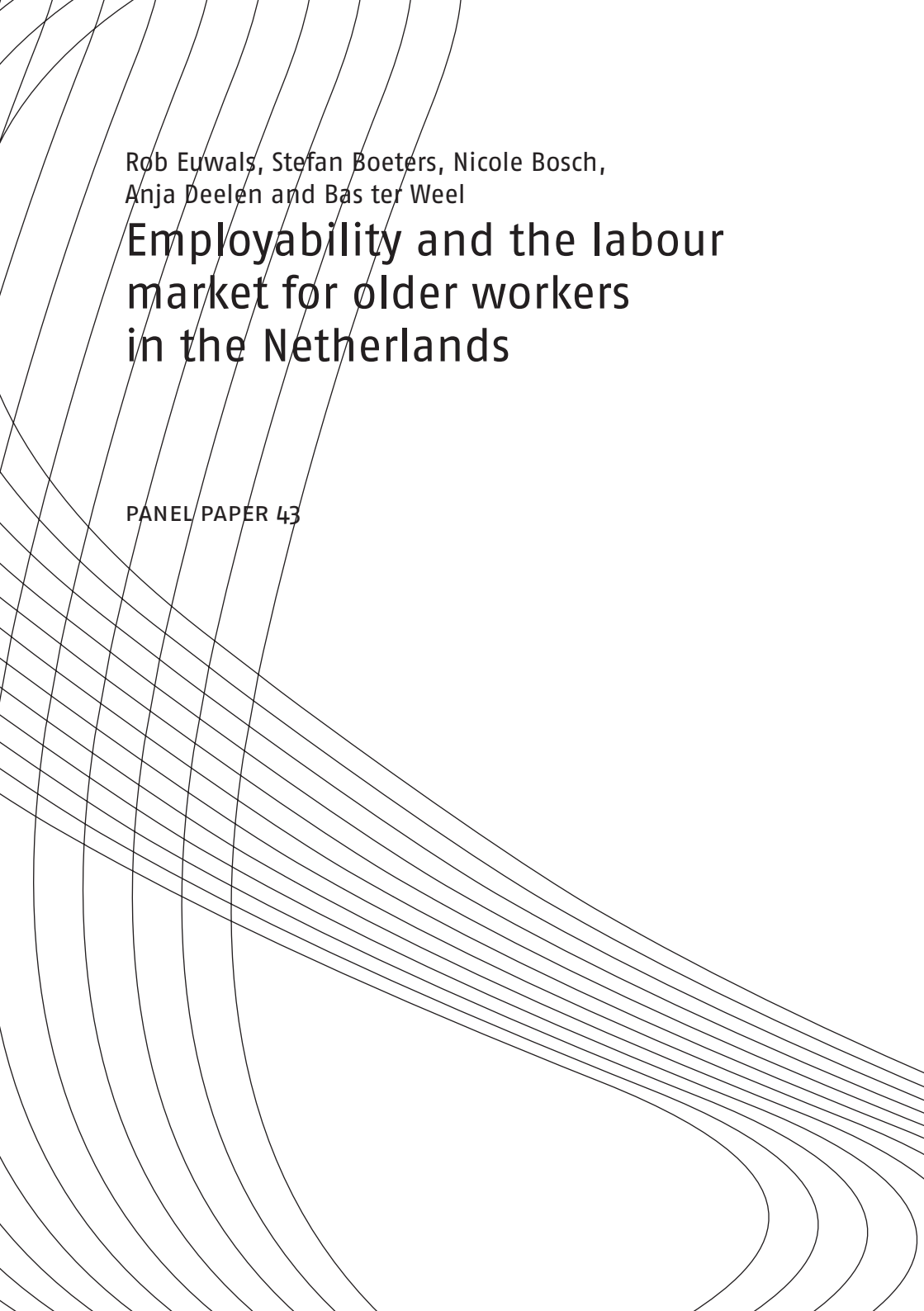


Netspar PANEL PAPERS

*Rob Euwals, Stefan Boeters, Nicole Bosch,
Anja Deelen and Bas ter Weel*

Employability and
the labour market for
older workers in the
Netherlands



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Rob Euwals, Stefan Boeters, Nicole Bosch,
Anja Deelen and Bas ter Weel

Employability and the labour market for older workers in the Netherlands

PANEL PAPER 43



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PREFACE

Netspar stimulates debate and fundamental research in the field of pensions, aging and retirement. The aging of the population is front-page news, as many baby boomers are now moving into retirement. More generally, people live longer and in better health while at the same time families choose to have fewer children. Although the aging of the population often gets negative attention, with bleak pictures painted of the doubling of the ratio of the number of people aged 65 and older to the number of the working population during the next decades, it must, at the same time, be a boon to society that so many people are living longer and healthier lives. Can the falling number of working young afford to pay the pensions for a growing number of pensioners? Do people have to work a longer working week and postpone retirement? Or should the pensions be cut or the premiums paid by the working population be raised to afford social security for a growing group of pensioners? Should people be encouraged to take more responsibility for their own pension? What is the changing role of employers associations and trade unions in the organization of pensions? Can and are people prepared to undertake investment for their own pension, or are they happy to leave this to the pension funds? Who takes responsibility for the pension funds? How can a transparent and level playing field for pension funds and insurance companies be ensured? How should an acceptable trade-off be struck between social goals such as solidarity between young and old, or rich and poor, and individual freedom? But most important of all: how can the

benefits of living longer and healthier be harnessed for a happier and more prosperous society?

The Netspar Panel Papers aim to meet the demand for understanding the ever-expanding academic literature on the consequences of aging populations. They also aim to help give a better scientific underpinning of policy advice. They attempt to provide a survey of the latest and most relevant research, try to explain this in a non-technical manner and outline the implications for policy questions faced by Netspar's partners. Let there be no mistake. In many ways, formulating such a position paper is a tougher task than writing an academic paper or an op-ed piece. The authors have benefitted from the comments of the Editorial Board on various drafts and also from the discussions during the presentation of their paper at a Netspar Panel Meeting.

I hope the result helps reaching Netspar's aim to stimulate social innovation in addressing the challenges and opportunities raised by aging in an efficient and equitable manner and in an international setting.

Roel Beetsma

Chairman of the Netspar Editorial Board

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SAVING BEHAVIOR AND PORTFOLIO CHOICE AFTER RETIREMENT

Policy recommendations

1. Unemployment insurance creates a fiscal externality because it drives a wedge between the private and social costs and benefits of jobs. Employees are hired less frequently and fired more frequently than is desirable from a social point of view. This effect can be mitigated in two ways. First, fiscal externalities can be reduced by restricting unemployment benefits to the cases of absolute necessity. This could lead, however, to severe and perhaps unwanted regressive distributive consequences. Second, employers can be compelled to take account of the fiscal externality by introducing experience rating in social security contributions or a combination of dismissal taxes with hiring subsidies. The level of these taxes and subsidies should correspond to the fiscal costs of unemployment, implying an increase during the life course and a rapid decrease during the last years before the statutory retirement age. Policymaking in this area needs to proceed with care. International experiences with a dismissal tax in France and Austria and with hiring subsidies in Germany indicate that undesirable side effects must be taken into account.
2. Agreements on investments in knowledge and professional skills, wage schemes and severance pay rules should fall under the responsibility of employers and employees and their representative organisations. Employers and employees are the

main beneficiaries of investments and are thus best equipped to decide about the type and level of investment. Investment agreements, however, need not take place on an individual level, as transaction costs related to separate agreements would be high. Collective agreements between unions and employer organisations could consist of a number of contract types that would suit the various specific career patterns typical to the professions and tasks in particular sectors of industry. Such agreements will lead to different levels of protection for employees; employees with professions that require specific knowledge will receive a larger degree of protection than employees with jobs that do not require such knowledge. To prevent selection effects, government intervention to guarantee some minimum level of protection may be desirable. Such intervention faces a trade-off between efficiency gained through differentiation between sectors and professions and the negative impact of selection.

3. Agreements on demotion and downward wage adjustments should also fall under the responsibility of employers and employees and their representative organisations. In general, employers are aware of the negative impact of wage reductions on employee motivation. Therefore, it is in their interest to create a working environment in which employees are prepared to accept such reductions without considering this a breach of an implicit contract. In addition, unions and employer organisations may enter into agreements on demotion on a collective level for professions for which decreased productivity from a certain age is evident.

Abstract

The employment of people over the age of 55 has increased substantially over the past two decades because of the aging of society and because of the increasing participation rate of elderly. As people get older, however, labour market results deteriorate. The probability of finding a job and undertaking investments in new skills and knowledge diminish with age. Moreover, because of their low job mobility, older people are more likely to stay in professions with routine tasks. The observed labour market outcomes for the elderly need not necessarily be the result of market failure. Still, there is room for improvement. Both employers and employees could invest more in employability. Government intervention in the labour market may lead to higher productivity over the life course. This study identifies three possible reasons for intervention: fiscal externalities of unemployment insurance, distorted human capital investment decisions and wage rigidities in the course of the working life.

1. Introduction

The “employability” of older workers is becoming an increasingly important policy issue in the Netherlands. As in many other countries, the Dutch welfare state is under pressure due to the ageing of the population. In particular, the increase in the number of pensioners as a share of the working age population will lead to high contribution rates in the public pension and health care system. Less prominent, but important as well, is the rising share of older workers on the labour market. On average, older workers face more difficult labour market conditions than their younger counterparts do. As a typical reaction to the ageing challenge, the Netherlands has entered a trajectory of increasing the statutory retirement age gradually over the upcoming years (Van der Horst et al., 2010). This directly relieves the first problem, as it decreases the number of pensioners while at the same time increasing the number of working-age people. The policy may, however, aggravate the second problem, as the share of older workers on the labour market increases even more strongly. Can public policy help workers to maintain a combination of skills, knowledge, motivation and health that is necessary for gainful employment on the labour market? How do labour market institutions need to be designed such that they stimulate the employment of older workers and the re-employment of the older unemployed?

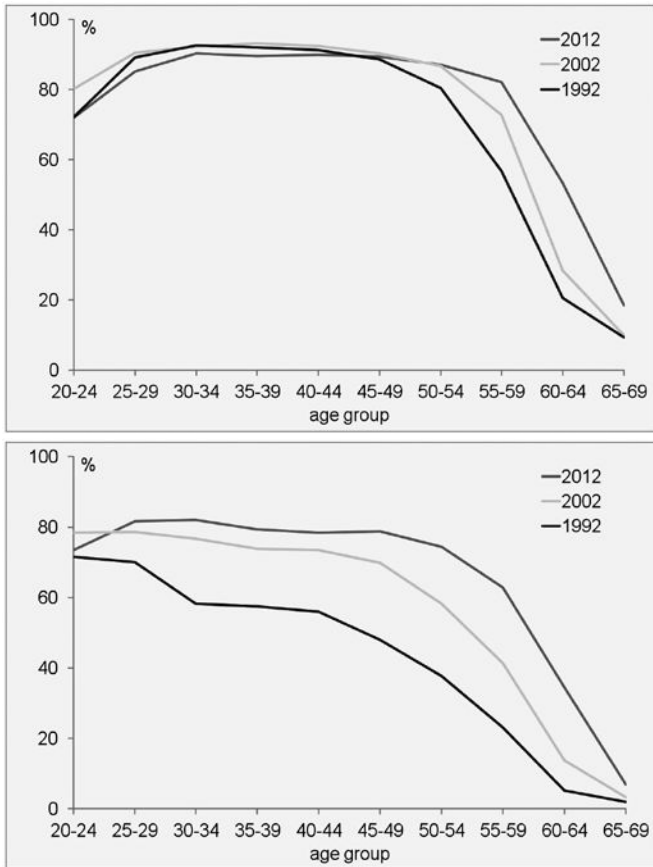
Past policies and changing norms in society have contributed to the increasing participation and employment rates of the elderly (Deelen and van Vuuren, 2009). Still, their employability remains a policy challenge. The participation (and so the share) of older workers in the labour market has increased over the past decades and this trend is projected to continue in the next decade (Euwals et al., 2014). Participation and employment rates

are, however, still steeply declining before the end of the working life. Figure 1 shows the participation levels in the Netherlands for men (left) and women (right), by age group and for three points in time: 1992, 2002 and 2012 (respectively, the green, purple and yellow lines). For men above the age of 55, the yellow line clearly is higher than the green one, which indicates a larger share of participants in those age groups (see also Arts and Otten, 2012). Participation levels for women in the Netherlands have increased for all age groups, particularly among older women. A high participation rate does not necessarily imply a high employment rate, however, and both participation and employment rates still drop substantially before statutory retirement age. Sustainable employment therefore remains a challenge.

This paper focuses on three stylised facts that illustrate the particular and potentially difficult situation of older workers. First, older unemployed persons experience more difficulties in finding a new job than do their younger counterparts. Second, investments in new knowledge and skills decrease with age. And third, job mobility is particularly low at the end of the working life. Apparently, the incentives to switch to another job with higher productivity decrease with age. Policy discussions on employability and sustainable employment stress the importance of maintaining good health, developing knowledge and skills as well as remaining open to changing jobs. All this is important for maintaining a sufficiently high productivity level and warranting job chances in the case of unemployment.

This panel paper discusses several economic labour–market mechanisms, based on market forces and rational individual choices, which produce different outcomes for older and younger people. These mechanisms may contribute to the explanation of the three stylised facts (lower reemployment rates, lower

Figure 1. Participation of older men (left) and among women (right) has increased



Source: Statistics Netherlands, Statline, supplemented with CPB calculations based on international definitions

investments in knowledge and lower job mobility) and may lead to a nuanced evaluation. The crucial issue is the extent to which the three stylised facts can be explained as an efficient outcome of market forces and rational choices made over the life

course. And, by contrast, a related issue is the extent to which these outcomes are the result of problems in the functioning of the labour market— problems such as fiscal externalities caused by unemployment insurance, distorted investment decisions or wage rigidities. These problems may provide some scope for policy redesign to improve the functioning of the labour market and to foster the employability of older workers.

Education and training, job mobility and the role of labour market policy are the core issues of this paper. Other potentially relevant aspects remain in the background. These are either covered in the existing literature on labour supply, savings, wages, productivity and employment protection (e.g. Euwals et al., 2009), or may be the subject of future work. Two important examples are health effects and wage rigidities. The analysis of investments in health is omitted from the study because it is more appropriately approached in a framework that looks at life expectancy after retirement and treats the statutory retirement age as a choice variable. This is addressed in Ewijk et al. (2013). Wage rigidities are beyond the scope of the present study as well. An important question in this context is whether wages continue to rise as workers get older (OECD, 2006; Deelen, 2012) or if wage growth is restricted by collective labour agreements with maximum wage levels per bracket. Currently, a CPB study is investigating how wages can continue to rise within such a wage structure.

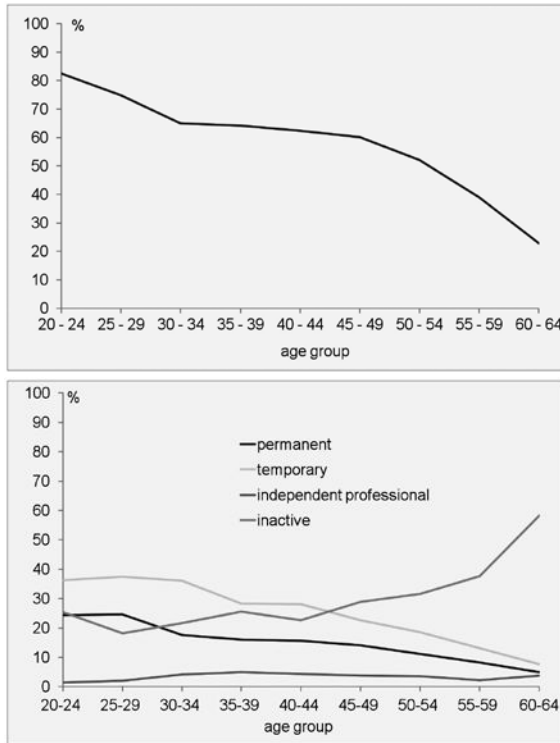
The following section contains more detail on the stylised facts about older people in the labour market. Section 3 investigates whether these patterns can be explained by simplified labour market models based on free market interaction and rational decisions. In Section 4, the horizon is broadened by introducing imperfections such as potentially distorting policies and non-rational behaviour. Section 5 draws policy conclusions.

2. Three age patterns on the labour market

As people grow older, their labour market situation worsens. With rising age, the probability of finding a job if unemployed, undertaking investments in new skills, gaining new knowledge and being open to mobility between jobs declines. As a consequence of the latter, older workers are likely to stay in professions where routine tasks prevail. Later in this study, we try to answer the question of whether these labour market outcomes for older people result from efficient labour-market mechanisms, or whether they are the consequence of a mal-functioning of the labour market and its institutions.

The first stylised fact on older people in the labour market is that the probability of an unemployed older person finding a job decreases with age. The left-hand graph of Figure 2 shows (by age) the employment chances of individuals after one year on unemployment benefits. After one year, only 20% of the 60–64 age group has found a new job, whereas for those younger than 40 this is about 60%. The lower probability of older people is partly due to their lower average educational level. However, even if one corrects for the level of education, the probability of finding a job diminishes with age (Geertjes, 2012; Raterink and Koning, 2013). In contrast, age turns out not to matter for the type of contract after one year of unemployment. The probability of finding permanent employment is about half the probability of finding temporary work, as is shown in the right-hand graph of Figure 2. When it comes to the wage level after a period of unemployment, age matters once again. For older workers, the decrease in the wage level after a job loss is the largest, the period of unemployment is the longest and the probability of ending up in inactivity is the highest of all age groups (Abbring et al., 2002).

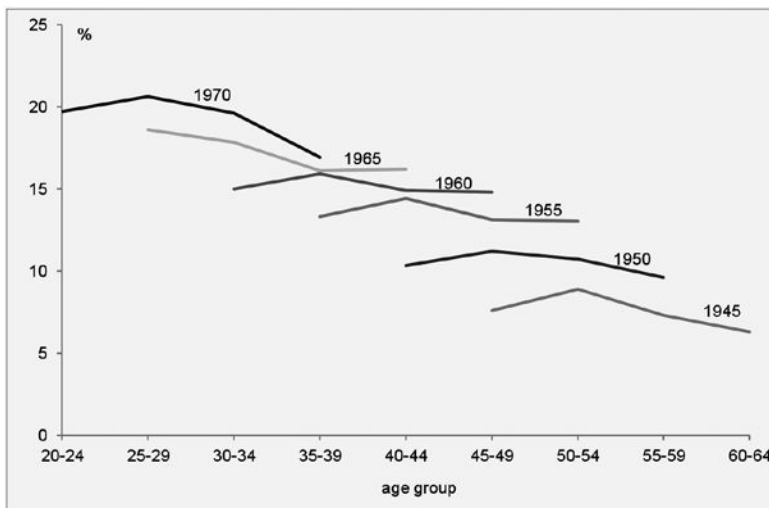
Figure 2. Probability of finding new employment after one year on unemployment benefits declines with age (left), and the outflow after one year of unemployment mostly leads to inactivity for older workers (right).



Source: Statistics Netherlands, Statline, supplemented with CPB calculations

The second stylised fact is that investments in knowledge and skills decrease with age. Figure 3 illustrates participation rates in lifelong learning for different generations of employees, born between 1945 and 1974. For each birth cohort the incidence of lifelong learning is decreasing with age. This decrease with age is discussed more comprehensively in Fouarge and de Grip (2014).

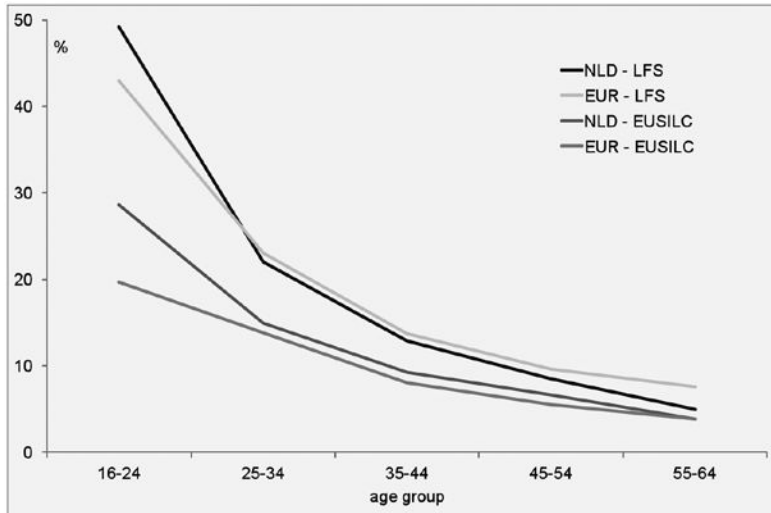
Figure 3. Younger generations participate more often in lifelong learning



Source: Statistics Netherlands, Statline, supplemented with CPB calculations. On the far right, people born between 1945 and 1949 (label 1945); on the far left, those born between 1970 and 1974 (label 1970). Lifelong learning encompasses all purposeful learning activity, whether formal, non-formal or informal, undertaken on an ongoing basis with the aim of improving knowledge, skills and competences.

Furthermore, less than 10% of the '1945' cohort (born in the years 1945 to 1949) participates in training, whereas for those born in the years 1970 to 1974, this is around 20%. This reflects the growing importance of the notion of "lifelong learning" in the public and policy debate (Borghans et al., 2011). However, compared to other countries, overall participation in lifelong learning in the Netherlands is relatively low (SER, 2012). This may point to particular problems in maintaining an investment level that warrants effective functioning in the job and employability in the case of a job loss.

Figure 4. Job-to-job mobility decreases strongly by age in the Netherlands



Source: own calculations in Deelen et al. (2014) based on the Labour Force Survey (LFS) and European Union Statistics on Income and Living Conditions (EU SILC); for both data sources the years 2007, 2008 and 2009 are pooled.

The third and final stylised fact has to do with job mobility. Figure 4 illustrates that older workers in the Netherlands are not particularly mobile between jobs (Deelen et al., 2014). According to both the Labour Force Survey (LFS) and the European Union Statistics on Income and Living Conditions (EU SILC), mobility decreases more strongly with age in the Netherlands than for nineteen other EU countries. Job switches are important for broadening and updating professional skills. Workers that do not follow the trends in innovations and demand shift are likely to end up in traditional professions that are dominated by routine tasks. These tasks are particularly under pressure from technological developments, which cause a further decrease in

employment opportunities. For instance, typists have all but disappeared, and professions such as librarians and bookkeepers are declining. The share of older people in these professions is large because old people in these jobs have low job mobility and younger people avoid them. Autor and Dorn (2009) and Bosch and Ter Weel (2013) describe these age-specific trends for the United States and the Netherlands, respectively. Both studies confirm that older people are more likely to be employed in declining professions with a large amount of routine and a high risk of outsourcing.

3. Age-specific labour market mechanisms

Before we can approach the question of how to evaluate the age-specific trends in the labour market that have been discussed in Section 2, and whether policy intervention is desirable, we must uncover the underlying mechanisms. To what extent can the precarious situation of older workers be explained as an outcome of the interaction of rational decisions and market forces? In this section we explore how far we can get in explaining the trends by economic models that focus on rational individual decisions taken over the life course in a flexibly adjusting market setting, and that disregard policy interventions. The rational decisions featured in the following subsections are varied. Employees decide about their job search strategy and the timing of withdrawal from the labour market. Firms decide about the recruitment of new staff. And both parties decide about investment in knowledge and professional skills. These decisions, which interact with coincidental events, such as being admitted to a certain type of education or getting the preferred job, have an impact on the situation during the working life. Even if employees and employers make decisions according to uniform principles, this can lead to particular effects at the end of the working life, which contribute to the explanation of the stylised facts in Section 2.

3.1 Investments in knowledge and skills

Knowledge and professional skills play an important role on the labour market. At the beginning of the life course, such investments lead to the acquisition of general knowledge. Investments in firm-specific knowledge mostly start after employee and employer have entered into a contract with the objective of long-term employment. Training and on-the-job

learning provide employees with a large amount of firm-specific knowledge. Generally speaking, older employees possess more firm-specific knowledge than their younger colleagues, but their ability to acquire new knowledge declines from a certain age onwards.

The incentives to invest in knowledge differ between employers and employees. Employees mostly seek general knowledge – knowledge that also could be applied in other employment relationships (Becker, 1962). Such knowledge leads to a higher wage, as employers bid against each other to hire such knowledgeable employees. Firm-specific knowledge often refers to production processes and only benefits the productivity levels of the firm involved; such knowledge is of no benefit to subsequent firms (Becker, 1962). Employees are hesitant to invest in such specific knowledge, as this would make them more dependent on the current employer. Employers may attract employees and retain them in positions that require firm-specific knowledge by offering them a contract that is more attractive than that offered to individuals in positions that do not require such knowledge. Employers may share the investment costs with their employees by offering them a wage level that is first lower and later higher than their productivity level (Hashimoto, 1981). This motivates employees to stay at the firm and to remain productive (Lazear, 1979, 1981) – and even to invest in firm-specific knowledge.

Investments in knowledge can only be adequately assessed with a life-cycle horizon. When young, people spend a lot of their time on education, as the return on such investment is high (Ben-Porath, 1976; Borghans and Ter Weel, 2012). The knowledge acquired is mostly of a general nature. Subsequently, people begin to search for professions and employers that may fit them.

Investments in firm-specific knowledge are not made until individuals find a suitable employer. Such specific knowledge is enhanced during people's working lives, through training and on-the-job learning (Borghans et al., 2011).

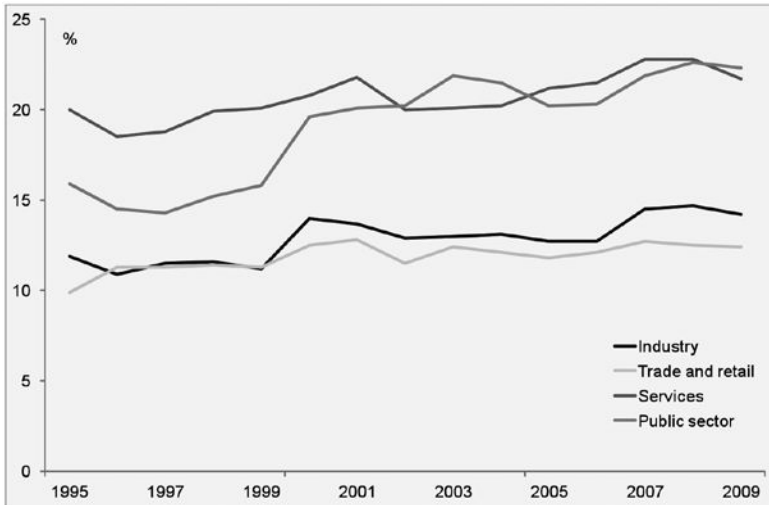
The economic literature takes a more differentiated look at the nature of firm-specific knowledge, as it turns out that examples of pure firm-specific knowledge are not easy to find. A first example of the nature of firm-specific knowledge is that, in a labour market with frictions, general knowledge may become similar to firm-specific knowledge, so that employers are willing to invest in it (Acemoglu and Pischke, 1998, 1999a, 1999b). Because in a labour market with frictions general knowledge is not easily capitalised at other employers, the incentive for employees to invest in it is low. For employers, however, this incentive is high. Examples of relevant labour market frictions are transaction costs (e.g. related to staff acquisition) and asymmetrical information (e.g. on the amount of training that prospective employees have had in positions at other employers). That employers are willing to invest in their employees' general knowledge was shown for people with tenured employment contracts in the Netherlands by Fouarge et al. (2011).

A second example of the nature of specific knowledge is highlighted in the situation when employers invest in their employees to generate the right mixture of different aspects of general knowledge (Lazear, 2009). Each employer has a unique production process that requires employees with a unique mixture of aspects of general knowledge. If employees move from one employer to another, this mixture needs adjustment. Employees are unlikely to bear the cost of this adjustment if the job change is voluntary; new employers compensate them. In contrast, if people have lost their former job, they will be prepared to pay these

costs, possibly in the form of a lower wage. Lazear (2009) claims that this theory explains the wage drop for workers who lose their job because of firm closures (Abbring et al., 2002).

Although older people possess a large amount of knowledge, this knowledge may be dated. In addition, from a certain age onwards, the ability to acquire new knowledge declines. A substantial amount of knowledge is accumulated during the early years of people's working lives and, depending on the type of knowledge, the increase in knowledge is likely to continue until the age of forty or fifty (Fouarge and De Grip, 2011; Bonsang et al., 2012). The older the worker grows, the higher becomes the probability that knowledge gets outdated. The study by Fouarge and De Grip distinguishes the outdateding of job-related knowledge due to technological and organisational developments, and the outdateding of sector- and firm-specific knowledge due to reorganisations and company closures. Bonsang et al. (2012) show that the ability to acquire new knowledge declines from a certain age onwards. The consequence of knowledge outdateding together with the declining ability of older workers to acquire new knowledge is that they are concentrated in professions or jobs with declining prospects. These professions and jobs may be reduced in size or become less attractive as the amount of routine tasks increases (Autor and Dorn, 2009; Bosch and Ter Weel, 2013). Firms have a strong interest in investments in knowledge and skills only if they are necessary for their own production process. The amount of the necessary knowledge and skills varies by sector. The amount also varies within sectors as the professional tasks within these sectors may vary from high-skilled and specialised to low-skilled and routine tasks. Figure 5 illustrates that the incidence of lifelong learning is high in services and in the public sector, indicating that investments are important in these sectors.

Figure 5. High incidence of lifelong learning in services and public sector



Source: Statistics Netherlands, Statline.

3.2 Search behaviour of employers and employees

Insight into search and matching processes in the labour market may help to understand why older employees select into certain types of jobs and why their chances of finding new employment after a job loss are below average. Labour supply and labour demand meet on the labour market. People supply their labour in order to generate an income and reach a certain standard of living. Employers pay for labour in order to produce. Both parties need time to find a good counterpart. They also need to acquire information about each other and the quality of the match during the employment relation (Mortensen and Pissarides, 1994; Moscarini, 2005; Low et al., 2010; Menzio et al., 2012). This process of achieving a good allocation on the labour market – i.e. matching the right job to the right person – takes time.

Over the course of time, employees get to know their potential employers. In the beginning of their working life, many people accept less attractive and often temporary jobs to escape unemployment and to build up labour market experience. Young people thus often have temporary contracts and their chances of a long-term contract increase as they get older. The fact that job search takes time is one of the reasons why temporary jobs with low wages exist on the labour market. Many young people will accept such jobs and continue their search for a better job while working (Cörvers et al., 2011). As time goes by, new job opportunities will present themselves. Many people regularly change jobs in the beginning of their careers until they find employment that really suits them (Moscarini, 2005; Menzio, 2012). Employees who find such a job are likely to stay, which also provides an explanation for job mobility decreasing with age. Employees would only consider leaving such jobs if productivity in the current job drops considerably. Low et al. (2010) introduce various types of risks in a life-cycle model of labour market search behaviour. In their model, the employee's income is determined by the value of the match between employer and employee, and the loss of a good match means a substantial loss of income. These results are confirmed by the empirical literature that shows that involuntary loss of employment on average leads to a considerable decrease in income (Ruhm, 1991; Jacobson et al., 1993; Stevens, 1997; Couch, 2001; Lefranc, 2003; Couch and Placzek, 2010). Abbring et al. (2002) show that such income losses are particularly large for older people.

3.3 End-game effect

At a certain point, the working life comes to an end. Until recently, this simple fact was being ignored in economic

studies on the functioning of the labour market. A number of economists, recently, have shown an interest in the labour market for older employees. After all, policymakers in many countries are interested in knowing how they might improve the functioning of the labour market for the older individuals. The questions of policymakers are not easy to answer, however, as approaching retirement age affects the behaviour of employees and their employers in various ways. This section describes three consequences of the finiteness of the working life.

The future value of the employee

As retirement age draws closer, an employee's future value decreases. In the year preceding retirement, this value is even reduced to zero, as the employee is leaving the company and will cease to contribute to production. When firms decide about hiring and retaining staff, they take into account not only the current value, but also the future value (Cheron et al., 2011). At the start of a job, the productivity level of an employee need not necessarily be higher than his wage. The prospect of productivity surpassing the wage level at a later stage makes employees attractive to new employers nevertheless. Employers also take into account that periods of lower production may be compensated by periods in which production levels are higher. Therefore, incidental low productivity does not immediately lead to dismissal. This phenomenon is referred to as labour hoarding.

As the retirement age approaches, losses due to incidentally lower productivity can no longer be compensated by possibly higher productivity in future periods. In the absence of employment protection, such incidentally lower productivity in the last phase of people's working lives will lead to immediate termination of the employment relationship. Therefore, as the

retirement age comes closer, the probability of job loss increases. This effect is illustrated in the text box 'End-game effect I: The future value of the employee' by means of the model developed by Cheron et al. (2011).

The role of future productivity is important, for example, in times of economic downturn. Employers may retain their staff because they expect their productivity to be high again in the following economic upswing. This, however, does not apply to older employees, as they will soon be retiring. Employers will not have the opportunity to benefit from a recovery in their productivity. In times of economic decline, therefore, employers wish to terminate the employment contract of older employees. This is optimal from the individual employers' point of view. Employers may negotiate with their employees on the terms of older workers leaving the firm before retirement. This does not necessarily form an argument for collective early retirement schemes.

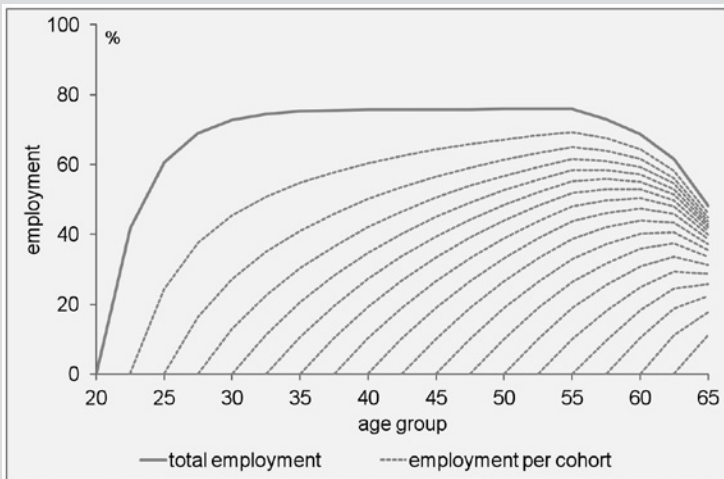
End-game effect I: The future value of the employee

Labour market opportunities decline as employees approach retirement age, because their future value diminishes. This value diminishes because the length of the future period in which their productivity can be expected to be high becomes shorter. To illustrate this, we used a search model in which productive life is finite and the labour market works without interference of unemployment benefits or employment protection (see the model description in Appendix A). The left-hand graph of Figure 6 shows the simulated employment by age and job duration. At the start of their working lives, all people are unemployed, after which employment quickly rises with age. From the age of 30 to 35, employment is at a steady high level (upper line). After age 55, level of employment decreases again, as a result of the so-called first end-game effect: The future value of employees declines. This decline occurs because periods of incidental low

productivity for older people, on this labour market without institutions, often lead to termination of the employment relationship. At a younger age, such periods do not result in termination because production losses can be compensated during future periods of high productivity. For older employees, however, such future periods are virtually non-existent. The figure also shows how long people stay in their jobs. The area between the first (solid) and the second (dotted) line represents employees who found their first job early in life and who have never changed jobs since.

The right-hand graph depicts the transitional probabilities from unemployment to employment and vice versa. Transition probabilities depend on the reservation productivity. In a world without institutions, the reservation productivity – the productivity level above which people are hired – equals that for existing jobs (i.e. the productivity level above which employees are not dismissed). The transition probability from unemployment to employment (green line) depends on age and is a mirror image of the transition probability from employment to unemployment (red line). Labour market opportunities, with respect to new employment and dismissal, remain constant up to the age of 55, after which they decrease. Employment relationships are terminated if a period of low productivity occurs around the end of people's working lives. At this stage of life, a higher productivity level would also be needed to find new employment.

Figure 6. Employment by age and job duration (left) and transition probabilities (right)



Note: simulation results from a matching model with finite working life

Return on investment

The return on investment related to an employee decreases with the approach of the employee's retirement age. This investment may, for example, consist of the expansion of knowledge and professional skills, also known as human capital (Becker, 1962; Ben-Porath, 1976), or make take the form of time spent searching for a better job (Mortensen and Pissarides, 1994).

End-game effect II: Investment in knowledge and skills

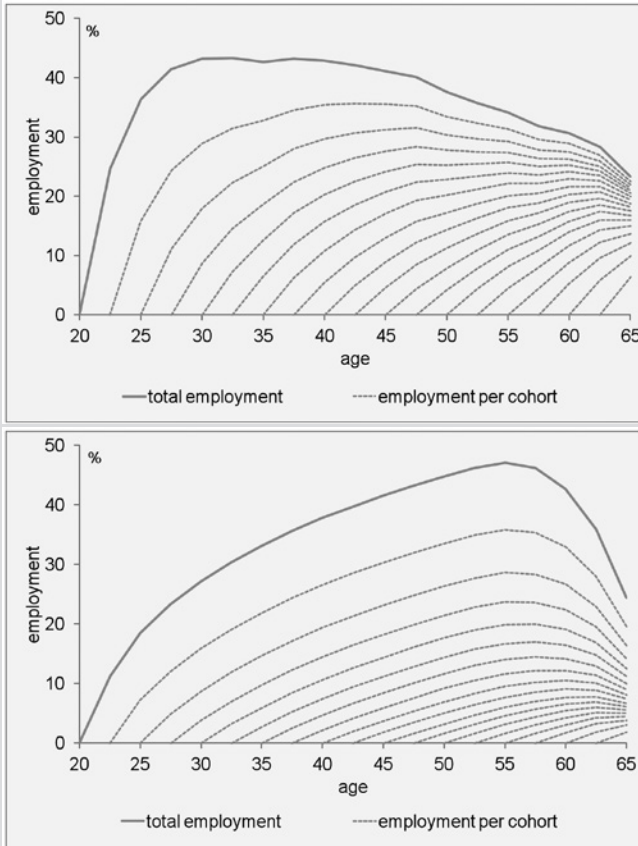
The return on investment in knowledge and skills diminishes as people get older. Older employees often possess specific knowledge that relates to the production process of their current employers, but which cannot be applied elsewhere. Such specific knowledge may become devalued due to technological developments or organisational changes. At the same time, the return on new investment in specific knowledge declines with age, as the payback time is reduced. Therefore, it is not efficient for older unemployed to get a job in a labour market segment where they need to make large investments in specific knowledge. If they happen to have that specific knowledge, there is no problem of course.

To illustrate the impact of specific investments, we expanded the search model to two sectors: one sector with and one without specific human capital. We assume that specific knowledge is acquired during people's working lives (learning by doing). During each period on the job, specific knowledge increases – as productivity does. However, specific knowledge is lost completely when people lose their job.

Figure 7 shows employment by age for the two sectors: without (left) and with human capital (right). Job mobility is larger in the first sector, as the probabilities of both finding and losing employment are higher. When people are young, the first effect dominates. They have a higher probability of finding employment in the sector without human capital. From a certain age onwards, the second effect (longer job duration) starts to dominate. Older employees thus have a higher probability of being employed in a sector with specific human capital. Once people are employed in this sector, the likelihood of them leaving their job is low. Therefore, the average job duration is high, and the largest share of older employees is found in this sector. Of all 55 year olds who work in the sector without specific knowledge requirement, only a small share is still in their first jobs, while this share is significantly higher in the sector with specific knowledge. Older employees have a larger probability of being employed in a sector with

human capital. However, for those in this age group who are looking for work, the probability of finding a job in this type of sector is small, as there is only a relatively short period left to gather firm-specific knowledge. Older people therefore have a better chance of finding new employment in a sector without specific human capital.

Figure 7. Employment by age without (left) and with (right) specific human capital



Note: results from a model containing two sectors; one with and one without specific human capital. For each year productivity is calculated, but for the sector with specific knowledge it is multiplied with a human capital factor that increases linearly with job duration (learning by doing).

Problems of older employees often start with an unexpected large drop in the value of specific knowledge (Fouarge and De Grip, 2011). These employees become less important for the production process, while it becomes less profitable for them to invest in new knowledge. This is due both to the short payback time and the reduced ability to acquire new knowledge (Bonsang et al., 2011). Employers would be interested in offering these employees a position that requires less firm-specific knowledge and accompany this with a corresponding wage cut. If no suitable positions with lower wages are available within the company, employers would prefer to dismiss these employees, who then have a large probability of ending up in the secondary segment of the labour market (Saint-Paul, 2009). This is elaborated in the text box 'End-game effect II: Investment in knowledge and skills'.

The role of health

As people's retirement age approaches, the risk of lower productivity due to health problems increases. This is a further contribution to the end-game effect (Saint-Paul, 2009). Employers become more reluctant to offer long-term employment contracts to older employees, and because of the greater risk of sickness absence, they are also likely to offer lower wages.

As people's age increases, so does the probability of their absence due to health problems. In itself, the number of sickness spells is no greater for older employees – those in the 55 to 64 year age group and the 35 to 44 year age group even have the lowest number of spells (TNO, 2012). The difference is in the duration of a sickness spell. The duration of a spell increases with age and is clearly the longest for employees in the 55 to 64 year age group. This is mostly due to an increase in chronic health problems (TNO, 2012). Total sickness absence of older employees

and the risks to employers, therefore, are higher for older than for younger employees.

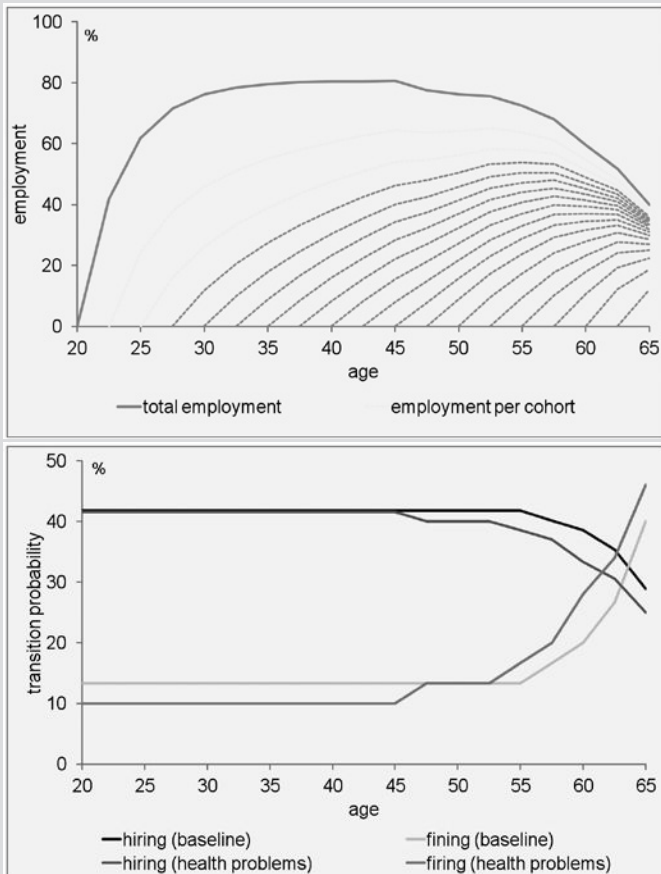
The decline in productivity due to health problems leads to a diminished probability of employment for older persons. The decline in employment opportunities can be kept relatively low, just as in the case of changes in value related to knowledge and professional skills, if all options of flexible reactions can be used. Employers may offer those employees a different albeit lower paid position within the company, or, if they are dismissed, people could find new, lower paid employment elsewhere. This is elaborated in the text box 'End-game effect III: Negative shocks in human health'.

End-game effect III: Negative shocks to health

As people grow older, the chances of long-term absence due to health problems increase. This causes older employees to be less attractive to employers. In the previous two text boxes we assumed that younger and older employees have equal opportunities to experience positive or negative shocks to their productivity level. Thus, the average productivity level for younger and older people in these two text boxes was the same. To illustrate the impact of a negative shock in health, the search model was modified so that, above the age of 55, productivity drops to zero with a certain probability.

The left-hand graph of Figure 8 shows employment by age and job duration. The first end-game effect, the future value of the employee, causes employment to decrease with age. Health risks add to this effect. The right-hand graph shows the transition probabilities. According to this model, the fall in the probability of finding a new job with age is larger than in the model without health risks. The reverse is true for their chances of dismissal. In addition to the direct effect there is an indirect effect. The chances of finding new employment are diminished as early as ten years before health problems may actually occur. Companies are aware of the likelihood of a future shock in health and anticipate this happening. The chances of younger people being dismissed from their jobs are therefore smaller, due to the fact that the labour supply is declining and therefore also the employers' chances of filling their job vacancies.

Figure 8. Employment by age and job duration (left) and transition probabilities (right)



Note: results from a model containing one sector in which people above age 55 experience a productivity drop to zero with a probability of 10%.

4. Arguments for policy interventions

The previous section showed that, even in a labour market that is governed by rational decisions of both employees and employers in a flexible market setting, the prospects of older people worsen from a certain age onwards. A market outcome of this sort is not necessarily efficient (Chéron et al., 2011). Still, it is hardly possible to justify government intervention to improve the position of older people from an efficiency point of view. Policy measures may even reduce overall production as they would disrupt the allocation on the labour market by reducing average match quality between employees and firms.

This section extends the discussion to different types of arguments for policy. The arguments can arise from policy interventions such as unemployment benefits (Section 4.1), from irrational individual behaviour and market failures in the case of investments (Section 4.2) or wage rigidities caused by loss aversion and reciprocity behaviour (Section 4.3). In each of these cases a problem on the labour market drives a wedge between the private and the social costs and benefits of jobs. This causes private parties to take decisions that are not optimal from a social welfare perspective. In the following sections, we explore whether policy can be expected to improve the market outcome.

4.1 Unemployment insurance and fiscal externalities

Most employees appreciate a steady income and avoid risk. The welfare state, thus, includes social insurance against loss of income, most prominently in the case of unemployment. In the Netherlands, the duration of the unemployment benefit increases with the number of years of contribution to the insurance. So on average, older unemployed persons have the

longest unemployment duration entitlement. Indisputably, income insurance serves a legitimate purpose, but it also leads to undesirable behaviour of employees and employers.

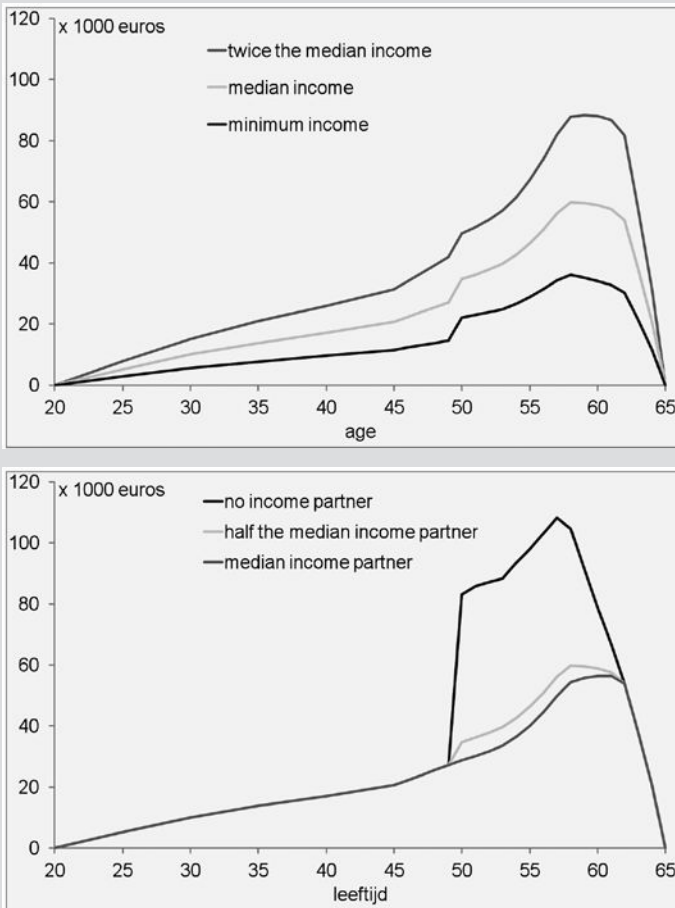
Employers take no account of any benefit or burden to society that is caused by their hiring or firing of an employee (Feldstein, 1976; Blanchard and Tirole, 2008; Cahuc and Zylberberg, 2008). Unemployment insurance has little direct impact on the decisions

Social costs of unemployment over the life course

Whenever employees are dismissed this creates costs to society, as the costs of income insurance and income provisions form a burden to the public budget. This is the case for unemployment benefits (WW), income provisions for older, partly disabled unemployed people (IOAW), and welfare benefits. The reverse is true for hiring an unemployment benefit recipient, as in those cases, employers reduce the costs to society; in other words, there are also public benefits to the employment of previously unemployed benefit recipients. These costs and benefits increase with the age of the employee, as entitlement to unemployment benefits increases as people are older and have more work experience. From a certain age onwards, however, costs decrease again due to the approaching retirement age. The development of costs and benefits over the life course is illustrated in Figure 9, which refers to WW and IOAW benefits for employees with work experience from the age of 22, and with a partner on half the median income. Costs to society were calculated, taking into account the likelihood of employees finding new employment after dismissal. The chances of unemployment benefit recipients finding a job are greatest for young people and strongly decline with increasing age (CBS, 2012; see also Figure 2). People from the age of 50 onwards have a large chance of going from WW to IOAW benefits (UWW, 2012). Finally, the chances of finding new employment for people on IOAW benefits are small (CBS, 2010). Public costs and benefits increase with age and rise sharply from the age of 50. At that age, people who lose their jobs are entitled to IOAW benefits once their WW benefit payments have ceased. The costs to society depend on the employee's income level (left-hand graph of Figure 9). The maximum is reached around the age of 58, for all income levels. This is the result of the job-finding probabilities for the unemployed, which are the lowest for people of that age. In addition to people's personal income, also that of their partner is important (right-hand graph of Figure 9). People are not entitled to IOAW if their partner's income is above a certain level. The costs to society from a benefit recipient with a partner

on an average income level are fully determined by the WW. For benefit recipients from the age of 50 onwards who have a partner without income, the costs to society are significantly higher. The labour market behaviour of the partner, thus, is fairly important.

Figure 9. Costs to society of unemployment related to people on different incomes and with partners on half the median income (left) and people on a median income with partners with various income levels (right)



Note: CPB calculations, see Euwals et al. (2013)

to either take on or dismiss personnel. Employers focus rather on productivity and wage costs. From a social welfare perspective, however, it would be preferable if employers would also take the costs of insurance into account, because of the external fiscal effect. For employers, it is profitable to dismiss an employee when his or her productivity level is below the wage costs. From the perspective of society, this is not an appropriate decision rule for dismissal, because unemployment insurance is publicly financed. From a social welfare perspective it may therefore be better for such employees to remain in employment. Feldstein (1976) argued that the system of experience rating of that time was not confronting US employers with the true costs of unemployment. Blanchard and Tirole (2008) and Cahuc and Zylberberg (2008) proposed charging employers a dismissal tax, so that they would take into account the social costs.

Employers also take too little account of the benefits of providing jobs for unemployed benefit recipients. Employment of this group would significantly decrease the costs to society and could be stimulated by awarding a hiring subsidy to employers (Mortensen and Pissarides, 2001; Michau, 2009). When implementing such a hiring subsidy, the phenomena of *deadweight loss* and *crowding out* must also be taken into account. Some benefit recipients may find a job without the subsidy anyway. And implementation in Germany has shown that the increase in employment due to hiring subsidies is partly being counterbalanced by a decrease in employment without hiring subsidy (Boockmann et al., 2007).

The magnitude of the fiscal externality due to hiring or firing varies over the life course. In the Netherlands, at the start of people's working lives, employees receive only low and short unemployment benefits. This implies low dismissal-related costs

to society. However, unemployment benefits increase as people get older and collect more labour market experience. At a certain age, the costs to society reach their maximum, after which they decrease again, as the period up to retirement becomes shorter. It is therefore a plausible idea to relate the dismissal tax and the employment subsidy to the magnitude of the fiscal externality (see the text box on 'Social costs of unemployment over the life course').

Unemployment insurance also has an impact on employee behaviour. On the one hand, there is a negative effect on search behaviour. A long period of receiving unemployment benefits leads to more unemployment, and many unemployed people find new employment just before their benefit entitlement ends (Andersen and Meyer, 1993, 2000; Lalive et al., 2006; Gautier and Van der Klaauw, 2012; Boonen and Van Ours, 2012). Thus, unemployment benefits reduce employment and production levels. On the other hand, unemployment benefits can have a positive impact on labour market allocation. They give the unemployed the time to find a good job, and therefore may have a positive impact on the average productivity. However, empirical research shows that the positive impact of unemployment benefits on productivity is small (Lalive, 2007), and for older unemployed people, it hardly plays any role at all. In contrast, at the end of people's working lives, the negative effects on search behaviour increase. Then the entitlement to unemployment benefits is largest, which reduces the incentive for people to accept a new job. In that case, benefit payments become an alternative route to withdrawal from the labour market (Kerkhofs et al., 1999).

Dutch labour market institutions prevent employers from dismissing workers at will and instead stimulate them to hire disadvantaged workers. Dutch employment protection

for permanent workers is strict (OECD, 2013). The new law on employment and security ('Wet Werk en Zekerheid') will give all dismissed workers a right to a so-called transition budget, to be paid by the employer. The amount of this budget increases with the length of tenure and so to a certain extent resembles the social costs of unemployment. The budget, however, deviates from the social costs as: (1) the budget starts at zero in case of job-to-job mobility, and (2) the budget increases mildly with age while the social costs increase strongly from age 55 to 62. On the hiring side, Dutch employers that hire older unemployed and partly disabled workers receive a so-called mobility bonus for a maximum length of three years.

4.2 Investments in knowledge and skills

Short-sightedness and restrictions on making binding agreements may lead to investment levels in knowledge and professional skills that are too low. Participation in lifelong learning decreases with age, but at least increases across generations (Figure 3). Nevertheless, in the Netherlands, too little may be being invested in ageing employees.

Economic theory predicts that impatient and short-sighted people invest little in knowledge and skills. Impatience and short-sightedness here may take the form of a high time discount rate, or so-called hyperbolic time discounting. The first form of short-sightedness implies that people choose lower education in a rational and time consistent way. People are conscious of what they are doing and revise their decisions only when they receive new information. The second form of short-sightedness implies that people choose lower education in a time-inconsistent manner. They therefore regret having made this choice. Golsteyn et al. (2013) show that people with a high time discount rate tend

to invest less in education. Later in life, these people appear to be less successful on the labour market. Cadena and Keys (2012) argue that time inconsistent choice-making at a young age is a major explanation for a low level of educational attainment. They show that young people who are impatient (in the sense that they behave in a restless manner) achieve only a low level of educational attainment. They also more often drop out from their studies, and at middle age they more often regret the choices they made earlier. As a consequence of their behaviour and the resulting choices, such people later in life have a lower income. Regret about study choices is a known phenomenon also in the Netherlands. Borghans et al. (2008) and ROA (2011) report that, varying in educational level, 10% to 30% of graduates regret their choice of study. This may be a consequence of time inconsistent choice behaviour, or of unrealistic expectations in case of time consistent choice behaviour.

Not much is known about the consequences of impatient and short-sighted behaviour with respect to investments in lifelong learning at an older age. Declining investment from a certain age onwards is a rational reaction to the labour market situation. This does not mean that the decline should start well before the retirement age, as 55-year-old employees have another ten years of employment ahead of them – and even longer, if the retirement age is raised. Therefore, investments at that age still may pay off. Older employees have proven themselves, for example, to be adept at learning new computer technology (Borghans and Ter Weel, 2002).

On top of short-sightedness, a second reason for too-low investments in specific knowledge and skills may be that binding agreements about the costs and benefits are difficult to make. In the real world, the amounts invested by both employee

and employer are not easily verifiable. And the return on such investments cannot easily be separated from fluctuations in business results that are due to other factors. This is the reason for incompleteness of contracts (i.e. contracts cannot contain all relevant information on all possible situations; Salanié, 1997). If one party claims part of the profits well after the other party has made an investment, the latter is not able to fully recover the investment cost. This is the so-called *hold-up problem*, and it causes both parties to invest less in the labour relationship than would be optimal from a social welfare point of view (Acemoglu and Pischke, 1999a, 1999b; Belot et al., 2007; Lazear, 2009).

For certain tasks for which specific knowledge or skills are important, the introduction of employment protection could bring an improvement. Section 3.1 described how employers can share the costs of investments with their employees by offering them a wage that is lower than their productivity in the beginning and higher later on (Hashimoto, 1981; Lazear, 1979). This motivates employees to stay in the job and also requires a mandatory retirement age. Employees do not, however, want to risk missing future rewards if the return on investment is low and their employers therefore dismiss them. For this reason the optimal contract may not only contain wages increasing with tenure, but also severance pay (Lazear, 1979). MacLeod (2005) and Belot et al. (2007) argue that the optimal employment contract depends on the market situation. If the expected return on specific investments is large, a contract with employment protection leads to the highest possible production level. However, both studies note that the optimal level of employment protection may be difficult to achieve in a labour market with heterogeneous sectors. Differences in employment protection between sectors may lead to negative selection, as risk-avoiding and intrinsically

less-motivated employees are likely to choose a sector with a high level of employment protection (Belot et al., 2007). Optimal policy design is almost impossible to determine in this case, because efficiency gains through differentiation between sectors and professions must be weighted against the possibly negative effect of selection.

The Dutch government stimulates employers and unions to reach agreements on education and development of worker skills at the sectoral level. Contributions to so-called education and development funds (O&O funds) are exempted from taxes, implying a fiscal subsidy. Although large firms may be willing to invest in their workers (as these workers may be less mobile), small firms may be less willing to invest (being confronted with more mobility of their workers). This leads to the aforementioned *hold-up problem*, in particular in sectors with many small firms. A subsidy may help small employers on their way to agree upon sector-specific funds. The investment in knowledge and skills by such a fund will, however, also be sector-specific; there is no incentive to invest in skills and knowledge that are general or specific to other sectors. So investment that stimulates mobility between sectors cannot be organised at this level (Van Vuuren and Euwals, 2011).

4.3 Wage rigidity and demotion

Downward wage rigidity may lead to too many employees staying in less-productive jobs. Contrary to the flexible market assumption in many economic models, wages in the real world are rarely adjusted downwards – not even in times of economic crisis. A second aspect that is missing in many theoretical models is that downward wage adjustments may be accompanied by changes in tasks or responsibilities. For older people, the reduction in

responsibilities, in combination with a wage reduction, may be an efficient labour market arrangement in situations in which productivity is declining (for example, due to health problems or a negative shock to the knowledge and skills). This is what is known as demotion—but this seems to be as rare a phenomenon as downward wage adjustment.

Wage rigidity may partly be explained as a result of rational behaviour of employers and employees. According to the theory of implicit contracts, both parties have good reason for agreeing on fixed wages for employees. In the classical form of implicit contracts (Baily, 1974; Azariades, 1975), risk-neutral employers offer their risk-avoiding employees insurance in the form of a fixed wage that is lower than their marginal productivity. In cases where employers wish to hold on to their employees for a longer period of time (for example, because of certain investments they made), they may offer them a wage level that is lower than the marginal productivity in the beginning and increases with job duration. This wage profile thus stimulates employees to exert effort until the end of their working life (Lazear, 1979, 2011).

In addition to contractual reasons for wage rigidity, experimental and empirical research has shown that behavioural aspects, such as equity and reciprocity, play an important role as well. Falk and Fehr (1999) argue that employees generally are not willing to accept wage reduction and respond by reducing their productivity level. This leads to wage rigidity, as experiments have confirmed. Experiments by Brown et al. (2004) and Altman et al. (2013) show that stable relations between employers and employees are the result of their behaviour in terms of pay and effort. Some employees respond to high wage offers by being highly productive, and these employees and their employers remain in a steady working relationship. Employees who do not

respond to high wage offers with higher effort will not receive a similar wage offer again and subsequently run the risk of becoming unemployed. Bewley (2002) and Agell and Benmarker (2003) both show that employers from the United States and Sweden are aware of the possible behavioural responses by employees. These employers indicated in interviews that even in hard times they would not reduce wage levels, as the negative impact on productivity would nullify any gains from lower wage levels. Interviews have shown that employers are not even prepared to hire applicants who say they would accept a wage that is lower than the average wage at their current employers. Employers anticipate a negative impact on their effort after they are hired.

Although the literature discussed in the previous paragraph relates to wage reductions under constant job characteristics and responsibilities, the arguments also apply to demotion. Employees may see demotion as the breach of an implicit contract, and even without such an implicit contract many employees may respond to demotion by lowering their effort level. However, this does not apply to all employees; some will accept wage reductions and demotion. In the Netherlands, demotion is not often used as a means to retain older personnel (Conen et al., 2012). The question of how employers could create a working environment, under which employees would accept such measures, is difficult to answer.

5. Conclusions and policy recommendations

The labour market situation becomes increasingly difficult as people become older. The probability of finding a new job if unemployed and investing in new knowledge diminishes with age. Moreover, because of their low job mobility, older people are more likely to stay in professions with routine tasks. This study has shown that these results can partly be explained by rational decisions taken by employees and employers in a flexible market environment. In times of temporary reductions in demand, older employees are often dismissed, the return on investment declines when they approach retirement age, and periods of sickness absence are on average longer for older employees. As long as there are no other market distortions, policies aiming at improving the labour market opportunities of older people are not likely to lead to improved productivity over the whole life course. Policy interventions may be welfare improving, however, if they address problems in the functioning of the market. These problems can be generated by fiscal externalities caused by unemployment insurance, non-optimal investments because of irrational behaviour or contracting difficulties, or wage rigidities caused by the behavioural reactions of employees.

In the case of the fiscal externality caused by unemployment insurance, policy can play a mitigating role. By driving a wedge between the social and private value of employment, unemployment insurance leads to socially suboptimal hiring and firing decisions. Public policy should make sure that employees only utilise social insurance in times of absolute necessity, with search for and acceptance of a new job being the preferred behaviour of the unemployed (Gautier and Van der Klaauw, 2012). Public policy should also deter employers from dismissing their

employees and stimulate them to employ older benefit recipients. This could be achieved by imposing a dismissal tax combined with employment subsidies (Blanchard and Tirole, 2008; Cahuc and Zylberberg, 2008; Michaud, 2009), or by experience rating of the unemployment insurance contributions (Feldstein, 1976). The level of these taxes and subsidies should correspond to the fiscal costs of unemployment, implying an increase during the life course and a rapid decrease during the last years before the statutory retirement age. Note that Dutch institutions already prevent employers dismissing workers at will. Dismissal taxes or experience rating will lead to even higher barriers to dismissing workers. To prevent higher barriers, the introduction of dismissal taxes and experience rating may be accompanied by less strict employment protection legislation. International experiences with dismissal taxes in France and Austria indicate that undesirable side-effects must be taken into account (Behaghel et al., 2008; Schnalzenberger and Winter-Ebmer, 2009). In addition, experience with hiring subsidies for older benefit recipients in Germany has shown that these subsidies come at the expense of lower job-finding probabilities of non-recipients (Boockmann et al., 2007).

Agreements on investments in knowledge and professional skills, wage schemes and severance payment rules, are the responsibility of employers and employees and their representative organisations. Private parties have strong incentives to cover these issues simultaneously in a single contract, and there are no obvious arguments on why government intervention would lead to better economic outcomes. Employers and their employees are the main beneficiaries of investments and are thus best equipped to decide about education and training needs. As transaction costs related to all these separate

individual agreements would be high, in certain sectors and for certain professions, unions and employer organisations could agree collectively on education and training, wage schemes and severance pay rules. Note that the Dutch government stimulates employers and unions to reach agreements on education and development of worker skills on the sectoral level. Contributions to so-called education and development funds are exempted from taxes, implying a fiscal subsidy. Many sectors do have such a fund and workers can participate in education and training financed by these funds. In sectors that contain various types of professions and tasks, the agreements could also take the form of a number of contract types that correspond to the different types of specific investments (MacLeod, 2005). It must be noted that such a system will lead to heterogeneity in employment protection; employees with professions that require specific knowledge will receive a larger degree of employment protection than employees with jobs that do not require such knowledge. This will be compensated by the fact that wage levels for jobs with lower knowledge levels will increase less steeply over time, with wages being relatively high from the beginning onwards. Differences in employment protection could, however, lead to adverse selection (Belot et al., 2007), which indicates the potential desirability of some government intervention.

Finally, agreements on demotion and wage adjustments are also primarily the responsibility of employers and employees and their representative organisations. Employers, generally, are aware of the negative impact of wage reductions on employee motivation (Bewley, 2002; Agell and Benmarker, 2003). Therefore, it would be up to employers to create a working environment in which employees are prepared to accept such reductions without considering this a breach of an implicit contract. Employers

may do so themselves, by attuning their human resource and wage policy accordingly. In addition, unions and employer organisations may enter into agreements on demotion on a collective level for professions for which decreasing productivity from a certain age is evident.

Appendix A: Matching model with age dimension

In this study, we use a matching model of the labour market to illustrate a number of effects that are a consequence of the finiteness of the working life as such or of labour market policies in such a setting. As the current version of the model does not easily lend itself to a quantitative calibration, the simulations need to be understood as qualitative illustrations rather than a quantitative assessment. Despite its considerable level of complexity, the model remains a radical simplification of reality. We discuss the most important caveats in the last paragraph of this appendix.

The economic framework of the model is a dynamic equilibrium in the labour market, where unemployed workers are searching for a job and firms are searching for workers to fill their vacancies. Vacancies and unemployed workers are matched with a certain probability. If the productivity of the worker in a match is above the required level, firm and worker agree on a wage, the vacancy is filled and the position becomes a productive job. This type of model has been pioneered by Mortensen and Pissaridis (e.g. Mortensen and Pissaridis, 1994). In the basic version, used almost exclusively in the existing literature, workers are infinitely lived. Apparently, this assumption is not appropriate for analysing age-specific labour market conditions. Recently, however, the model has been generalised to workers with a finite lifetime (Cheron et al., 2011). We use a numerical version of the Cheron et al. model for our illustrative simulations. The most important assumptions in this model are summarised in the following list.

- The lifespan of the agents is split into periods of equal length (2.5 years).

- At age 20, individuals enter the labour market. They start as unemployed until they find their first job.
- Age 65 is the mandatory point of retirement, where individuals leave the labour market and start to receive pensions.
- In each period, individual productivity is determined by a random draw from a uniform distribution between 0 and 1.
- The reference point for this productivity is the exogenous utility of unemployment, which is set at 0.4 and generated by leisure rather than unemployment benefits.
- At each new draw of the productivity, workers whose productivity is above the reservation productivity remain employed or get a job in a new match, respectively.
- Workers whose productivity is below the reservation productivity lose their job or, if unemployed and searching for a job, are not hired.
- The level of the reservation productivity is endogenously determined by the requirement that the value of the job (discounted future stream of income for both firm and worker) must be positive.
- In determining the value of a job, all possible future transitions into other states (unemployment or productivity changes) are taken into account.
- Wages are flexible and are determined by Nash bargaining. Both firm and worker receive a fixed share of the surplus that the job generates above the respective outside options.
- In the basic model setup, two policy instruments are available: hiring subsidies and firing taxes. These may vary by age of the worker.
- The government budget is balanced by a lump-sum tax which is paid by both employed and unemployed workers.

Figure A.1 Employment by cohort (left panel) and reservation productivity (right panel)

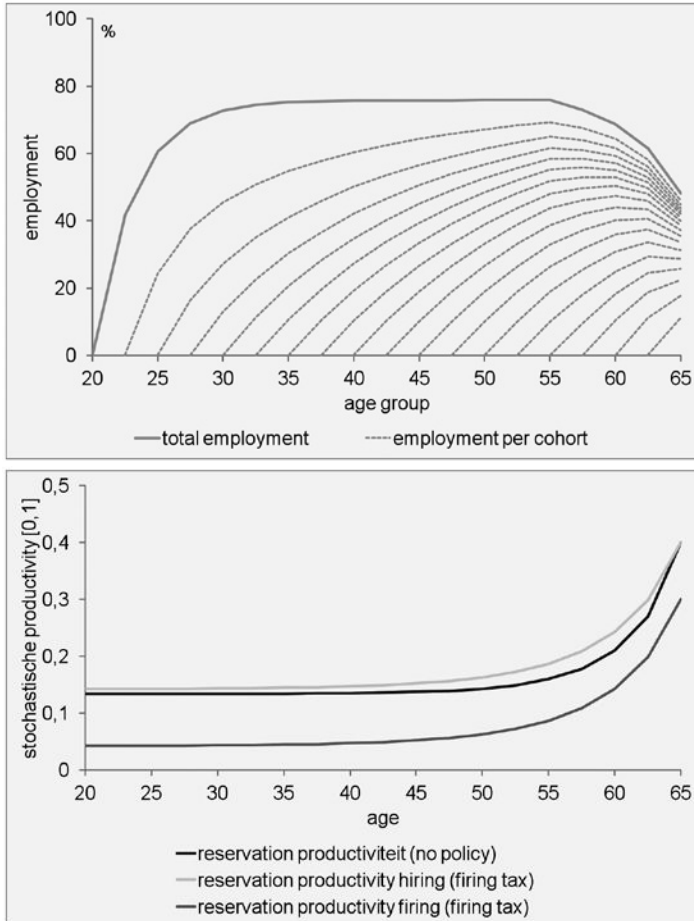


Figure A.1 illustrates the basic types of simulation results generated with the model sketched above. The left-hand side panel shows employment by age and by tenure. Everyone starts unemployed at the age of 20; then, the employment rate increases sharply

until it reaches a stable level of almost 80% from age 30 until 55. In the last few years before mandatory retirement labour market conditions worsen (see box 'End game effect I: future value of workers'.) At each age, total employment can be decomposed by job cohort. The dashed lines delineate new jobs from jobs that started two, three, etc. periods earlier.

The right-hand side panel of Figure A.1 shows the reservation productivity, which governs the hiring and firing decisions. In the reference situation without policy (green line), the reservation productivity is identical for new and existing jobs. The effects of a firing tax are significant for the reservation productivity of existing jobs (yellow line). Through indirect effects, however, the hiring decision (red line) is affected as well, even if only slightly.

Despite its considerable degree of complexity, our labour market model remains a radically simplified picture of the complex labour market mechanisms in reality. Two deviations from reality that we find particularly relevant are the following.

- Wage rigidity: in the model we assume flexible wages. In reality, however, we are faced with different types of wage rigidity. Most importantly for our case, wages are unlikely to simply follow downward shocks in productivity. Many employers shy away from wage cuts because they fear detrimental effects on worker motivation (see Section 4.2 for a discussion of wage flexibility). This also holds for possible productivity drops towards the end of the working life (for example, because of a negative health shock; see the Box on end-game effect III). What wage rigidity means for our model outcomes is not easy to determine beforehand: on the one hand employers may want to dismiss workers in case of a negative shock (as the wage will not adjust); on the other hand, equilibrium wages may in fact be lower as employers

will take wage rigidity into account. The net effect on firings is therefore not obvious.

- Directed search: in the model it is not possible for a firm to direct its search for a worker to a certain age class. By assumption, a vacancy is open for all unemployed individuals. In each match, the unemployed workers get a chance to reveal their productivity (even if the reservation productivity varies by age). In reality, however, pre-selection of applicants by age does take place. The employment effect at the end of the working life may therefore be larger than suggested by the model.

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Employability and the labour market for older workers in the Netherlands

The employment of people over age of 55 has increased substantially over the past two decades because of the aging of society and because of the increasing participation rate of elderly. Labour market results however deteriorate as people get older. The probability of finding a job and investments in new skills and knowledge diminish with age. Rob Euwals, Stefan Boeters, Nicole Bosch, Anja Deelen and Bas ter Weel (all CPB) identify in this paper three possible reasons for government intervention: fiscal externalities of the unemployment insurance, distorted human capital investment decisions and wage rigidities in the course of the working life.