Earnings Losses After Non-employment Increase With Age

Thomas Zwick

ZEW

Zentrum für Europäische
Wirtschaftsforschung GmbH

Centre for European
Economic Research

Discussion Paper No. 08-041

Earnings Losses After Non-employment Increase With Age

Thomas Zwick

Non technical summary

Germany has the highest unemployment rate of older people in comparison to the average unemployment rate of all developed economies. Obviously older people face stronger difficulties to re-enter the labour market after a non-employment spell. This contribution analyses if these difficulties also lead to higher earnings losses of older employees after re-entering the labour market. More specifically, this paper calculates the relative earnings of employees before and after a non-employment spell and compares them with the earnings of employees without non-employment spells.

Splitting employees into four age groups shows that older employees who lose their jobs face higher earnings losses. A couple of years before non-employment older employees still earn more than employees with comparable observable characteristics without non-employment spells. This earnings advantage turns into a strong disadvantage directly before the non-employment spell. Younger employees have a relatively constant earnings disadvantage before non-employment, however. One year after the non-employment spell, younger employees earn at least what their comparison group without non-employment spells earns. By contrast, older employees start one year after their non-employment spell with an earnings disadvantage of up to ten percent and even face measureable earnings losses six years after non-employment.

There are several reasons for higher earnings losses of older employees after non-employment – they have higher specific human capital investments, higher seniority earnings, and more frequently have to change jobs involuntary than younger employees. Finally, older employees with non-employment spells might more frequently be employed in enterprises in economic trouble. A comparison of the earnings losses of those employees who re-enter the same company after non-employment suggests the prevalence of the latest reason – younger employees get an earnings premium when they re-enter their previous employer and older employees face an earnings loss in comparison to those employees who find a job at another employer after non-employment.

Nichttechnische Zusammenfassung

Deutschland weist unter allen entwickelten Volkswirtschaften die höchste Arbeitslosenquote Älterer im Vergleich zur durchschnittlichen Arbeitslosenquote auf. Ältere haben größere Schwierigkeiten, nach einer Arbeitsunterbrechung in den Arbeitsmarkt zurück zu kommen. Dieser Beitrag untersucht, ob diese Schwierigkeiten auch zu höheren Lohnabschlägen Älterer beim Wiedereintritt in Beschäftigung führen. Konkret wird der mit einer Erwerbslosigkeitsperiode verbundene Lohnabschlag bis zu sechs Jahre vor und nach einer Arbeitsunterbrechung berechnet.

Bei einer Unterscheidung der Beschäftigten nach Altersgruppen zeigt sich, dass ältere Beschäftigte stärkere Lohneinbussen bei Arbeitsunterbrechungen hinnehmen müssen als jüngere Beschäftigte. Weit vor einer Erwerbslosigkeitsperiode haben ältere Beschäftigte noch höhere Löhne als Beschäftigte mit den gleichen beobachtbaren Eigenschaften aber ohne spätere Arbeitsunterbrechung. Dieser Einkommensvorteil wandelt sich in den letzten Jahren vor der Arbeitsunterbrechung in einen gravierenden Einkommensnachteil. Jüngere Beschäftigte hingegen sehen sich vor der Erwerbslosigkeit einem relativ konstanten Einkommensabschlag gegenüber. Ein Jahr nach der Arbeitsunterbrechung verdienen jüngere Beschäftigte bereits wieder mindestens genauso viel wie Gleichaltrige ohne Erwerbsunterbrechung. Die älteren Beschäftigten starten im Jahr nach ihrer Erwerbslosigkeit mit Abschlägen bis zu zehn Prozent, die sich zwar verringern, jedoch auch sechs Jahre nach der Erwerbslosigkeit noch messbar sind.

Es gibt mehrere Gründe, weshalb ältere Beschäftigte einen höheren Lohnabschlag akzeptieren müssen als jüngere Beschäftigte, wenn sie nach Erwerbslosigkeit wieder in Beschäftigung kommen. Sie verlieren möglicherweise mehr spezifisches Humankapital und bekamen beim vorherigen Arbeitgeber einen Senioritätsaufschlag. Zudem wechseln jüngere Beschäftigte häufiger freiwillig den Arbeitgeber, um die Passgenauigkeit ihres Arbeitsplatzes zu erhöhen. Ein letzter Grund könnte darin liegen, dass ältere Arbeitnehmer mit Erwerbslosigkeitsperioden in Unternehmen mit wirtschaftlichen Schwierigkeiten beschäftigt sind und deshalb unfreiwillig arbeitslos werden. Ein Vergleich der Lohnabschläge der Beschäftigten, die nach Erwerbslosigkeit wieder im gleichen Unternehmen arbeiten, legt die letzte Erklärung nahe – jüngere Beschäftigte erhalten einen Lohnaufschlag, während ältere Beschäftigte einen Lohnabschlag gegenüber denjenigen erhalten, die nach einer Arbeitsunterbrechung einen Arbeitsplatz bei einem anderen Unternehmen erhalten.

Earnings Losses after Non-employment Increase with Age

Thomas Zwick[*]

Centre for European Economic Research (ZEW)

L7,1

68161 Mannheim

zwick@zew.de

June 2008

Abstract

This paper shows that earnings losses after unemployment increase with age. First, older employees start out with relatively high earnings in comparison to employees without employment interruptions several years before the non-employment spell. This earnings advantage turns into a strong earnings disadvantage shortly before the non-employment spell. Younger unemployed have a relatively stable and small earnings disadvantage before non-employment. Second, while the younger employees quickly enjoy earnings higher than those without employment interruptions after the non-employment spell, earnings for older employees are lower even six years after the unemployment spell. If those with non-employment spells re-enter the labour market at the same employer, the earnings impact is the more positive the younger the employee. This paper uses representative administrative spell data for 1993-2001 that allow us to take into account the precise length of all non-employment spells and calculate the exact dates before and after the spells.

JEL Codes: C23, J31, J40
Key Words: Earnings losses, non-employment, age

1 Introduction

This paper looks into the anatomy of earnings losses before and after non-employment in Germany by age. There are a couple of reasons why earnings losses can differ depending on the age of those affected by non-employment. Search theory asserts that younger employees switch jobs in order to improve their job match while older employees can find it hard to improve their match (Mortensen and Pissarides, 1999). This means that younger employees more frequently switch employers voluntarily even accepting non-employment spells and older employees mainly lose their job involuntarily. Another argument in this vein is that enterprises in economic trouble frequently have an older work force because they could not hire new younger employees for a longer time span. They may have to set free older employees temporarily in order to survive. In addition, older employees have more to lose from a reduction in seniority than younger employees in the wake of a non-employment spell because earnings increase with seniority and an older job entrant gets compared with employees with long seniority spells (Lazear, 1979; Zwick, 2008). Finally, older workers may have accumulated more specific human capital that is lost after switching the employer.

Earnings losses may begin prior to non-employment and measuring earnings losses by comparing only the final earnings on the job from which the worker was displaced with the new earnings is likely to underestimate the size of these losses. In this paper, therefore the approach by Jacobson et al. (1993) is used that includes earnings comparisons several years before and after the non-employment spell. This paper presents mainly two extensions to the literature on earnings losses before and after non-employment. First, it uses rich individual spell data to construct yearly separation dummies until six years before and after all non-employment spells. So far, earnings losses are calculated mainly on the basis of quarterly or yearly data. This means that short non-employment spells cannot be accounted for. In addition, we know the exact begin and end point of the non-employment spells and therefore can determine the precise point in time when an earnings spell is say two years before the non-employment spell or three years after. We can also calculate the impact of different non-employment spell lengths on earnings after the separation. Second, this paper differentiates between the non-employment effects of different age groups and gender. It hereby demonstrates that earnings losses increase with age. In addition, a first attempt is made to empirically validate the different

hypotheses mentioned above on the sources of the differences in earnings losses between age groups. The empirical strategy is to interact earnings losses with a dummy that equals one for those who re-enter the labour market at the same employer.

The next section contains an overview over the empirical literature on earnings losses of displaced workers. Section three describes the estimation strategy and section four the data used. Section five presents the estimation results and section six concludes.

2 Earnings losses of displaced workers – a literature review

Addison and Portugal (1989) analyse wage losses incurred by job displacement using the US Displaced Worker Survey, a supplement to the Current Population Survey. While they are careful in taking into account tenure and experience before unemployment as well as unemployment duration, they only compare wages of workers displaced between 1979 and 1984 on a certain point in time before and after unemployment. Houle and Oudenrode (1994) replicate Addison and Portugal´s (1989) study using Canadian data. In both studies unemployment duration is not perfectly measured and it is not clear if the job observed is the first one after unemployment. The Canadian study finds a lower impact of unemployment on wage losses than the US study and confirms the observation that previous tenure increases wage losses. Houle and Oudenrode (1994) stress that frequently working time before unemployment decreases and it is therefore important either to observe working hours directly or exclude employees with part time spells. Both papers provide a snapshot view of short-term earnings losses focusing solely on workers who have been displaced. Since they do not account for the earnings growth that would have occurred in the absence of job losses, the are likely to underestimate the magnitude of wage losses.

Burda and Mertens (2001) use the German GSOEP in order to predict displacement status on a sample of employees in the social security file of the IAB (IABS). They include a dummy on the displacement status in a wage growth model containing only employees who became unemployed in 1986, i.e. they only compare the wage development at a certain point in time for employees with previous unemployment spells. They find that the wage loss is economically insignificant for those re-employed at their previous employer, while the wage loss is only 3.6% for those re-employed at another employer.

Arulampalam (2001) explores the structure of the earnings losses in more detail by observing them until four years after the unemployment spell and even in the second job

after unemployment. She uses the representative British Household Panel Survey that includes employees with and without unemployment spells and includes a broad range of variables related to individual wages. She finds that unemployment carries a wage penalty of 6% on re-entry while the gap widens to 14% after three years. The wage loss is also carried to the second job after unemployment.

Lefranc (2003) tries to disentangle the loss of seniority-accumulated firm-specific earnings potential and changes in the match heterogeneity after unemployment spells, i.e. categorise the losses into type and tenure. On the basis of yearly data for France and the United States, he uses a difference in difference model where wage differences are regressed on a dummy that is one if somebody experienced a job displacement. He adds an interaction term between the job loss dummy and tenure in the previous job and finds a negative correlation. Finally, he first provides a consistent estimate of seniority wages on the basis of the method by Topel (1991) and calculates the wage development minus the seniority component in order to identify the size of both reasons for wage losses – average match or firm quality and loss of seniority. He finds that in France the wage loss is mainly due to the loss of accumulated firm specific earnings potential, while in the US, more than half of measured wage losses arise from a downgrading into lower quality job matches.

Carneiro and Portugal (2006) measure the earnings losses of Portuguese workers. They use a linked employer-employee data set containing three yearly earnings before and after unemployment. They use observations for all employees who became unemployed in 1994, 1995 or 1996. Individuals in the "experiment" group must have been in the same firm for at least three years before losing the job. They construct three control groups. In each year the experiment group might have lost the job, 300´000 employees are randomly drawn who work in a firm that did not close down in the respective year and who worked there at least for two years in the year preceding the year the experiment group lost the job. They found that earnings losses are around 10% and lasting in Portugal. After adding tenure to the earnings equation, they argue that the loss of tenure accounts for a large share of the wage loss. Also employer characteristics and the length of unemployment spells explain a large part of the earnings loss.

Jacobson et al. (1993) were the first to point out that the measurement of the wage loss strongly depends on the points in time before and after unemployment because the earnings of those who finally get unemployed begin to decline already several years before the actual unemployment event. It is therefore not only important to observe the wage

development several years before and after the unemployment spell, but also to compare the wage development of the unemployed with employees with uninterrupted careers. Their data have the disadvantage that they observe labour market status and wages only at a fixed quarterly date. In addition, there is no indication of working hours, and observations disappear if employees move from the state of Pennsylvania to other regions. The authors therefore do not observe shorter unemployment spells and they cannot identify if wage reductions are a consequence of shorter working hours. They also constrain their sample to high tenure employees until 50 years of age in firms above 50 employees. They find substantial earnings losses for those employees with unemployment spells starting already three years prior to the actual spell. The losses are larger for younger employees, employees with higher tenure, those previously employed in larger firms, and males. The larger wage losses of younger employees are compensated by stronger relative wage increases after several quarters in employment, however.

Bender et al. (2002) estimate wage losses from unemployment for France and Germany. They use administrative data from the Employment Sample of the IAB (IABS) plus additional plant information for Germany and the Annual Social Data Reports (DADS) and the Permanent Dynamic Sample (EDP) for France. They take into account the wage development before the unemployment spell, use daily earnings instead of earnings during a larger time period that may contain unemployment periods and they differentiate between displacements caused by plant closures and other displacements (such as quits or dismissals) Finally, they take into account non-employment spells in addition to unemployment spells. They restrict their analysis to high-attachment prime age males who have stayed with a single firm for at least four years. The authors find that unemployment wage losses are insignificant in France and less than one percent in Germany. There are high wage losses, however, for those who are unemployed for more than one year (the effect is 5% in France and between 13 and 20% in Germany).

3 Estimation Strategy

The estimation strategy of this paper draws on Jacobson et al. (1993) and Bender et al. (2002). The sample of workers is not reduced, however, by only keeping workers with a high attachment to their employers before non-employment. This paper calculates the impact of non-employment spells on earnings until six years before and after. Only non-

employment spells longer than five days are taken into account.[2] In addition, only non-employment spells are included of those who re-entered the labour market, because we want to have the same sample of employees with non-employment spells before and after the employment interruption occurs. All employment interruptions are included and not only those of displaced workers. The main reason for this decision is that the ZA sample of the IABS does not contain the date when establishments´ identification numbers disappear. This is the information used for example by Bender et al. (2002) in order to sort out establishments that closed down not longer than two years after unemployment entry. These establishments might not actually have closed down however but they might have been bought by another establishment or re-organised fundamentally and therefore changed their establishment identifier. Another option to identify displaced workers would have been to use steep employment decreases as an indicator for mass lay-offs. This option is also not possible here because we do not have the information on establishment size and we cannot construct it from our sample. In addition, we cannot observe if an establishment with a very similar work force re-appears under a different establishment indicator because we only have a small sample of the workforce. This also means that we cannot discern the earnings effects of employees at different dates before an establishment closes down (Schwerdt, 2008) and we cannot discern voluntary and involuntary separations. This means that the effects observed are mainly descriptive and not causal upon involuntary job displacement.

The main advantage of the spell data set is that we observe all non-employment spells and not only those spells occurring at the day of observation in quarterly or yearly data. In contrast to Jacobson et al. (1993), earnings are not set to zero during non-employment (and included in the regression) but only earnings during employment spells are observed. According to the earnings loss literature, gender, age, nationality, qualification, year dummies, and economic sector are included as explanatory variables. In addition, based on the results from the search and seniority wage literature (Zwick, 2008) that tenure matters for wage formation, also tenure in the current job is included. Finally, this paper is more specific about the impact of non-employment than most contributions to the earnings loss literature by not only including a dummy indicating if non-employment was longer than one year but by including a series of non-employment

---

[2] Non-employment spells until one week are excluded in order to keep out purely frictional non-employment spells where the employees had a new job already before they went into non-employment.

spell dummies. This gives us larger flexibility.[3] In order to observe the earnings development before and after unemployment, separation dummies are introduced that indicate if the earnings observation is one until six years before or after a non-employment spell.

The empirical model is defined as follows:

$$y_{it} = Z_i'\alpha + \gamma_t + X_{it}'\beta + \sum_{k \geq -m} D_{it}^k \delta_k + \varepsilon_{it}.$$

Here y_{it} is individual (log) earnings in spell t, Z_i indicates a vector of the time invariant characteristics of the employee and his or her employer, γ_t are year dummies, and the vector X_{it} comprises time variable individual characteristics of the employees relevant for the wage. The dummy variables D finally have value one, if the earnings observation is from one until six years before the start of a non-employment spell or one until six years after the end of a non-employment spell, i.e. $m=6$ and $k=1,..,12$. We use spell data and therefore observe non-employment spells with a daily accuracy. If, for example, non-employment started on May 1st 1999 and ended on July 1st 1999, the separation dummy one year before is measured on the spell that covers May 1st 1998 and the separation dummy one year after at spell on July 1st 2000.

Based on previous studies, several hypotheses on the impact of the covariates on earnings are straightforward (Bender et al.; 2002, Schwerdt, 2008; Zwick, 2008): A higher qualification level, age and tenure should have a positive and non-employment a negative impact on earnings. Foreigners and women should earn less. There are also several arguments that earnings losses should increase with age. First, younger employees frequently voluntarily change their employers – even accepting a non-employment spell – in order to improve their job match (Mortensen and Pissarides, 1999). The chances are smaller for older employees that they can improve their match further. The share of involuntary separations might also be larger for older employees because they work in enterprises in economic troubles. These enterprises frequently have an older work force than comparable enterprises because they were not able to hire younger employees for a certain time span. Second, earnings increase with seniority and therefore entrants *ceteris paribus* earn lower earnings (Lazear, 1979). Especially older entrants therefore have a larger earnings disadvantage because they get compared with employees with long seniority. Especially in Germany, deferred seniority wage patterns seem to be rather steep

---

[3] It is found that wages decrease with previous unemployment, but not linearly or quadratically.

in an international comparison (Zwick, 2008) and this might also lead to relatively high wage losses for older employees in comparison to younger employees. Finally, older employees might have invested more in specific human capital and these investments are lost after the change of employers. We can find an indication which of these reasons is more prevalent by interacting the earnings loss indicator with a dummy for those who re-enter the labour market at the same employer. The first reason – involuntary job loss because the employer is in economic trouble – should lead to a negative coefficient for the interaction term. The other two reasons – loss of specific human capital and seniority – should lead to a positive coefficient for the interaction term.

In order to test the hypotheses, the sample of employees between 20 and 60 years of age is split into 10 year age brackets and between both genders. Robustness checks include an indicator which equals one if the establishment after re-employment is the same as the employer before unemployment.

4 Data

For this inquiry, we use the scientific use file of the employee statistics of the IAB (IABS) provided by the Zentralarchiv in Cologne (ZA), for further information see Bender et al. (1996; 2002). The register data of the IABS comprise data of the employment biography of two percent of the employees and unemployed covered by the social security system for the period 1975 until 2001 – this means more than 80% of all potential employees. Excluded from these data are the self-employed, civil servants, and workers with a very small income. The Employment Statistics give continuous information on employment spells, earnings, job and personal characteristics. They are based on microdata delivered by firms about their individual employees. The same is done if the employee changes employment or the employer or if there are changes in the social insurance payment obligations such as earnings changes. The duration of a spell is computed not in days worked but in calendar days. Originally, the data of the employment statistics were taken over for administrative purposes of the social security system and were collected by the Federal Employment Agency. Since they are used to calculate the pensions of retired people, the income and spell duration information are very reliable. For example, no problem of recall or reporting is encountered as in population surveys.

On the basis of these spell data, we can identify periods of employment and non-employment on a daily basis for a large and representative sample of individuals for a long

time period. Specifically, we also observe short periods of non-employment or employment that are unobservable in quarterly or yearly data. In addition, we can mark periods before and after non-employment spells with a daily accuracy.

The earnings variable is measured for calendar days. It is deflated by the consumer price index calculated by the German Federal Statistical Office. Earnings are censored at the contribution assessment ceiling of the social security system. This relates to about 10% of the employment spells. We therefore first identify, whose earnings are censored on the basis of the official social security contribution thresholds that change every year and differ for Eastern and Western Germany. The earnings regressions take account of the individual censoring by using censored normal regressions.[4] We only can identify the censoring for both parts of the country since 1992 and therefore earnings spells are not used before 1992.

Tenure and experience are also censored for spells starting before 1960 for West Germany and 1990 for East Germany. Therefore experience is replaced by age which is a good indicator for potential experience and the censored tenure variables are imputed (this concerns 4.1% of the spells in West and 6.7% of the spells in East Germany). The imputation is executed by creating 20 cells differentiated by gender, education (six schooling groups) and nationality (German versus non-German), and running censored regressions for each cell. The covariates comprise age, age square, eight dummies for school and professional qualification and sixteen binary variables for sector (compare also Gartner, 2005). Predicted tenure for each censored observation is then calculated and assigned for each spell.

This paper includes employees aged 20-60 in order to examine the entire age spectrum. Only full time employees are included in order to avoid biases because we know that frequently hours worked decrease prior to non-employment (Houle and van Audenrode, 1995) and we do not know the exact number of hours worked. Finally, only observations of those employees are included who return to work after a non-employment spell and those with uninterrupted employment spells.

In order to capture relevant further elements for individual earnings, a broad spectrum of individual and employer characteristics is included. This paper uses five dummies to characterise the educational background, age and age square as indicators for

---

[4] The command `cnreg` is used in STATA.

experience, tenure, a dummy for foreigners and for females, sixteen sector dummies, and year dummies.

5   Results

The censored earnings regressions lead to the expected correlations of the covariates to earnings: education level, tenure, and (with a decreasing rate) age have a positive impact on earnings while prior non-employment spells decrease earnings. Foreigners earn less than German citizens and females earn less than males (compare Table 1). Already three years before the separation, earnings are significantly lower for those who experience a non-employment spell later. The reason might be that those who lose their job later on are have negative unobservables or that the employers for whom they work pay less. The earnings loss increases to 6% one year before the unemployment (see the first column in Table 1). One year after the separation, a large portion of the earnings loss is already made up again and two years after the separation, those who experienced unemployment but found a new job again even have higher earnings than those who did not experience an unemployment spell. We have to deduct the negative unemployment spell effect from the coefficient, however. The earnings mark-up even reaches 7% after six years. This is only slightly less than the earnings punishment for those not employed for between 15 and 30 days – this means that those with non-employment spells less than 15 days are better off after six years while those with non-employment spell longer than 30 days still have lower earnings than those without non-employment spells.

If we split the sample into different age groups, we observe the following patterns: relative earnings losses with non-employment decline stronger with age (compare columns two to five in Table 1 or Figure 1). The first aspect is that older employees earned more several years before the non-employment spell than their colleagues who did not experience a non-employment spell later on – obviously this group of employees is not a negative selection nor did employers that shed employees more than four years later already pay less. The youngest group of those employees who experience non-employment later consistently has an earnings disadvantage between one and three percent in all six years before the non-employment spell. At least in their age cohort these employees have therefore unobservable negative characteristics or they work at employers with a lower earnings level.

After the non-employment spell, the pattern is the opposite – the youngest cohort enjoys a positive earnings mark-up in comparison to the reference group (at least after deducting the wage loss directly induced by non-employment) already one year after the non-employment spell. This earnings bonus even increases to more than 10 percent six years after the non-employment spell (which neutralises the earnings losses incurred by a non-employment spell between 61 and 100 days in this age cohort). The age cohort between 50 and 59 years never really recovers from the earnings loss after a non-employment spell. Only in the sixth year after the non-employment spell the earnings loss is not significantly lower than zero any more – an employee who had a non-employment spell between 61 and 100 days six years before still suffers an earnings loss of almost 11 percent, however). The other two age cohorts lie between both extremes. Jacobson et al. (1983) find rather small differences between the earnings losses of employees from different age groups. They also stress, however, that younger employees recover sooner from earnings losses after separation.

In order to further investigate what the reasons of the higher earnings losses of older employees might be, additional interaction terms are added between the dummies flagging the time distance to the non-employment spell and a dummy indicating that the employee was re-hired by the same enterprise as before the non-employment spell, compare Table 2. The first result is that at least one year before the separation, the interaction term is positive for all age cohorts (with a declining coefficient with age, see Figure 2). This means that those employees who are re-hired are a positive selection from the group of employees facing non-employment. The interaction coefficient is also positive for the youngest cohort after the unemployment spell. It is however negative in the range between three and six percent for the older age groups. One might interpret this as evidence for the importance of the argument that older employees re-enter enterprises that had dismissed them because they have been in economic trouble (and therefore also had to reduce their earnings level). The alternative hypotheses – older employees suffer higher earnings losses because potential new employers suppose that they are less capable, have negative unobservable characteristics, lose more specific human capital or their seniority wage mark-up are therefore not supported.

If we analyse the earnings differentials of men and women separately (see Table 3), we find that women who return to the labour market after a non-employment spell suffer lower earnings losses than men. This is also found by Jacobson et al. (1983). Before the

non-employment spell the earnings losses are lower for women than for men (beside the oldest cohort) and after the non-employment spell the earnings recover quicker and stronger for women (again the picture is not so clear for the oldest cohort).

6 Conclusions

This paper shows that earnings losses suffered after non-employment spells increase with the age of employees. In order to show this, the impact of non-employment spells on earnings is calculated for the period six years before until six years after the spell. The higher earnings losses of older employees result from several facts. The relative earnings position with respect to employees without non-employment spells several years before the separation is better for older employees. This earnings mark-up turns into a high earnings loss shortly before the unemployment spell. Young employees face a relatively low and constant earnings disadvantage in the years before the separation. After the non-employment spell the younger re-employed enjoy a wage higher than that of those without unemployment spells. This earnings advantage increases to more than 10 percent after six years – it neutralises a non-employment spell between 15 and 30 days. The older age cohorts see their relative earnings further reduced after the unemployment spell – even after six years there are earnings losses that have to be added to the earnings disadvantage incurred by the non-employment spell. From these findings the paper deducts that younger employees can improve their match by changing employers even if this includes a non-employment spell. In addition, younger employees who experience a separation are a group with lower earnings taking the observables into account. Older employees who have a non-employment spell later on are a more positive selection from their peer group. After their non-employment spell, they see their earnings position eroded either because they have to accept a worse match or because the new employer pays them less irrespective of their relatively high productivity. Both facts points to the hypothesis that non-employment of older employees is less frequently voluntary than non-employment of younger employees. If we look at the earnings mark-up for those who re-enter the labour market after non-employment at the same employer, this hypothesis seems to be supported. The interaction term is positive for the youngest cohort and negative for the oldest cohort – this might be a consequence of the employers of older employees setting free and re-hiring their employees because they are in economic trouble and therefore paying less. Other common hypotheses for the higher earnings losses of

older employees are not supported – for earnings losses induced by losses in human capital, seniority wage mark-ups or the uncertainty on unobservable characteristics the interaction term might have been more positive for the older than the younger employees with separations.

This paper cannot distinguish between voluntary and involuntary separations. In addition only few details on establishment characteristics can be included. It seems promising, however, to separate the impact of individual and employer characteristics on the earnings losses. We need linked employer employee data for this or at least information on the complete workforce of establishments.

Literature

Addison, John T./Portugal, Pedro (1989): Job Displacement, Relative Wage Changes, and Duration of Unemployment, *Journal of Labor Economics* 7 (3): 281-302.

Bender, Stefan/Hilzendegen/Rohwer, Götz/Rudolph, Helmut (1996): Die IAB-Beschäftigtenstichprobe 1975-1990, eine praktische Einführung, Beiträge zur Arbeitsmarkt- und Berufsforschung 197, Nürnberg.

Bender, Stefan/Dustmann, Christian/Margolis, David/Meghir, Costas (2002): Worker Displacement in France and Germany. In: P. J. Kuhn (ed.), Losing work, moving on: international perspectives on worker displacement, Kalamazoo: Upjohn Institute for Employment Research: 375-470.

Boockmann, Bernhard/Zwick, Thomas (2004), Betriebliche Determinanten der Beschäftigung älterer Arbeitnehmer, *Zeitschrift für Arbeitsmarktforschung* 37 (1): 53-63.

Burda, Michael C./Mertens, Antje (2001), Estimating Wage Losses of Displaced Workers in Germany, *Labour Economics* 8: 15-41.

Carneiro, Anabela/Portugal, Pedro (2006): Earnings Losses of Displace Workers: Evidence from a Matched Employer-Employee Data Set, IZA Discussion Paper 2289, Bonn.

Chan, Sewin/Stevens, Ann Huff (2001): Job Loss and Employment Patterns of Older Workers, *Journal of Labor Economics* 19: 484-521.

Christensen, Björn (2005) : Die Lohnansprüche deutscher Arbeitsloser, Berlin: Springer.

Disney, Richard (1996): Can We Afford to Grow Older? A Perspective on the Economics of Aging. MIT Press, Cambridge (Mass.).

Gartner, Hermann (2005): The imputation of wages above the contribution limit with the German IAB employment sample, FDZ Methodenreport Nr. 02/2005, Nürnberg.

Heywood, John S./Ho, Lok-Sang/Wei, Xiangdong (1999): The Determinants of Hiring Older Workers: Evidence from Hong Kong, *Industrial and Labor Relations Review* 52: 444-458.

Houle, Mario/Audenrode, Mark van (1994): Job Displacement, Wages, and Unemployment duration in Canada, *Labour Economics* 2: 77-91.

Jacobson, Louis/LaLonde, Robert/Sullivan, Daniel (1993): Earnings Losses of Displaced Workers, *American Economic Review* 83 (4): 685-709.

Koller, Barbara/Bach, Hans-Uwe/Brixy, Udo (2003): Ältere ab 55 Jahren – Erwerbstätigkeit, Arbeitslosigkeit und Leistungen der Bundesanstalt für Arbeit, IAB Werkstattbericht, Nr. 5, Nürnberg.

Lazear, Edward (1979): Why is there Mandatory Retirement? *Journal of Political Economy* 87: 1261-1284.

Lefranc, Arnaud (2003): Labor Market Dynamics and Wage Losses of Displaced Workers in France and the United-States, William Davidson Institute Working Paper 614.

Mortensen, Dale T./Pissarides, Christopher A. (1999): New developments in models of search in the labor market, in: Orley Ashenfelter/David Card (eds.), Handbook of Labor Economics, edition 1, volume 3, chapter 39: 2567-2627.

Schwerdt, Guido (2008): Labor Turnover before Plant Closure: "Leaving the Sinking Ship" vs. "Captain Throwing Ballast Overboard", CESifo Working Paper 2252, Munich.

Zwick, Thomas (2008): The Employment Consequences of Seniority Wages, ZEW Discussion Paper 08-039, Mannheim.

Figure 1: Earnings before and after a non-employment spell in comparison to employees with uninterrupted employment, separated by age group
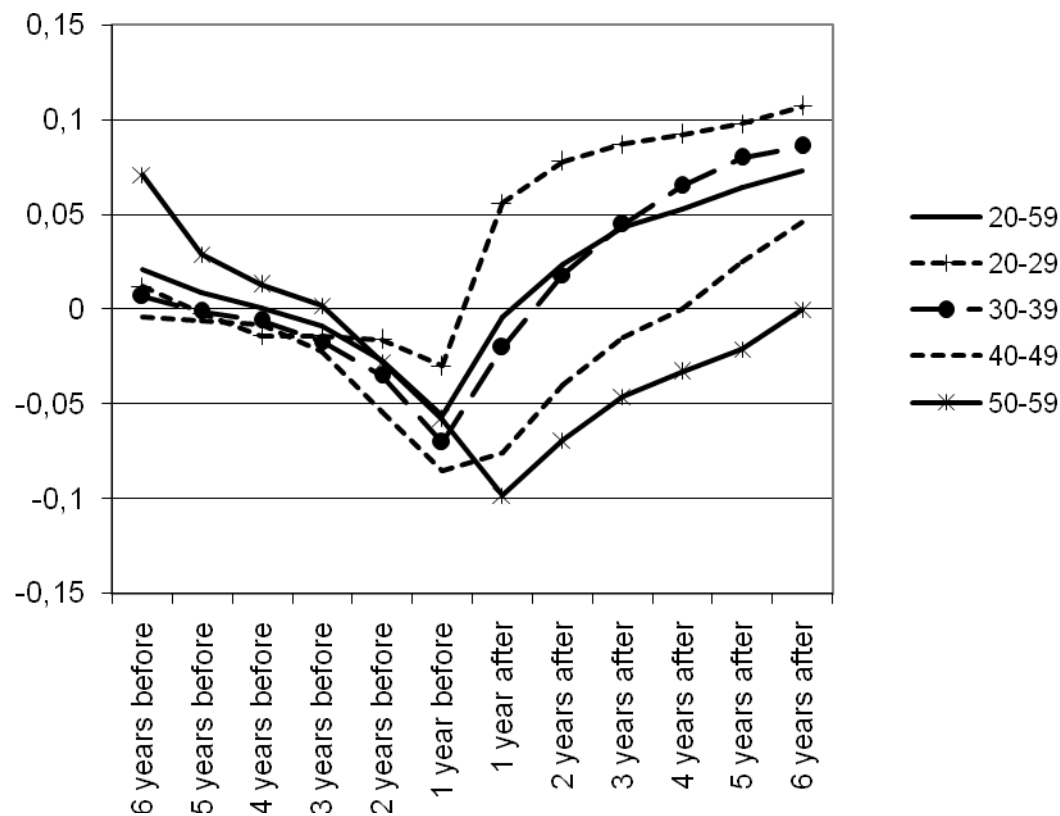
Figure 2: Deviations from earnings losses for those who re-start at the same employer after unemployment, separated by age group
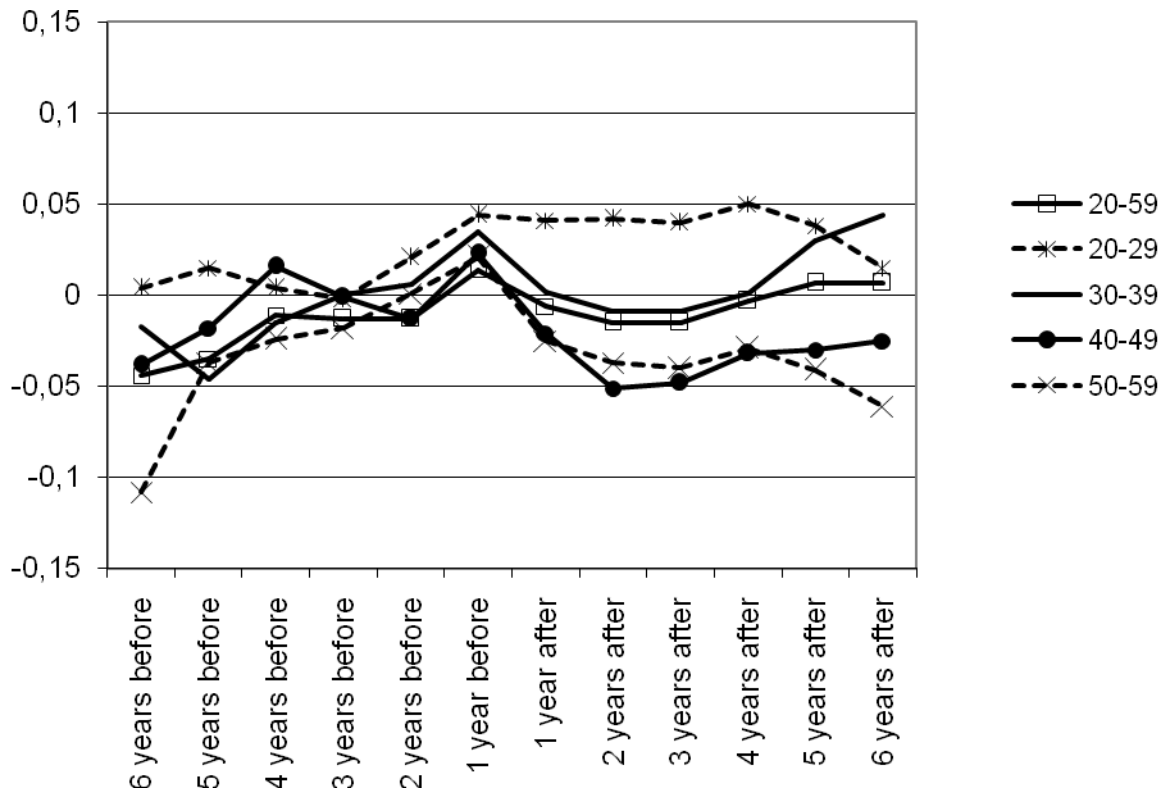
Table 1: Impact of unemployment spells on earnings, dependent variable: log earnings

	Age 20-60		Age 20-29		Age 30-39	
	Coefficient		Coefficient		Coefficient	
Unemployment spell 15 until 30 days	-0.083	***	-0.079	***	-0.090	***
Unemployment spell 31 until 60 days	-0.103	***	-0.092	***	-0.107	***
Unemployment spell 61 until 100 days	-0.115	***	-0.105	***	-0.122	***
Unemployment spell 101 until 200 days	-0.166	***	-0.139	***	-0.168	***
Unemployment spell 201 until 365 days	-0.218	***	-0.173	***	-0.228	***
Unemployment spell 366 until 730 days	-0.204	***	-0.152	***	-0.196	***
Unemployment spell more than days 731	-0.248	***	-0.184	***	-0.229	***
Employed at the same employer after separation	-0.004	***	0.044	***	0.003	*
6 years before separation	0.021	***	0.012		0.007	
5 years before separation	0.009	*	-0.002		-0.001	
4 years before separation	0.001		-0.014	**	-0.006	
3 years before separation	-0.009	**	-0.014	**	-0.017	***
2 years before separation	-0.027	***	-0.016	***	-0.035	***
1 year before separation	-0.056	***	-0.030	***	-0.070	***
1 year after separation	-0.004	***	0.056	***	-0.020	***
2 years after separation	0.024	***	0.078	***	0.018	***
3 years after separation	0.043	***	0.087	***	0.045	***
4 years after separation	0.053	***	0.092	***	0.065	***
5 years after separation	0.064	***	0.098	***	0.080	***
6 years after separation	0.073	***	0.107	***	0.086	***
School degree, no professional degree	0.073	***	0.070	***	0.055	***
Professional degree, secondary school degree	0.265	***	0.245	***	0.235	***
Professional degree, tertiary school degree	0.475	***	0.377	***	0.476	***
University, university of applied sciences	0.691	***	0.528	***	0.657	***
Foreigner	-0.105	***	-0.070	***	-0.142	***
Tenure in years	0.011	***	0.051	***	0.012	***
Age	0.050	***	0.133	***	0.066	***
Age x Age	-0.001	***	-0.002	***	-0.001	***
Female	-0.245	***	-0.118	***	-0.254	***
Constant	2.808	***	1.566	***	2.640	***
16 economic sector dummies, year dummies	Yes		Yes		Yes	
Number observations	4865091		1448445		1586082	
Pseudo R^2	0.2715		0.2657		0.2448	

Table 1 (continued)

	Age 40-49		Age 50-59	
	Coefficient		Coefficient	
Unemployment spell 15 until 30 days	-0.080	***	-0.088	***
Unemployment spell 31 until 60 days	-0.101	***	-0.108	***
Unemployment spell 61 until 100 days	-0.109	***	-0.106	***
Unemployment spell 101 until 200 days	-0.171	***	-0.172	***
Unemployment spell 201 until 365 days	-0.215	***	-0.205	***
Unemployment spell 366 until 730 days	-0.208	***	-0.240	***
Unemployment spell more than days 731	-0.245	***	-0.355	***
Employed at the same employer after separation	-0.017	***	-0.061	***
6 years before separation	-0.004		0.071	**
5 years before separation	-0.006		0.029	
4 years before separation	-0.008		0.013	
3 years before separation	-0.022	***	0.002	
2 years before separation	-0.054	***	-0.028	**
1 year before separation	-0.085	***	-0.058	***
1 year after separation	-0.076	***	-0.098	***
2 years after separation	-0.040	***	-0.069	***
3 years after separation	-0.015	***	-0.046	***
4 years after separation	0.000		-0.033	***
5 years after separation	0.025	***	-0.021	***
6 years after separation	0.046	***	-0.0002	
School degree, no professional degree	0.095	***	0.075	***
Professional degree, secondary school degree	0.284	***	0.268	***
Professional degree, tertiary school degree	0.549	***	0.545	***
University, university of applied sciences	0.763	***	0.786	***
Foreigner	-0.103	***	-0.082	***
Tenure in years	0.003		0.036	***
Age	0.036	***	0.050	***
Age x Age	-0.0003	***	-0.0004	***
Female	-0.324	***	-0.327	***
Constant	3.117	***	2.775	***
16 economic sector dummies, year dummies	Yes		Yes	
Number observations (censored)	1198550		708830	
Pseudo R^2	0.2574		0.2268	

Table 2:   Impact of unemployment spells on earnings, dependent variable: log earnings

	Age 20-60		Age 20-29		Age 30-39	
	Coefficient		Coefficient		Coefficient	
Unemployment spell 31 until 60 days	-0.106	***	-0.087	***	-0.108	***
Unemployment spell 61 until 100 days	-0.115	***	-0.096	***	-0.120	***
Unemployment spell 101 until 200 days	-0.171	***	-0.133	***	-0.169	***
Unemployment spell 201 until 365 days	-0.223	***	-0.166	***	-0.229	***
Unemployment spell 366 until 730 days	-0.211	***	-0.155	***	-0.199	***
Unemployment spell more than days 731	-0.255	***	-0.193	***	-0.234	***
6 years before separation	0.004		-0.008		-0.015	
5 years before separation	-0.001		-0.022	*	-0.009	
4 years before separation	-0.009		-0.021	**	-0.018	*
3 years before separation	-0.016	***	-0.020	**	-0.025	***
2 years before separation	-0.031	***	-0.023	***	-0.042	***
1 year before separation	-0.060	***	-0.035	***	-0.077	***
1 year after separation	-0.014	***	0.048	***	-0.026	***
2 years after separation	0.018	***	0.073	***	0.014	***
3 years after separation	0.040	***	0.089	***	0.043	***
4 years after separation	0.048	***	0.089	***	0.063	***
5 years after separation	0.060	***	0.096	***	0.075	***
6 years after separation	0.069	***	0.108	***	0.080	***
6 years before separation*same employer	-0.044		0.004		-0.017	
5 years before separation*same employer	-0.035	*	0.015		-0.046	
4 years before separation*same employer	-0.011		0.004		-0.015	
3 years before separation*same employer	-0.013		-0.002		0.0006	
2 years before separation*same employer	-0.013		0.021		0.006	
1 year before separation*same employer	0.014	**	0.044	***	0.035	***
1 year after separation*same employer	-0.006		0.041	***	0.002	
2 years after separation*same employer	-0.015	***	0.042	***	-0.009	
3 years after separation*same employer	-0.015	***	0.040	***	-0.009	
4 years after separation *same employer	-0.003		0.050	***	0.0009	
5 years after separation*same employer	0.007		0.038	***	0.030	***
6 years after separation*same employer	0.007		0.015		0.044	***
School degree, no professional degree	0.076	***	0.055	***	0.059	***
Professional degree, secondary school degree	0.274	***	0.251	***	0.240	***
Professional degree, tertiary school degree	0.493	***	0.389	***	0.488	***
University, university of applied sciences	0.713	***	0.535	***	0.674	***
Foreigner	-0.117	***	-0.079	***	-0.156	***
Tenure in years	0.024	***	0.042	***	0.028	***
Age	0.048	***	0.097	***	0.071	***
Age x Age	-0.0005	***	-0.001	***	-0.0009	***
Female	0-.239	***	-0.103	***	-0.244	***
Constant	2.957	***	2.152	***	2.657	***
16 economic sector dummies, year dummies	Yes		Yes		Yes	
Number observations	3607943		979819		1190802	
Pseudo R^2	0.2622		0.2622		0.2358	

Table 2 (continued)

	Age 40-49		Age 50-59	
	Coefficient		Coefficient	
Unemployment spell 31 until 60 days	-0.106	***	-0.128	***
Unemployment spell 61 until 100 days	-0.111	***	-0.124	***
Unemployment spell 101 until 200 days	-0.176	***	-0.186	***
Unemployment spell 201 until 365 days	-0.222	***	-0.211	***
Unemployment spell 366 until 730 days	-0.211	***	-0.244	***
Unemployment spell more than days 731	-0.241	***	-0.360	***
6 years before separation	-0.021		0.092	
5 years before separation	-0.021		0.046	
4 years before separation	-0.019		0.020	
3 years before separation	-0.029	***	0.006	
2 years before separation	-0.052	***	-0.036	**
1 year before separation	-0.090	***	-0.073	***
1 year after separation	-0.083	***	-0.107	***
2 years after separation	-0.042	***	-0.074	***
3 years after separation	-0.015	***	-0.044	***
4 years after separation	-0.002		-0.030	***
5 years after separation	0.025	***	-0.014	*
6 years after separation	0.046	***	0.008	
6 years before separation*same employer	-0.038		-0.108	
5 years before separation*same employer	-0.018		-0.037	
4 years before separation*same employer	0.016		-0.024	
3 years before separation*same employer	-0.0008		-0.018	
2 years before separation*same employer	-0.013		0.001	
1 year before separation*same employer	0.023	*	0.021	
1 year after separation*same employer	-0.021	**	-0.025	*
2 years after separation*same employer	-0.051	***	-0.037	**
3 years after separation*same employer	-0.048	***	-0.040	**
4 years after separation *same employer	-0.032	**	-0.029	
5 years after separation*same employer	-0.030	**	-0.041	**
6 years after separation*same employer	-0.025	*	-0.061	***
School degree, no professional degree	0.115	***	0.094	***
Professional degree, secondary school degree	0.303	***	0.291	***
Professional degree, tertiary school degree	0.572	***	0.565	***
University, university of applied sciences	0.800	***	0.810	***
Foreigner	-0.120	***	-0.084	***
Tenure in years	0.015	***	-0.020	**
Age	0.024	***	0.071	***
Age x Age	-0.0002	***	-0.0007	***
Female	-0.313	***	-0.327	***
Constant	3.463	***	2.310	***
16 economic sector dummies, year dummies	Yes		Yes	
Number observations	910309		572401	
Pseudo R^2	0.2538		0.2244	

Table A1: Descriptive statistics

	Average	Age 20-29	Age 30-39	Age 40-49	Age 50-59
Earnings	4.151	3.956	4.191	4.232	4.260
Unemployment spell 15 until 30 days	0.023	0.028	0.025	0.021	0.016
Unemployment spell 31 until 60 days	0.032	0.037	0.035	0.030	0.024
Unemployment spell 61 until 100 days	0.033	0.035	0.036	0.032	0.028
Unemployment spell 101 until 200 days	0.048	0.047	0.052	0.050	0.037
Unemployment spell 201 until 365 days	0.040	0.031	0.046	0.047	0.031
Unemployment spell 366 until 730 days	0.033	0.023	0.036	0.038	0.036
Unemployment spell more than days 731	0.027	0.014	0.029	0.030	0.040
Employed at the same employer after separation	0.045	0.029	0.050	0.054	0.049
6 years before separation	0.001	0.001	0.001	0.001	0.001
5 years before separation	0.002	0.001	0.002	0.002	0.002
4 years before separation	0.002	0.002	0.003	0.003	0.003
3 years before separation	0.004	0.003	0.004	0.004	0.004
2 years before separation	0.006	0.005	0.006	0.006	0.006
1 year before separation	0.010	0.009	0.011	0.010	0.010
1 year after separation	0.018	0.021	0.021	0.017	0.012
2 years after separation	0.013	0.013	0.015	0.012	0.009
3 years after separation	0.010	0.009	0.012	0.010	0.007
4 years after separation	0.008	0.007	0.010	0.009	0.007
5 years after separation	0.007	0.005	0.009	0.008	0.006
6 years after separation	0.006	0.004	0.008	0.007	0.005
School degree, no professional degree	0.219	0.216	0.200	0.224	0.252
Professional degree, secondary school degree	0.647	0.669	0.622	0.651	0.654
Professional degree, tertiary school degree	0.037	0.050	0.048	0.026	0.014
University, university of applied sciences	0.075	0.038	0.112	0.081	0.058
Foreigner	0.120	0.144	0.113	0.113	0.108
Tenure in years	0.006	0.006	0.006	0.006	0.005
Age	37.673	25.212	34.244	44.251	54.103
Female	0.351	0.428	0.335	0.324	0.297

Table 3: Separation dummies by gender

Age		Years before separation						Years after separation					
		6	5	4	3	2	1	1	2	3	4	5	6
20-59	Women	-0.034 *	-0.019	-0.027 **	-0.027 ***	-0.034 ***	-0.052 ***	-0.003	0.025 ***	0.045 ***	0.053 ***	0.065 ***	0.072 ***
	Men	0.014	-0.001	-0.005	-0.013 ***	-0.032 ***	-0.058 ***	-0.026 ***	0.005 **	0.026 ***	0.038 ***	0.052 ***	0.063 ***
20-29	Women	-0.053 **	-0.031	-0.026	-0.038 ***	-0.030 **	-0.039 ***	0.053 ***	0.075 ***	0.090 ***	0.095 ***	0.102 ***	0.105 ***
	Men	0.009	-0.018	-0.022 **	-0.019 **	-0.022 ***	-0.030 ***	0.053 ***	0.082 ***	0.096 ***	0.095 ***	0.100 ***	0.113 ***
30-39	Women	-0.026	-0.021	-0.026	-0.005	-0.018	-0.031 ***	0.008	0.033 ***	0.055 ***	0.068 ***	0.076 ***	0.072 ***
	Men	-0.013	-0.014	-0.019 **	-0.030 ***	-0.048 ***	-0.085 ***	-0.045 ***	0.000	0.030 ***	0.055 ***	0.076 ***	0.090 ***
40-49	Women	-0.022	-0.010	-0.020	-0.029	-0.050 ***	-0.078 ***	-0.047 ***	-0.011	0.014 *	0.025 ***	0.050 ***	0.076 ***
	Men	-0.021	-0.026 *	-0.010	-0.023 **	-0.051 ***	-0.082 ***	-0.110 ***	-0.076 ***	-0.051 ***	-0.035 ***	-0.007	0.014 ***
50-59	Women	-0.019	-0.012	-0.067	-0.046	-0.049	-0.100 ***	-0.122 ***	-0.086 ***	-0.051 ***	-0.040 ***	-0.028 **	-0.014
	Men	0.087 *	0.061 *	0.043 *	0.023	-0.020	-0.043 ***	-0.100 ***	-0.078 ***	-0.053 ***	-0.038 ***	-0.030 ***	-0.011