	0.00130	-0.00109
	(0.000893)	(0.000812)	(0.000839)	(0.000918)	(0.00108)	(0.000887)	(0.00102)	(0.000967)	(0.00116)	(0.00107)	(0.000936)
Pre-reform, 11 months	-0.000514	-0.000285	-0.00118	-0.00110	-0.000171	-0.000445	-0.000729	0.000733	-0.00263***	-0.000935	-0.00125
	(0.000879)	(0.000795)	(0.000915)	(0.000771)	(0.000980)	(0.000888)	(0.000775)	(0.000922)	(0.000867)	(0.000982)	(0.000977)
Pre-reform, 12 months	-0.000513	0.00101	-0.00176*	-0.000256	-0.00202**	-0.000956	0.000297	-0.000131	-0.00144*	-0.000701	-0.000807
	(0.000815)	(0.00104)	(0.000902)	(0.000940)	(0.000984)	(0.000825)	(0.000880)	(0.000829)	(0.000814)	(0.000920)	(0.000853)
Pre-reform, 13-18 months	-6.01e-05	-0.000150	-0.000348	0.000155	-0.000487	0.000451	0.00188***	9.40e-05	-0.00180***	-0.000411	-1.70e-06
	(0.000566)	(0.000559)	(0.000611)	(0.000561)	(0.000573)	(0.000613)	(0.000618)	(0.000579)	(0.000589)	(0.000611)	(0.000641)
Observations	176,232	183,073	185,408	186,814	188,463	188,997	186,426	182,743	180,488	176,192	173,190
R-squared	0.002	0.001	0.002	0.001	0.002	0.002	0.002	0.002	0.002	0.002	0.002

Note: Robust standard errors, clustered by person, in parentheses. *** p<0.01, ** p<0.05, * p<0.1. In addition to the variables shown, the regressions include legal retirement age (statutory, earliest without discount, earliest with discount), local unemployment rate, earnings, as well as dummy variables for month of birth, calendar month, region, type of job, education, nationality, occupation and industry.

Table 2 (cont.)
Regression estimates of steady-state and anticipatory effects of the UI reform, by sex and age
B. Females

VARIABLES	(12) Age 52	(13) Age 53	(14) Age 54	(15) Age 55	(16) Age 56	(17) Age 57	(18) Age 58	(19) Age 59	(20) Age 60	(21) Age 61	(22) Age 62
Post-reform	-0.00261***	-0.00138	-0.00111	0.000123	-0.00174*	-0.00430***	-0.00481***	-0.00406***	-0.00267	0.000616	-0.00533*
	(0.000850)	(0.000886)	(0.00102)	(0.00109)	(0.00104)	(0.00153)	(0.00162)	(0.00110)	(0.00305)	(0.00727)	(0.00309)
Pre-reform, 1 month	-0.000889	0.00226	0.00586***	0.00334*	0.00619***	0.0209***	0.0107***	0.0169***	0.0142**	0.00892	-0.00202
	(0.00135)	(0.00147)	(0.00178)	(0.00184)	(0.00188)	(0.00329)	(0.00355)	(0.00440)	(0.00633)	(0.00648)	(0.00458)
Pre-reform, 2 months	0.000635	6.80e-05	0.00181	-0.000180	0.00138	0.00457**	0.00639**	0.0104***	0.0127***	0.0115*	0.00175
	(0.00108)	(0.00121)	(0.00135)	(0.00128)	(0.00154)	(0.00216)	(0.00294)	(0.00337)	(0.00486)	(0.00630)	(0.00371)
Pre-reform, 3 months	-0.00118	0.00163	0.00113	-0.000299	0.00169	0.00682***	-0.000906	0.0123***	0.00318	0.00445	-0.000246
	(0.00105)	(0.00127)	(0.00141)	(0.00124)	(0.00159)	(0.00242)	(0.00222)	(0.00357)	(0.00423)	(0.00554)	(0.00333)
Pre-reform, 4 months	-0.00124	-0.00333***	0.00126	0.00107	-0.000100	0.00202	0.000815	0.00434	0.000859	0.00156	-0.00296
	(0.000959)	(0.00111)	(0.00141)	(0.00136)	(0.00126)	(0.00226)	(0.00273)	(0.00296)	(0.00417)	(0.00568)	(0.00340)
Pre-reform, 5 months	-0.00158*	0.00107	-0.000896	0.000951	-0.00204*	0.000894	-0.00192	0.00321	0.000823	0.00297	0.00484
	(0.000945)	(0.00110)	(0.00114)	(0.00124)	(0.00107)	(0.00189)	(0.00185)	(0.00288)	(0.00424)	(0.00525)	(0.00334)
Pre-reform, 6 months	-0.00159	-0.000409	-0.00113	-0.000466	-0.000579	-0.000381	0.00136	0.00559**	0.00612	0.00249	-0.00186
	(0.00100)	(0.000975)	(0.00108)	(0.00115)	(0.00129)	(0.00183)	(0.00200)	(0.00285)	(0.00456)	(0.00528)	(0.00249)
Pre-reform, 7 months	0.000165	-0.000427	0.000205	-0.000101	-0.000343	0.000541	0.00402	-0.00112	0.00869*	0.00604	0.00165
	(0.00111)	(0.00109)	(0.00130)	(0.00123)	(0.00129)	(0.00213)	(0.00252)	(0.00250)	(0.00471)	(0.00542)	(0.00318)
Pre-reform, 8 months	-0.00183**	-0.00180**	-0.000244	-0.00123	-0.00145	-0.00116	-0.00110	4.15e-05	0.00363	0.00253	-0.00411*
	(0.000862)	(0.000841)	(0.000991)	(0.00103)	(0.000960)	(0.00149)	(0.00191)	(0.00215)	(0.00371)	(0.00466)	(0.00220)
Pre-reform, 9 months	-0.00191**	-0.000884	-0.000286	0.000159	-0.000275	-0.00379***	-0.00169	-0.00114	-0.00142	0.00651	-0.000766
	(0.000835)	(0.000825)	(0.00113)	(0.00115)	(0.00100)	(0.00147)	(0.00152)	(0.00230)	(0.00303)	(0.00487)	(0.00269)
Pre-reform, 10 months	8.45e-05	0.000588	0.000253	-0.000875	0.00279**	0.000968	-0.000691	-0.00286	-0.00119	0.00645	-0.000753
	(0.00104)	(0.00107)	(0.00120)	(0.00119)	(0.00139)	(0.00185)	(0.00210)	(0.00238)	(0.00379)	(0.00474)	(0.00250)
Pre-reform, 11 months	-0.00233***	-0.000135	-0.00137	0.000722	0.000293	-0.000418	-0.00141	-0.000908	-0.00180	0.00567	-0.000242
	(0.000805)	(0.000824)	(0.000985)	(0.00108)	(0.00113)	(0.00158)	(0.00160)	(0.00233)	(0.00299)	(0.00441)	(0.00264)
Pre-reform, 12 months	-0.00224***	-8.00e-06	-0.000990	-0.00119	-0.000711	-0.000417	-0.00368**	-0.00363*	-0.000525	0.000208	-0.00421*
	(0.000794)	(0.000893)	(0.000872)	(0.00113)	(0.00100)	(0.00143)	(0.00152)	(0.00194)	(0.00323)	(0.00413)	(0.00218)
Pre-reform, 13-18 months	-0.00120**	0.000211	3.79e-05	-0.000597	-0.00125*	0.000160	-0.00178	0.00136	0.00106	-0.00475***	0.00133
	(0.000552)	(0.000580)	(0.000655)	(0.000723)	(0.000667)	(0.000937)	(0.00134)	(0.00153)	(0.00196)	(0.00179)	(0.00168)
Observations	169,661	166,797	161,541	151,774	128,834	106,378	81,038	66,847	53,426	43,451	32,403
R-squared	0.002	0.002	0.002	0.004	0.003	0.007	0.007	0.007	0.009	0.006	0.005

Note: Robust standard errors, clustered by person, in parentheses. *** p<0.01, ** p<0.05, * p<0.1. In addition to the variables shown, the regressions include legal retirement age (statutory, earliest without discount, earliest with discount), local unemployment rate, earnings, as well as dummy variables for month of birth, calendar month, region, type of job, education, nationality, occupation and industry.

Table 3
Changes in UI Expenditure Due to Reform, 2 years after potential exit

Steady state effect			Anticipatory effect	Total effect
Subtotal	Mechanical	Behavioral	Subtotal	Total
-4.752	-3.379	-1.373	236	-4.516

Note: Millions of year 2000 Euros. The anticipatory effect is based on the estimated effects up to six months preceding the implementation of the reform.