

The impact of employer's  
characteristics and beliefs on propensity  
to hire older job applicants

Evidence from a stated preferences experiment

Raymond Montizaan, Didier Fouarge

# The impact of employer's characteristics and beliefs on the propensity to hire older job applicants: Evidence from a stated preferences experiment

Raymond Montizaan<sup>1</sup>  
Maastricht University (ROA),  
Netspar and IZA  
P.O. Box 616  
NL-6200 MD Maastricht  
The Netherlands

Didier Fouarge  
Maastricht University (ROA)  
and Netspar  
P.O. Box 616  
NL-6200 MD Maastricht  
The Netherlands

## Abstract

This paper makes use of a vignette study to investigate employer's willingness to hire older job applicants. We focus on the extent to which the hiring probability of older job applicants is related to various characteristics of the applicants, and simultaneously investigate the role of employer's characteristics such as age and gender, and their assessment of older workers' wage, productivity and skills compared to that of younger workers. The evidence indicates that the probability of being hired decreases substantially with the age of the job applicant. Other things equal, a 60-year-old job applicant has a 41%-points lower probability of being hired compared to a 35-year-old applicant. Even with 10 years of relevant job experience, older job applicants are never preferred to younger job applicants. Our estimates show that the hiring probability of older job applicants depends significantly on the age of the employer. Job applicants aged 60 years have a 10%-points lower probability of being hired when the employer him-/herself is aged 35 years or less than when the employer is 55 years or older. We furthermore find that positive assessments of employers on older workers' relative wage costs, productivity, and skills increase the hiring probability, but that age discrimination remains persistent despite controlling for these assessments. Moreover, the significant interaction effect between the age of the job applicant and the age of the employer does not disappear when we control for these assessments. The most frequently identified age stereotypes among employers within the literature thus explain only a small fraction of age discrimination in the hiring behavior of employers.

Keywords: Hiring, age discrimination, employer's characteristics

JEL codes: J71, J14, J23, J64

---

<sup>1</sup>Corresponding author: Raymond Montizaan: [r.montizaan@maastrichtuniversity.nl](mailto:r.montizaan@maastrichtuniversity.nl). We thank Eric Bonsang, Andries de Grip, Adriaan Kalwij, Arjan Non and Ruud Gerards.

# 1. Introduction

In the coming decades most industrialized countries will experience fundamental public policy challenges to face the burden of the ongoing population aging. In particular, the rising age dependency ratio creates an imperative to increase the labor force participation of older generations. Many industrialized countries have therefore already implemented major pension reforms aimed at increasing the labor supply of older workers. These reforms include, among others, decreases in the generosity of pension benefits, increases of the eligibility age for early retirement or outright abolition of such schemes, and increases of the statutory retirement age (e.g., Gruber and Wise 1998; Duval 2005; Mastrobuoni 2009; Kangas et al. 2010; Börsch-Supan 2012; Staubli and Zweimüller 2013). In the policy debate, less attention has been paid to potential demand-side barriers, although several studies in sociology and psychology suggested that there are substantial negative stereotypes about older workers among employers (e.g., Finkelstein and Burke 1998; Finkelstein et al. 1998; Chiu et al. 2001; Henkens 2005; Van Dalen et al. 2009). This literature has identified different types of stereotypes (see Posthuma and Campion 2009 for an overview). The most frequently mentioned stereotypes are that older workers have lower abilities, are less productive, are more costly because they are paid higher wages, and are in worse health (e.g., Faley et al. 1984; Hutchens 1986; Kite and Johnson 1988; Lin et al. 1992; Finkelstein et al. 1995, 2000; Finkelstein and Burke 1998; Saks and Waldman 1998; Kite et al. 2005; Hedge et al. 2006). The main question is whether such stereotypes indeed are the main determinants of age discrimination and what role employer characteristics play in this relationship.

This paper makes use of a vignette study to measure employer's propensity to hire older job applicants and the extent to which the hiring probability is related to various characteristics of

the applicants. The vignette study is part of survey data collected among Dutch employers in the public and privatized sector, the ROA Public Sector Employers Survey. The core of the survey aims at monitoring HR practices and determining how employers assess older workers' wage costs, productivity, and skills in comparison to younger workers. The online survey was sent out in 2011 to all (approximately 2.500) employers – mostly HR-officers or managing directors who are directly involved in the hiring process within their organization. We achieved a higher response rate than for similar employer surveys, which reduces the likelihood that the results we find are driven by selection issues. In total 1.100 employers answered the questionnaire . In the vignette study, we presented employers with the hypothetical but realistic situation that they need to hire a new employee. In six vignettes, employers had to choose between two job applicants. To make the choice simple and realistic, the job applicants differed in three randomly assigned characteristics: their age, experience in a similar job, and the training need to function in the job.<sup>2</sup>

The unique combination of employer survey data with the outcomes of the vignette study enables us to determine in a causal way to what extent the hiring probability of older job applicants is related to the employer's own age, gender, experience, as well as employer's assessments of older workers' wage costs, productivity, and underlying productive skills. Moreover, our study pushes the analysis of the drivers of age discrimination one step further by investigating whether employer's assessments of older workers' wage, productivity, and underlying productive skills impact the relationship between their own personal characteristics and the propensity that older job applicants are hired.

Although there is a large body of research on discrimination in labor markets (e.g., Bertrand and Mullainathan 2004; Rubineau and Kang 2012; Kuhn and Shen 2013; Arceo-Gomez

---

<sup>2</sup> The choice of these characteristics is based on Evans (2012) which showed that recruiters in general exclusively focus on job applicants' skill needs, gender, experience and age.

and Campos-Vazquez 2014; Rubinstein and Brenner 2014; Ruffle and Shtudinger 2015), the focus on discriminatory barriers to older job applicants' employment is limited in economic literature. Moreover, the existing evidence on discrimination is less compelling for age than for gender and race (Neumark and Song 2012). This is an important gap in the literature as in the Netherlands 33% of all official reported discrimination complaints in 2013 were related to ageism (Van Haaften 2014). In the U.S., 23% of all the legal charges claiming discrimination in 2014 concerned age discrimination (U.S. Equal Employment Opportunity Commission 2014).

Nevertheless, there is some evidence within the economic literature that age discrimination is pervasive in employers' hiring behavior (e.g., Hutchens 1988; Finkelstein et al. 1995; Johnson and Neumark 1997; Hirsch et al. 2000; Adams 2002, 2004; Kite et al. 2005). The correlations found in these early papers are difficult to interpret causally, however, as they were not able to distinguish whether the lower likelihood to be hired for older people is due to discrimination, higher reservation wages, or clustering of older job applicants in shrinking industries or occupations (Lahey 2008). The most dominant approach in recent years is therefore to establish the degree of age discrimination on the labor market by using field experiments (Bendick et al. 1996, 1999; Levitt 2004; Riach and Rich 2006; Lahey 2008).<sup>3</sup> These field experiments usually made use of resume audits for which matched pairs of applicants had been sent in person to job interviews or correspondence testing (Neumark 2012). Correspondence testing involves sending off fake résumés in which job applicant's characteristics are randomly changed, after which the invitation rate to job interviews is taken as indicator for discrimination of particular groups of people in the labor market. The main advantage of correspondence testing is that it enables the researcher to control strictly for all variables other than the personal

---

<sup>3</sup> Levitt (2004) did not focus on labor market discrimination, but used the contestant voting behavior on a television game show to distinguish between taste-based and information-based theories of discrimination instead. He found convincing evidence for taste-based discrimination against older players.

characteristics to be tested and provide hard evidence on the prevalence of discrimination. A major drawback, however, is that field experiments in general present mainly descriptive evidence on age discrimination, but do not allow for identifying the underlying reasons why employers discriminate against older job applicants. This is because invitation rates do not reveal who was responsible within organizations for inviting job applicants and therefore do not provide information on whether and what kinds of stereotyping, conscious discrimination or other intentions play a role in the hiring process.

This paper contributes to the existing discrimination literature in several important ways. First, it fills a gap in the literature by using a combination of data from a vignette study and an employer's survey to establish the extent to which hiring propensities are related to job applicants' characteristics as well as the extent to which these propensities are explained by stereotypes that employers hold about older workers' wage costs, productivity and underlying productive skills. With these analyses our study builds a bridge between the many studies that aimed to identify age stereotypes and the recent experimental studies in the discrimination literature that provide clean estimates of the degree of age discrimination in the labor market.

Second, we are also able to shed more light on the drivers of age discrimination by investigating to what extent employer's assessments of older workers' wage, productivity, and underlying productive skills are related to their own personal characteristics. In our study we make an in-depth analysis on the degree to which employers' assessments of older workers vary among different dimensions of productivity and skills and how these differences depend on their personal characteristics. It is crucial to make a distinction between productivity dimensions as information-based statistical discrimination theory argues that discrimination occurs when employers are misinformed or have imperfect information on the productivity and ability of workers, while at the same time existing evidence shows that the incompleteness in information

and employers' assessments on workers' productivity differ strongly for different dimensions of productivity and ability (Green and James, 2003). Hence, it is possible that age discrimination is mainly driven by employers' assessments on particular productive skills. Based on psychological literature on the decline of cognitive abilities we distinguish five key types of skills which may change substantially over workers' life cycle: learning and coping with change, problem solving, experience, supervision, and communication skills (e.g., Horn and Cattell 1967; and Salthouse 1985; Wrenn and Maurer, 2004). Learning and coping with change refers to basic mechanisms of processing information which are closely related to biological and physical factors. One important aspect of this type of ability is the speed with which operations can be executed. Problem solving and experience are based on the knowledge acquired through education, training and other life experiences. Unlike learning and coping with change, which is subject to a clear decline as people age, these skills may be maintained at older ages and is likely to be subject to a lower rate of age-related decline (Salthouse 2012). Wrenn and Maurer (2004) finally provided evidence that communication and supervision skills are perceived to improve with age. Supervision skills are actually perceived to increase the most after age 50.

Our results indicate that the probability of being hired decreases substantially with the age of the job applicant. Other things equal, a 60-year-old job applicant has a 41%-points lower probability of being hired compared to a 35-year-old applicant. This difference in the propensity closely matches the 40% difference in the interview invitation rate between young and old applicants found in the field experiment by Lahey (2008). Having 10 years of related work experience increases the hiring probability by 29%-points compared to applicants with no experience, while having substantial training needs decreases the hiring probability with 53%-points compared to having no training needs. However, older job applicants cannot make up for their lower hiring probability by bringing in relevant experience. Our estimates show that the

hiring propensity of older job applicants depends significantly on the age of the employer. Job applicants aged 60 years have a 10%-points lower probability of being hired when the employer him-/herself is 35-years or younger compared to the situation in which the employer is 56 years or older. We find that the employers' assessment of older workers' wages, relative productivity, and skills affect the hiring probability largely in the expected way, but that age discrimination is only partly be 'explained' by these assessments. Moreover, the significant interaction effect between the age of the job applicant and that of the employer does not disappear when we control for these assessments. Well-known age stereotypes among employers thus explain only a small part of the age discrimination in hiring decision. Yet, we do observe considerable heterogeneity in the assessments of the different dimensions of productivity. Younger employers judge more negatively about the productivity of workers aged 55-64 years relative to that of younger workers and are therefore more likely to discriminate against older job applicants. This holds in particular for the assessment of supervision and communication skills.

The structure of the paper is as follows. Section 2 describes the data, the stated preferences experiment, the variables used in the analyses and the empirical approach. Section 3 presents the results and Section 4 summarizes the findings and concludes.

## **2. Data**

We collected unique survey data among employers in the Dutch public and privatized sector (ROA Public Sector Employers Survey). We sent an e-mail in April 2011 to all 2,500 employers in these sectors with a link to a web-based survey. The e-mail was received by HR-managers and managing directors who are responsible for HR practices and all retirement related issues within



their organizations.<sup>4</sup> The e-mail addresses were provided by ABP, the pension fund for the public, education and privatized sector. For each organization ABP has one contact person. The survey was answered by 1,100 employers, all of different organizations. Table A1 shows that the response rate is fairly equally distributed across the different subsectors.

The core of the survey aimed at monitoring HR practices, the employers' views on wage costs, productivity and skills of workers, and included detailed questions on organizational characteristics and personal characteristics of the employer as well as the stated preferences experiment which forms the basis of our analyses.

### ***2.1 The stated preferences experiment***

Our stated preferences experiment relies on a vignette study. Vignettes can best be described as hypothetical, yet realistic, situations in which stories about characters or scenarios appropriate to a particular study are presented to respondents, after which they are asked to show their preferences, judgment, or anticipated behavior (McFadden et al. 2005). This allows the researcher to explore participants' views or behavior on the issues arising from the situation. In case of our hiring vignette, employers are asked to make judgments about job applicants described in the vignettes. A premise is that complex decisions are often made on the basis of holistic judgments rather than a rational calculus based on aggregation of parts. People often find themselves in situations that require quick decisions and are unlikely to be aware of how each component of possible choices factors into their decision making. Existing evidence shows that this also holds for hiring decision. Evans (2012) investigated how much time recruiters spend on reviewing resumes in the field. The study was conducted using a technologically advanced

---

<sup>4</sup> The e-mail addresses were provided by ABP, the pension fund for the public, education and privatized sector. ABP has detailed contact information for persons in organizations who are responsible for pension and HR issues.

assessment of eye movement (eye-tracking) that records and analyzes where and how long a person focuses when seeking information or completing activities and gauged specific behaviors of 30 actual recruiters during a 10-week period as they performed online tasks, including resume and candidate profile reviews. Most shockingly, the results show that the average corporate recruiter only spends 6 seconds on reviewing a resume before making their decision to invite applicants for an interview. Eye-tracking showed that recruiters used most of their time to very quickly scan for basic employee characteristics (age, experience, education, and name) which are normally on the top of the first page of the resume. The exclusive focus on job applicants' skill needs, experience and age in our stated preferences experiment, as explained below, thus closely replicates actual behavior of recruiters in the field.

The main advantage of using vignettes over standard survey questions is that it allows to take multiple attributes into account and to vary them randomly. This allows for the causal estimation of the relative importance of characteristics used. In this sense, vignette studies do not differ from the field experiments that make use of correspondence testing which randomly changes job applicants' characteristics. Several studies in different fields on various topics have systematically examined the extent to which the hypothetical behavior reported in vignette studies compares to actual behavior in field experiments and presented convincing evidence that is supportive of the validity of the data generated through the use of vignettes (Peabody et al. 2000; Peabody et al. 2004; Eifler 2007; Telser and Zweifel 2007). As we will see in the next section, the age discrimination pattern in our vignette study also closely matches the degree of age discrimination found in field experiments (e.g., Lahey 2008). Due to the supportive evidence which shows that data generated through the use of vignettes resemble closely data generated in field experiments, vignette studies have become widely accepted in fields such as transportation economics, environmental economics (Hensher 1997), research on professional ethics (Taylor

2006), management research (Karpinska et al. 2013a) and in sociology (Karpinska et al. 2013b). Although the use of stated-preferences experiments is still limited in mainstream economics, this research approach is also quickly gaining ground (see, e.g., Barsky et al. 1997; Revelt and Train 1998; Kapteyn et al 2007; Kantarci and Van Soest 2008; Benjamin et al. 2014; Van Soest and Vonkova 2014).

In the vignette study, we presented employers with the hypothetical situation that they need to hire a new employee for the most common job in their organization. We then gave them the choice between two applicants. To make the choice simple and realistic, the applicants differed in three characteristics: 1) their age (35, 45, 55 or 60 years-old), 2) experience in a similar job (no experience, 5 years of experience, or 10 or more years of experience), and 3) the training need to function in the job (no training needed, short training needed to make skills up-to-date, or substantial training needed to make skills up-to-date). See Appendix B for an example of the vignette employers received. It is important to note here that the average retirement age in Netherlands currently is 64 years and 5 months and the eligibility age for the state old age pension is 66 years. Job applicants aged 60 can thus still work for 6 years for prospective employers.

Experience in a similar job is included in the vignette to enable employers to distinguish in their preferences for age and experience. Based on human capital theory and extant empirical evidence we would expect that job experience is considered by the employers as an easily obtainable proxy for constructs like job knowledge, skills acquired on the job, and productivity of the job applicants. Important to mention here is that experience in a similar job does not refer to the total labor market experience of a job applicant. The training need is included to signal to employers whether job applicants have deficiencies in their human capital which constrain them

to carry out the job. Deficiencies in human capital can arise due to, e.g., technical or economic skills obsolescence (De Grip and Van Loo 2002).<sup>5</sup>

Each employer had to choose six times between two applicants. The attributes of the characteristics of the applicants were randomly assigned, thus enabling us to assess the importance of age in the hiring process relative to that of relevant job experience and training needs. We also randomized the ordering in which the attributes were presented to the employers.<sup>6</sup>

## ***2.2 Survey questions***

To identify the role of the personal characteristics of employers in the hiring process, and to elicit how employers' preferences to hire older employees depend on age stereotyping, we gathered information on the basic personal characteristics of the employers (the age, gender, tenure, and the education level of employer). We also asked them to assess the overall productivity of workers in specific age-groups:<sup>7</sup>

*Which mark would you give to the average employee in the following age groups for his / her performance with respect to the different skills mentioned below?*

*35-44 years   45-54 years   55-64-years*

*Overall productivity*        

*Please report on a scale of 1 to 10 where 1 stands for very bad and 10 stands for very good*

---

<sup>5</sup> Technical skills obsolescence refers to the fact that workers lose skills due to aging or atrophy of skills due to insufficient use. Economic skills obsolescence could result from technological and organizational changes that affect the demand for skills, shifts in the sector structure of employment or firm closure.

<sup>6</sup> The randomisation was performed across employers. To avoid confusion employers see the characteristics always in the same order.

<sup>7</sup> All survey questions concerning productivity and wage costs were asked after the vignette experiment to avoid priming employers to think badly about older workers.

We measured in a similar way how employers rate the wage costs of the workers (on a scale from 1 to 10, where 1 stands for very low and 10 stands for very high) in these age groups as well as the performance of workers along five skill dimensions (using the same scale as is used to measure overall productivity). Based on evidence from psychology on the decline of cognitive abilities (e.g., Horn and Cattell 1967; and Salthouse 1985; Wrenn and Maurer 2004) and work place stereotyping (Posthuma and Campion 2009), we make a distinction between 1) *skills related to learning and coping with change and stress* (flexibility, ability to deal with organizational and technological change, ability to deal with stress), 2) *skills related to experience* (experience and professionalism), 3) *problem solving skills*, 4) *supervision skills* (planning of work and supervision), and 5) *communication skills* (communication skills and cooperation with colleagues). Posthuma and Campion (2009) identified, based on an extensive search in PsychINFO and Business Source Complete databases among approximately 7,000 scientific publications on stereotyping, 117 articles that specifically analyzed age stereotyping in the work place and summarized the most commonly observed types of age stereotyping among employers. The five skill dimensions we distinguish here resemble closely the types of age stereotypes defined by Posthuma and Campion (2009). We construct the employer's assessment on the five skills dimensions for each worker age group (*35-44 years 45-54 years 55-64-years*), by taking the average value on all the underlying skills (see Table A4 in the appendix for more details on the skills underlying the five skills dimensions).

### ***2.3 Descriptive statistics***

Table 1 provides descriptive information on the basic characteristics of the organizations and the employers who responded to the survey. 31% of the employers are based in the government sector, 40% in the education sector and 29% in the privatized sector. 23% of the workforce is, on

average, aged 55 years or older. Absenteeism rates and turnover rates in the organizations are 5% and 6% respectively. The HR-departments in the organizations in our estimation sample employ, on average, eight workers. The standard deviation, however, shows that there is considerable variation in the size of the HR departments across the different employers.

We observe that the average employer is 51 years old, more often a male (60%) and is highly educated (63% of all the employers have a higher professional educational degree, while 24% have a university degree). The standard deviation of the age variable is large (8.93) which means that we have enough variation to investigate the impact of employers' age on the hiring behavior. We further observe that employers have, on average, 13 years of tenure within their organization. The fact that most employers have built up considerable experience within their organization implies that it is likely that they have good knowledge about the skills requirements and their own preferences for specific types of workers in their organization and that they have already developed a broad network within their organization, which may help them to exert influence in the hiring process.

Table 2 provides descriptive information on the employers' assessments of wage costs, productivity and the five productivity skill dimensions. We find substantial differences in employers' assessments of the wage costs and productivity of older versus younger workers. In accordance with previous studies (Faley et al. 1984; Kite and Johnson 1988; Finkelstein and Burk 1998; Finkelstein et al. 2000 and Hedge et al. 2006), employers in our sample hold the stereotype that older workers are more costly because they have higher wages. They rate the wage costs of 35-44 years old workers at 6.50 on a scale from 1 to 10 and the wage costs of 55-64 years old at 8.04. There exists a non-linearity in employers' assessments on workers' productivity with age. Employers rate the productivity of 35-44 years old workers and 45-54 years old workers at 7.61 and 7.65 respectively, suggesting that they think that productivity remains rather stable or may

even slightly increase with age in these life cycle stages. However, they rate the overall productivity of workers aged 55-64 years substantially lower (at 7.16). When we look at the underlying productive skills, a more nuanced view appears. Workers in the age group 45-54 years receive the highest grade for problem solving skills, supervision skills and communication skills, while both younger and older workers score lower on these respective skills. Employers' assessments of experience improve linearly with age, while things look very differently for the assessments of learning and coping with change. The latter worsens with age from 7.47 for 35-44 years old to only 6.57 for 55-64 years old. This is consistent with previous studies suggesting that employers hold stereotypes about older workers lower ability to learn, and that older workers therefore have less potential for development (Finkelstein et al. 1995; Wrenn and Mauer 2004; and Hedge et al. 2006).

Mann-Whitney U-Tests show (Column 4 of Table 2) that the differences in the ratings of the 35-44 years and the 56-64 years old are statistically significant for the wage costs, overall productivity and four of the five productivity dimensions. The exception is the problem solving skills for which no statistically significant difference is found.

## ***2.4 Empirical strategy***

We first estimate Linear Probability Models (LPM) in which we relate the likelihood to be hired to the employee characteristics in the stated preferences experiment. Because each employer in the dataset had to choose six times between two applicants, we use a clustered sandwich estimator to allow for intragroup correlation on the individual level (Rogers 1993; Wooldridge 2002). As employers filled in several vignettes, we also include dummy variables in our models that control for the ordering of the vignettes. We further estimated individual fixed effect and conditional logit models to show that the results are robust to the estimation technique used.

Subsequently, we regress the likelihood to be hired while interacting the employee characteristics with those of the employer. This allows us to identify the heterogeneity in age discrimination among employers by age, gender, tenure and education level. We continue with estimating LPMs in which we look more closely at the relationship between the employer characteristics and the employer's stereotypes about older workers wage costs, overall productivity, and underlying productive skills. The main aim is to see to what extent employers' characteristics such as age determine the assessment of wage costs and productivity. Finally, we estimate LPMs on the likelihood to be hired in which we investigate in detail to what extent age stereotypes that are most frequently put forward in the literature are affecting age discrimination in the hiring process, and also look at heterogeneous effects of employer' characteristics and their assessments on wage costs and productivity by including interaction effects.

### **3. Results**

#### ***3.1 Basic result: eliciting age discrimination in the stated preferences experiment***

Table 3 shows the estimation results of our basic model in which we regress the characteristics of the job applicants (age groups, experience, and training need) on the likelihood to be hired. Column 1 presents the results of a LPM, while Columns 2 and 3 presents the marginal effects of a fixed effects analysis and a conditional logit model. The table shows that the hiring propensity strongly differs by age. The hiring propensity of job applicants who are only 45 years old is already 7%-points lower compared to that of applicants who are 35 years old and applicants aged 55 have a 23%-points lower hiring propensity. The strongest decline in the hiring propensity is, however, visible for the oldest applicants. A job applicant who is 60 years old has a 41%-points lower hiring propensity than a job applicant who is 35 years old.



Work experience in a similar job increases the hiring likelihood. Having five years of related work experience increases the hiring likelihood with 25%-points compared to having no work experience. However, the difference in the hiring rate of applicants with 5 or 10 years of experience is negligible. Apparently, having some related work experience works as a stepping stone to being hired, while the number of additional years of experience seems to matter less in the hiring process. Having a substantial training need is a substantial deal breaker. Job applicants who need a long training course to get their skills up-to-date have a 50%-points lower likelihood to be hired. We further observe no substantial differences between the coefficients of the LPM model in Column 1 and the fixed effects model or the conditional logit model in Columns 2 and 3 of Table 3, indicating that the attributes of the characteristics of the applicants were randomly assigned in a proper way and that our estimation results are robust to the use of the different estimation techniques.

Figures 1a and 1b show the hiring propensities based on our LPM estimations. It is immediately clear from the figures that job applicants who are 60 years old have virtually no chance on the labor market, especially when they lack experience or are in need of training. It is, however, particularly striking that for a 60-years-old, having substantial experience cannot compensate for the detrimental effect of age on the likelihood of being hired. Figure 1a shows that the hiring propensity of a 60-years-old with 10 years of experience is still 12%-points lower than for a 35-years-old without any job-relevant experience. The necessity to keep skills up-to-date is emphasized by the pattern displayed in Figure 1b. The likelihood to be hired of a 60-years-old job applicant with a strong training need is 91%-points less than that of an applicant who is 35 years old and who has no training need. However, the hiring propensity is only 41%-points lower when 60-years-old job applicants have no training need. Applicants aged 35 years with a substantial training need have a 50%-points lower hiring propensity compared to

applicants with the same age who have no substantial training need. Continuous human capital investments thus significantly contribute to relatively improving the labor market position of older job applicants.

We also performed analyses in which we interact all job applicants' characteristics with each other (shown in Table A2 of Web Appendix A). We get similar results, but also observe that 60-years-old job applicants with 10 years of experience have an 38.5%-point higher propensity to be hired compared to 60-years-old job applicants with no job related experience. Yet this positive effect of experience cannot fully compensate the negative main effect of age (coefficient = -.509) Table A2 furthermore shows that training needs decrease the likelihood to be hired, but also that the decrease is smaller for older workers with no job related experience than for older workers with job related experience. This result hints at the possibility that a substantial training need of experienced job applicants signals to employers that these applicants have been subject to considerable skills obsolescence which constrains them to carry out the job but may also limit them to re-acquire the appropriate skills needed for the job.

### ***3.2 Employers' characteristics and the hiring propensity***

The hiring propensity of older job applicants may differ substantially between different types of employers. For example, it could be the case that discrimination is stronger when employers themselves belong to younger age groups and less strong when employers have an age similar to that of the job applicant (Karpinska et al. 2013b). Such behavior would be consistent with the results of several studies on race discrimination which show that in the United States, black job applicants are hired at a greater rate by establishments with black hiring agents than by those with white hiring agents (Carrington and Troske 1998; Raphael et al. 2000; Stoll et al. 2004). To test this conjecture, we combine the data from the vignette study and the employer's survey and

proceed by examining to what extent the hiring propensity of older job applicants is related to basic employer characteristics such as the employer's own age, gender, and experience. We divide the age of the employer in four age groups that mirror the age categories of the job applicants in our vignette study: 35 years and younger, 36-45 years, 46-55 years, and 56 years and older.

Table 4 shows the estimation results in which we interact these basic employer characteristics with the characteristics of the job applicants. The hiring propensity of older job applicants depends significantly on the age of the employer. Job applicants aged 60 years have a 10%-points higher probability of being hired when the employer him-/herself is 56 years or older, compared to when the employer is 35-years old or younger.<sup>8</sup> Nevertheless, a 60-year old applicant is still less likely to be hired than a 35-year old applicant, even when the employer is 56 years or older. Figure 2 depicts this interaction effect graphically. The figure shows that heterogeneity in the hiring propensity of older applicants is mostly driven by the behavior of employers aged 35 or younger. In particular this group of employers tends to favor job applicants who are in the same age group to which they themselves belong, at the cost of the oldest age group.

The table further shows that employers with more experience are less likely to hire older job applicants. The interaction effect between employers' experience and employees' age is, however, not robust to alternative model specifications (results available on request). We also find a statistically weak significant interaction effect between the employer's gender and the dummy indicating that the job applicant is 60 years suggesting that male employers seem to discriminate older job applicants slightly more than do female employers.

---

<sup>8</sup> Table A8 shows that the significant age interaction effects are present in the government and the privatized sector. This implies that the results do not have a limited explanatory power for the government sector, but can be generalized to the private sector. We do not, however observe a significant interaction effect in the education sector.

The impact of the employer's age on age hiring outcomes will depend in part on his/her position within the establishment. We could expect that the age of hiring agents in particular leads to age discrimination in the hiring procedure when they exercise more influence on this process or are more likely to work with the job applicant after he/she is hired. We therefore have replicated the estimations for small and large organizations separately. The idea behind this analysis is that in particular employers of smaller organizations will see new hires more often and may be less bounded by organizational protocol and HR departments that can interfere with their own personal preferences and potentially has affected their answers in the vignette study. Table A7 shows, however, that the age interaction effect is present in both small and large organizations.

There are several potential avenues discussed in the literature by which the age of the employer can affect the age of hires (Stoll et al. 2004). First, when making hiring decisions employers may rely on social networks. It is likely that the age composition of these networks depends on the own age of the employer. Second, older applicants may self-select in organizations that have an older labor force. Older job applicants may take into account a priori the likelihood of being treated fairly in the application process which can imply that they would first apply to firms where they may face less discrimination, i.e. firms in which older workers more often hold positions of authority. Third, the age of the hiring agent may directly influence age preferences when they get disutility from working with individuals with different ages. If such preferences affect hiring outcomes, younger employers are more likely to discriminate against (or less likely to discriminate in favor of) older applicants than older employers. In case of our stated preferences experiment we can rule out the first two mechanisms. After all, the job applicants in the vignettes were anonymous which limits the usefulness of social networks. Additionally, since employers were confronted in the vignettes with a situation in which job

applicants with different ages applied for the job we can rule out that self-selection by hires is driving our results.

### ***3.3 Employers' assessments of wage costs, productivity, and underlying productive skills***

The finding that age discrimination is less prevalent when employers themselves are older leads us to question how the preferences of employers for older versus younger job applicants are formed? We pursue our analyses by inventorying whether employer's assessments on the wage costs, productivity and underlying productive skills of older workers differ with their own age.

Table 5 presents the results of LPMs in which we relate employers' characteristics to their relative assessment of older workers' wage costs, productivity and underlying productive skills. As already became clear from the descriptive statistics in Table 3, both young and old employers think that the wage costs of older workers are higher. We further do not find any significant effect of employers' age on the assessment of the wage costs. This is, however, not the case for the assessments on productivity. Both young and old employers assess that productivity declines with age, but employers who are 56 years and older are more positive about older workers' productivity than employers who are 35 years or younger: a one standard deviation increase in the relative rating among employers aged 56 years and older increases the hiring propensity with approximately 4%-points. This result is at odds with previous empirical evidence in the field which typically reveals little or no systematic relation of age with measures of job performance (e.g., Rhodes 1983; Hunter and Hunter 1984; Waldman and Avolio 1986; Davies and Sparrow 1988; McEvoy and Cascio 1989; Hunter and Schmidt 1998; Sturman 2003; Cardoso et al. 2011; Börsch-Supan and Weiss 2013). When we consider the underlying productive skills, however, we

observe a more nuanced view of employers on the productive skills of older workers.<sup>9</sup> Older workers get a better assessment from both young and old employers when it concerns experience, while both groups of employers give a significantly worse assessment of older worker's skills related to learning and coping with change, and a slightly worse assessment of their problem solving, supervision and communicative skills compared to younger workers.

Older employers give significantly higher grades to the supervision skills and the communication skills of older workers relative to younger workers. The difference in the assessment of the relative overall productivity of young and older workers by both groups of employers is therefore likely mainly driven by the difference in how they think about these two particular different productivity dimensions.<sup>10</sup>

### ***3.4 Employers' characteristics, assessments of wage costs, productivity and underlying productive skills, and the hiring propensity***

To what extent can the relative hiring propensities of older job applicants be explained by frequently documented age stereotypes that older workers are less productive and are more costly because they are paid higher wages? And do the differences in the age stereotypes of younger and older employers explain the age interaction effect on the hiring propensity which we observed in Table 4?

Table 6 presents the results of LPMs in which we use the combination of the vignette study and the employer's survey data to establish the extent to which the hiring propensity of older job applicants is related to employers' assessments of older workers' relative wage costs

---

<sup>9</sup> Table A4 shows the estimations on the underlying individual skill measures which are used to construct the five aggregated productive skill dimensions used in Table 4.

<sup>10</sup> Table A3 in Web Appendix provides more descriptive evidence on the average assessments of workers in different age groups by age group of the employers and shows that the standard deviation of the wage costs assessments is not larger for younger employer groups. The same holds for the productivity assessments.

and productivity. In case age discrimination is predominantly caused by wage costs and productivity concerns, we would expect that controlling for the employers' assessments would reduce the size of the age coefficients as we then estimate the age effect holding assessments on productivity and wage costs constant. The estimation results in Column 1 indicate that a positive assessment of older workers relative productivity is indeed an important indicator. Employers' assessments of older workers' relative productivity and wage costs affect the hiring probability largely in the expected way. Employers who judge more positively about the productivity of workers aged 55-64 years relative to 35-44-years-old workers are more likely to hire older workers. A one standard deviation increase in the assessment of older workers' productivity relative to younger workers' productivity decreases the hiring propensity of 35 years old job applicants with 3.0%-points, while it increases the relative hiring propensity of 60 years old job applicants with 1.5%-points. However, controlling for productivity only marginally decreases the age coefficients. Columns 2 and 3 in the table show that the same holds when we control for employers' assessments on wage costs. After jointly controlling for productivity and wage costs assessments, the hiring propensity of applicants aged 60 remains 35.7%-points lower than for the 35 years old. This corresponds to a drop of only 1.2%-points compared to the coefficient of the hiring propensity of 60 years old in our basic estimation in Column 1 of Table 3. From this result we can conclude that well-known age stereotypes among employers thus explain only a small part of the age discrimination in hiring decision.

Table 7 finally presents the estimation results of the model in which we simultaneously include the characteristics of the job applicants and the employers' personal characteristics, their interactions and employers' assessments of their workers' wage costs and productivity. We find that the significant interaction effect between the ages of the job applicant and the employer does not disappear when we control for employers' assessments of productivity and wage costs. In our

setting we thus find no evidence that employers' stereotypes of older workers are important determinants for the differences in young and old employer's preferences for hiring job applicants in specific age groups.<sup>11,12</sup>

### ***3.5 Labor and health costs***

Employers' assessments of workers wage costs and productivity do not explain away the significant negative interaction effect between employers' age and the age of the job applicant, thereby ruling out the two most frequently mentioned reasons why age discrimination takes place. A potential caveat, however, could be that employing older workers may involve higher labor costs which are not part of the standard wage costs. Non-wage labor costs, for example, can include social security and insurance contributions, labor taxes and other costs related to employing someone such as applying additional HR-instruments to enable employees to stay productive at a later age. Moreover, the productivity assessments do not incorporate potential health risks involved with employing older workers which endanger future productivity. We have therefore repeated our analyses in which we include dummy variables that capture whether or not employers agree to statements in the survey that older workers are more expensive or involve more health risks. Table 8 shows that the inclusion of these alternative measures does not change our main result that older employers are more likely than young employers to hire older job applicants.<sup>13</sup>

---

<sup>11</sup> Tables A9 and A10 in Web Appendix A furthermore show that this result is robust to the inclusion of triple interaction effects between the age of the employer, their assessments on workers wage costs and productivity, and the job applicant's age. Older employers who think more positively about the wage costs or productivity of older workers do not more often hire older job applicants than younger employers who have positive assessments.

<sup>12</sup> Table A5 in Web Appendix A shows that the results do not change when we replace our productivity indicator with the five productive skills dimensions.

<sup>13</sup> Table A6 shows that older employers do not think differently about labor costs or health risks than younger employers.



### ***3.6 Ageing work force and discrimination***

Age discrimination may occur when organizations aim at diversity at the workplace and simultaneously experience a strong ageing of their work force. In that case, the work force composition is an attenuating circumstance which may (partly) justify and be an important driver behind age discrimination. We tested the extent to which the work force age composition has an impact on the age discrimination in our stated preferences experiment by matching our data to an administrative dataset of the Dutch public sector's pension fund with the number of employees by age for each organization. This allows us to calculate the organization's share of employees aged 55 years and older. We subsequently performed heterogeneity analyses in which we interacted our all job applicants' characteristics with the work force share of employees aged 55 years and older. We found no evidence that our main results are heterogeneous with the age composition of organizations' work forces.

## **4. Discussion and conclusion**

This paper makes use of a vignette study to investigate the relationship between a job applicant's age and employer's willingness to hire older workers. The focus is on the extent to which the hiring propensity of older job applicants is related to employers' assessments of older workers' wages, productivity and productive skills, and personal characteristics such as the employer's own age, gender, and experience.

Our results indicate that the probability of being hired decreases substantially with the age of the job applicant. Other things equal, a 60-year-old job applicant has a 41%-points lower probability of being hired compared to a 35-year-old applicant. Having 10 years of related work experience increases the hiring probability by 29%-points relatively to applicants with no experience, while substantial training needs decrease the hiring probability with 53%-points.

Importantly, our analyses show that older workers cannot compensate their lower hiring probability by offering relevant work experience. Our estimates show that the hiring probability of older job applicants depends significantly on the age of the employer. Job applicants aged 60 years have a 10%-points higher probability of being hired when the employer him-/herself is 56 years or older, compared to when the employer is 35 years or younger. Nevertheless, 60-years-old job applicants are less likely to be hired than younger applicants, even when the employer is 56 years or older. We furthermore find that the employers' assessments of older workers' relative productivity, wage costs and skills affect the hiring propensity in the expected way. Employers who are more negative about the relative wage costs and productivity of older workers are less likely to hire older job applicants. Nevertheless, the sizes of the coefficients that measure age discrimination in the hiring process hardly change when we control for these assessment in our model. We further find that younger employers judge more negatively about the productivity of workers aged 55-64 years relative to that of younger workers and are therefore more likely to discriminate against older job applicants. This holds in particular for the assessment of supervision and communication skills. The significant interaction effect between the age of the job applicant and that of the employer in the estimations on the hiring propensity does, however, not disappear when we control for these assessments. Well-known age stereotypes among employers thus explain only a small part of the age discrimination in hiring decision.

The evidence provided by this paper highlights the importance of demand-side barriers to the odds of employment of older job seekers. Because the demand for labor from older workers seems to be smaller than that for younger workers, it is unlikely that major pension reforms that have been implemented by the large majority of industrialized countries in the past decades, will guarantee that older job seekers will be able to find employment. Public policies that depend on older people finding work to maintain their quality of living and working life therefore need to

consider this demand side and the taste-based discrimination by employers. Since productivity and wage concerns only marginally impact age discrimination in the hiring process, more research in the economic literature is needed to establish how preferences towards older versus job applicants are formed.

Despite the fact that many organizations, both public and private, do advocate the recognition of workforce diversity as a core corporate value, the inclusion of the terms ‘older worker’ and ‘younger worker’ into discussions on this topic is uncommon (Finkelstein et al. 1995). Because older and younger job applicants are not perfect substitutes due to differences in cognitive and non-cognitive skills and experience, a focus on age diversity can be socially and economically important for employers. In this context, the evidence provided in this paper highlights the role of the employer’s own age in establishing age diversity within their organization. The fact that the hiring probability of older job applicants crucially depends on the age of the employer, shows that it is important to strive for policies aimed a balanced age distribution of hiring officers within organizations.

## **References**

- Adams, Scott J. 2002. “Passed Over for Promotion Because of Age: An Empirical Analysis of the Consequences.” *Journal of Labor Research*, Vol. 23, pp. 447-61.
- Adams, Scott J. 2004. “Age Discrimination Legislation and the Employment of Older Workers.” *Labour Economics*, Vol. 11, pp. 219-41.
- Arceo-Gomez, E.O., and R.M. Campos-Vazquez (2014). Race and Marriage in the Labor Market: A Discrimination Correspondence Study in a Developing Country. *American Economic Review*, 104: 376-80.

- Barsky, R. B., Juster, F. T., Kimball, M. S. and Shapiro, M. D. (1997) Preference parameters and behavioral heterogeneity: An experimental approach in the health and retirement study. *Quarterly Journal of Economics*, 537–579.
- Becker, G. (1957). *The economics of discrimination*, The University of Chicago Press, Chicago.
- Bertrand, M., and S. Mullainathan, S. (2004). Are Emily and Brendan more employable than Latoya and Tyrone? Evidence on racial discrimination in the labor market from a large randomized experiment.” *American Economic Review*, Vol. 94, 991-1013.
- Bendick, M., Jr., Brown, L.E. and K. Wall (1999). “No Foot in the Door: An Experimental Study of Employment Discrimination Against Older Workers.” *Journal of Aging & Social Policy*, Vol. 10, pp. 5-23.
- Bendick, M., Jr., Jackson, C.W., and J. H. Romero. 1996. “Employment Discrimination Against Older Workers: An Experimental Study of Hiring Practices.” *Journal of Aging & Social Policy*, Vol. 8, pp. 25-46.
- Benjamin D.J., & Heffetz, O., & Kimball, M., and N. Szembrot (2014). " Beyond Happiness and Satisfaction: Toward Well-Being Indices Based on Stated Preference," *American Economic Review*, Vol. 104(9), pages 2698-2735, September.
- Börsch-Supan, A.H. (2012). *Entitlement reforms in Europe: policy mixes in the current pension reform process*. No. w18009. National Bureau of Economic Research.
- Börsch-Supan, A.H. and Weiss, M. (2013). *Productivity and age: Evidence from work teams at the assembly line*, ROA Research Memorandum 009 009, Maastricht University, Research Centre for Education and the Labour Market (ROA).
- Bulow, J. I., & Summers, L. H. (1986). A theory of dual labor markets with application to industrial policy, discrimination, and Keynesian unemployment. *Journal of labor Economics*, 4(3, Part 1), 376-414.

- Cardoso, A.R., Guimarães, P., Varejão, J. (2011). Are Older Workers Worthy of Their Pay? An Empirical Investigation of Age-Productivity and Age-Wage Nexuses, *De Economist*, Volume 15, 95-111.
- Carrington, W.J., and K.R. Troske. 1998. "Interfirm Segregation and the Black/White Wage Gap." *Journal of Labor Economics*, Vol. 16, No. 2 (April), pp. 231-60.
- Chiu, W.C.K., Chan, A.W., Snape E., and T. Redman (2001) "Age stereotypes and discriminatory attitudes towards older workers: An East-West comparison" *Human Relations*, 54(5):629-661.
- Dalen, H. van, Henkens, C. & Schippers, J. (2009). *Unraveling the age-productivity nexus: Confronting perceptions of employers and employees*. CentER Discussion Paper, 2009, 1-31.
- Davies D.R., and P.R., Sparrow (1988). Effects of age, tenure, training, and job complexity on job performance. *Psychol Aging*, Vol. 3, 307–14.
- De Grip, A., and J. van Loo (2002). The Economics of Skills Obsolescence: A Review, in: A. de Grip, J. van Loo and K. Mayhew (Eds.), *The Economics of Skills Obsolescence*, *Research in Labor Economics*, vol. 21, JAI Press, 2002, 1-26.
- Eifler, S. (2007). "Evaluating the Validity of Self-reported Deviant Behavior Using Vignette Analyses." *Quality & Quantity*, Vol. 41:303-18.
- Evans, E. (2012). *Eye Tracking Online Metacognition: Cognitive Complexity and Recruiter Decision Making*. The Ladders report.
- Faley, R. H., Kleiman, L. S., & Lengnick-Hall, M. L. 1984. Age discrimination and personnel psychology: A review and synthesis of the legal literature with implications for future research. *Personnel Psychology*, 37: 327-350.

- Finkelstein, L. M., and M.J. Burke (1998). Age stereotyping at work: The role of rater and contextual factors on evaluations of job applicants. *Journal of General Psychology*, 125, 3 17-345.
- Finkelstein, L. M., Higgins, K. D., & Clancy, M. 2000. Justifications for ratings of old and young job applicants: An exploratory content analysis. *Experimental Aging Research*, 26: 263-283.
- Finkelstein, L. M., Burke, M. J., and N.S. Raju (1995). Age discrimination in simulated employment contexts: An integrative analysis. *Journal of Applied Psychology*, 85,652-663.
- Green, F., and D. James (2003). Assessing skills and autonomy: the job holder versus the line manager, *Human Resource Management Journal*, Vol. 13, 63-77.
- Gruber, J., & Wise, D. (1998). Social security and retirement: An international comparison. *American Economic Review*, 88(2), 158-163.
- Hirsch, B.T., Macpherson, D.A., and Melissa Hardy (2000). "Occupational Age Structure and Access for Older Workers." *Industrial and Labor Relations Review*, Vol. 53, pp. 401-18.
- Hedge, J. W., Borman, W. C., and Lammlein, S. E. 2006. *The aging workforce: Realities, myths, and implications for organizations*. Washington, DC: American Psychological Association.
- Henkens, K. (2005). Stereotyping older workers and retirement, the managers' point of view, *Canadian Journal on Aging*, 35-48.
- Hensher, D.A. (1997). Behavioral Value of Travel Time Savings in Personal and Commercial Automobile Travel, in Greene, D., Jones, D. and Delucchi, M. (eds.) *The Full Costs and Benefits of Transportation*, Springer-Verlag, Berlin, 245-280.

- Horn, J.L., and R.B. Cattell (1967). Age differences in fluid and crystallized intelligence. *Acta Psychologica*, 26, 107–129.
- Hunter J., Hunter R. (1984). Validity and utility of alternate predictors of job performance. *Psychol Bull* Vol. 96,72–98.
- Hunter J., Schmidt F.L (1996). Intelligence and job performance: economic and social implications. *Psychol Public Policy Law*. Vol. 2, 447–72.
- Hutchens, R. (1986). Delayed payment contracts and a firm's propensity to hire older workers. *Journal of labor economics*, 4(4), 439-457.
- Hutchens, Robert M (1988). “Do Job Opportunities Decline with Age?” *Industrial and Labor Relations Review*, Vol. 42, pp. 89-99.
- Johnson, R.W. and D. Neumark (1997). Age Discrimination, Job Separations, and Employment Status of Older Workers: Evidence from Self-Reports, *Journal of Human Resources*, University of Wisconsin Press, vol. 32(4), pages 779-811.
- Kangas, O., Lundberg, U., & Ploug, N. (2010). Three routes to pension reform: Politics and institutions in reforming pensions in Denmark, Finland and Sweden. *Social Policy & Administration*, 44(3), 265-284.
- Kantarci, T., & Van Soest, A. (2008). Gradual retirement: preferences and limitations. *De Economist*, 156(2), 113-144.
- Kapteyn, A., Smith, J. P. and A. Van Soest (2007). Vignettes and self-reports of work disability in the United States and the Netherlands. *American Economic Review*, 97, 461–473.
- Karpinska, K., Henkens, K., & Schippers, J. (2013a). Hiring retirees: impact of age norms and stereotypes. *Journal of Managerial Psychology*, 28(7/8), 886-906.
- Karpinska, K., Henkens, K., & Schippers, J. (2013b). Retention of older workers: Impact of managers' age norms and stereotypes. *European Sociological Review*, 29(6), 1323-1335.

- Kite, M. E., & Johnson, B. T. 1988. Attitudes toward older and younger adults: A meta-analysis. *Psychology and Aging*, 3: 233-244.
- Kite, M.E., Stockdale, G.D., Whitley Jr., B.E. and B.T. Johnson (2005). "Attitudes Toward Younger and Older Adults: An Updated Meta-Analytic Review." *Journal of Social Issues*, Vol. 61, pp. 241-66.
- Kuhn, P., and K. Shen (2013). Gender Discrimination in Job Ads: Evidence from China, *Quarterly Journal of Economics*, Vol. 128, 287-336
- Lahey, J. (2008). Age, Women, and Hiring. *Journal of Human Resources*, University of Wisconsin Press, vol. 43, 30-56
- Levitt, S. (2004). "Testing Theories Of Discrimination: Evidence From Weakest Link." *Journal of Law and Economics*, 2004, 47(2), 431-452.
- Lin, T. R., Dobbins, G. H., & Farh, J. L. 1992. A field study of race and age similarity effects on interview ratings in conventional and situational interviews. *Journal of Applied Psychology*, 77: 363-371.
- Mastrobuoni, G. (2009). Labor supply effects of the recent social security benefit cuts: Empirical estimates using cohort discontinuities. *Journal of Public Economics*, 93(11), 1224-1233.
- McEvoy G.M., Cascio W.F. (1989). Cumulative evidence of the relationship between employee age and job performance. *Journal of Applied Psychology*, Vol. 74, 11–17.
- McFadden, D., Bemmaor, A., Caro, F., Dominitz, J., Jun, B., Lewbel, A., Matzkin, R., Molinari, F., Schwarz, N., Willis, R., and J. Winter (2005): Statistical Analysis of Choice Experiments and Surveys, *Marketing Letters*, Vol. 16, 183–196.
- Neumark, D., and J. Song (2012). "Barriers to Later Retirement: Increases in the Full Retirement Age, Age Discrimination, and the Physical Challenges of Work", *Michigan Retirement*



*Research Centre* working paper wp265, University of Michigan, Michigan Retirement Research Center.

Neumark, D. (2012). "Detecting Discrimination in Audit and Correspondence Studies," *Journal of Human Resources*, Vol. 47. 1128-1157.

Peabody, J., J. Luck, P. Glassman, T. Dresselhaus, and M. Lee (2000). "Comparison of Vignettes, Standardized Patients, and Chart Abstraction: A Prospective Validation Study of 3 Methods for Measuring Quality." *Journal of the American Medical Association* 283:1715-722.

Peabody, J., F. Tozija, J. Muñoz, R. Nordyke, and J. Luck (2004). "Using Vignettes to Compare the Quality of Clinical Care Variation in Economically Divergent Countries." *Health Services Research* Vol. 39, 1951-970.

Posthuma, R. A., & Campion, M. A. (2008). Age stereotypes in the workplace: Common stereotypes, moderators, and future research directions. *Journal of management*. Vol. 35, 158-188.

Raphael, Steven, Michael A. Stoll, and HarryJ. Holzer. 2000. "Are Suburban Firms More Likely to Discriminate against African Americans?" *Journal of Urban Economics*, Vol. 48, No. 3, pp. 485-50

Revelt, D. and Train, K. (1998) Mixed logit with repeated choices: Household choices of appliance efficiency level. *Review of Economics and Statistics*, 80, 647–657.

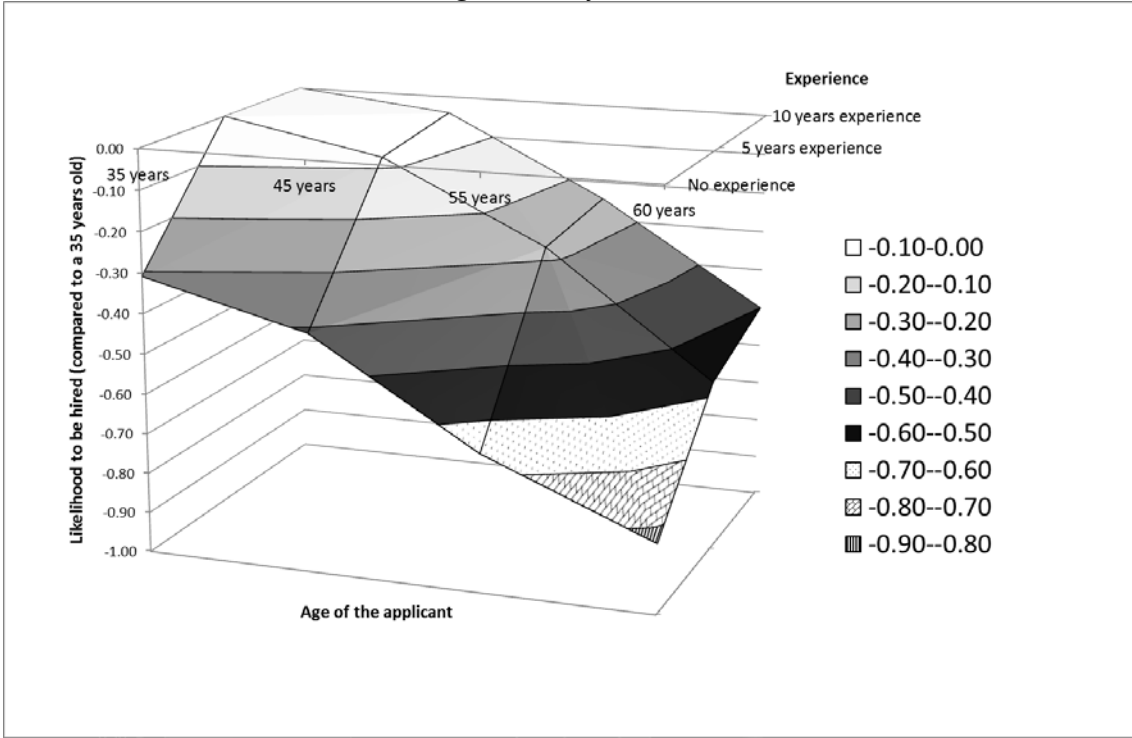
Riach, P. A., and J. Rich (2002). "Field Experiments of Discrimination in the Market Place." *Economic Journal*, Vol. 112, pp. F480-F518.

Rhodes SR. (1983). Age-related differences in work attitudes and behavior: a review and conceptual analysis. *Psychol Bull*, Vol. 93, 328–67.

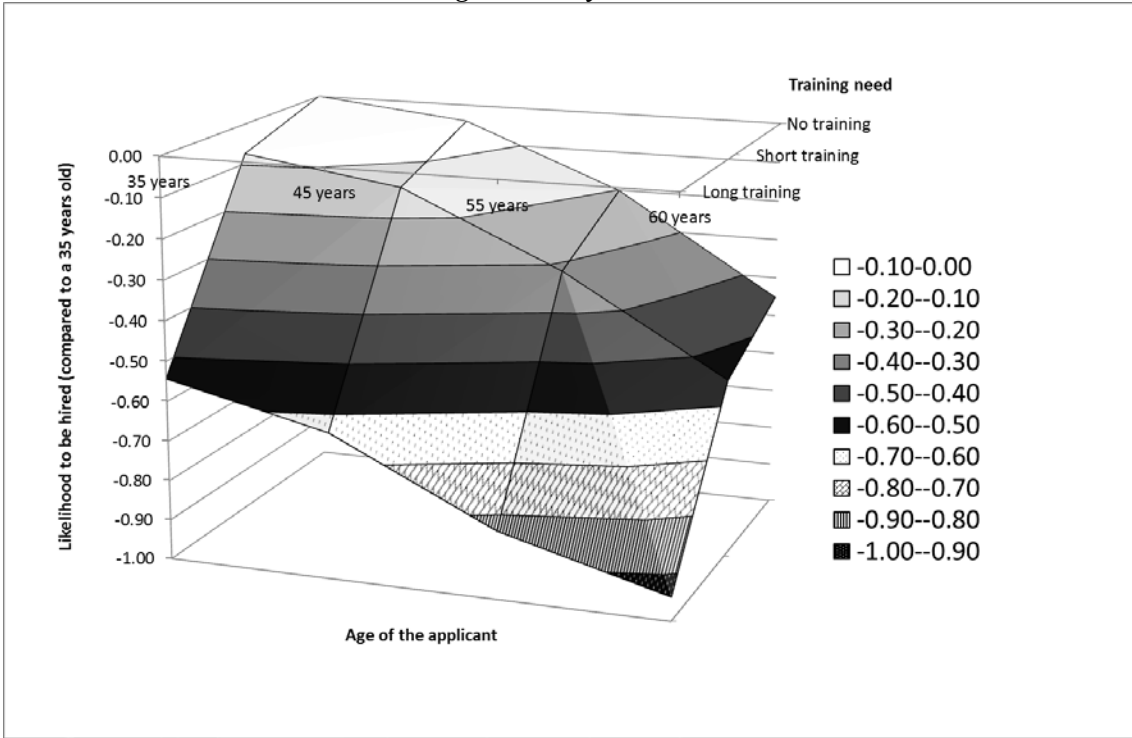
- Rogers, W.H. (1993). Regression standard errors in clustered samples. *Stata Technical Bulletin*, Vol. 13, 19-23.
- Rubineau, B., and Kang, Y. (2012). Bias in white: A longitudinal natural experiment measuring changes in discrimination, *Management Science*, 58, 660-677.
- Rubinstein, Y., and D. Brenner (2014). Pride and Prejudice: Using Ethnic-Sounding Names and Inter-Ethnic Marriages to Identify Labour Market Discrimination, *Review of Economic Studies*, Vol. 81, 389-425
- Ruffle, B.J., and Z. Shtudiner (2015) Are Good-Looking People More Employable?. *Management Science*, Vol. 61, 1760-1776.
- Saks, A. M., & Waldman, D. A. 1998. The relationship between age and job performance evaluations for entry-level professionals. *Journal of Organizational Behavior*, 19: 409-419.
- Salthouse, T.A. (1985). *Speed of behavior and its implications for cognition*. In: Birren, J.E. (Ed); Schaie, K. Warner (Ed), *Handbook of the psychology of aging* (2nd ed.). The handbooks of aging., (pp. 400-426). New York, NY, US: Van Nostrand Reinhold.
- Salthouse, T.A. (2012). Consequences of age-related cognitive declines. *Annual Review of Psychology*, 63: 201-226.
- Stoll, M. A., Raphael, S., and H.J. Holzer (2004). Black job applicants and the hiring officer's race. *ILR Review*, 57(2), 267-287.
- Staubli, S., & Zweimüller, J. (2013). Does raising the retirement age increase employment of older workers?. *Journal of Public Economics*, 108, 17–32.
- Sturman M.C. (2003). Searching for the inverted U-shaped relationship between time and performance: meta-analyses of the experience/performance, tenure/performance, and age/performance relationships. *Journal of Management*. Vol. 29, 609–40.

- Telser, H., and P. Zweifel, (2007). “Validity of Discrete-Choice Experiments Evidence for Health Risk Reduction.” *Applied Economics* Vol. 39. 69-78.
- U.S. Equal Employment Opportunity Commission (2014), Data compiled by the Office of Research, Information and Planning from data reported via the quarterly reconciled Data Summary Reports and compiled from EEOC's Charge Data System and, from FY 2004 forward, EEOC's Integrated Mission System, Washington, DC.
- Van Soest, A., & Vonkova, H. (2014). How sensitive are retirement decisions to financial incentives? A stated preference analysis. *Journal of Applied Econometrics*, 29(2), 246-264.
- Van Haaften, M., (2014). *Discriminatie op de arbeidsmarkt. Rapport over klachten gemeld bij Antidiscriminatievoorzieningen in Nederland*, Bureau voor Discriminatiezaken Kennemerland.
- Waldman D.A, Avolio B.J. (1986). A meta-analysis of age differences in job performance. *Journal of Applied Psychology*, Vol. 71,33–38.
- Wooldridge, J.M. (2002). *Econometric analysis of cross section and panel data*, Cambridge, MA: MIT Press.
- Wrenn, K. and T. Maurer (2004). “Beliefs about older workers' learning and development behavior in relation to beliefs about malleability of skills, age-related decline and control”, *Journal of Applied Social Psychology*, Vol. 34 No. 2, pp. 223-42.

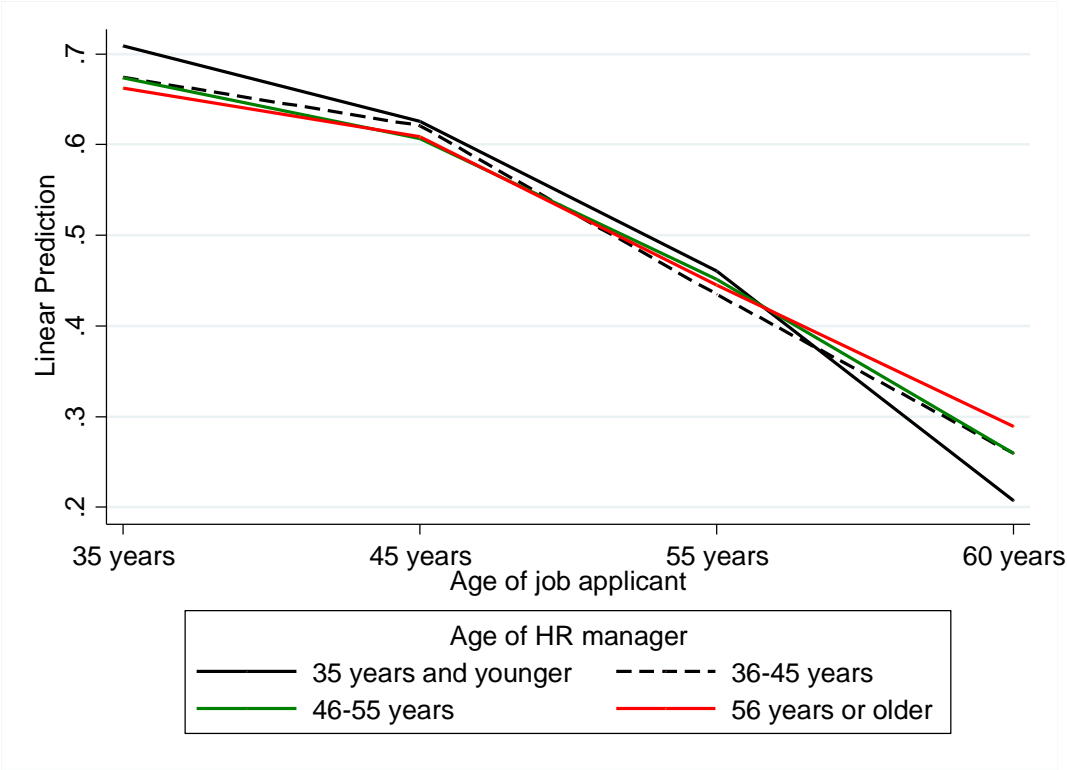
**Figure 1a**  
Likelihood to be hired based on the vignette study



**Figure 1b**  
Likelihood to be hired based on the vignette study



**Figure 2**  
*Likelihood to be hired depending on the age of the employer*



**Table 1**

***Descriptive statistics: Organization and Personal characteristics of employers***

<b>Employers characteristics</b>	<b>Mean</b>	<b>St.dev</b>
<b><i>Organization characteristics</i></b>		
Government sector	0.31	0.46
Education sector	0.40	0.49
Privatized sector	0.29	0.45
Workers with a permanent contract	87.77	14.65
Size of the HR-department	7.66	21.6
Absenteeism	5.34	4.12
Turnover share	5.83	5.87
Workforce share 55 years and older	0.23	0.13
<b><i>Personal characteristics of employers</i></b>		
Age	50.68	8.93
Gender (male is 1)	60.29	0.49
Tenure	12.74	11
Higher professional education level	0.63	0.48
University level	0.24	0.42

Sample means, standard deviations in parentheses.

**Table 2**  
**Descriptive statistics: employers assessments of worker age groups**

	35-44 years old	45-54 years old	54-64 years old	P-value Mann Whitney U test (difference 35- 44 years-54-64 years old)
<b>Employers assessments</b>				
Wage costs	6.50 (1.13)	7.41 (1.00)	8.04 (1.21)	0.000***
Productivity	7.61 (0.85)	7.65 (0.75)	7.16 (0.96)	0.000***
Learning and coping with change	7.47 (0.76)	7.16 (0.71)	6.57 (0.89)	0.000***
Problem solving	7.28 (0.89)	7.49 (0.78)	7.33 (0.95)	0.175
Experience	7.28 (0.70)	7.70 (0.60)	7.73 (0.75)	0.000***
Supervision skills	7.09 (0.80)	7.45 (0.71)	7.36 (0.82)	0.000***
Communicative skills	7.36 (0.71)	7.41 (0.62)	7.26 (0.76)	0.001***

Sample means, standard deviations in parentheses.

**Table 3**  
**Basic results: age discrimination in the stated preferences experiment**

Likelihood to be hired	(1) LPM	(2) Fixed effects	(3) Conditional logit model
45 years (35 years = ref.)	-0.065*** (0.011)	-0.069*** (0.012)	-0.073*** (0.011)
55 years	-0.230*** (0.012)	-0.245*** (0.013)	-0.236*** (0.010)
60 years	-0.405*** (0.012)	-0.431*** (0.013)	-0.368*** (0.008)
5 years of experience (no experience = ref.)	0.245*** (0.011)	0.257*** (0.012)	0.213*** (0.010)
10 years of experience	0.271*** (0.012)	0.285*** (0.012)	0.239*** (0.010)
Short training necessary (no training necessary = ref.)	-0.096*** (0.011)	-0.101*** (0.011)	-0.103*** (0.010)
Long training necessary	-0.502*** (0.011)	-0.526*** (0.012)	-0.410*** (0.009)
Vignette ordering fixed effects	Yes	-	Yes
Constant	0.704*** (0.013)	0.715*** (0.013)	
Observations	12,848	12,848	12,848
R-squared	0.347	0.365	0.358

OLS estimates including robust standard errors corrected for clustering on the individual level in parentheses in Column 1. Column 2 presents fixed effects results. Column 3 reports the marginal effects from a conditional logit model. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1



**Table 4**  
**Employers' characteristics interacted with age of the applicant**

Likelihood to be hired	(1)	(2)	(3)
45 years (35 years = ref.)	-0.065*** (0.011)	-0.082** (0.038)	-0.067* (0.040)
55 years	-0.230*** (0.012)	-0.219*** (0.047)	-0.203*** (0.048)
60 years	-0.405*** (0.012)	-0.457*** (0.039)	-0.434*** (0.040)
Age of the HR manager 36-45 years (35 years or younger = ref.)		-0.117** (0.051)	-0.110** (0.051)
Age of the HR manager 46-55 years		-0.049 (0.048)	-0.047 (0.049)
Age of the HR manager 56 years and older		-0.059 (0.050)	-0.051 (0.051)
45 years * age of the HR manager 36-45 years		0.029 (0.046)	0.028 (0.046)
45 years * age of the HR manager 46-55 years		0.007 (0.043)	0.013 (0.044)
45 years * age of the HR manager 56 years and older		0.016 (0.046)	0.032 (0.047)
55 years * age of the HR manager 36-45 years		0.013 (0.054)	0.009 (0.054)
55 years * age of the HR manager 46-55 years		0.026 (0.052)	0.027 (0.052)
55 years * age of the HR manager 56 years and older		0.026 (0.055)	0.035 (0.055)
60 years * age of the HR manager 36-45 years		0.093* (0.048)	0.088* (0.048)
60 years * age of the HR manager 46-55 years		0.085* (0.045)	0.089** (0.045)
60 years * age of the HR manager 56 years and older		0.121** (0.048)	0.135*** (0.050)
Tenure in the firm		-0.000 (0.001)	-0.000 (0.001)
45 years * tenure		0.000 (0.001)	0.000 (0.001)
55 years * tenure		-0.002* (0.001)	-0.002* (0.001)
60 years * tenure		-0.003** (0.001)	-0.003** (0.001)
Gender (male = 1)			0.004 (0.028)
45 years * gender			-0.034 (0.025)
55 years * gender			-0.028 (0.027)
60 years * gender			-0.050* (0.027)
Constant	0.704*** (0.013)	0.770*** (0.042)	0.763*** (0.044)

Observations	12,848	12,254	12,016
--------------	--------	--------	--------

OLS estimates including robust standard errors corrected for clustering on the individual level in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

**Table 5**

***Employers' characteristics and their relative assessment of older workers' productivity and wage costs***

VARIABLES	Wage costs	Productivity	Underlying productive skill dimensions				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
			Learning and coping with change	Problem solving	Experience	Supervision skills	Communicative skills
Age of the HR manager 36-45 years (35 years or younger = ref.)	-0.178 (0.202)	0.038 (0.150)	0.111 (0.143)	0.005 (0.163)	0.011 (0.130)	0.159 (0.123)	0.131 (0.113)
Age of the HR manager 46-55 years	0.113 (0.192)	0.131 (0.143)	0.092 (0.135)	0.070 (0.155)	-0.003 (0.124)	0.291** (0.117)	0.190* (0.107)
Age of the HR manager 56 years and older	0.241 (0.204)	0.367** (0.152)	0.233 (0.144)	0.223 (0.165)	0.087 (0.131)	0.385*** (0.124)	0.247** (0.114)
Male	-0.001 (0.005)	0.007** (0.004)	0.004 (0.003)	0.006 (0.004)	0.006* (0.003)	0.004 (0.003)	0.007** (0.003)
Tenure	-0.059 (0.100)	-0.270*** (0.074)	-0.158** (0.070)	0.090 (0.080)	0.047 (0.064)	0.066 (0.060)	-0.039 (0.055)
Low education	-0.621*** (0.138)	-0.182* (0.102)	0.039 (0.097)	0.017 (0.111)	-0.008 (0.089)	-0.027 (0.084)	-0.030 (0.076)
High education	0.158 (0.111)	0.150* (0.082)	-0.016 (0.078)	-0.045 (0.089)	0.007 (0.071)	-0.115* (0.067)	-0.015 (0.061)
Constant	1.564*** (0.180)	-0.587*** (0.134)	-1.015*** (0.127)	-0.197 (0.146)	0.320*** (0.116)	-0.079 (0.109)	-0.346*** (0.101)
Observations	898	917	890	912	893	906	894
R-squared	0.038	0.038	0.013	0.019	0.013	0.034	0.022

OLS estimates including robust standard errors in parentheses \*\*\* p<0.01, \*\* p<0.05, \* p<0.1. The wage costs variable measures the deviation in the assessments of the wage costs of employees who are 55-64 years minus the assessment of employees' wage costs who are between 35 and 44 years old. The productivity variable measures the deviation in the assessments of the productivity of employees who are 55-64 years minus the assessment of employees' productivity who are between 35 and 44 years old.

**Table 6**  
**Relative assessment of older workers' productivity and wage costs, and the hiring propensity**

Likelihood to be hired	(1)	(2)	(3)
45 years (35 years = ref.)	-0.047*** (0.013)	-0.057*** (0.020)	-0.040* (0.021)
55 years	-0.216*** (0.014)	-0.194*** (0.021)	-0.176*** (0.022)
60 years	-0.387*** (0.015)	-0.384*** (0.021)	-0.357*** (0.022)
Productivity	-0.032*** (0.012)		-0.030** (0.013)
Wage costs		0.011 (0.011)	0.016 (0.011)
45 years * productivity	0.035*** (0.012)		0.037*** (0.013)
55 years * productivity	0.035*** (0.012)		0.033*** (0.012)
60 years * productivity	0.048*** (0.013)		0.045*** (0.013)
45 years * wage costs		-0.005 (0.010)	-0.005 (0.010)
55 years * wage costs		-0.022** (0.009)	-0.027*** (0.009)
60 years * wage costs		-0.013 (0.009)	-0.017* (0.010)
5 years of experience (no experience = ref.)	0.241*** (0.013)	0.253*** (0.019)	0.254*** (0.020)
10 years of experience	0.274*** (0.014)	0.259*** (0.020)	0.277*** (0.021)
5 years of experience * productivity	0.003 (0.011)		-0.001 (0.012)
10 years of experience * productivity	0.024** (0.012)		0.023* (0.012)
5 years of experience * wage costs		-0.003 (0.009)	-0.006 (0.009)
10 years of experience * wage costs		0.006 (0.010)	0.001 (0.010)
Short training necessary (no training necessary = ref.)	-0.091*** (0.013)	-0.084*** (0.019)	-0.086*** (0.020)
Long training necessary	-0.511*** (0.013)	-0.501*** (0.020)	-0.508*** (0.021)
Short training necessary * productivity	-0.001 (0.011)		-0.001 (0.012)
Long training necessary * productivity	-0.015 (0.012)		-0.015 (0.013)
Short training necessary * wage costs		-0.002 (0.009)	-0.001 (0.009)
Long training necessary * wage costs		-0.000 (0.009)	0.000 (0.010)
Survey question ordering fixed effects	Yes	Yes	Yes
Constant	0.692*** (0.016)	0.681*** (0.023)	0.662*** (0.024)
Observations	11,208	11,000	10,666
R-squared	0.350	0.350	0.351

OLS estimates including robust standard errors corrected for clustering on the individual level in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1 The wage costs variable measures the deviation in the assessments of the wage costs of employees who are 55-64 years minus the assessment of employees' wage costs who are between 35 and 44 years old. The productivity variable measures the deviation in the assessments of the productivity of employees who are 55-64 years minus the assessment of employees' productivity who are between 35 and 44 years old.

**Table 7**

***Relative assessment of older workers' productivity, and wage costs, employers' age, and the hiring propensity***

<b>Likelihood to be hired</b>	<b>(1)</b>	<b>(3)</b>
45 years (35 years = ref.)	-0.048 (0.043)	-0.045 (0.047)
55 years	-0.215*** (0.054)	-0.169*** (0.057)
60 years	-0.427*** (0.046)	-0.382*** (0.049)
Age of the HR manager 36-45 years (35 years or younger = ref.)	-0.146*** (0.054)	-0.146*** (0.055)
Age of the HR manager 46-55 years	-0.074 (0.050)	-0.074 (0.051)
Age of the HR manager 56 years and older	-0.080 (0.053)	-0.078 (0.055)
45 years * age of the HR manager 36-45 years	0.023 (0.049)	0.022 (0.050)
45 years * age of the HR manager 46-55 years	-0.004 (0.046)	-0.002 (0.047)
45 years * age of the HR manager 56 years and older	0.022 (0.050)	0.020 (0.052)
55 years * age of the HR manager 36-45 years	0.047 (0.059)	0.043 (0.060)
55 years * age of the HR manager 46-55 years	0.039 (0.057)	0.053 (0.058)
55 years * age of the HR manager 56 years and older	0.059 (0.060)	0.076 (0.061)
60 years * age of the HR manager 36-45 years	0.115** (0.052)	0.111** (0.053)
60 years * age of the HR manager 46-55 years	0.082* (0.048)	0.082* (0.049)
60 years * age of the HR manager 56 years and older	0.141*** (0.053)	0.139*** (0.055)
Productivity	-0.037*** (0.013)	-0.035** (0.014)
45 years * productivity	0.035*** (0.013)	0.038*** (0.014)
55 years * productivity	0.038*** (0.013)	0.036*** (0.013)
60 years * productivity	0.046*** (0.014)	0.042*** (0.015)
Wage costs		0.013 (0.011)
45 years * wage costs		-0.002 (0.010)
55 years * wage costs		-0.030*** (0.009)
60 years * wage costs		-0.019* (0.010)
Constant	0.782*** (0.047)	0.747*** (0.051)
Observations	10,482	9,940
R-squared	0.358	0.360

OLS estimates including robust standard errors corrected for clustering on the individual level in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1 The wage costs variable measures the deviation in the assessments of the wage costs of employees who are 55-64 years minus the assessment of employees' wage costs who are between 35 and 44 years old. The productivity variable measures the deviation in the assessments of the productivity of employees who are 55-64 years minus the assessment of employees' productivity who are between 35 and 44 years old.

**Table 8**

***Relative assessment of older workers' productivity, labor costs, and health risks and the hiring propensity***

<b>Likelihood to be hired</b>	<b>(1)</b>	<b>(2)</b>
45 years (35 years = ref.)	-0.046 (0.047)	-0.057 (0.047)
55 years	-0.168*** (0.058)	-0.162*** (0.058)
60 years	-0.382*** (0.051)	-0.368*** (0.051)
Age of the HR manager 36-45 years (35 years or younger = ref.)	-0.145*** (0.055)	-0.144*** (0.055)
Age of the HR manager 46-55 years	-0.072 (0.051)	-0.070 (0.052)
Age of the HR manager 56 years and older	-0.076 (0.055)	-0.075 (0.055)
45 years * age of the HR manager 36-45 years	0.022 (0.049)	0.021 (0.049)
45 years * age of the HR manager 46-55 years	-0.001 (0.047)	-0.002 (0.046)
45 years * age of the HR manager 56 years and older	0.022 (0.052)	0.022 (0.051)
55 years * age of the HR manager 36-45 years	0.044 (0.060)	0.044 (0.060)
55 years * age of the HR manager 46-55 years	0.055 (0.058)	0.053 (0.058)
55 years * age of the HR manager 56 years and older	0.079 (0.061)	0.078 (0.061)
60 years * age of the HR manager 36-45 years	0.115** (0.053)	0.118** (0.053)
60 years * age of the HR manager 46-55 years	0.087* (0.049)	0.086* (0.049)
60 years * age of the HR manager 56 years and older	0.145*** (0.055)	0.144*** (0.055)
Productivity	-0.035** (0.014)	-0.036** (0.014)
45 years * productivity	0.038*** (0.014)	0.039*** (0.014)
55 years * productivity	0.036*** (0.013)	0.036*** (0.013)
60 years * productivity	0.042*** (0.015)	0.037** (0.015)
Wage costs	0.014 (0.011)	0.014 (0.011)
45 years * wage costs	-0.001 (0.010)	-0.002 (0.010)
55 years * wage costs	-0.029*** (0.009)	-0.029*** (0.009)
60 years * wage costs	-0.019* (0.010)	-0.018* (0.010)
Older workers more expensive	-0.013 (0.029)	-0.015 (0.030)
45 years * older workers more expensive	-0.001 (0.026)	-0.007 (0.027)
55 years * older workers more expensive	-0.008 (0.027)	-0.005 (0.028)
60 years * older workers more expensive	-0.009 (0.029)	0.003 (0.029)
Older workers involve more health risks		-0.001 (0.029)
45 years * older workers involve more health risks		0.039 (0.027)
55 years * older workers involve more health risks		-0.019 (0.030)
60 years * older workers involve more health risks		-0.068** (0.029)
Constant	0.748*** (0.051)	0.747*** (0.052)
Observations	9,940	9,940
R-squared	0.360	0.362

OLS estimates including robust standard errors corrected for clustering on the individual level in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1. The dummy variables which measures that older workers are more expensive or involve more health risks according to the employer are based on a survey questions which asked which obstacles employers experience in keeping their older workers employed.

## Web Appendix A

*Table A1*  
*Response rate by subsector*

	Response rate
National government	45
Provinces and district water boards	58
Municipalities	50
Police	43
Primary education	33
Secondary education	39
Intermediate vocational education	40
Higher vocational education	60
Universities	64
Academic hospitals	50
Water, energy and public utilities	51
Privatized firms	37
Other	42

**Table A2**  
**All job applicants' characteristics interacted**

<b>Likelihood to be hired</b>	<b>(t)</b>
45 years (35 years = ref.)	-0.085** (0.036)
55 years	-0.274*** (0.036)
60 years	-0.509*** (0.033)
5 years of experience (no experience = ref.)	0.249*** (0.028)
10 years of experience	0.275*** (0.026)
45 years * 5 years of experience	0.041 (0.039)
45 years * 10 years of experience	0.040 (0.038)
55 years * 5 years of experience	0.076* (0.046)
55 years * 10 years of experience	0.061 (0.042)
60 years * 5 years of experience	0.043 (0.044)
60 years * 10 years of experience	0.110*** (0.042)
Short training necessary (no training necessary = ref.)	-0.111*** (0.036)
Long training necessary	-0.528*** (0.031)
45 years * Short training necessary	0.013 (0.050)
45 years * Long training necessary	0.020 (0.044)
55 years * Short training necessary	-0.030 (0.050)
55 years * Long training necessary	0.122*** (0.041)
60 years * Short training necessary	0.109** (0.047)
60 years * Long training necessary	0.331*** (0.038)
5 years of experience * Short training necessary	0.032 (0.042)
5 years of experience Long training necessary	0.023 (0.041)
10 years of experience * Short training necessary	0.018 (0.040)
10 years of experience Long training necessary	-0.049 (0.040)
45 years * 5 years of experience * Short training necessary	-0.055 (0.062)
45 years * 5 years of experience Long training necessary	-0.083 (0.060)
45 years * 10 years of experience * Short training necessary	-0.005 (0.059)
45 years * 10 years of experience Long training necessary	-0.029 (0.060)
55 years * 5 years of experience * Short training necessary	0.037 (0.066)
55 years * 5 years of experience Long training necessary	-0.248*** (0.061)
55 years * 10 years of experience * Short training necessary	0.011 (0.064)
55 years * 10 years of experience Long training necessary	-0.102* (0.061)
60 years * 5 years of experience * Short training necessary	-0.124* (0.065)
60 years * 5 years of experience Long training necessary	-0.273*** (0.056)
60 years * 10 years of experience * Short training necessary	-0.179*** (0.064)
60 years * 10 years of experience Long training necessary	-0.263*** (0.056)
Constant	0.714*** (0.026)
Observations	12,848
R-squared	0.358

OLS estimates including robust standard errors corrected for clustering on the individual level in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

**Table A3**  
**Employers age and assessments**



<b>Employers age</b>	<b>Total sample</b>	<b>35 years and younger</b>	<b>36-45 years</b>	<b>46-55 years</b>	<b>56 years and older</b>
<b><i>Employers characteristics</i></b>					
Gender (male = 1)	0.61 (0.49)	0.35 (0.48)	0.38 (0.49)	0.57 (0.50)	0.80 (0.40)
Tenure	13.61 (10.98)	5.19 (3.77)	7.25 (5.63)	12.13 (9.54)	19.51 (19.51)
Highly educated (university or more)	0.23 (0.42)	0.18 (0.39)	0.21 (0.41)	0.24 (0.43)	0.23 (0.42)
<b><i>Employers assessments</i></b>					
Wage costs employees 35-44 years	6.5 (1.13)	6.46 (1.06)	6.61 (1.10)	6.44 (1.21)	6.49 (1.08)
Wage costs employees 45-54 years	7.41 (1.00)	7.16 (0.94)	7.44 (1.09)	7.34 (1.10)	7.49 (0.84)
Wage costs employees 55-64 years	8.04 (1.21)	7.88 (1.16)	7.92 (1.45)	7.99 (1.30)	8.17 (1.00)
Productivity employees 35-44 years	7.61 (0.85)	7.75 (0.66)	7.68 (1.02)	7.58 (0.85)	7.59 (0.75)
Productivity employees 45-54 years	7.66 (0.75)	7.62 (0.65)	7.68 (0.85)	7.66 (0.78)	7.63 (0.70)
Productivity employees 55-64 years	7.16 (0.96)	7.13 (0.80)	7.06 (1.13)	7.06 (0.99)	7.28 (0.86)
Learning and coping with change employees 35-44 years	7.47 (0.76)	7.57 (0.61)	7.51 (0.84)	7.43 (0.77)	7.48 (0.70)
Learning and coping with change employees 45-54 years	7.16 (0.71)	7.15 (0.60)	7.19 (0.70)	7.16 (0.76)	7.15 (0.69)
Learning and coping with change employees 55-64 years	6.57 (0.89)	6.53 (0.73)	6.57 (0.91)	6.48 (0.91)	6.65 (0.90)
Problem solving skills employees 35-44 years	7.28 (0.90)	7.39 (0.76)	7.35 (1.08)	7.28 (0.90)	7.25 (0.79)
Problem solving skills employees 45-54 years	7.49 (0.78)	7.34 (0.85)	7.47 (0.89)	7.50 (0.83)	7.53 (0.66)
Problem solving skills employees 55-64 years	7.33 (0.95)	7.25 (0.85)	7.22 (1.09)	7.28 (1.04)	7.44 (0.80)
Experience employees 35-44 years	7.27 (0.70)	7.38 (0.49)	7.32 (0.83)	7.25 (0.65)	7.23 (0.70)
Experience employees 45-54 years	7.70 (0.60)	7.71 (0.59)	7.73 (0.58)	7.69 (0.63)	7.68 (0.59)
Experience employees 55-64 years	7.73 (0.75)	7.77 (0.70)	7.69 (0.90)	7.66 (0.81)	7.80 (0.62)
Supervision skills employees 35-44 years	7.10 (0.80)	7.36 (0.61)	7.11 (0.98)	7.05 (0.78)	7.10 (0.75)
Supervision skills employees 45-54 years	7.45 (0.71)	7.45 (0.64)	7.38 (0.83)	7.45 (0.73)	7.49 (0.63)
Supervision skills employees 55-64 years	7.36 (0.82)	7.30 (0.68)	7.21 (1.02)	7.31 (0.85)	7.50 (0.68)
Communicative skills employees 35-44 years	7.36 (0.71)	7.58 (0.62)	7.38 (0.86)	7.33 (0.67)	7.33 (0.68)
Communicative skills employees 45-54 years	7.40 (0.62)	7.45 (0.54)	7.38 (0.67)	7.41 (0.62)	7.42 (0.61)
Communicative skills employees 34-44 years	7.26 (0.76)	7.21 (0.67)	7.17 (0.85)	7.23 (0.77)	7.34 (0.70)
Number of observations	1.245	89	250	470	436

Sample means, standard deviations in parentheses.

**Table A4**  
**Employers' characteristics and their relative assessment of dimensions of older workers' skills**

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
	Learning and coping with change				Problem solving	Experience		Supervision skills		Communicative skills	
VARIABLES	Flexibility	Ability to deal with organization al change	Ability to deal with technolo- gical change	Abilities to deal with stress	Problem solving abilities	Knowledge	Profession- alism	Planning of work	Supervi- sion	Commu- nication skills	Coopera- tion with colle- gues
Age of the HR manager 36-45 years (35 years or younger = ref.)	0.028 (0.225)	0.140 (0.200)	0.262 (0.197)	0.019 (0.164)	0.005 (0.163)	-0.004 (0.164)	0.020 (0.134)	0.144 (0.146)	0.174 (0.152)	0.094 (0.144)	0.168 (0.125)
Age of the HR manager 46-55 years	-0.061 (0.214)	0.211 (0.190)	0.051 (0.187)	0.117 (0.156)	0.070 (0.155)	-0.071 (0.156)	0.075 (0.127)	0.331** (0.139)	0.251* (0.144)	0.156 (0.137)	0.225* (0.119)
Age of the HR manager 56 years and older	0.119 (0.228)	0.508** (0.201)	0.151 (0.199)	0.199 (0.166)	0.223 (0.165)	-0.011 (0.165)	0.163 (0.135)	0.331** (0.148)	0.444*** (0.154)	0.187 (0.146)	0.308** (0.126)
Male	-0.004 (0.005)	0.004 (0.005)	0.007 (0.005)	0.007* (0.004)	0.006 (0.004)	0.009** (0.004)	0.004 (0.003)	0.003 (0.003)	0.004 (0.004)	0.010*** (0.003)	0.003 (0.003)
Tenure	-0.361*** (0.111)	-0.163* (0.098)	-0.154 (0.097)	0.031 (0.081)	0.090 (0.080)	0.052 (0.080)	0.042 (0.066)	-0.015 (0.072)	0.148** (0.075)	-0.056 (0.071)	-0.022 (0.061)
Low education	0.113 (0.152)	0.100 (0.135)	0.345*** (0.133)	-0.291*** (0.112)	0.017 (0.111)	0.025 (0.110)	-0.051 (0.091)	-0.049 (0.100)	-0.002 (0.104)	-0.000 (0.097)	-0.060 (0.084)
High education	-0.018 (0.124)	-0.028 (0.109)	-0.019 (0.108)	0.043 (0.089)	-0.045 (0.089)	0.005 (0.090)	-0.008 (0.073)	-0.102 (0.080)	-0.128 (0.083)	-0.060 (0.078)	0.031 (0.068)
Constant	-0.444** (0.201)	-1.471*** (0.178)	-1.876*** (0.176)	-0.270* (0.146)	-0.197 (0.146)	0.458*** (0.146)	0.192 (0.119)	-0.074 (0.130)	-0.083 (0.136)	-0.327** (0.129)	-0.365*** (0.112)
Observations	916	915	915	900	912	917	899	910	908	894	895
R-squared	0.015	0.019	0.018	0.021	0.019	0.010	0.012	0.015	0.038	0.021	0.014

OLS estimates including robust standard errors. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1. All skill dimensions measure the deviation in the assessments of the specific skill of employees who are 55-64 years minus the assessment of employees' skills who are between 35 and 44 years old.

**Table A5**

**Relative assessment of the aggregated dimensions of older workers' productivity and wage costs and the impact of employers age**

<b>Likelihood to be hired</b>	<b>(1)</b>	<b>(2)</b>	<b>(3)</b>	<b>(4)</b>	<b>(5)</b>	<b>(6)</b>
45 years (35 years = ref.)	-0.054 (0.049)	-0.063 (0.047)	-0.073 (0.047)	-0.065 (0.047)	-0.057 (0.048)	-0.054 (0.051)
55 years	-0.162*** (0.058)	-0.188*** (0.056)	-0.201*** (0.056)	-0.188*** (0.057)	-0.173*** (0.057)	-0.163*** (0.059)
60 years	-0.386*** (0.051)	-0.409*** (0.049)	-0.415*** (0.050)	-0.406*** (0.050)	-0.409*** (0.051)	-0.385*** (0.053)
Age of the HR manager 36-45 years (35 years or younger = ref.)	-0.148*** (0.055)	-0.152*** (0.055)	-0.152*** (0.055)	-0.147*** (0.056)	-0.145*** (0.055)	-0.140** (0.056)
Age of the HR manager 46-55 years	-0.073 (0.051)	-0.079 (0.052)	-0.079 (0.052)	-0.076 (0.052)	-0.073 (0.052)	-0.067 (0.052)
Age of the HR manager 56 years and older	-0.084 (0.055)	-0.088 (0.055)	-0.090 (0.055)	-0.083 (0.055)	-0.079 (0.055)	-0.077 (0.055)
45 years * age of the HR manager 36-45 years	0.021 (0.050)	0.023 (0.050)	0.023 (0.050)	0.029 (0.050)	0.022 (0.051)	0.026 (0.052)
45 years * age of the HR manager 46-55 years	0.005 (0.048)	0.003 (0.047)	0.007 (0.048)	0.010 (0.048)	0.000 (0.048)	0.012 (0.049)
45 years * age of the HR manager 56 years and older	0.024 (0.052)	0.035 (0.052)	0.033 (0.052)	0.037 (0.052)	0.028 (0.052)	0.035 (0.054)
55 years * age of the HR manager 36-45 years	0.043 (0.059)	0.046 (0.060)	0.048 (0.059)	0.046 (0.060)	0.038 (0.060)	0.041 (0.060)
55 years * age of the HR manager 46-55 years	0.057 (0.057)	0.060 (0.058)	0.062 (0.057)	0.058 (0.058)	0.052 (0.058)	0.055 (0.058)
55 years * age of the HR manager 56 years and older	0.083 (0.060)	0.086 (0.061)	0.088 (0.060)	0.085 (0.061)	0.074 (0.061)	0.082 (0.061)
60 years * age of the HR manager 36-45 years	0.114** (0.053)	0.120** (0.054)	0.119** (0.054)	0.115** (0.054)	0.117** (0.055)	0.109** (0.055)
60 years * age of the HR manager 46-55 years	0.091* (0.049)	0.095* (0.050)	0.094* (0.050)	0.087* (0.050)	0.092* (0.051)	0.084* (0.051)
60 years * age of the HR manager 56 years and older	0.152*** (0.055)	0.158*** (0.056)	0.159*** (0.055)	0.148*** (0.056)	0.147*** (0.056)	0.146*** (0.056)
Learning and coping with change	-0.029* (0.016)					-0.013 (0.019)
45 years * Learning and coping with change	0.015 (0.014)					0.015 (0.017)
55 years * Learning and coping with change	0.032** (0.015)					0.026 (0.018)
60 years * Learning and coping with change	0.025 (0.016)					0.025 (0.018)
Problem solving		-0.025** (0.013)				-0.006 (0.016)
45 years * Problem solving		0.002 (0.012)				-0.013 (0.014)
55 years * Problem solving		0.009 (0.012)				-0.012 (0.015)
60 years * Problem solving		0.003 (0.013)				-0.020 (0.015)
Experience			-0.035** (0.016)			-0.020 (0.019)
45 years * Experience			0.022 (0.016)			0.020 (0.019)
55 years * Experience			0.024* (0.014)			0.020 (0.017)
60 years * Experience			0.014 (0.017)			0.006 (0.020)
Supervision skills				-0.032* (0.016)		-0.007 (0.021)
45 years * Supervision skills				0.003 (0.017)		-0.013 (0.020)
55 years * Supervision skills				0.017 (0.015)		-0.006 (0.019)
60 years * Supervision skills				0.029 (0.019)		0.027 (0.023)
Communicative skills					-0.038** (0.017)	-0.017 (0.022)
45 years * Communicative skills					0.025 (0.019)	0.017 (0.022)
55 years * Communicative skills					0.044*** (0.017)	0.031 (0.021)
60 years * Communicative skills					0.014 (0.019)	-0.002 (0.022)
Wage costs	0.011 (0.011)	0.013 (0.011)	0.015 (0.011)	0.015 (0.011)	0.013 (0.011)	0.015 (0.011)
45 years (35 years = ref.) * wage costs	-0.002 (0.011)	-0.004 (0.011)	-0.004 (0.011)	-0.006 (0.011)	-0.004 (0.011)	-0.004 (0.011)
55 years * wage costs	-0.028*** (0.009)	-0.032*** (0.009)	-0.032*** (0.009)	-0.033*** (0.010)	-0.031*** (0.009)	-0.029*** (0.010)
60 years * wage costs	-0.018* (0.010)	-0.019** (0.010)	-0.020** (0.010)	-0.021** (0.010)	-0.018* (0.010)	-0.021** (0.010)
Constant	0.744*** (0.052)	0.764*** (0.051)	0.781*** (0.051)	0.768*** (0.051)	0.756*** (0.051)	0.748*** (0.054)
Observations	9,904	9,968	9,928	9,910	10,000	9,800
R-squared	0.360	0.359	0.359	0.359	0.358	0.360

OLS estimates including robust standard errors corrected for clustering on the individual level in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

The five aggregated skill dimensions are calculated using the arithmetic average of the underlying skill dimensions presented in Table A3.

**Table A6**  
***Employers' characteristics and their relative assessment of costs involved with older workers' and health risks***

VARIABLES	(1) Older workers are more expensive	(2) Older workers involve more health risks
Age of the HR manager 36-45 years (35 years or younger = ref.)	0.030 (0.066)	0.028 (0.063)
Age of the HR manager 46-55 years	0.085 (0.063)	-0.020 (0.060)
Age of the HR manager 56 years and older	0.127* (0.067)	-0.007 (0.064)
Male	-0.002 (0.002)	-0.001 (0.002)
Tenure	0.024 (0.033)	0.033 (0.031)
Low education	-0.026 (0.043)	-0.012 (0.041)
High education	0.008 (0.037)	-0.064* (0.035)
Constant	0.375*** (0.059)	0.353*** (0.056)
Observations	1,093	1,093
R-squared	0.008	0.005

OLS estimates including robust standard errors. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1. The dummy variables which measures that older workers are more expensive or involve more health risks according to the employer are based on a survey questions which asked which obstacles employers experience in keeping their older workers employed.

**Table A7**  
**Employers' characteristics interacted with age of the applicant: small and large organizations**

Likelihood to be hired	(1)	(2)
	Small organizations	Large organizations
45 years (35 years = ref.)	-0.127* (0.071)	-0.032 (0.049)
55 years	-0.216*** (0.070)	-0.192*** (0.065)
60 years	-0.451*** (0.062)	-0.421*** (0.054)
Age of the HR manager 36-45 years (35 years or younger = ref.)	-0.066 (0.068)	-0.157** (0.074)
Age of the HR manager 46-55 years	-0.112* (0.066)	0.004 (0.071)
Age of the HR manager 56 years and older	-0.112* (0.065)	0.004 (0.078)
45 years * age of the HR manager 36-45 years	0.082 (0.079)	-0.002 (0.057)
45 years * age of the HR manager 46-55 years	0.096 (0.075)	-0.045 (0.055)
45 years * age of the HR manager 56 years and older	0.097 (0.078)	-0.008 (0.063)
55 years * age of the HR manager 36-45 years	-0.026 (0.078)	0.045 (0.075)
55 years * age of the HR manager 46-55 years	0.102 (0.075)	-0.035 (0.072)
55 years * age of the HR manager 56 years and older	0.106 (0.079)	-0.026 (0.077)
60 years * age of the HR manager 36-45 years	0.057 (0.072)	0.110* (0.065)
60 years * age of the HR manager 46-55 years	0.095 (0.070)	0.080 (0.060)
60 years * age of the HR manager 56 years and older	0.131* (0.074)	0.135** (0.068)
Tenure in the firm	0.001 (0.002)	-0.002 (0.002)
45 years * tenure	0.000 (0.002)	0.001 (0.002)
55 years * tenure	-0.003* (0.002)	-0.001 (0.002)
60 years * tenure	-0.001 (0.002)	-0.004** (0.002)
Gender (male = 1)	0.014 (0.039)	-0.002 (0.039)
45 years * gender	-0.056 (0.038)	-0.016 (0.034)
55 years * gender	-0.066* (0.038)	0.002 (0.039)
60 years * gender	-0.054 (0.043)	-0.045 (0.036)
Constant	0.772*** (0.060)	0.759*** (0.064)
Observations	5,454	6,562

OLS estimates including robust standard errors corrected for clustering on the individual level in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

**Table A8**  
**Employers' characteristics interacted with age of the applicant: sector differences**

Likelihood to be hired	(1)	(2)	(3)
	Government sector	Privatized sector	Education sector
45 years (35 years = ref.)	-0.174* (0.094)	-0.066 (0.071)	-0.022 (0.052)
55 years	-0.252** (0.098)	-0.159* (0.085)	-0.236*** (0.069)
60 years	-0.576*** (0.072)	-0.417*** (0.080)	-0.382*** (0.057)
Age of the HR manager 36-45 years (35 years or younger = ref.)	-0.127 (0.103)	0.061 (0.084)	-0.300*** (0.076)
Age of the HR manager 46-55 years	-0.064 (0.101)	0.085 (0.080)	-0.173** (0.068)
Age of the HR manager 56 years and older	-0.079 (0.107)	0.042 (0.089)	-0.154** (0.069)
45 years * age of the HR manager 36-45 years	0.083 (0.103)	0.044 (0.077)	0.050 (0.066)
45 years * age of the HR manager 46-55 years	0.069 (0.100)	0.086 (0.074)	-0.058 (0.059)
45 years * age of the HR manager 56 years and older	0.108 (0.104)	0.082 (0.089)	-0.027 (0.062)
55 years * age of the HR manager 36-45 years	0.000 (0.108)	-0.046 (0.093)	0.179** (0.082)
55 years * age of the HR manager 46-55 years	0.040 (0.106)	0.037 (0.092)	0.063 (0.075)
55 years * age of the HR manager 56 years and older	0.116 (0.111)	0.135 (0.104)	-0.014 (0.078)
60 years * age of the HR manager 36-45 years	0.179** (0.087)	0.093 (0.088)	0.129* (0.076)
60 years * age of the HR manager 46-55 years	0.196** (0.083)	0.117 (0.088)	0.041 (0.065)
60 years * age of the HR manager 56 years and older	0.286*** (0.092)	0.261** (0.103)	-0.001 (0.068)
Tenure in the firm	-0.002 (0.002)	0.000 (0.003)	0.000 (0.002)
45 years * tenure	0.000 (0.002)	0.003 (0.003)	-0.001 (0.002)
55 years * tenure	-0.004* (0.002)	-0.003 (0.003)	-0.001 (0.002)
60 years * tenure	-0.004 (0.002)	-0.004 (0.003)	-0.002 (0.002)
Gender (male = 1)	-0.009 (0.048)	-0.008 (0.051)	0.021 (0.046)
45 years * gender	0.006 (0.043)	-0.127*** (0.047)	0.004 (0.043)
55 years * gender	0.082* (0.048)	-0.099* (0.053)	-0.036 (0.041)
60 years * gender	0.004 (0.049)	-0.152*** (0.050)	-0.014 (0.044)
Constant	0.828*** (0.093)	0.628*** (0.076)	0.857*** (0.059)
Observations	3,794	3,462	4,760

OLS estimates including robust standard errors corrected for clustering on the individual level in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

**Table A9**

**Relative assessment of older workers' wage costs, and the impact of employers age: interactions**

<b>Likelihood to be hired</b>	<b>(1)</b>
45 years (35 years = ref.)	-0.058 (0.044)
55 years	-0.216*** (0.061)
60 years	-0.432*** (0.048)
Age of the HR manager 36-45 years (35 years or younger = ref.)	-0.145*** (0.055)
Age of the HR manager 46-55 years	-0.085 (0.052)
Age of the HR manager 56 years and older	-0.086 (0.055)
45 years * age of the HR manager 36-45 years	0.056 (0.053)
45 years * age of the HR manager 46-55 years	0.028 (0.050)
45 years * age of the HR manager 56 years and older	0.036 (0.053)
55 years * age of the HR manager 36-45 years	0.063 (0.068)
55 years * age of the HR manager 46-55 years	0.054 (0.065)
55 years * age of the HR manager 56 years and older	0.077 (0.067)
60 years * age of the HR manager 36-45 years	0.117* (0.060)
60 years * age of the HR manager 46-55 years	0.107** (0.054)
60 years * age of the HR manager 56 years and older	0.160*** (0.058)
Wage costs	-0.023 (0.024)
45 years * wage costs	0.006 (0.035)
55 years * wage costs	0.021 (0.057)
60 years * wage costs	0.032 (0.038)
Age of the HR manager 36-45 years * wage costs	0.007 (0.031)
Age of the HR manager 46-55 years * wage costs	-0.017 (0.026)
Age of the HR manager 56 years and older * wage costs	0.005 (0.029)
45 years * Age of the HR manager 36-45 years * wage costs	0.050 (0.048)
45 years * Age of the HR manager 46-55 years * wage costs	0.055 (0.040)
45 years * Age of the HR manager 56 years and older * wage costs	-0.004 (0.044)
55 years * Age of the HR manager 36-45 years * wage costs	0.020 (0.067)
55 years * Age of the HR manager 46-55 years * wage costs	0.014 (0.060)
55 years * Age of the HR manager 56 years and older * wage costs	0.023 (0.061)
60 years * Age of the HR manager 36-45 years * wage costs	-0.008 (0.053)
60 years * Age of the HR manager 46-55 years * wage costs	0.030 (0.043)
60 years * Age of the HR manager 56 years and older * wage costs	0.014 (0.047)
Constant	0.781*** (0.047)
Observations	10,482
R-squared	0.355

OLS estimates including robust standard errors corrected for clustering on the individual level in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

**Table A10**

**Relative assessment of older workers' productivity and the impact of employers age: interactions**

<b>Likelihood to be hired</b>	<b>(1)</b>
45 years (35 years = ref.)	-0.106 (0.066)
55 years	-0.171** (0.083)
60 years	-0.472*** (0.077)
Age of the HR manager 36-45 years (35 years or younger = ref.)	-0.173** (0.072)
Age of the HR manager 46-55 years	-0.063 (0.068)
Age of the HR manager 56 years and older	-0.123* (0.071)
45 years * age of the HR manager 36-45 years	0.083 (0.078)
45 years * age of the HR manager 46-55 years	0.038 (0.076)
45 years * age of the HR manager 56 years and older	0.122 (0.080)
55 years * age of the HR manager 36-45 years	0.023 (0.095)
55 years * age of the HR manager 46-55 years	0.022 (0.091)
55 years * age of the HR manager 56 years and older	0.106 (0.092)
60 years * age of the HR manager 36-45 years	0.182** (0.090)
60 years * age of the HR manager 46-55 years	0.123 (0.085)
60 years * age of the HR manager 56 years and older	0.246*** (0.091)
Productivity	0.008 (0.029)
45 years * productivity	0.022 (0.039)
55 years * productivity	-0.026 (0.039)
60 years * productivity	0.029 (0.041)
Age of the HR manager 36-45 years * productivity	0.013 (0.032)
Age of the HR manager 46-55 years * productivity	-0.014 (0.031)
Age of the HR manager 56 years and older * productivity	0.015 (0.031)
45 years * Age of the HR manager 36-45 years * productivity	-0.025 (0.043)
45 years * Age of the HR manager 46-55 years * productivity	-0.011 (0.042)
45 years * Age of the HR manager 56 years and older * productivity	-0.044 (0.042)
55 years * Age of the HR manager 36-45 years * productivity	0.004 (0.045)
55 years * Age of the HR manager 46-55 years * productivity	0.019 (0.043)
55 years * Age of the HR manager 56 years and older * productivity	-0.018 (0.042)
60 years * Age of the HR manager 36-45 years * productivity	-0.050 (0.045)
60 years * Age of the HR manager 46-55 years * productivity	-0.021 (0.044)
60 years * Age of the HR manager 56 years and older * productivity	-0.062 (0.044)
Constant	0.776*** (0.062)
Observations	10,274
R-squared	0.355

OLS estimates including robust standard errors corrected for clustering on the individual level in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1



## Web Appendix B

### Example vignette

Below you find a description of two persons who have applied for the most common job in your organization. Suppose you have to hire a new employee, which person do you prefer?

#### Preference applicant A

Age: 35 years
Experience in similar job: 5 years
Needed training to function in the job: substantial training needed to make skills up-to-date

#### Preference applicant B

Age: 60 years
Experience in similar job: 10 years or more
Needed training to function in the job: no training needed to make skills up-to-date