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# A lost generation? The financial crisis and the length of working life in Spain

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# A lost generation? The financial crisis and the length of working life in Spain

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While there has been considerable debate about extending the length of working life, little is known about the issue. We use data of the Spanish Continuous Working Life Sample from 2004 to 2013 and calculate period working life tables to assess the impact of the financial crisis on working life expectancy in Spain. We find that the recession had a tremendous impact, but that the impact differed considerably by occupational category, gender, and age group. Men working in skilled non-manual jobs were little affected, while male unskilled manual workers lost close to 14 years of working life expectancy. Women were less affected than men. Decomposing the effect of the recession by age group shows that young individuals mostly were hit as hard or harder than older workers. When we compare our findings to results obtained by Sullivan's method, we find that the use of the latter approach does not accurately reflect the levels and the trends in working life expectancy.

**Keywords:** Great Recession; Length of working life; Multistate life table; Spain; Sullivan's method; Working life expectancy;

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## 1. Introduction

Population aging will put a strain on social security systems in developed countries in the near future. Increasing the length of working life is considered to be a potential remedy, and has thus been proposed by the European Commission (2010). As a consequence, the statutory retirement age has been raised in several countries (OECD, 2013, 2015). Currently, however, very little is known about the length of working life, including about how it developed in the past, which factors affect it, and how it differs by country and region.

Most of the existing studies on length of working life have focused on the United States (Dudel and Myrskylä, 2016; Skoog and Ciecka, 2010; Millimet et al, 2010, 2003; Hayward and Grady, 1990; Smith, 1986), although studies on the issue have also been conducted for Finland (Leinonen et al, 2016; Nurminen et al, 2005), the United Kingdom (Haberman and Bloomfield, 1990; Butt et al, 2008), the Netherlands (Liefbroer and Henkens, 1999), and Denmark (Hoem, 1977). For Finland in 2006, Nurminen et al (2005) estimated working life expectancy at age 16 at 29.7 years for females and 31.4 years for males; meaning that 16-year-old Finnish females (males) could expect to spend 29.7 years (31.4 years) in employment. Leinonen et al (2016) estimated that working life expectancy at age 50 in 2012 was 9.1 years for Finnish males and 10 years for Finnish females. Findings for the UK by Butt et al (2008) generally showed a lower working life expectancy than in Finland, while most estimates for the US have been higher. For example, Dudel and Myrskylä (2016) estimated that 50-year-olds in the US in 2008-2011 had a working life expectancy of 12.7 years for males and 11.0 years for females, with strong educational gradients (see also Skoog and Ciecka, 2010; Millimet et al, 2003).

While a number of developed countries have been covered by the literature, many of these studies refer to periods before 2000, and there still is no full understanding of how changes in the economic environment and the accompanying increases and decreases in unemployment affect the length of working life, especially in the context of recent recessions. One country for which there is only limited information on working life expectancy is Spain. The financial crisis had a tremendous impact on the Spanish economy starting in 2008, leading to a severe recession that is now commonly referred to as the "Great Recession" (for a general overview see Jimeno and Santos, 2014). According to Eurostat, the unemployment rate in Spain more than tripled, from 8.2% in 2007 to 24.8% in 2012. Spanish young people have been especially vulnerable to the consequences of the crisis, and youth unemployment in the country has risen considerably (Dolado et al, 2013), leading to concerns about a "lost generation" (e.g., Govan, 2012). The long-term youth unemployment level has also increased, but is low compared to the overall level of unemployment, and compared to levels in other European countries (O'Higgins, 2012).

Several factors that likely contributed to the increase in unemployment in general and to the increase of youth unemployment in particular have been identified. These factors include the two-tier structure of the Spanish labor market, in which some workers have highly protected employment contracts while other workers have weakly protected fixed-term contracts (Bentolila et al, 2012a,b); and high levels of skills mismatch and overqualification, partly due to low regional mobility (Dolado et al, 2013). While the dynamics behind the crisis are being unraveled, the potential effects of the crisis on the length of working life have not yet been explored. While we can expect to find that the average length of working life decreased due to unemployment, it is not clear how the losses in working life expectancy are distributed across working ages. For example, high levels of youth unemployment might lead to losses in working life expectancy at a relatively young age, confirming the concerns about the lost generation. On the other hand, relatively low levels of long-term youth unemployment could imply that losses in working life expectancy at young ages come at the cost of increasing job instability.

The only estimates of working life expectancy available for Spain are provided by Eurostat, and are based on Sullivan's method (Sullivan, 1971). For instance, for 2014 Eurostat reported that the expected duration of working life at age 15 was 37.1 years for Spanish males and 32.3 years for Spanish females. Widely used in health research (e.g. Crimmins and Saito, 2001), Sullivan's method generally combines survival probabilities obtained from life tables with prevalence rates to estimate the time spend in a state of interest. In its estimates of working life expectancy, Eurostat uses labor force participation rates as prevalence rates (Hytti and Nio, 2004), including the time spent in both employment and unemployment over the length of working life.

Unlike Eurostat, most of the scientific literature on working life expectancy cited above used Markov chains based on incidence rates that capture transitions between states. It is well known that Sullivan's method can lead to biased estimates when mortality rates or incidence rates change over time, as prevalence rates may not adequately capture rapid changes in incidence rates (Imai and Soneji, 2007; Mathers and Robine, 1997; Newman, 1988). It may be expected that the incidence of both (un)employment and labor force participation changed rapidly during the financial crisis. Despite the financial crisis, Eurostat's recent estimates of the length of working life have been relatively stable, declining slightly from 38.3 years in 2008 to 37.1 years in 2014 for males, and increasing from 29.8 years in 2008 to 32.3 years in 2014 for females.

In this paper, we present estimates of the length of working life, or of working life expectancy (WLE), for Spain for the period of 2004 to 2013. Working life expectancy is defined as the expected time spent being employed during a lifetime. We calculate period multistate life tables based on Markov chains, estimated using a large sample from the Spanish social security register known as the Continuous Working Life Sample.

Our study contributes to the literature in several ways. First, to the best of our knowledge, we are the first to report working life table estimates for Spain. Second, we analyze differences by occupational category (manual vs. non-manual and skilled vs. unskilled), whereas the literature has focused on education (for an exception see Leinonen et al, 2016). Both education and occupational category are of importance for WLE and complement each other, while also capturing different aspects of working life (e.g. Geyer et al, 2006). Third, we decompose WLE into contributions by age groups. For instance, assume that total working life expectancy amounts to 35 years; i.e., the average individual spends 35 years of her lifetime in employment. The contribution of the age group consisting of ages 20 to 29 could be eight years; meaning that eight of 35 years of WLE are realized when individuals are in this age group, and the remaining 27 years are realized in other age groups. This calculation allows us to assess in which age groups years spent working are gained and lost over time, and thus whether concerns about a lost generation are accurate and which groups should be targeted by policies.

Moreover, we assess the use of Sullivan's method for the estimation of active working life expectancy (AWLE), including the lifetime spent in both employment and unemployment. To assess whether Sullivan's method is appropriate for investigating working life, we compare the results of this approach with the findings from the Markov chain approach.

The remainder of this paper is structured as follows. The dataset we use is described in section 2. Our methods are introduced in section 3. Our results are presented in section 4, and discussed in section 5. Section 6 concludes.

## 2. Data

The Continuous Working Life Sample (CWLS; Muestra Continua de Vida Laboral) is a 4% random sample of the Social Security Register in Spain, covering individuals who pay contributions or receive social security benefits (López Gómez et al, 2016). Data for contributing individuals is reported to the social security administration by employers and verified by the administration. The sample, which was extracted for the first time in 2004, contains labor trajectories dating as far back as 1981, and up through 2013. To ensure that individual follow-ups are possible, individuals remain in the sample from 2004 if they continue to be in contact with the social security system. Individuals lost due to death or administrative inactivity are replaced randomly until the sample reaches 4%. For individuals who are added to the sample as replacements, retrospective information is also available. Individuals lost in a certain year will enter the sample again if they become administratively active in subsequent years.

The dataset contains extensive information on each individual's working life, including on his or her employment spells and spells of receiving social security benefits, occupational category, and date of death. Using this information, we assign each individual one of four labor force states for each year: employed, unemployed (receiving unemployment benefits), retired (receiving pension benefits), or inactive. Inactive means that the individual was under age 65 and not in contact with the social security system (e.g., that he or she was in education or a homemaker), or that the individual was receiving disability benefits. We assigned each individual's labor force state based on the state in which he or she spent the most time during a year. For example, if during a given year an individual was unemployed for seven months, employed for four months, and inactive for one month, the individual would be assigned the state "unemployed". Inactive and unemployed individuals aged 65 and older are counted as retired, as individuals of retirement age are not entitled to unemployment benefits (Rebollo-Sanz, 2012). Since people over age 80 are almost never in employment, individuals in this age group are always counted as retired.

The occupational category is reported by the employer, and is divided into four categories according to the qualifications required for the job: skilled manual, skilled non-manual, unskilled manual, and unskilled non-manual. Although this variable is available for salaried workers only and not for self-employed workers or retirees, this lack of information is unproblematic for our analyses, as we focus on the highest occupational status ever obtained, which can be determined for most individuals in the sample (see below and sec. 3.2). The "highest" occupational category is determined by assuming that non-manual is higher than manual, and that skilled is higher than unskilled. For example, assume that an individual was employed in an unskilled non-manual position from 1995 to 2005, and in a skilled non-manual position thereafter. The highest occupational status ever attained by this person is skilled non-manual, and does not change over time.

We use CWLS data from 2004 to 2013 for our analyses. Thus, we do not use the retrospective data before 2004. We made this choice because the data is selective regarding survival. For example, individuals who were retired during the 1980s and who died at the beginning of the 1990s are not covered by the 2004 sample. From 2004 to 2013, the CWLS contains information on 1,405,395 individuals. For our analyses, we use information on the $1,272,695$ individuals – or roughly 91% of the sample – to whom we could assign an occupational category (see sec. 3.1 for more details). We employ a longitudinal perspective, focusing on the transitions of individuals between labor force states. In total, we observe $11,000,363$ yearly transitions for the period 2004 to 2013.

## 3. Methods

### 3.1. Markov chain methods

To model the transition between labor force states (and death) we use a Markov chain approach (Hoem, 1977; Millimet et al, 2003). More specifically, we specify a discrete-time Markov chain to estimate working life expectancy and related measures. Let $Z_t$ denote the labor force state at time $t$. Markov chains are based on transition probabilities $\Pr(Z_{t+1} = i|Z_t = j) = p_{ij}$, which capture the probability of being in state $i$ at time $t + 1$ conditional on being in state $j$ at time $t$. All results are derived from these transition probabilities. As we noted above, we distinguish between four labor force states: employed, unemployed, inactive, and retired. Individuals move between these states according to the transition probabilities. In addition to the state at time $t$, we assume that transition probabilities differ by gender, age, calendar year, and occupational category. We assume that 99 years is the highest age that can be reached, and that all individuals aged 99 will die.

Transition probabilities are collected in the transition matrix $\mathbf{P} = [p_{ij}]$. $\mathbf{P}$ is of dimension $m \times m$, where $m$ is the number of states, including the states discussed above, as well as an additional absorbing state "dead". Using the transition matrix, several quantities can be calculated (e.g., Kemeny and Snell, 1971). The time spent in any state $i$ starting from any state $j$, $n_{ij}$, can be calculated as

$$\mathbf{N} = (\mathbf{I}_s - \mathbf{U})^{-1}, \tag{1}$$

where $\mathbf{U}$ is a transition matrix that does not include absorbing states and $\mathbf{I}_s$ is an identity matrix of dimension $s \times s$, where $s = m - 1$ is the number of non-absorbing (transient) states. The column sums of $\mathbf{N}$ give the life expectancy conditional on starting in state $j$. To calculate the time spent in a subset of states starting from state $j$ – e.g., the time spent in the employed state irrespective of age starting from the state "aged zero and inactive" – we have to sum the entries of the $j$th column that relate to employed states.

We estimate the life expectancy in each of the four labor force states: working life expectancy, life expectancy in unemployment, life expectancy in retirement, and inactive life expectancy. If not stated otherwise, our results are life expectancies at age 15, meaning that the life expectancies in each of the four labor force states sum to the total life expectancy at age 15. In addition, we decompose working life expectancy by six age groups (19 or younger, 20 to 29, 30 to 39, 40 to 49, 50 to 59, 60 or older), giving the contribution of each age group to total working life expectancy.

### 3.2. Estimation of transition probabilities

To estimate transition probabilities $\Pr(Z_{t+1} = i|Z_t = j)$, we use multinomial logistic regression (Greene, 2012). The state at time $t + 1$ is used as the dependent variable and the state at time $t$ is used as one of the explanatory variables. Age is included as a cubic smoothing spline, which does not restrict the effect of age to a specific functional form (Yee and Wild, 1996). The highest occupational category ever attained is included via dummy variables. We use data of the years 2004 to 2013 and control for trends by including dummy variables for years using 2004 as a reference. We analyze transitions from $t$ to $t + 1$. This means, for example, that the dummy for 2006 relates to the transition from 2006 to 2007. Thus, no dummy is included for 2013, as it is only used as year $t + 1$ in conjunction with data from 2012. We also use interaction terms of occupational category and year (for interactions with age and gender, see below).

The regression model outlined above is applied to each of 10 subsamples, which are generated by splitting the data by gender and by the following age groups: 15 to 29, 30 to 54, 55 to 64, 65 to 79, and 80 to 99. The first age group corresponds to the transition from education to the labor market and early working life. Age 30 to 54 covers the larger part of working life, while the transition to retirement occurs in the age range of 55 to 64. Age 65 to 79 corresponds to retirement and age 80 to 99 to advanced age. Among the advantages of splitting the dataset and applying regression separately to each subsample are that doing so allows for discontinuities in the otherwise smooth age schedule and for the introduction of implicit interactions of age and gender with all explanatory variables. It also reduces the computational burden. As the size of the CWLS is large, using this approach does not lead to a notable loss of eciency. Individual subsamples are still sizable, and the smallest subsample consists of roughly $59,000$ transitions, while the largest has $3,100,000$ transitions.

As we already noted in section 2, we are able to assign the highest occupational category ever attained to roughly 91% of the individuals covered by the CWLS. While the occupational category itself changes over time, the highest occupational category ever attained is mostly stable after age 29. For example, between 2004 and 2005 this status is constant for roughly 90% of individuals. To assess whether missing information on occupational category affects our findings, we conducted sensitivity analyses in which all of the individuals with no information on occupational category were classified as skilled non-manual, skilled manual, unskilled non-manual, or unskilled manual. Otherwise, the analyses were carried out as described in this section. Compared to the findings of our main analyses, in which observations with missing information are dropped, the results differed only slightly. We thus assume that missingness is non-selective, and can be safely ignored. Results of the sensitivity analysis are given in appendix B.

### 3.3. Adjustment of transition probabilities

The dataset has two potential issues. First, the dataset is selective, as it only covers individuals who are in contact with the social security system. Specifically, the transition probabilities for which the labor force state $Z_t$ equals inactive might be biased. For example, the probability of transitioning from inactivity to employment might be biased upwards, as individuals who stay inactive for the whole period of 2004 to 2013 are not included in our dataset. Note, however, that valid estimates can be attained for the transition probabilities conditional on being employed, unemployed, or retired.

To test whether selectivity of the dataset affects the results, we combined the CWLS with data on the total population by age and gender taken from the Human Mortality Database (HMD; 2015), and estimated the transition probabilities using a nonparametric approach. For the technical background and the detailed results of this analysis, see appendix A. Our basic reasoning for performing this test is that the nonparametric approach should give reliable estimates, and is thus suitable for use as a benchmark to which we can compare our findings. Note that the nonparametric approach cannot be used for calculations by occupational category, as the HMD includes information by age and gender only, and not by occupational category. We therefore compared the results for the total population.

For females, the results for the total population differed considerably from the benchmark. For males, the results did not diverge substantially, which implies that coverage of the male population in the social security register is more complete than coverage of females. To take this discrepancy into account, we applied a simplified variant of the correction approach outlined by Dudel and Myrskylä (2016) to the transition probabilities for females (for technical details, see appendix A). Moreover, we also applied the approach of Dudel and Myrskylä (2016) to the survival probabilities of both males and females. After the corrections were applied, the results for both males and females differed only marginally from the benchmark.

A second potential issue is that it is not possible to distinguish between moving from one of the "social security states" to inactivity and outmigration. For instance, assume that an individual is employed and is thus in contact with the social security system in 2004, and then moves abroad. Another individual is employed in 2004 and becomes inactive thereafter. In both cases, there are no entries in the social security data after 2004. Simply assuming that both individuals are inactive will lead to a potentially large overestimation of the probability of moving to inactivity, as the levels of outmigration were sizable for at least some of the years of our study period (Larramona, 2013; Izquierdo et al, 2015). To deal with this issue, we correct the transition probabilities according to outmigration probabilities estimated using data obtained from the Instituto Nacional de Estadística. Details are given in appendix A.

### 3.4. Sullivan's method

In contrast to the Markov chain approach, Sullivan's method is based not on transition probabilities, but on prevalence rates. Formally, the remaining life expectancy spent in a state $j$ at age $x$ can be calculated as

$$e_j(x) = l_x \sum_{k=x}^{99} L_k d_j(k), \tag{2}$$

where $l_x$ is used to denote the survivor function of a life table, $L_x$ gives the person-years lived at age $x$ derived from the same life table, and $d_j(x)$ gives the proportion of individuals in state $j$ at age $x$ (Sullivan, 1971). Essentially, future expected lifetime is weighted by the probability of being in state $j$.

A detailed discussion of the assumptions needed to apply Sullivan's method is presented in Imai and Soneji (2007). The results obtained using Sullivan's method may differ from the results obtained using Markov chains, as the former are based on prevalence rates, $d_j$, while the latter are based on transition probabilities, $p_{ij}$, and the prevalence rates might not fully reflect the transition probabilities (Mathers and Robine, 1997).

As an example, assume we are interested in the time spent in employment in a strongly segregated labor market in which employed individuals have a high probability of staying employed, while unemployed individuals mostly stay unemployed. For people entering the labor market, there are two possible tracks: one of employment and one of unemployment. Now assume that between two periods the probability of entering the employment track decreases drastically for young individuals because of adverse economic conditions. In this scenario, employment prevalence will decrease for young individuals only, and Sullivan's method will thus show no dramatic change; whereas the Markov chain approach will capture the shift toward more individuals being on the unemployment track, and will thus show a strong drop in employment expectancy.

To compare Sullivan's method with the Markov chain approach, we directly compare our findings to estimates from Eurostat, which are based on Eurostat life tables and age-specific labor force participation rates derived from the EU labor force survey. As the labor force participation rates of the EU labor force survey capture both time spent in employment and time spent in unemployment, and thus AWLE, we combine our estimates of life expectancy spent in employment and unemployment to calculate life expectancy spent in the labor force. Labor force participation rates also count as part of the labor force individuals who are not receiving unemployment benefits but are looking for employment, whereas the CWLS does not include these individuals. Thus, these individuals are counted as inactive in our analysis. As this use of different definitions could lead to differences in the results, we also calculated labor force participation rates using the CWLS, and combined these rates with life tables for Spain obtained from the Human Mortality Database (2015) to calculating AWLE using Sullivan's method.

All calculations were conducted using R (R Core Team, 2015). Moreover, the `VGAM` package for R was used (Yee, 2010). Figures were created using `ggplot2` (Wickham, 2009).

Table 1: Number of individuals and transitions by gender and occupational category.

| | Individuals | Transitions | Relative |
|---|---|---|---|
| *By gender* | | | |
| Male | 722,333 | 6,189,028 | 57% |
| Female | 550,362 | 4,811,335 | 43% |
| *By occupational category* | | | |
| Skilled non-manual | 74,957 | 654,032 | 6% |
| Skilled manual | 144,817 | 1,222,560 | 11% |
| Unskilled non-manual | 305,075 | 2,650,622 | 24% |
| Unskilled manual | 747,846 | 6,473,149 | 59% |
| *Total* | 1,272,695 | 11,000,363 | 100% |

Source: Own calculation, CWLS 2004-2013

## 4. Results

### 4.1. Transitions and transition probabilities

Table 1 gives an overview of the number of individuals and the number of transitions by gender and occupational category. As males have a higher labor force attachment than females, there are more males than females in the CWLS. The structure of the sample with regard to occupational category is skewed in favor of unskilled and manual work. This reflects the structure of the Spanish labor market, which is dominated by labor-intensive industries with a high demand for unskilled work (construction, tourism, personal services; see Bentolila et al, 2012b).

Figure 1 shows the transition probabilities for key transitions based on data of the years 2012 and 2013. The first panel shows the probability of becoming employed conditional on being inactive by age and gender, whereby only findings for the main working ages of 15 to 64 are shown. The second panel shows the probability of staying employed conditional on being employed, and the third panel shows the probability of retiring conditional on being employed; i.e., of leaving the labor market.

The probability of becoming employed conditional on being inactive increases relatively steadily starting at age 15, and peaks at age 25 for females and at age 29 for males. For example, the probability of becoming employed at age 29 reflects the transition from being inactive at age 29 in 2012 to being employed at age 30 in 2013. Females have a higher probability of becoming employed than males for most ages up to age 29, except for ages 15 and 16. This difference reflects the fact that females spend more time in education and enter the labor market later than males (Dolado et al, 2000). The lagged peak and lower level among males may arise if significant numbers of inactive males are unemployed but are not receiving unemployment benefits, as the eligibility criteria are strict and a minimum amount of contributions is needed to qualify (Venn, 2012). A strong break occurs for both males and females at age 30. This discontinuity is due to the estimation of transition probabilities by subsamples. Estimating transition probabilities using only one sample instead of multiple subsamples would lead to a smoother schedule, but with potentially biased

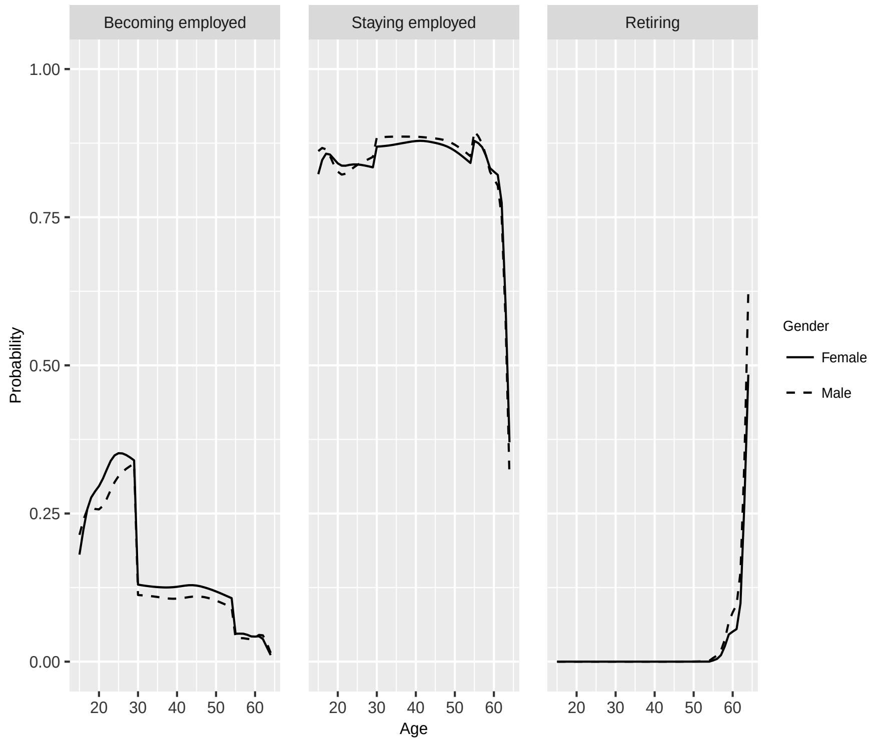


Figure 1: Transition probabilities by age (15 to 64) and gender: Probability of becoming employed conditional on being inactive; probability of staying employed; probability of retiring out of employment; 2012/2013. Source: Own calculation, CWLS 2004-2013.

estimates. Up to age 54 the transition probabilities do not change much, and then decrease rapidly.

The probability of staying employed is lower for individuals up to age 30 (85%) than for individuals up to age 54 (almost 90%). This gap is attributable to the fact that younger individuals are more likely than older workers to be on a fixed-term contract. This pattern might also explain the higher probability of staying employed found for males than for females (Azmat et al, 2006). Starting at age 60, the probability of staying employed decreases rapidly due to retirement. This trend is mirrored in the probability of retiring, which increases sharply starting at age 60.

## 4.2. Results on working life expectancy for the total population

Before we break down WLE by occupational category, we present findings for the total male and the total female population, which give an overview of the general trends in Spain. These results are based on estimates of transition probabilities that do not include occupational category as an explanatory variable. Findings are shown in table 2. Note that due to our methodological approach, each row of the table relates to two years $t$ and $t+1$; e.g., 2004 and 2005. As the recession hit Spain in 2008, 2007/2008 can be seen as a transition period, while the years before this point can be viewed as a pre-crisis period, and the years after this point can be seen as a period marked by recession. The first column of the table shows results for WLE measured in years; the second column shows the expected number of years spent in

Table 2: Life expectancy (in years) spent in employment, unemployment, inactivity, and retirement, for Spanish males and females by year.

| | Employed | Unemployed | Inactive | Retired | Total |
|---|---|---|---|---|---|
| *Males* | | | | | |
| 2004/2005 | 37.76 | 2.43 | 5.80 | 16.50 | 62.48 |
| 2005/2006 | 36.51 | 2.19 | 7.71 | 16.11 | 62.45 |
| 2006/2007 | 37.51 | 2.57 | 6.54 | 16.56 | 63.11 |
| 2007/2008 | 32.08 | 3.98 | 10.77 | 16.42 | 62.98 |
| 2008/2009 | 25.61 | 6.70 | 14.64 | 16.70 | 63.63 |
| 2009/2010 | 28.47 | 6.43 | 12.16 | 16.95 | 63.96 |
| 2010/2011 | 29.32 | 5.56 | 12.26 | 17.28 | 64.37 |
| 2011/2012 | 26.08 | 6.20 | 15.13 | 17.24 | 64.47 |
| 2012/2013 | 28.75 | 5.88 | 12.64 | 17.45 | 64.64 |
| *Females* | | | | | |
| 2004/2005 | 32.77 | 3.02 | 12.34 | 20.92 | 68.53 |
| 2005/2006 | 30.48 | 2.73 | 15.31 | 20.46 | 68.99 |
| 2006/2007 | 32.61 | 3.61 | 12.31 | 21.02 | 69.35 |
| 2007/2008 | 29.97 | 4.11 | 14.64 | 20.82 | 69.51 |
| 2008/2009 | 25.64 | 5.42 | 18.14 | 20.48 | 69.57 |
| 2009/2010 | 26.62 | 5.86 | 16.56 | 20.93 | 69.62 |
| 2010/2011 | 27.15 | 5.27 | 16.76 | 21.13 | 69.74 |
| 2011/2012 | 24.92 | 5.43 | 18.75 | 21.29 | 70.26 |
| 2012/2013 | 24.69 | 4.76 | 19.61 | 21.28 | 70.33 |

Source: Own calculation, CWLS 2004-2013

unemployment; the third and the fourth columns show results for the states "inactive" and "retired", respectively; and the fifth column shows total life expectancy.

All of these numbers can be interpreted similar to total life expectancy, and represent the average time spent in each state (measured in years) by members of a hypothetical cohort who experience the transition probabilities of a specific period. Because of the method we apply to correct mortality, the total life expectancy is similar to the life table estimates from the HMD, albeit with marginal differences: e.g., according to our findings, remaining life expectancy at age 15 for females in 2012/2013 is 70.33 years, while the corresponding value reported by the HMD for 2012 is 70.41.

Because of the recession, WLE has decreased considerably for both males and females. WLE was roughly 38 years for males and 33 years for females in 2006/2007, but had declined to 26 years for both males and females in 2008/2009. This implies that males lost nearly 12 years of WLE while females lost seven years due to the recession. WLE varied before and during the crisis, but these year-by-year differences are small compared to the impact of the recession. The large gender difference in the impact of the recession is at least partly attributable to differences in the distribution of the sexes across economic sectors, as more men than women work in sectors like

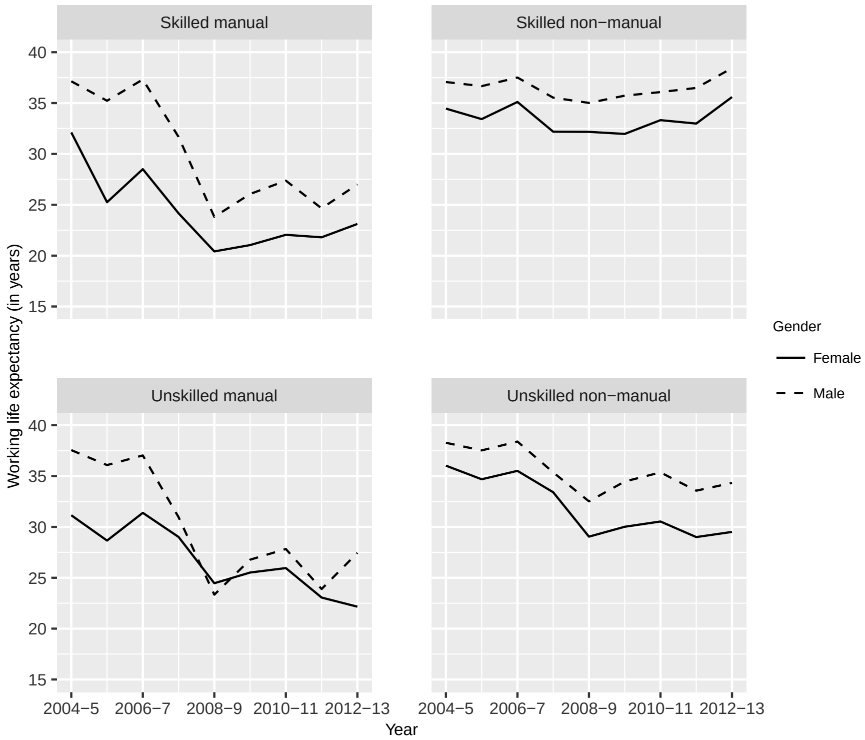


Figure 2: Average time spent in employment (WLE) 2004 to 2012 by occupational category and gender. Source: Own calculation, CWLS 2004-2013.

construction that have been hit especially hard by the recession (Bentolila et al, 2012a).

The years of WLE lost due to the recession are mostly spent in either unemployment or inactivity. Interestingly, we observe a reversal of the gender difference in time spent in unemployment due to the recession. For example, in 2006/2007 the average number of years spent in unemployment was 3.6 for females and 2.6 for males. In 2008/2009, these figures were 5.4 and 6.7, respectively. This finding is particularly striking because female unemployment was generally higher than male unemployment before the recession hit, mostly due to the fact that females are more likely than males to work on a temporary fixed-term contract (Azmat et al, 2006). Unlike the time spent in unemployment and inactivity, the time spent in retirement has not been greatly affected by the recession for either males or females. Women spent four more years in retirement than men, mostly due to their longer life expectancy.

### 4.3. Working life expectancy by occupational category

Estimates of WLE (measured in years) by occupational category and gender are shown in figure 2. These results only include years spent in employment. Additional tables showing life expectancy in all labor force states by gender and occupational category are provided in appendix C.

Before the recession, both unskilled manual and non-manual male workers had a WLE of roughly 38 years (2004/2005 value), while both skilled non-manual and manual individuals had a slightly lower WLE of 37 years. The impact of the Great Recession differed considerably by occupational category, and reversed the gap between skilled and unskilled work. The changes in WLE between 2006/2007 and 2008/2009 amounted to 2.5 years for skilled non-manual work, 5.9 years for unskilled non-manual work, and close to 14 years for both skilled and unskilled manual work. As was mentioned above, these shifts reflect the fact that certain economic sectors were in a boom phase before the crisis, and have been hit more severely by the recession than other sectors. For the most recent period (2012/2013), WLE is still below pre-recession levels for skilled manual, unskilled manual, and unskilled non-manual workers; with values of 27 years, 27 years, and 34 years, respectively. For skilled non-manual workers, WLE is above the pre-recession level, with a value of 38 years.

The results for females roughly follow those of males, but mostly at a lower level. For instance, in 2004/2005 WLE was 37 years for male and 32 years for female skilled manual workers. Interestingly, the gender gap in WLE decreased considerably for manual work, while it increased slightly for non-manual work. The gender gap is calculated as the WLE of males minus the WLE of females. For example, the gender gap for unskilled manual workers was 5.6 years in 2006/2007 and 1.1 years in 2008/2009. For skilled manual workers, these values were 8.8 and 3.4, respectively. The recession thus had a greater impact on females than on males working in non-manual jobs, but a smaller impact on females than on males working in manual jobs. Again, this pattern can be explained by the distribution of the genders across economic sectors; i.e., female unskilled manual workers are employed in different sectors than their male counterparts (Anghel et al, 2014). There is also evidence for both added worker effects and discouraged worker effects in Spain (Congregado et al, 2011); meaning that a woman may enter the labor market because her partner becomes unemployed (added worker effect), or that a woman may leave the labor market because she becomes unemployed and cannot find a new job (discouraged worker effect). We can speculate that the former effect dominates among manual workers, while the latter effect dominates among non-manual workers. We are not, however, able to test whether this is the case with our data.

### 4.4. Decomposition of working life expectancy by age group

The WLE losses may be concentrated in specific age groups. For instance, we can speculate that because of high youth unemployment, most of the years lost are concentrated at younger ages. Figures 3 and 4 present a decomposition of the changes in WLE between 2006/2007 and 2008/2009 by age class for males and females, and for all occupational categories. The bars in each plot indicate how the differences in WLE are distributed among the following age classes: 19 or younger, 20 to 29, 30 to 39, 40 to 49, 50 to 59, and 60 or older. For instance, the total WLE of skilled manual male workers decreased by 13.5 years, and 2.7 of these years were lost in the age group 30 to 39. Detailed results are provided in appendix C.

For both males and females and none of the occupational categories the age groups 19 or younger and 60 or older contributed substantially to WLE, and the losses are small. If we focus on the prime working age groups, we can see that for male skilled and unskilled manual workers, the losses are relatively evenly distributed among the age classes, although the losses are slightly larger in the age groups 20 to 29 and 50 to 59. For male skilled and unskilled non-manual workers, the losses are more concentrated in the younger age groups. Thus, for males the impact of youth

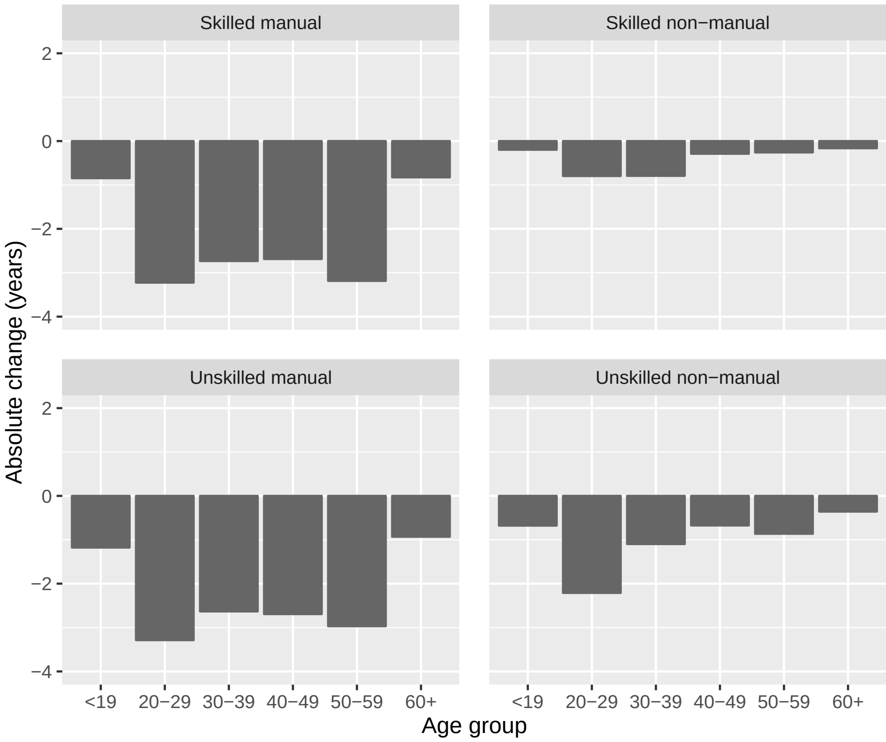


Figure 3: Decomposition of change in WLE between 2006/2007 and 2008/2009 by age group for males by occupational category. Source: Own calculation, CWLS 2004-2013.

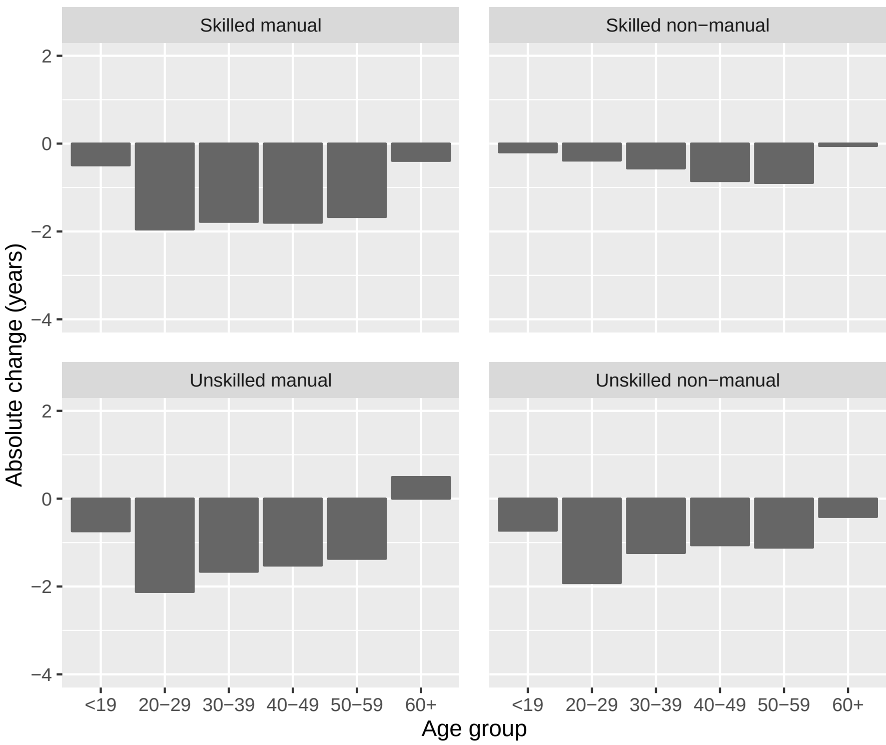


Figure 4: Decomposition of change in WLE between 2006/2007 and 2008/2009 by age group for females by occupational category. Source: Own calculation, CWLS 2004-2013.

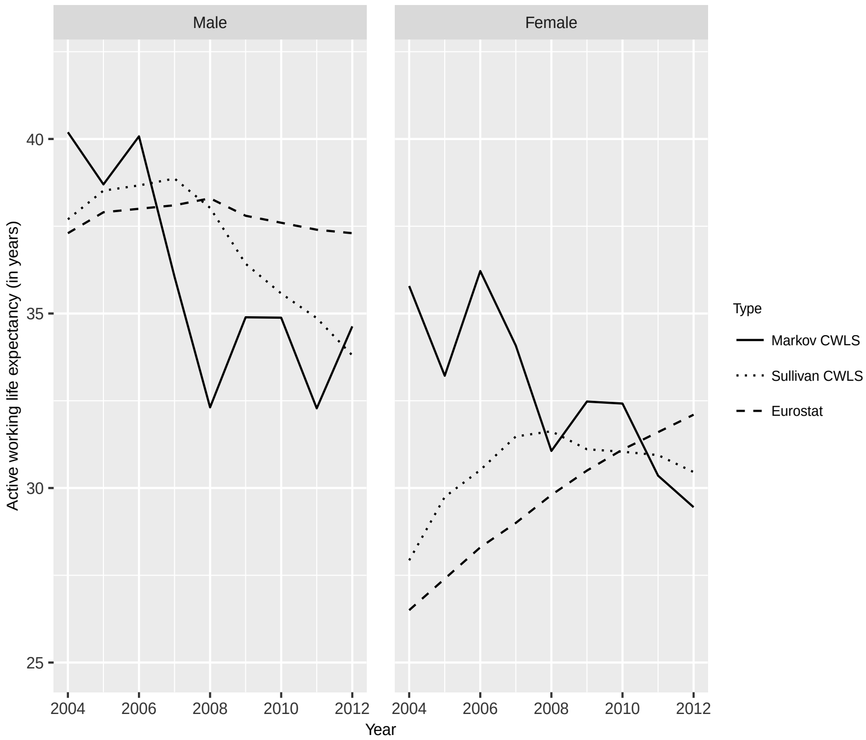


Figure 5: Average time spent in the labor force (AWLE; in years) 2004 to 2012 by year and gender, calculated using transition probabilities and Markov chains (Markov CWLS); participation rates obtained from the CWLS and Sullivan's method (Sullivan CWLS); and estimates provided by Eurostat based on Sullivan's method. Source: Eurostat; own calculation, CWLS 2004-2013.

unemployment on WLE seems to be limited to non-manual workers. Interestingly, for females the losses are more concentrated in the younger age groups for unskilled but not for skilled workers. For skilled non-manual female workers, the losses even show the opposite pattern, and are concentrated at higher ages. The total loss of WLE is, however, small for this group.

## 4.5. Active working life expectancy and Sullivan's method

Figure 5 compares the estimates of active working life expectancy (AWLE) based on Markov chains with the estimates obtained using Sullivan's method; i.e., the Eurostat estimates and the estimates based on the CWLS, as described in section 3.4. The Markov chain estimates are calculated by adding the columns "Employed" and "Unemployed" of table 2. Note that for the estimates obtained from Markov chains, each data point in the figure relates to two years, but the axis labels only show the first year. For instance, the data point for 2012 actually relates to 2012 as $t$ and to 2013 as $t + 1$. For the results based on Sullivan's method, each data point relates to one year as usual.

For males, the differences between our estimates based on Markov chains and the Eurostat estimates are rather large. The biggest difference is found for 2008/2009, with the Eurostat estimates being nearly six years higher than our estimates. While our findings show a decline in male AWLE of roughly 12 years between 2006/2007 and 2008/2009; the Eurostat estimates actually show an increase of 0.3 years between 2006 and 2008, and the values are generally rather stable. As we discussed above, this discrepancy may be at least partly due to the fact that the Eurostat estimates are based on labor force participation rates, which also include individuals who are not receiving unemployment benefits but are looking for work; whereas the CWLS only allows us to cover individuals who are receiving unemployment benefits. The labor force participation rates calculated from the CWLS thus differ from the Eurostat estimates. AWLE calculated using CWLS data shows a decline for males, but the decrease is later and slower than in the Markov estimates; i.e., a decline of just 0.6 years between 2006 and 2008. Thus, this estimate differs from the estimate generated using the Markov chain approach, again by roughly six years.

For females, the results also differ strongly depending on whether the Markov approach or Sullivan's method are used. Both our estimates and Eurostat's estimates obtained using Sullivan's method show an increase in WLE, at least from 2004 to 2008; while the Markov chain approach shows a decrease. After 2008, all of the estimates are roughly at the same level for at least some years, but the trends still differ: the estimates obtained using the Markov chain approach show a decline of roughly 1.6 years between 2008/2009 and 2012/2013, the estimates obtained using Sullivan's method based on CWLS data show a decline of 1.1 years between 2008 and 2012, and the Eurostat estimates show an increase of 2.3 years. Overall, Sullivan's method seems to miss both the levels and the trends of AWLE.

## 5. Discussion

### 5.1. Main findings

Our results show that the recession had a strong negative effect on working life expectancy in Spain. In light of the rather extreme increase in unemployment rates following the onset of the recession, this finding comes as no surprise. The lost lifetime in employment is spent not just in unemployment, but in inactivity. The increase in inactivity can be attributed to several factors. First, young Spaniards are staying in the educational system longer to increase their chances in the labor market and to avoid unemployment (Dolado et al, 2013). Second, some individuals may withdraw from the labor market at least temporarily if they are not entitled to unemployment benefits and do not expect to find a job (Congregado et al, 2011). Third, unemployed individuals may lose their eligibility for unemployment benefits after a certain period of time (Venn, 2012) and are then counted as inactive. Fourth, some individuals might apply for permanent disability programs and benefits. In Spain, these programs have long been used as a form of early retirement and a pathway out of employment, as benefits for permanent disability have been less restrictive and more generous than early retirement schemes (García-Gómez et al, 2012). Individuals with poor employment conditions have been shown to be especially likely to retire early due to permanent disability (Benavides et al, 2015). But it seems unlikely that the Great Recession would have had a strong effect on the uptake of disability benefits, as recent reforms have reduced the attractiveness of disability benefits, and inflows into disability programs have recently been decreasing (Silva and Vall-Castello, 2012).

If we break down WLE by occupational category, we see that the impact of the recession has differed considerably across these groups. This finding is consistent with the results of the emerging literature on the crisis in Spain, which has shown that sectors dominated by low-skilled work have been hit harder than others (Bentolila et al, 2012a). More surprising is the result that before the recession unskilled workers had a slightly higher WLE than skilled workers, as most research has shown that having a higher social class or level of education is associated with having a higher WLE (Leinonen et al 2016; Millimet et al 2010; for an exception see Liefbroer and Henkens 1999). As the highest occupational category ever attained is correlated with education–e.g., skilled non-manual workers will on average have a higher education than unskilled manual workers–we expected to find similar results for Spain. Our unanticipated finding may be explained by the interplay of two factors. First, because skilled individuals have to spend more time in the educational system than unskilled workers, they spend more time in the inactive state when they are young. Second, in 2004/2005 unemployment was extremely low by Spanish standards due to a boom in construction and market services that generated a large demand for unskilled work (Bentolila et al, 2012a; Jimeno and Santos, 2014). Because of the latter factor, employment levels were extremely high for unskilled workers in the pre-recession period covered in our dataset.

When we decompose the effect of the recession by age groups, we find that for some occupational categories (skilled/unskilled non-manual males; unskilled manual/non-manual females) younger people have been harder hit than older people, as would be expected given the high rates of youth unemployment (Dolado et al, 2013) and supporting the concerns about the lost generation (e.g., Govan, 2012). For skilled and unskilled manual male workers, the losses are distributed relatively evenly among age groups, although the effects are slightly stronger for the youngest and the oldest workers. This distribution may be attributable to the tremendous impact of the recession on sectors that employ large numbers of male manual workers, hitting young and old workers alike. The finding that skilled non-manual females lost the most WLE at higher ages is surprising; but their total loss in WLE is small.

Compared to findings from the literature, our results indicate that WLE in Spain at age 15 was relatively high before the start of the recession and relatively low thereafter. For Finland for the year 2006, Nurminen et al (2005) reported estimates of WLE at age 16 of 29.7 years for females and 31.4 years for males. Our estimates for 2006/2007 are 32.6 years for females and 37.5 years for males, while our estimates for 2012/2013 (the most recent period for which we have data) are 24.7 years for females and 28.8 years for males. This discrepancy may be attributable to the fact that before the recession unemployment was low in Spain and the demand for unskilled labor was high. However, WLE at age 50 has always been relatively low for Spain. For 2012/2013, WLE at age 50 was 8.7 years for employed males and 7.9 years for employed females. For WLE at age 50, Leinonen et al (2016) reported values of 9.1 years for males and 10.0 years for females in Finland in 2012, while Dudel and Myrskylä (2016) reported values of 12.7 years for males and 11.0 years for females in the US in 2008-2011. The differences found between Spain and the US can be explained by evidence showing that retirement in the US is not as clear-cut as it is in many European countries; i.e., it is relatively common for older Americans to return to employment after a period of retirement (e.g. Hayward and Grady, 1990). The differences between Finland and Spain are small for males. The differences found between females in these two countries seem to be caused by the expected time spent in inactivity at age 50, which is higher in Spain (5.3 years) than in Finland (2.3 years, including disability retirement). This suggests that older Finnish women are more attached to and integrated into the labor market than their Spanish counterparts.

### 5.2. Methodological considerations

Our comparison of Sullivan's method with Markov chains showed that Sullivan's method leads to misleading estimates of both the trends and the levels of AWLE. The results obtained using Sullivan's method show no or a lagged effect of the recession on males and an increase in AWLE for females, while the results obtained using Markov chains show a strong impact of the recession and a decrease in AWLE for both males and females. A portion of the difference between Eurostat's estimates and our findings is attributable to discrepancies in the definitions applied, as Eurostat uses labor force participation rates, which include unemployed individuals looking for work but not receiving unemployment benefits; whereas the CWLS only allows us to define individuals as unemployed if they are receiving unemployment benefits. But even if we use labor force participation rates calculated on the basis of the CWLS, Sullivan's method still gives misleading estimates. Thus, using Sullivan's method is inappropriate if the underlying transition probabilities are changing fast, as was the case for employment during the recession.

Several caveats regarding our findings are in order. First, all our findings are based on a period perspective, and show what would happen to a hypothetical cohort if the conditions of a specific period prevailed. While this approach can provide useful information on the conditions of a period, our results may not directly translate to the experiences of real birth cohorts (Leinonen et al, 2016). Second, a potential question that may be raised about our results is whether we have been able to estimate the effect of the recession, as changes in WLE may be affected not only by the crisis, but by other factors as well. While we cannot rule out the effects of other factors, it is clear that the drastic changes we find are overwhelmingly attributable to the recession. Moreover, not distinguishing between part- and full-time employment may be problematic, especially for women. Our findings show that the recession had a less severe impact on females, but this could partly be due to a reduction in full-time work and an increase in part-time work.

The CWLS also has potential issues with selectivity, as only individuals who are in contact with the social security system are covered. Moreover, it does not capture outmigration. While we correct for these issues, our adjustment procedures ignore occupational category, as the additional datasets we use for adjustment do not contain information on occupation. If, for instance, outmigration differs by occupational class, our findings may be biased. However, we have no means of controlling for whether this bias is actually occurring; and, if so, how much it affects our results. Given that the effect of adjustment for outmigration is moderate and adjustment for selectivity leads to results close to a nonparametric benchmark, we assume that the level of bias is moderate at worst (for details, see appendix A).

## 6. Conclusions

Our findings show that the Great Recession has had a strong impact on working trajectories in Spain and that working life expectancy (WLE) declined rapidly. However, the effects of the recession on WLE vary considerably by occupational category and gender. Skilled non-manual workers have been only slightly affected, while unskilled manual workers have lost a very large number of years of WLE. Notably, despite findings from the literature showing that higher education is generally associated with higher WLE, we found that in the pre-recession period in the early to mid-2000s skilled workers had a slightly lower WLE than unskilled workers. Women have been less affected by the recession than men. Decomposing losses in WLE by age groups showed that the WLE lost at younger ages strongly depends on the occupational category, and that – at least for some categories – it is roughly comparable to or only slightly higher than the WLE lost at older ages. Still, overall our findings support the idea of a lost generation. Using Sullivan's method to calculate life expectancy spent in the labor force leads to estimates that are wrong in terms of both levels and trends, and are highly misleading.

While there is no direct translation from period to cohort WLE, our results nevertheless point to losses in cohort WLE due to the duration of the crisis and its consequences for the labor market. In the early to mid-2000s, considerably more WLE could be accumulated than after the start of the recession in the late 2000s. While younger and middle-aged individuals may be able to catch up on lifetime worked if economic conditions improve, there are still potential risks like scarring effects; a term that refers to the negative effects of unemployment spells on later labor market performance (Bell and Blanchflower, 2011). Older individuals who experience reduced time spent in employment may have insufficient opportunities to catch up before retirement. In light of population aging, this loss of WLE seems rather troublesome, as there is already substantial pressure on the Spanish social security system in general and its pension system in particular (Sánchez Martín and Sánchez Marcos, 2010; Díaz-Giménenz and Díaz-Saavedra, 2009). Given our findings, it remains to be seen whether recent reforms – e.g., the increase in the retirement age from 65 to 67 over the period of 2013 to 2027 – will lead to a notable increase in the length of working life.

Potential avenues for future study include investigating the broader question of how economic conditions in general and the financial crisis in particular affect WLE. While our findings indeed show that the recession has had a strong impact, it remains to be seen if this will also be true from a cohort perspective, and for other countries and institutional settings.

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## A. Correcting transition probabilities

### A.1. Correcting for selectivity regarding inactivity

As outlined in the main text transition probabilities for females starting in the inactive state will be corrected as well as survival probabilities for males and females. Adjustments are conducted in two steps, i.e. first transition probabilities are adjusted and then survival probabilities. The adjustment of survival probabilities follows Dudel and Myrskylä (2016) and uses life tables obtained from the Human Mortality Database (2015) (HMD).

Adjustment of transition probabilities for the inactive state to correct for selectivity of the CWLS proceeds in the following fashion. First, transition probabilities are estimated based on CWLS data and population data taken from the HMD. More specifically, for each year the CWLS is used to estimate the size and structure of the population by age, gender, and in the labor force states employed, unemployed, retired, and disabled. This is done by weighting every observation available for a specific year by its inverse selection probability 100/4. Let $n_{t,a,g,s}$ denote the population counts derived this way where $t$ indicates the year, $a$ the age $(0,\ldots,99)$, $g$ the gender, and $s$ the labor force state. Let $n_{t,a,g}$ be the total population for age $a$, gender $g$, and year $t$ obtained from the HMD. The number of inactive individuals can be calculated as

$$n_{t,a,g,\texttt{inactive}} = n_{t,a,g} - \left(n_{t,a,g,\texttt{employed}} + n_{t,a,g,\texttt{unemployed}} + n_{t,a,g,\texttt{retired}} + n_{t,a,g,\texttt{disabled}}\right).$$

Transition probabilities are calculated as

$$p_{ij} = \frac{n_{t,a,g,j}^{t+1,a+1,g,i}}{n_{t,a,g,j}},$$

where $n_{t,a,g,j}^{t+1,a+1,g,i}$ is the number of individuals who are in state $j$ and age $a$ at time $t$ and in state $j$ and age $a+1$ at time $t+1$. To calculate these for $j$ being equal to inactive first transitions to the labor force states employed, unemployed, retired, and disabled are calculated. This is done by counting observations in the CWLS who are in state $i$ at $t+1$ and were inactive at time $t$ and weighting these observations with 100/4. Then probabilities of dying are calculated for the inactive state, which requires $n_{t,a,g,j}^{t+1,\texttt{dead}}$. This number can be derived by exploiting the fact that

$$n_{t,a,g}^{t+1,\texttt{dead}} = n_{t,a,g,\texttt{employed}}^{t+1,\texttt{dead}} + n_{t,a,g,\texttt{unemployed}}^{t+1,\texttt{dead}} + n_{t,a,g,\texttt{retired}}^{t+1,\texttt{dead}} + n_{t,a,g,\texttt{disabled}}^{t+1,\texttt{dead}} + n_{t,a,g,\texttt{inactive}}^{t+1,\texttt{dead}}.$$

The first four quantities on the right hand side can be estimated using the CWLS, while $n_{t,a,g}^{t+1,\texttt{dead}}$ is taken from the HMD. Finally, the probability of staying inactive is calculated by using the fact that $\sum_i p_{ij} = 1$.

In a second step, nonparametric estimates are used to adjust semiparametric estimates of transition probabilities starting in labor force state inactive by occupational category. Let $p_{j,a,t,g,o}$ be the probability of being in state inactive in age $a$ at time $t$ for gender $g$ and occupational category $o$ and moving to the state $j$ (e.g. employed) in age $a+1$ at time $t+1$. Assume that this probability has been estimated using the semiparametric approach. Let $\mathrm{P}_{a,t,g}(o)$ be the proportion of inactive individuals in age $a$ at time $t$ and of gender $g$ and of occupational category $o$, which is estimated using the CWLS. The probability of moving to state $j$ unconditional on occupational category is given by

$$p_{j,a,t,g} = \sum_{o} p_{j,a,t,g,o} \mathrm{P}_{a,t,g}(o)$$

Let $p^{*}_{j,a,t,g}$ be the estimate of the unconditional probability obtained by applying the nonparametric approach outlined above. Semiparametric estimates $p_{j,a,t,g,o}$ are then multiplied by a correction factor $a_{j,a,t,g}$ which is calculated as

$$a_{j,a,t,g} = \frac{p^{*}_{j,a,t,g}}{p_{j,a,t,g}}.$$

Adjusted transition probabilities $p^{A}_{j,a,t,g,o}$ are then calculated as

$$p^{A}_{j,a,t,g,o} = p_{j,a,t,g,o} a_{j,a,t,g} c_{j,a,t,g,o},$$

where $c_{j,a,t,g,o} = 1/\left(\sum_j a_{j,a,t,g} p_{j,a,t,g,o}\right)$ is an additional scaling factor which guarantees that for each occupational category $\sum_j p^{A}_{j,a,t,g,o} = 1$ holds. Because of this additional scaling factor

$$p^{*}_{j,a,t,g} = \sum_{o} p^{A}_{j,a,t,g,o} \mathrm{P}_{a,t,g}(o)$$

will only hold approximately.

Note that this approach based on indirect nonparametric estimates is not perfect. Our reasoning is that the CWLS should give a relatively complete picture of working trajectories of males as they typically have high labor force participation rates and most of them will either be employed, unemployed, disabled, or retired, implying that the semiparametric estimates of transition probabilities based on the CWLS should lead to reasonable results, i.e. results which are only slightly biased, if at all. If estimates of WLE derived completely nonparametrically coincide with those of the semiparametric approach and adjustment does not change the results of the semiparametric approach much, then the nonparametric estimates should not be totally off. If this is the case for males, completely nonparametric estimates of WLE for females can serve as a benchmark for unadjusted semiparametric estimates to assess whether selectivity of the social security population is strong and they can be used to assess whether the adjustment method outlined above leads to reasonable results.

## A.2. Correcting for out migration

To adjust for out-migration we first calculated out migration probabilities by age and gender using population counts obtained from the HMD and out-migration counts obtained from the Estadística de Variaciones and the Estadística de Migraciones (see below). Let $m_{t,a,g}$ denote these out-migration probabilities. Let $p^{A}_{i,a,t,g,o}$ denote the adjusted probability of being in state $i$ at time $t$ and occupational category $o$ and moving to the state inactive at $t+1$ (adjusted using the method described in A.1). These adjusted probabilities will then be corrected via $p^{A}_{i,a,t,g,o} - m_{t,a,g}$, yielding probabilities $p^M_{i,a,t,g,o}$. In a second step, transition probabilities are rescaled such that they sum to survival probabilities. These rescaled probabilities are then used for calculating WLE and so on.

While the data from the Estadística de Migraciones (EM) is considered to be better than the data from the Estadística de Variaciones (EVR) (Izquierdo et al, 2015), which has several potential issues and may give out migration counts which are too low (see Larramona, 2013), it is only available starting with 2008, while the EVR data is available for all years we study. Because of this, we use the age structure of out migration of 2008 obtained from the EM for the years 2004 to 2007. Out migration counts for 2004 to 2007 obtained from the EVR are assumed to be 10% too low and are multiplied by 1.1 to adjust for this issue. This value was obtained from a comparison of the EM and EVR for the years 2008 to 2012.

The approach to correct for migration assumes that out migration does only differ by age, gender, and year and does not differ by occupational category and current state. Unfortunately, we do not have access to data by occupational category. In theory one could use an approach similar as the one outlined above to correct for selectivity regarding inactivity. But while it seems reasonable and is in line with the literature to assume that transitions out of inactivity differ by highest occupational category ever obtained things are not so clear for out migration. While it is known that better educated have a higher probability of emigrating, this somewhat changed during the recession, as lesser educated have been hit more hard than others and economic factors have strong effects on migrating (Izquierdo et al, 2015). Moreover, the population of emigrants is highly selective with respects to other characteristics and consists to a large share of immigrants moving out of Spain (Larramona, 2013). As the CWLS does not contain any information on migration status we stick to the simple approach outlined above. A comparison of corrected and uncorrected results is given below.

### A.3. Effects of adjustments

Figure A1 shows a comparison of estimates of WLE by gender and method. Results of the semiparametric method are presented with and without correction, where corrected results are adjusted for selectivity and out migration as outlined above. Survival probabilities are adjusted using the approach described by Dudel and Myrskylä (2016). Results of the nonparametric approach are also adjusted for out migration. In case of males most estimates are relatively close to each other, except for the year 2007 for which the absolute difference between the nonparametric and the unadjusted semiparametric estimates amounts to 1.9 years. For other years differences are smaller, e.g. 0.8 for 2012. Adjusted semiparametric estimates are mostly close to the nonparametric approach. Correcting for selectivity has an effect on estimates, but this effect is mostly small and differences are only in levels and not in trends. For females the differences between the nonparametric approach and the uncorrected semiparametric approach are larger and range between 2.3 years and 4.4 years. As can be seen in the figure trends are roughly equal but the levels differ considerably. Applying corrections the differences range between 0.0 and 0.6 years. Adjusting transition probabilities thus seems necessary.

Figure A2 shows the effect of adjusting for out migration, showing results based on semiparametric estimates of transition probabilities both unadjusted and adjusted for out migration. For both males and females the effect of adjustment is relatively small for pre-crisis years and the biggest difference between adjusted and unadjusted results amounts to 0.5 years. During the crisis out migration increased considerably which leads to stronger effects of adjustment. For example, for males the difference between adjusted and unadjusted results in 2012 is roughly 1.5 years. Thus, the effect of adjusting for out migration is not as big as the effect of adjusting for sample selectivity, especially for pre-crisis years.

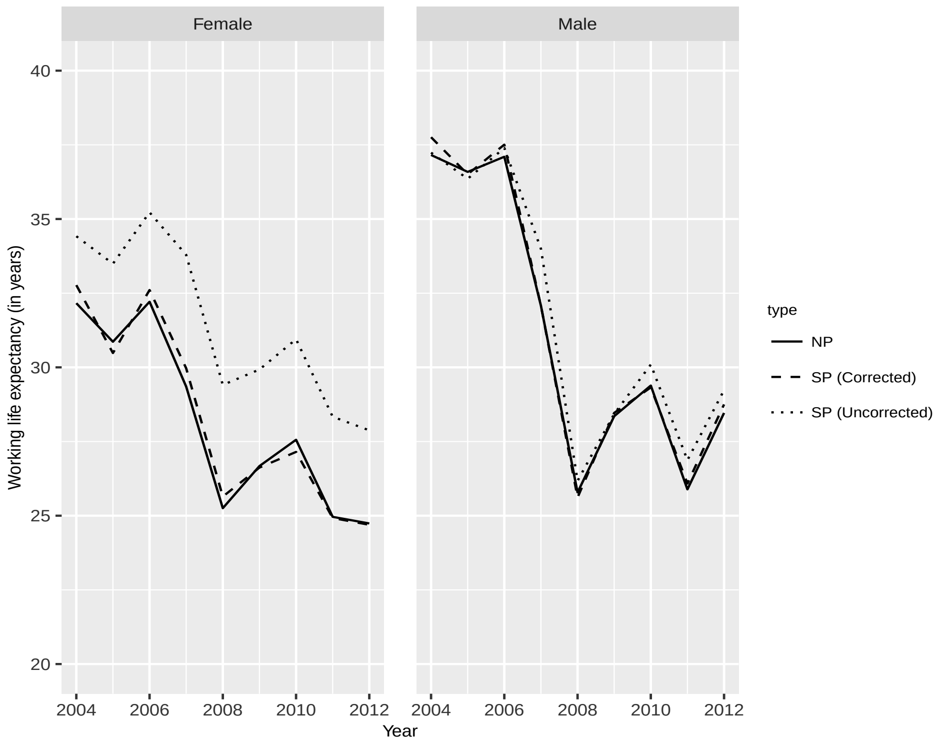


Figure A1: Comparison of WLE estimates over time for males and females by method (NP=Nonparametric; SP=Semiparametric)

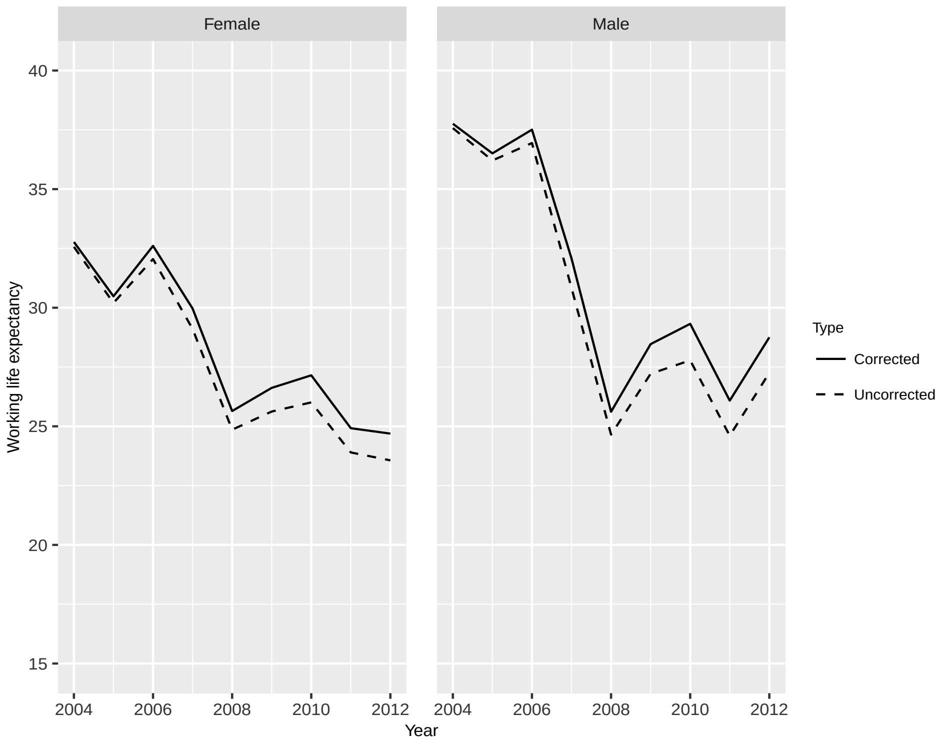


Figure A2: Comparison of WLE estimates adjusted and not adjusted for migration

## B. Results of the sensitivity analysis regarding occupational category

Exemplary results of the sensitivity analysis conducted to assess whether missing information on occupational category may bias our results are given in figures B1 and B2. The figures show our original findings for WLE by occupational category from the main text as well as results which were obtained by assuming that individuals with missing occupational category all belong to the category "skilled non-manual". Results of the sensitivity analyses where missing values were replaced with either " skilled manual", "unskilled non-manual", or "unskiled manual" are qualitatively similar.

In all cases levels and trends of WLE obtained from the sensitivity analysis are close to our original analysis. The only exception are skilled non-manual males, for whom the sensitivity analysis shows an increase in WLE from 2004 to 2007. Mean absolute deviations are 0.6 years (skilled non-manual), 0.6 years (skilled manual), 0.4 years (unskilled non-manual), and 0.4 years (unskilled manual) for males. For females mean absolute deviations are all below 0.1 years and results of the analyses are close to identical.

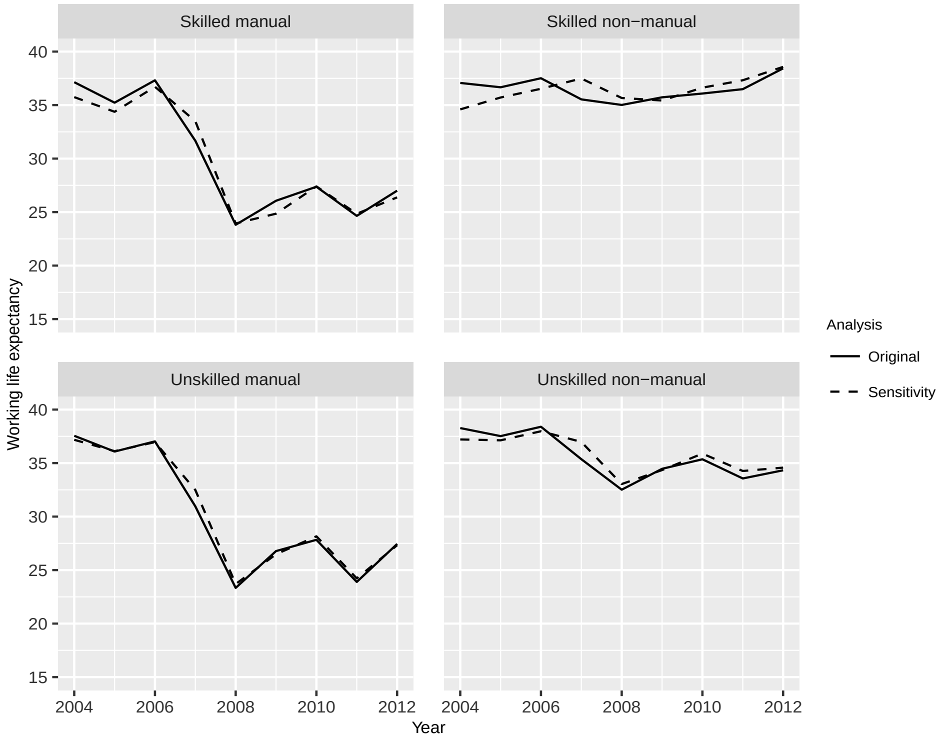


Figure B1: Comparison of WLE estimates from the original and the sensitivity analysis for males.

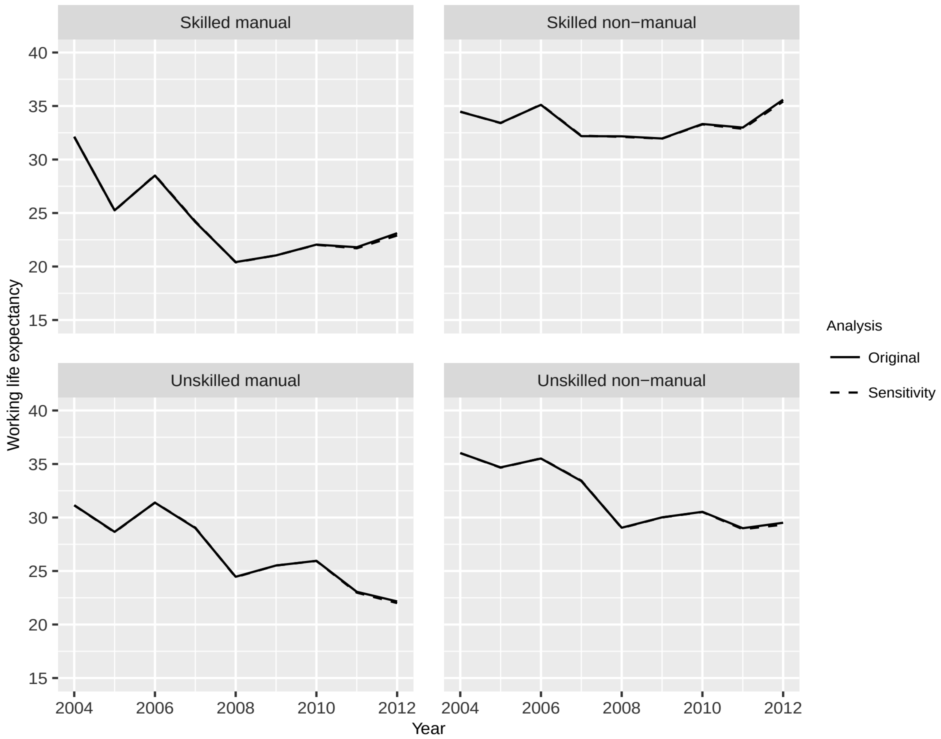


Figure B2: Comparison of WLE estimates from the original and the sensitivity analysis for females.

## C. Additional tables

The tables in this section present detailed findings of our analyses.

- Detailed results on life expectancy in all labor force states by gender and occupational category are given in tables C1 to C4. These results can be interpreted as those in table 2 of the main paper and the findings shown in figure 2 of the main paper are extracted from these tables.
- Tables C5 to C8 show detailed results for the composition of working life expectancy by age group discussed in section 4.4 of the main paper. Figure 3 and 4 in the main paper are based on these results.
- Additional results not presented in the main paper are given in tables C9 to C16, which decompose the life expectancy in inactivity and the life expectancy in unemployment by age group, similar to the findings discussed in section 4.4 of the main paper.

Table C1: Life expectancy spent in employment, unemployment, inactivity, and retirement, for Spanish males and females by year; Skilled non-manual

| | Employed | Unemployed | Inactive | Retired | Total |
|---|---|---|---|---|---|
| *Males* | | | | | |
| 2004/2005 | 37.07 | 0.76 | 9.54 | 17.04 | 64.41 |
| 2005/2006 | 36.67 | 0.65 | 10.40 | 16.73 | 64.44 |
| 2006/2007 | 37.51 | 0.64 | 9.79 | 17.00 | 64.94 |
| 2007/2008 | 35.53 | 0.64 | 12.04 | 17.66 | 65.87 |
| 2008/2009 | 35.01 | 0.89 | 12.17 | 17.59 | 65.66 |
| 2009/2010 | 35.73 | 1.07 | 11.13 | 18.43 | 66.36 |
| 2010/2011 | 36.08 | 1.27 | 10.56 | 18.44 | 66.35 |
| 2011/2012 | 36.49 | 1.69 | 10.11 | 19.41 | 67.69 |
| 2012/2013 | 38.43 | 1.84 | 7.82 | 19.09 | 67.19 |
| *Females* | | | | | |
| 2004/2005 | 34.46 | 0.81 | 13.10 | 21.38 | 69.76 |
| 2005/2006 | 33.42 | 0.68 | 14.40 | 21.54 | 70.04 |
| 2006/2007 | 35.11 | 0.72 | 13.03 | 21.52 | 70.38 |
| 2007/2008 | 32.18 | 0.63 | 15.82 | 22.34 | 70.97 |
| 2008/2009 | 32.17 | 0.83 | 16.21 | 20.72 | 69.92 |
| 2009/2010 | 31.96 | 1.04 | 15.72 | 21.75 | 70.47 |
| 2010/2011 | 33.32 | 1.18 | 14.74 | 22.39 | 71.64 |
| 2011/2012 | 32.98 | 1.67 | 14.30 | 23.21 | 72.16 |
| 2012/2013 | 35.59 | 1.97 | 11.15 | 21.92 | 70.63 |

Table C2: Life expectancy spent in employment, unemployment, inactivity, and retirement, for Spanish males and females by year; Skilled manual

| | Employed | Unemployed | Inactive | Retired | Total |
|---|---|---|---|---|---|
| *Males* | | | | | |
| 2004/2005 | 37.14 | 1.31 | 6.94 | 16.84 | 62.23 |
| 2005/2006 | 35.23 | 1.19 | 9.57 | 16.99 | 62.97 |
| 2006/2007 | 37.32 | 1.37 | 7.67 | 17.76 | 64.12 |
| 2007/2008 | 31.67 | 1.71 | 13.27 | 17.06 | 63.70 |
| 2008/2009 | 23.81 | 3.07 | 20.21 | 17.56 | 64.65 |
| 2009/2010 | 26.06 | 3.07 | 18.01 | 17.23 | 64.38 |
| 2010/2011 | 27.37 | 3.16 | 16.78 | 18.14 | 65.45 |
| 2011/2012 | 24.65 | 3.58 | 19.30 | 17.72 | 65.24 |
| 2012/2013 | 27.00 | 4.08 | 16.30 | 18.03 | 65.41 |
| *Females* | | | | | |
| 2004/2005 | 32.12 | 2.05 | 13.59 | 21.84 | 69.60 |
| 2005/2006 | 25.25 | 1.66 | 21.52 | 19.99 | 68.43 |
| 2006/2007 | 28.50 | 1.90 | 18.03 | 20.15 | 68.58 |
| 2007/2008 | 24.16 | 1.90 | 22.14 | 23.11 | 71.31 |
| 2008/2009 | 20.42 | 2.66 | 25.58 | 21.98 | 70.63 |
| 2009/2010 | 21.04 | 2.94 | 24.69 | 20.67 | 69.34 |
| 2010/2011 | 22.05 | 2.99 | 23.86 | 21.86 | 70.76 |
| 2011/2012 | 21.80 | 3.27 | 23.80 | 21.82 | 70.69 |
| 2012/2013 | 23.11 | 3.50 | 22.54 | 21.73 | 70.88 |

Table C3: Life expectancy spent in employment, unemployment, inactivity, and retirement, for Spanish males and females by year; Unskilled non-manual

| | Employed | Unemployed | Inactive | Retired | Total |
|---|---|---|---|---|---|
| *Males* | | | | | |
| 2004/2005 | 38.27 | 1.62 | 6.28 | 17.34 | 63.51 |
| 2005/2006 | 37.52 | 1.41 | 7.58 | 16.94 | 63.46 |
| 2006/2007 | 38.40 | 1.55 | 6.80 | 17.99 | 64.73 |
| 2007/2008 | 35.37 | 1.67 | 9.84 | 17.77 | 64.65 |
| 2008/2009 | 32.51 | 3.04 | 11.40 | 17.98 | 64.94 |
| 2009/2010 | 34.47 | 3.05 | 9.57 | 18.21 | 65.29 |
| 2010/2011 | 35.36 | 3.00 | 8.52 | 18.15 | 65.04 |
| 2011/2012 | 33.56 | 3.41 | 10.44 | 18.35 | 65.76 |
| 2012/2013 | 34.33 | 3.49 | 9.30 | 18.83 | 65.95 |
| *Females* | | | | | |
| 2004/2005 | 36.02 | 2.14 | 9.68 | 21.04 | 68.88 |
| 2005/2006 | 34.69 | 2.00 | 11.39 | 21.13 | 69.20 |
| 2006/2007 | 35.51 | 2.14 | 10.55 | 21.52 | 69.72 |
| 2007/2008 | 33.41 | 2.31 | 12.51 | 21.53 | 69.75 |
| 2008/2009 | 29.04 | 3.37 | 16.01 | 21.43 | 69.86 |
| 2009/2010 | 30.01 | 3.60 | 14.88 | 22.34 | 70.82 |
| 2010/2011 | 30.53 | 3.46 | 14.52 | 22.27 | 70.78 |
| 2011/2012 | 29.00 | 3.74 | 15.93 | 22.05 | 70.71 |
| 2012/2013 | 29.51 | 3.88 | 15.19 | 22.17 | 70.75 |

Table C4: Life expectancy spent in employment, unemployment, inactivity, and retirement, for Spanish males and females by year; Unskilled manual

| | Employed | Unemployed | Inactive | Retired | Total |
|---|---|---|---|---|---|
| *Males* | | | | | |
| 2004/2005 | 37.55 | 3.16 | 5.09 | 16.25 | 62.06 |
| 2005/2006 | 36.08 | 2.84 | 7.43 | 15.64 | 61.99 |
| 2006/2007 | 37.03 | 3.40 | 6.01 | 15.95 | 62.39 |
| 2007/2008 | 30.96 | 5.64 | 10.09 | 15.77 | 62.46 |
| 2008/2009 | 23.34 | 8.98 | 14.55 | 16.02 | 62.90 |
| 2009/2010 | 26.78 | 8.62 | 11.56 | 16.36 | 63.32 |
| 2010/2011 | 27.83 | 7.18 | 12.12 | 16.71 | 63.84 |
| 2011/2012 | 23.90 | 7.90 | 15.58 | 16.54 | 63.91 |
| 2012/2013 | 27.44 | 7.31 | 12.53 | 16.70 | 63.98 |
| *Females* | | | | | |
| 2004/2005 | 31.15 | 3.84 | 13.27 | 20.73 | 68.99 |
| 2005/2006 | 28.66 | 3.45 | 16.64 | 20.08 | 68.82 |
| 2006/2007 | 31.39 | 4.97 | 12.32 | 20.76 | 69.44 |
| 2007/2008 | 29.01 | 5.81 | 14.33 | 19.97 | 69.12 |
| 2008/2009 | 24.46 | 7.32 | 17.95 | 19.74 | 69.48 |
| 2009/2010 | 25.52 | 8.04 | 15.82 | 20.16 | 69.54 |
| 2010/2011 | 25.95 | 7.02 | 16.50 | 20.43 | 69.91 |
| 2011/2012 | 23.06 | 6.97 | 19.28 | 20.72 | 70.02 |
| 2012/2013 | 22.16 | 5.64 | 21.51 | 20.76 | 70.07 |

Table C5: WLE decomposed by age groups for skilled non-manual males and females

| | <19 | 20-29 | 30-39 | 40-49 | 50-59 | 60+ |
|---|---|---|---|---|---|---|
| *Males* | | | | | | |
| 2004/2005 | 1.13 | 6.81 | 9.41 | 8.99 | 7.76 | 2.97 |
| 2005/2006 | 1.24 | 6.21 | 9.31 | 8.96 | 7.86 | 3.08 |
| 2006/2007 | 1.34 | 6.79 | 9.37 | 8.98 | 7.85 | 3.17 |
| 2007/2008 | 1.20 | 5.79 | 8.66 | 8.93 | 7.79 | 3.16 |
| 2008/2009 | 1.15 | 6.00 | 8.57 | 8.69 | 7.59 | 3.01 |
| 2009/2010 | 1.22 | 6.71 | 8.87 | 8.68 | 7.40 | 2.85 |
| 2010/2011 | 1.34 | 7.26 | 8.88 | 8.54 | 7.24 | 2.82 |
| 2011/2012 | 1.41 | 7.54 | 8.90 | 8.47 | 7.23 | 2.93 |
| 2012/2013 | 2.02 | 8.75 | 9.09 | 8.39 | 7.21 | 2.96 |
| *Females* | | | | | | |
| 2004/2005 | 1.04 | 6.44 | 8.44 | 8.49 | 7.38 | 2.68 |
| 2005/2006 | 1.19 | 6.42 | 7.92 | 8.11 | 7.04 | 2.73 |
| 2006/2007 | 1.22 | 6.40 | 8.08 | 8.39 | 7.51 | 3.51 |
| 2007/2008 | 1.11 | 5.92 | 7.55 | 7.77 | 6.84 | 2.98 |
| 2008/2009 | 1.02 | 6.02 | 7.51 | 7.54 | 6.62 | 3.46 |
| 2009/2010 | 1.02 | 6.08 | 7.80 | 7.75 | 6.63 | 2.68 |
| 2010/2011 | 1.17 | 6.86 | 7.98 | 7.59 | 6.45 | 3.27 |
| 2011/2012 | 1.12 | 6.50 | 7.89 | 7.66 | 6.64 | 3.19 |
| 2012/2013 | 1.76 | 8.25 | 8.45 | 7.76 | 6.57 | 2.80 |

Table C6: WLE decomposed by age groups for skilled manual males and females

| | <19 | 20-29 | 30-39 | 40-49 | 50-59 | 60+ |
|---|---|---|---|---|---|---|
| *Males* | | | | | | |
| 2004/2005 | 1.57 | 7.84 | 9.39 | 9.04 | 7.63 | 1.67 |
| 2005/2006 | 1.51 | 7.06 | 9.21 | 8.69 | 7.16 | 1.59 |
| 2006/2007 | 1.71 | 7.73 | 9.35 | 8.98 | 7.66 | 1.88 |
| 2007/2008 | 1.32 | 6.13 | 8.32 | 8.08 | 6.32 | 1.51 |
| 2008/2009 | 0.86 | 4.50 | 6.62 | 6.30 | 4.48 | 1.06 |
| 2009/2010 | 0.96 | 5.44 | 7.24 | 6.61 | 4.66 | 1.14 |
| 2010/2011 | 0.97 | 5.68 | 7.39 | 6.90 | 5.13 | 1.30 |
| 2011/2012 | 0.86 | 5.26 | 6.80 | 6.14 | 4.42 | 1.17 |
| 2012/2013 | 1.08 | 6.26 | 7.30 | 6.42 | 4.70 | 1.25 |
| *Females* | | | | | | |
| 2004/2005 | 1.24 | 7.01 | 8.15 | 7.92 | 6.35 | 1.45 |
| 2005/2006 | 1.05 | 5.81 | 6.48 | 6.16 | 4.58 | 1.18 |
| 2006/2007 | 1.18 | 6.19 | 7.08 | 6.98 | 5.56 | 1.50 |
| 2007/2008 | 0.97 | 5.17 | 6.15 | 5.98 | 4.64 | 1.26 |
| 2008/2009 | 0.69 | 4.23 | 5.30 | 5.18 | 3.89 | 1.11 |
| 2009/2010 | 0.76 | 4.71 | 5.66 | 5.21 | 3.71 | 0.99 |
| 2010/2011 | 0.81 | 5.20 | 5.84 | 5.17 | 3.71 | 1.31 |
| 2011/2012 | 0.71 | 4.64 | 5.77 | 5.46 | 4.02 | 1.21 |
| 2012/2013 | 0.92 | 5.86 | 6.18 | 5.26 | 3.67 | 1.23 |

Table C7: WLE decomposed by age groups for unskilled non-manual males and females

| | <19 | 20-29 | 30-39 | 40-49 | 50-59 | 60+ |
|---|---|---|---|---|---|---|
| *Males* | | | | | | |
| 2004/2005 | 1.69 | 8.01 | 9.42 | 9.14 | 7.97 | 2.05 |
| 2005/2006 | 1.79 | 7.71 | 9.30 | 8.90 | 7.63 | 2.19 |
| 2006/2007 | 1.82 | 7.93 | 9.39 | 9.07 | 7.88 | 2.31 |
| 2007/2008 | 1.50 | 6.74 | 8.81 | 8.75 | 7.40 | 2.16 |
| 2008/2009 | 1.14 | 5.72 | 8.29 | 8.39 | 7.02 | 1.95 |
| 2009/2010 | 1.31 | 6.73 | 8.68 | 8.48 | 7.10 | 2.16 |
| 2010/2011 | 1.47 | 7.40 | 8.83 | 8.56 | 7.14 | 1.96 |
| 2011/2012 | 1.26 | 6.88 | 8.47 | 8.15 | 6.71 | 2.10 |
| 2012/2013 | 1.42 | 7.46 | 8.63 | 8.14 | 6.70 | 1.98 |
| *Females* | | | | | | |
| 2004/2005 | 1.73 | 8.07 | 8.62 | 8.33 | 7.10 | 2.18 |
| 2005/2006 | 1.76 | 7.85 | 8.23 | 7.94 | 6.67 | 2.24 |
| 2006/2007 | 1.83 | 7.92 | 8.32 | 8.06 | 6.92 | 2.47 |
| 2007/2008 | 1.53 | 7.15 | 7.98 | 7.83 | 6.67 | 2.25 |
| 2008/2009 | 1.10 | 6.00 | 7.08 | 7.00 | 5.81 | 2.05 |
| 2009/2010 | 1.24 | 6.57 | 7.41 | 7.06 | 5.71 | 2.04 |
| 2010/2011 | 1.21 | 6.73 | 7.54 | 7.17 | 5.80 | 2.08 |
| 2011/2012 | 1.08 | 6.23 | 7.16 | 6.85 | 5.56 | 2.11 |
| 2012/2013 | 1.21 | 6.90 | 7.42 | 6.83 | 5.34 | 1.82 |

Table C8: WLE decomposed by age groups for unskilled manual males and females

| | <19 | 20-29 | 30-39 | 40-49 | 50-59 | 60+ |
|---|---|---|---|---|---|---|
| *Males* | | | | | | |
| 2004/2005 | 2.28 | 8.48 | 9.04 | 8.67 | 7.28 | 1.81 |
| 2005/2006 | 2.24 | 8.27 | 8.91 | 8.26 | 6.68 | 1.72 |
| 2006/2007 | 2.34 | 8.40 | 8.97 | 8.47 | 6.99 | 1.86 |
| 2007/2008 | 1.79 | 6.92 | 7.94 | 7.33 | 5.54 | 1.44 |
| 2008/2009 | 1.16 | 5.11 | 6.34 | 5.77 | 4.02 | 0.93 |
| 2009/2010 | 1.35 | 6.04 | 7.04 | 6.48 | 4.69 | 1.18 |
| 2010/2011 | 1.25 | 6.16 | 7.28 | 6.75 | 5.03 | 1.36 |
| 2011/2012 | 0.99 | 5.43 | 6.55 | 5.89 | 4.08 | 0.96 |
| 2012/2013 | 1.14 | 6.16 | 7.25 | 6.63 | 4.92 | 1.33 |
| *Females* | | | | | | |
| 2004/2005 | 1.82 | 7.73 | 7.66 | 7.04 | 5.46 | 1.44 |
| 2005/2006 | 1.74 | 7.42 | 7.13 | 6.37 | 4.74 | 1.25 |
| 2006/2007 | 1.83 | 7.50 | 7.39 | 6.95 | 5.62 | 2.10 |
| 2007/2008 | 1.54 | 6.65 | 6.83 | 6.45 | 5.14 | 2.40 |
| 2008/2009 | 1.09 | 5.38 | 5.73 | 5.43 | 4.25 | 2.59 |
| 2009/2010 | 1.27 | 5.94 | 6.15 | 5.76 | 4.36 | 2.03 |
| 2010/2011 | 1.17 | 6.02 | 6.35 | 5.92 | 4.48 | 2.01 |
| 2011/2012 | 0.93 | 5.21 | 5.87 | 5.57 | 4.08 | 1.41 |
| 2012/2013 | 1.01 | 5.81 | 5.94 | 5.18 | 3.47 | 0.74 |

Table C9: Inactive life expectancy decomposed by age groups for skilled non-manual males and females

| | <19 | 20-29 | 30-39 | 40-49 | 50-59 | 60+ |
|---|---|---|---|---|---|---|
| *Males* | | | | | | |
| 2004/2005 | 3.86 | 3.04 | 0.36 | 0.62 | 1.27 | 0.88 |
| 2005/2006 | 3.75 | 3.65 | 0.50 | 0.71 | 1.34 | 0.95 |
| 2006/2007 | 3.65 | 3.06 | 0.44 | 0.70 | 1.36 | 1.07 |
| 2007/2008 | 3.79 | 4.11 | 1.16 | 0.79 | 1.57 | 1.13 |
| 2008/2009 | 3.84 | 3.81 | 1.19 | 0.98 | 1.71 | 1.14 |
| 2009/2010 | 3.77 | 3.05 | 0.86 | 0.95 | 1.81 | 1.21 |
| 2010/2011 | 3.64 | 2.45 | 0.81 | 1.06 | 1.90 | 1.20 |
| 2011/2012 | 3.57 | 2.16 | 0.71 | 1.06 | 1.89 | 1.21 |
| 2012/2013 | 2.94 | 0.84 | 0.47 | 1.08 | 1.90 | 1.08 |
| *Females* | | | | | | |
| 2004/2005 | 3.95 | 3.37 | 1.36 | 1.26 | 2.05 | 1.61 |
| 2005/2006 | 3.80 | 3.43 | 1.90 | 1.64 | 2.41 | 1.72 |
| 2006/2007 | 3.77 | 3.46 | 1.76 | 1.38 | 1.92 | 1.24 |
| 2007/2008 | 3.88 | 3.94 | 2.28 | 1.99 | 2.62 | 1.61 |
| 2008/2009 | 3.96 | 3.76 | 2.25 | 2.18 | 2.84 | 1.71 |
| 2009/2010 | 3.97 | 3.63 | 1.94 | 1.97 | 2.88 | 1.84 |
| 2010/2011 | 3.81 | 2.76 | 1.69 | 2.09 | 3.03 | 1.87 |
| 2011/2012 | 3.86 | 2.97 | 1.68 | 1.95 | 2.74 | 1.60 |
| 2012/2013 | 3.20 | 1.12 | 1.00 | 1.77 | 2.78 | 1.77 |

Table C10: Inactive life expectancy decomposed by age groups for skilled manual males and females

| | <19 | 20-29 | 30-39 | 40-49 | 50-59 | 60+ |
|---|---|---|---|---|---|---|
| *Males* | | | | | | |
| 2004/2005 | 3.41 | 1.90 | 0.24 | 0.41 | 0.87 | 0.60 |
| 2005/2006 | 3.47 | 2.71 | 0.46 | 0.82 | 1.52 | 1.09 |
| 2006/2007 | 3.27 | 2.02 | 0.30 | 0.53 | 1.09 | 0.95 |
| 2007/2008 | 3.66 | 3.57 | 1.25 | 1.31 | 2.36 | 1.63 |
| 2008/2009 | 4.11 | 5.00 | 2.60 | 2.74 | 3.89 | 2.36 |
| 2009/2010 | 4.01 | 3.99 | 1.99 | 2.50 | 3.78 | 2.25 |
| 2010/2011 | 4.01 | 3.80 | 1.85 | 2.20 | 3.34 | 2.08 |
| 2011/2012 | 4.11 | 4.14 | 2.31 | 2.85 | 3.99 | 2.40 |
| 2012/2013 | 3.89 | 3.06 | 1.70 | 2.44 | 3.60 | 2.12 |
| *Females* | | | | | | |
| 2004/2005 | 3.75 | 2.67 | 1.34 | 1.54 | 2.56 | 2.23 |
| 2005/2006 | 3.94 | 3.95 | 3.09 | 3.38 | 4.55 | 3.11 |
| 2006/2007 | 3.80 | 3.58 | 2.48 | 2.53 | 3.46 | 2.67 |
| 2007/2008 | 4.02 | 4.53 | 3.37 | 3.48 | 4.36 | 2.87 |
| 2008/2009 | 4.29 | 5.39 | 4.03 | 4.11 | 4.98 | 3.28 |
| 2009/2010 | 4.22 | 4.83 | 3.55 | 4.00 | 5.15 | 3.44 |
| 2010/2011 | 4.17 | 4.26 | 3.33 | 4.07 | 5.21 | 3.33 |
| 2011/2012 | 4.27 | 4.87 | 3.41 | 3.71 | 4.77 | 3.26 |
| 2012/2013 | 4.06 | 3.54 | 2.85 | 3.87 | 5.24 | 3.48 |

Table C11: Inactive life expectancy decomposed by age groups for unskilled non-manual males and females

| | <19 | 20-29 | 30-39 | 40-49 | 50-59 | 60+ |
|---|---|---|---|---|---|---|
| *Males* | | | | | | |
| 2004/2005 | 3.28 | 1.66 | 0.21 | 0.33 | 0.74 | 0.56 |
| 2005/2006 | 3.19 | 1.99 | 0.33 | 0.59 | 1.13 | 0.85 |
| 2006/2007 | 3.16 | 1.76 | 0.25 | 0.44 | 0.91 | 0.79 |
| 2007/2008 | 3.47 | 2.93 | 0.78 | 0.70 | 1.40 | 1.06 |
| 2008/2009 | 3.82 | 3.72 | 1.03 | 0.79 | 1.44 | 1.10 |
| 2009/2010 | 3.65 | 2.62 | 0.63 | 0.71 | 1.43 | 1.03 |
| 2010/2011 | 3.49 | 2.02 | 0.49 | 0.65 | 1.34 | 1.03 |
| 2011/2012 | 3.71 | 2.58 | 0.76 | 0.95 | 1.73 | 1.21 |
| 2012/2013 | 3.54 | 2.00 | 0.58 | 0.91 | 1.67 | 1.10 |
| *Females* | | | | | | |
| 2004/2005 | 3.24 | 1.48 | 0.86 | 1.15 | 1.92 | 1.53 |
| 2005/2006 | 3.21 | 1.74 | 1.27 | 1.54 | 2.36 | 1.78 |
| 2006/2007 | 3.14 | 1.65 | 1.17 | 1.40 | 2.07 | 1.62 |
| 2007/2008 | 3.45 | 2.39 | 1.46 | 1.60 | 2.31 | 1.80 |
| 2008/2009 | 3.87 | 3.33 | 2.08 | 2.19 | 2.95 | 2.09 |
| 2009/2010 | 3.73 | 2.70 | 1.69 | 2.11 | 3.04 | 2.12 |
| 2010/2011 | 3.76 | 2.58 | 1.59 | 2.03 | 2.97 | 2.09 |
| 2011/2012 | 3.89 | 3.09 | 1.87 | 2.24 | 3.15 | 2.19 |
| 2012/2013 | 3.75 | 2.40 | 1.57 | 2.25 | 3.38 | 2.35 |

Table C12: Inactive life expectancy decomposed by age groups for unskilled manual males and females

| | <19 | 20-29 | 30-39 | 40-49 | 50-59 | 60+ |
|---|---|---|---|---|---|---|
| *Males* | | | | | | |
| 2004/2005 | 2.66 | 0.80 | 0.20 | 0.39 | 0.86 | 0.68 |
| 2005/2006 | 2.70 | 1.08 | 0.37 | 0.87 | 1.63 | 1.27 |
| 2006/2007 | 2.60 | 0.84 | 0.25 | 0.60 | 1.18 | 1.04 |
| 2007/2008 | 3.12 | 1.90 | 0.73 | 1.20 | 2.11 | 1.53 |
| 2008/2009 | 3.75 | 3.29 | 1.51 | 1.85 | 2.73 | 1.93 |
| 2009/2010 | 3.54 | 2.22 | 0.92 | 1.37 | 2.29 | 1.72 |
| 2010/2011 | 3.67 | 2.48 | 1.04 | 1.42 | 2.31 | 1.71 |
| 2011/2012 | 3.95 | 3.39 | 1.61 | 2.03 | 2.97 | 2.11 |
| 2012/2013 | 3.79 | 2.71 | 1.04 | 1.41 | 2.32 | 1.75 |
| *Females* | | | | | | |
| 2004/2005 | 3.13 | 1.27 | 1.29 | 2.08 | 3.29 | 2.71 |
| 2005/2006 | 3.21 | 1.71 | 1.93 | 2.83 | 4.16 | 3.30 |
| 2006/2007 | 3.11 | 1.56 | 1.46 | 2.02 | 2.74 | 1.92 |
| 2007/2008 | 3.39 | 2.20 | 1.78 | 2.34 | 3.06 | 2.05 |
| 2008/2009 | 3.84 | 3.13 | 2.39 | 2.93 | 3.67 | 2.49 |
| 2009/2010 | 3.65 | 2.34 | 1.75 | 2.46 | 3.42 | 2.71 |
| 2010/2011 | 3.77 | 2.55 | 1.84 | 2.54 | 3.55 | 2.76 |
| 2011/2012 | 4.02 | 3.55 | 2.37 | 2.85 | 3.88 | 3.10 |
| 2012/2013 | 3.94 | 2.99 | 2.40 | 3.41 | 5.02 | 4.24 |

Table C13: Life expectancy in unemployment decomposed by age groups for skilled non-manual males and females

| | <19 | 20-29 | 30-39 | 40-49 | 50-59 | 60+ |
|---|---|---|---|---|---|---|
| *Males* | | | | | | |
| 2004/2005 | 0.01 | 0.11 | 0.13 | 0.13 | 0.24 | 0.14 |
| 2005/2006 | 0.01 | 0.09 | 0.10 | 0.10 | 0.21 | 0.14 |
| 2006/2007 | 0.01 | 0.10 | 0.09 | 0.09 | 0.20 | 0.15 |
| 2007/2008 | 0.00 | 0.07 | 0.10 | 0.12 | 0.21 | 0.13 |
| 2008/2009 | 0.01 | 0.16 | 0.17 | 0.17 | 0.26 | 0.12 |
| 2009/2010 | 0.01 | 0.20 | 0.19 | 0.19 | 0.31 | 0.16 |
| 2010/2011 | 0.02 | 0.26 | 0.23 | 0.23 | 0.36 | 0.18 |
| 2011/2012 | 0.02 | 0.27 | 0.34 | 0.35 | 0.49 | 0.22 |
| 2012/2013 | 0.03 | 0.38 | 0.39 | 0.40 | 0.48 | 0.15 |
| *Females* | | | | | | |
| 2004/2005 | 0.01 | 0.18 | 0.16 | 0.14 | 0.22 | 0.11 |
| 2005/2006 | 0.01 | 0.13 | 0.13 | 0.12 | 0.19 | 0.09 |
| 2006/2007 | 0.01 | 0.13 | 0.13 | 0.12 | 0.21 | 0.13 |
| 2007/2008 | 0.01 | 0.12 | 0.13 | 0.12 | 0.17 | 0.08 |
| 2008/2009 | 0.01 | 0.20 | 0.19 | 0.16 | 0.20 | 0.07 |
| 2009/2010 | 0.01 | 0.28 | 0.24 | 0.20 | 0.24 | 0.07 |
| 2010/2011 | 0.02 | 0.36 | 0.29 | 0.22 | 0.23 | 0.06 |
| 2011/2012 | 0.02 | 0.52 | 0.40 | 0.31 | 0.33 | 0.08 |
| 2012/2013 | 0.04 | 0.61 | 0.50 | 0.39 | 0.37 | 0.07 |

Table C14: Life expectancy in unemployment decomposed by age groups for skilled manual males and females

| | <19 | 20-29 | 30-39 | 40-49 | 50-59 | 60+ |
|---|---|---|---|---|---|---|
| *Males* | | | | | | |
| 2004/2005 | 0.01 | 0.19 | 0.20 | 0.20 | 0.46 | 0.24 |
| 2005/2006 | 0.01 | 0.18 | 0.20 | 0.20 | 0.41 | 0.19 |
| 2006/2007 | 0.02 | 0.20 | 0.23 | 0.23 | 0.46 | 0.23 |
| 2007/2008 | 0.02 | 0.27 | 0.34 | 0.36 | 0.53 | 0.21 |
| 2008/2009 | 0.03 | 0.45 | 0.67 | 0.72 | 0.89 | 0.31 |
| 2009/2010 | 0.03 | 0.53 | 0.66 | 0.66 | 0.85 | 0.32 |
| 2010/2011 | 0.03 | 0.49 | 0.70 | 0.73 | 0.91 | 0.29 |
| 2011/2012 | 0.03 | 0.57 | 0.80 | 0.84 | 1.01 | 0.33 |
| 2012/2013 | 0.03 | 0.65 | 0.92 | 0.97 | 1.14 | 0.35 |
| *Females* | | | | | | |
| 2004/2005 | 0.01 | 0.30 | 0.45 | 0.39 | 0.63 | 0.27 |
| 2005/2006 | 0.01 | 0.22 | 0.36 | 0.32 | 0.50 | 0.26 |
| 2006/2007 | 0.01 | 0.22 | 0.38 | 0.36 | 0.60 | 0.32 |
| 2007/2008 | 0.01 | 0.28 | 0.42 | 0.38 | 0.56 | 0.24 |
| 2008/2009 | 0.02 | 0.36 | 0.62 | 0.59 | 0.77 | 0.31 |
| 2009/2010 | 0.02 | 0.44 | 0.73 | 0.66 | 0.79 | 0.29 |
| 2010/2011 | 0.02 | 0.51 | 0.75 | 0.63 | 0.76 | 0.31 |
| 2011/2012 | 0.02 | 0.48 | 0.79 | 0.72 | 0.89 | 0.38 |
| 2012/2013 | 0.02 | 0.58 | 0.94 | 0.79 | 0.84 | 0.32 |

Table C15: Life expectancy in unemployment decomposed by age groups for unskilled non-manual males and females

| | <19 | 20-29 | 30-39 | 40-49 | 50-59 | 60+ |
|---|---|---|---|---|---|---|
| *Males* | | | | | | |
| 2004/2005 | 0.02 | 0.30 | 0.28 | 0.27 | 0.51 | 0.24 |
| 2005/2006 | 0.02 | 0.25 | 0.25 | 0.24 | 0.44 | 0.21 |
| 2006/2007 | 0.02 | 0.27 | 0.25 | 0.25 | 0.49 | 0.26 |
| 2007/2008 | 0.02 | 0.28 | 0.30 | 0.31 | 0.51 | 0.25 |
| 2008/2009 | 0.03 | 0.52 | 0.59 | 0.62 | 0.92 | 0.36 |
| 2009/2010 | 0.04 | 0.61 | 0.61 | 0.61 | 0.86 | 0.33 |
| 2010/2011 | 0.03 | 0.55 | 0.60 | 0.61 | 0.88 | 0.33 |
| 2011/2012 | 0.03 | 0.50 | 0.69 | 0.73 | 1.04 | 0.42 |
| 2012/2013 | 0.03 | 0.52 | 0.74 | 0.80 | 1.05 | 0.35 |
| *Females* | | | | | | |
| 2004/2005 | 0.02 | 0.43 | 0.48 | 0.40 | 0.58 | 0.23 |
| 2005/2006 | 0.02 | 0.39 | 0.46 | 0.38 | 0.53 | 0.21 |
| 2006/2007 | 0.03 | 0.41 | 0.45 | 0.39 | 0.59 | 0.28 |
| 2007/2008 | 0.03 | 0.44 | 0.52 | 0.45 | 0.63 | 0.25 |
| 2008/2009 | 0.03 | 0.65 | 0.80 | 0.70 | 0.89 | 0.32 |
| 2009/2010 | 0.03 | 0.72 | 0.87 | 0.73 | 0.91 | 0.33 |
| 2010/2011 | 0.03 | 0.68 | 0.83 | 0.70 | 0.89 | 0.34 |
| 2011/2012 | 0.03 | 0.66 | 0.92 | 0.80 | 0.97 | 0.35 |
| 2012/2013 | 0.03 | 0.70 | 0.98 | 0.84 | 0.97 | 0.35 |

Table C16: Life expectancy in unemployment decomposed by age groups for unskilled manual males and females

| | <19 | 20-29 | 30-39 | 40-49 | 50-59 | 60+ |
|---|---|---|---|---|---|---|
| *Males* | | | | | | |
| 2004/2005 | 0.06 | 0.66 | 0.60 | 0.59 | 0.91 | 0.35 |
| 2005/2006 | 0.05 | 0.59 | 0.56 | 0.54 | 0.79 | 0.31 |
| 2006/2007 | 0.06 | 0.70 | 0.64 | 0.63 | 0.96 | 0.41 |
| 2007/2008 | 0.08 | 1.13 | 1.19 | 1.17 | 1.50 | 0.55 |
| 2008/2009 | 0.09 | 1.54 | 2.03 | 2.09 | 2.43 | 0.80 |
| 2009/2010 | 0.10 | 1.70 | 1.93 | 1.90 | 2.25 | 0.72 |
| 2010/2011 | 0.07 | 1.33 | 1.59 | 1.61 | 1.94 | 0.64 |
| 2011/2012 | 0.06 | 1.15 | 1.75 | 1.85 | 2.24 | 0.84 |
| 2012/2013 | 0.06 | 1.09 | 1.62 | 1.75 | 2.08 | 0.70 |
| *Females* | | | | | | |
| 2004/2005 | 0.06 | 0.97 | 0.99 | 0.74 | 0.86 | 0.23 |
| 2005/2006 | 0.05 | 0.85 | 0.90 | 0.67 | 0.77 | 0.22 |
| 2006/2007 | 0.06 | 0.92 | 1.11 | 0.92 | 1.31 | 0.66 |
| 2007/2008 | 0.06 | 1.13 | 1.35 | 1.10 | 1.47 | 0.70 |
| 2008/2009 | 0.07 | 1.47 | 1.84 | 1.52 | 1.76 | 0.66 |
| 2009/2010 | 0.08 | 1.70 | 2.05 | 1.67 | 1.89 | 0.66 |
| 2010/2011 | 0.07 | 1.42 | 1.77 | 1.45 | 1.68 | 0.64 |
| 2011/2012 | 0.05 | 1.23 | 1.73 | 1.48 | 1.74 | 0.74 |
| 2012/2013 | 0.05 | 1.18 | 1.61 | 1.30 | 1.22 | 0.27 |