

# The impact of employer's characteristics on the willingness to hire older workers: Evidence from a stated preferences experiment

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## 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 44%-point 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 decreases the hiring probability with 53%-points. 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 older than 55 years of age than when the employer is aged 35 years or less. We furthermore find that positive assessments of employers on older workers' relative wage costs, productivity, and skills increase the hiring probability, but that 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. This is consistent with taste-based theories of discrimination.

Keywords: Hiring, age discrimination, employer's characteristics

JEL codes: J71, J14, J23, J64

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# 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). Moreover, anecdotal evidence that older workers experience discrimination because of their age is widespread (e.g., Johnson and Neumark 1997). Stereotyping and age discrimination therefore make it uncertain that large groups of older people will be able to remain employed or find new employment.

This paper makes use of a vignette study to investigate employer's willingness to hire older job applicants and the extent to which the hiring probability is related to various characteristics of the applicants. Using survey data, we subsequently assess to what extent the hiring probability of older job applicants is related to the employer's own age, gender, experience, and other personal characteristics of the employer. We furthermore investigate how employers assess older workers' wage costs, productivity, and underlying productive skills, and

show to what extent their assessments affects their hiring decisions. Finally, we investigate whether employer's assessments of older workers' wage, productivity, and productive skills impact the relationship between their personal characteristics and the hiring probability of older workers.

The vignette study which forms the core of our analyses is part of unique survey data collected among Dutch public and privatized sector employers, 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 within public and privatized sector firms. The survey was fielded online in 2011 among all (approximately 2.500) employers – mostly HR-officers or managing directors – within these sectors of whom 1.100 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 applicants differed in three randomly assigned characteristics: their age, experience in a similar job, and the training need to function in the job.

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 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 charges claiming discrimination in 2014 concerned age discrimination (U.S. Equal Employment Opportunity Commission 2014).

Nevertheless, there is sparse evidence within the economic literature that age discrimination is pervasive in hiring policies (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 wage, 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>2</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 major advantage of correspondence testing is that it enables the researcher to control strictly for all variables other than the personal characteristics to be tested and provide hard evidence that discrimination is prevalent. A major drawback, of this approach, 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 stereotyping, conscious discrimination or other intentions played a role in the hiring process.

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<sup>2</sup> Levitt (2004) does not focus on labor market discrimination, but uses the contestant voting behavior on a television game show to distinguish between taste-based and information-based theories of discrimination instead. He finds convincing evidence for taste-based discrimination against older players.

Within economics there are two leading theories of age discrimination: taste-based discrimination and information-based statistical discrimination. The first type of discrimination is identified by Becker (1957) and occurs when employers or other economic actors get disutility from working with individuals of a certain age group. They therefore prefer not to interact with individuals from that age group and are willing to pay a financial price to avoid interactions. Taste-based discrimination is considered to be inefficient in terms of overall social welfare (Becker, 1957). The second type of discrimination is information-based statistical discrimination. This occurs when an individual is judged based on group characteristics due to incomplete information, for example because signals of ability and productivity are less informative within that group (Levitt, 2004). Stereotyping older workers may therefore be efficient to individual employers in case there is imperfect information about the age-productivity and age-wage nexuses. Stereotyping is, however, inefficient on the macro level in such a situation. Information-based statistical discrimination can also occur when specific groups of employers have acquired wrong information about the productivity and wages of older workers, which would imply that discrimination is inefficient on both the micro and the macro level.

This paper contributes to the existing literature in several important ways. First, it fills an important 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 the hiring probability of older job applicants is related to job applicants' and employers' characteristics, while simultaneously investigating the extent to which employers hold specific views about older workers' wage costs, productivity and underlying productive skills, and whether these assessments impact the relationship between the personal characteristics of employers and the hiring probability of older job applicants. None of the recent field experimental studies does ascertain how age discrimination in hiring decisions depends on employer characteristics, stereotyping, and their interrelationship.

Second, in our analyses we make an in-depth analysis on the degree to which employers' assessments of older workers differ among different dimensions of productivity and skills, and investigate how these differences in assessments depends on employer characteristics. It is crucial to make this distinction 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 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 therefore distinguish five key types of skills which may change substantially differ over workers' life cycle: fluid intelligence, problem solving, experience, supervision, and communication skills (e.g., Horn and Cattell 1967; and Salthouse 1985; Wrenn and Maurer, 2004). Fluid intelligence 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 during the life with education and other life experiences. Unlike fluid intelligence, 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 be skills which improve the most over the life cycle. Supervision skills are actually perceived to increase the most after age 50.

Finally, this paper contributes to the existing literature by analyzing how well the two dominant competing theories on age discrimination explain the discrimination patterns we find in our analyses. The detailed information on employers' characteristics and their assessments of

older workers productivity allows us to shed more light on the importance of the way employers think about older workers for the hiring rate of older job applicants.

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 44%-point lower probability of being hired compared to a 35-year-old applicant. This difference in the likelihood 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. 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 the situation in which the employer is 35-years or younger. We furthermore find that the employers' assessment of older workers' wages, relative productivity, and skills affect the hiring probability largely in the expected way. Older employers judge more positively about the productivity of workers aged 55-64 years relative to that of younger workers and are therefore less likely to discriminate against older workers. This holds in particular for the assessment of supervision and communication skills. Older employers do not, however, judge more positively about the relative wage costs of older workers, but are more willing to hire older workers even when they think that wage costs of older workers are high. 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. The evidence is therefore most consistent with the taste-based theory of discrimination.

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 Dutch public and privatized sector employers in 2011 (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.<sup>3</sup> 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. The survey was answered by 1,100 employers. The core of the survey aimed at monitoring HR practices, the employers' views on 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

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<sup>3</sup> The e-mail addresses were provided by ABP, which has detailed contact information for each employer, due to its role as the public sector's pension fund.



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.<sup>4</sup> 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 the 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.

Vignette studies are widely accepted in fields such as transportation economics, environmental economics (Hensher 1997), research on professional ethics (Taylor 2006) and among sociologists. Although the use of stated-preferences experiments is still limited in economics, this research approach is recently 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). This is partly due to the fact that several studies have systematically examined the extent to which the hypothetical behavior reported in vignette studies compares to actual behavior 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).

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<sup>4</sup> Evans (2012) provides interesting anecdotal field evidence on the time recruiters spend on reviewing resumes. The study was conducted using a technologically advanced assessment of eye movement (eye-tracking) that records and analyzes where and how long a person focuses when digesting 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. 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 skill needs, experience and age in our stated preferences experiment thus closely reflects the real life behavior of recruiters.

In our 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: their age (35, 45, 55 or 60 years-old), experience in a similar job (no, 5, or 10 or more years of experience), and 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). Experience 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. The training need is included to signal to employers whether job applicants have deficiencies in their human capital which constrain job applicants to carry out the job. Deficiencies in human capital may 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 (see Appendix B for an example of the vignette employers received). 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 relevant job experience and training needs. We also randomized the ordering in which the attributes were presented to the employers.

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<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.

## 2.2 Survey questions

To identify the role of the personal characteristics of employers in the hiring process, and to investigate which of the above mentioned theories provides a more likely explanation for the employers' preferences to hire older employees, we gathered information on the basic personal characteristics of the employers: the age, gender, tenure, and the education level of employer. Moreover, we asked employers to assess the overall productivity of workers in specific age-groups:

*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?*

	<i>35-44 years</i>	<i>45-54 years</i>	<i>55-64-years</i>
<i>Overall productivity</i>	<input type="text"/>	<input type="text"/>	<input type="text"/>

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

We measured in a similar way how employers rate the wage costs of the workers in these age groups as well as the performance of workers along five skill dimensions. Based on psychological literature on the decline of cognitive abilities (e.g, Horn and Cattell 1967; and Salthouse 1985; Wrenn and Maurer 2004), we make a distinction in *fluid cognitive skills* (flexibility, ability to deal with organizational and technological change, ability to deal with stress and problem solving abilities), *crystallized cognitive skills* (experience and professionalism), *problem solving skills*, *supervision skills* (planning of work and supervision), and *communication skills* (communication skills and cooperation with colleagues). We construct the employer's assessment on the five skills dimensions by age group, by taking the average value on the underlying skills.

### ***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. Absenteeism rates and turnover rates in their organizations are 5% and respectively 6%. 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.

When we look at the personal characteristics of the employers it becomes clear that the average employer is relatively old (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). 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 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.

### ***2.4 Empirical strategy***

We estimate Linear Probability models in which we regress the likelihood to be hired on 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). We

include dummy variables in our models that control for the ordering of the vignettes. In several models we interact the employee characteristics with those of the employer, as well as with the employer's views about older workers wage costs, productivity, and skills. Finally, fixed effect and conditional logit models are estimated to show that the results are robust to the estimation technique used.

### **3. Results**

#### ***3.1 Basic result***

Table 2 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 simple linear probability model, while Columns 2 and 3 presents the marginal effects of a fixed effects analysis and a conditional logit model. The table shows that there is substantial differential hiring by age. A job applicant who is 60 years old has a 41%-points lower likelihood to be hired than a job applicant who is 35 years old. The comparison of the likelihood to be hired of job applicants with different ages reveals that job applicants who are only 45 years old have already substantial worse labor market perspectives compared to 35 years old applicants, and that the hiring rate further decreases exponentially with age.

With regard to the other characteristics of the job applicants it becomes clear that work experience in a similar job increases the hiring likelihood. Having 5 related work experience increases the hiring likelihood with 25% 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 work related 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, implying that the training need indeed does signal to employers that job applicants have deficiencies in their human capital which constrain them to carry out the job.

Figures 1a and 1b show the hiring likelihoods based on our LPM estimations. It is immediately clear from the figures that job applicants who are 60 years old have virtually no change on the labor market, especially when they lack experience or are in need for training. 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. It is particularly striking that, for a 60 year-old, having substantial experience cannot compensate for the detrimental effect of age on the likelihood of being hired.

We 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 2, 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.<sup>6</sup>

### ***3.2 Employers' characteristics and the likelihood to be hired***

Taste based discrimination occurs when employers get disutility from working with individuals from a certain age. They prefer not to interact with these individuals and are willing to pay a

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<sup>6</sup> We also performed analyses in which we interacted all job applicants' characteristics (shown in Table A1 of Web Appendix A). We get similar results, but also observe that 60 year old job applicants with 10 years of experience have a 11%-point higher likelihood to be hired compared to 60 year old job applicants with no job related experience. Table A1 furthermore shows that prospective investments in human capital (training need) decreases the likelihood to be hired, but also that the decrease is smaller for older workers with no job related experience compared to older workers with job related experience. This result hints at the possibility that the training need for experienced job applicants signals that these applicant have deficiencies in their human capital which constrain them to carry out the job and to acquire the appropriate skills.

financial price to avoid these interactions. We would expect that taste based age discrimination will be stronger when employers themselves belong to younger age groups. To test this conjecture, we combine the data from the vignette study and the employer's survey to establish the extent to which the hiring probability of older job applicants is related to three basic employer characteristics: age, experience, and gender. We divide the age of the employer in four age groups which correspond to the different ages of the job applicants in our vignette study: 35 years and younger, 36-45 years, 46-55 years, and 56 years and older. Table 3 shows the estimation results in which we interact these basic employer characteristics with the characteristics of the job applicants. The estimates show that the hiring probability of older job applicants indeed 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>7,8</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 and older. Figure 2 depicts this interaction effect graphically.

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. We also find a statistically weak significant interaction effect between the employer's gender dummy (male = 1) and the dummy indicating that the job applicant is 60 years. Male employers thus seem to discriminate older job applicants slightly more than female employers.

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<sup>7</sup> Table A6 shows that this result holds for both small and large organizations, implying that the discriminatory behavior does not differ among employers who will more or less likely be working with the job applicants after they are hired.

<sup>8</sup> Table A7 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.

### ***3.3 Employers' assessments of wage costs, productivity, and underlying skills, and the likelihood to be hired***

The finding that age discrimination is less prevalent when employers themselves are older provides a first clue that a large part of age discrimination is due to taste based preferences. It may also be the case, however, that younger employers are more misinformed or have imperfect information on wage costs, the productivity, and underlying productive skills of older workers than older employers. We therefore pursue our analyses by inventorying whether employer's assessments on the wage costs, productivity and underlying productive skills of older workers differ with their age and we will subsequently analyze whether these assessments impact the relationship between the personal characteristics of employers and the hiring probability of older job applicants.

Table 4 presents the results of simple regression analyses in which relate employers' characteristics to their relative assessment of older workers' wage costs, productivity and underlying productive skills. It becomes clear that both young and old employers think that the wage costs of older workers are higher. There is no significant effect of employers' age on the assessment of the wage costs, indicating that their assessments are rather similar. This is 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 remain more positive about older workers' productivity than employers who are 35 years or younger.<sup>9</sup> The assessments of

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<sup>9</sup> Table A2 in Web Appendix provides descriptive evidence on the average assessments for each age group of employers. The table shows that that both young and old employers assess that the wage costs of older workers are higher. The standard deviation of the assessment of the wage costs is not larger for younger employer groups, indicating that younger employers do not vary more in their assessment than older employers. This result is inconsistent with the information-based statistical discrimination theory as we would expect that younger of employers should experience more uncertainty about the wage costs of older workers due to a lack of own experience. The table further indicates that employers assess that the productivity declines with age, but also estimate that this decline is substantially smaller than younger employers envision. We do again find no significant difference in the standard deviation of employers' assessments of the productivity of the different age groups.



employers on workers overall productivity thus provides a different view than the 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>10</sup> Older workers get a better assessment from both young and old employers when it concerns their supervision skills and experience, while they get a worse assessment on their fluid intelligence and problem solving skills compared to younger workers. Striking is that older employers significantly grade the supervision skills and the communication skills of older workers higher than younger employers. The difference in the assessment of the relative productivity between both groups of employers can therefore partially be attributed to the way how they think about these particular two different productivity dimensions.

We fill an important gap in the literature by analyzing whether the wage costs and productivity assessments impact the relationship between the personal characteristics of employers and the hiring probability of older workers. In case the role of employers' age in the discrimination patterns is predominantly information-based instead of taste based, we can expect that controlling for the assessments on wage costs and productivity would reduce the size of the age interaction. Table 5 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 employers' assessments on older workers' relative productivity and wage costs affect the

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<sup>10</sup> Table A3 shows the estimations on the underlying individual skill measures which are used to construct the five aggregated productive skill dimensions used in Table 4.

hiring probability largely in the expected way. Employers who judge more positively about the productivity and wage costs of workers aged 55-64 years relative to 35-44 year old workers are more likely to hire older workers. More important is that the significant interaction effect between the ages of the job applicant and the employer does not disappear when we control for these assessments, irrespective of whether we include the assessments on the overall productivity measure or the underlying skill dimensions in our analyses. The evidence is therefore more consistent with the taste-based theory of discrimination, and indicates that information on productivity and wages is not an important determinant for the differences of young and old employers' preferences for hiring job applicants in specific age groups.<sup>11,12</sup>

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

Employers' assessments on 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 measure whether or

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<sup>11</sup> Tables A8 and A9 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 A4 in Web Appendix A shows that the results do not change when we replace our productivity indicator with the five productive skills dimensions.

not employers agree to statements in the survey that older workers are more expensive or involve more health risks. Table 6 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>

#### **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. The focus is on the extent to which the hiring probability of older job applicants is related to the employer's own age, gender, experience, and other personal characteristics. We analyze the extent to which employers' assessments about older workers' wages, productivity and skills compared to that of younger workers impact their hiring decisions. Finally, we investigate whether the employers' assessments about older workers impact the relationship between their personal characteristics and the hiring probability of older workers.

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 44%-point 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 decreases the hiring probability with 53%-points. 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-

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<sup>13</sup> Table A5 shows that older employers do not think differently about labor costs or health risks than younger employers.

years or younger. Nevertheless, 60-year olds 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 on older workers' relative productivity, wage costs and skills affect the hiring probability in a way which is partly consistent with statistical age discrimination. Older employers judge more positively about the productivity of workers aged 55-64 years relative to that of workers who are between 34 and 44 years old and are therefore more likely to hire older workers. This holds in particular for the assessment of supervision and communication skills. However, older employers do not judge more positively about the relative wage costs of older workers, but are more willing to hire older workers, even when they think that wage costs of older workers are high. Most interestingly, the significant interaction effect between the ages of the job applicant and the employer does not disappear when we control for these assessments. This last piece of evidence is therefore more consistent with the taste-based theory of discrimination.

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 the 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 preferences of employers.

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 workers and younger workers and 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.

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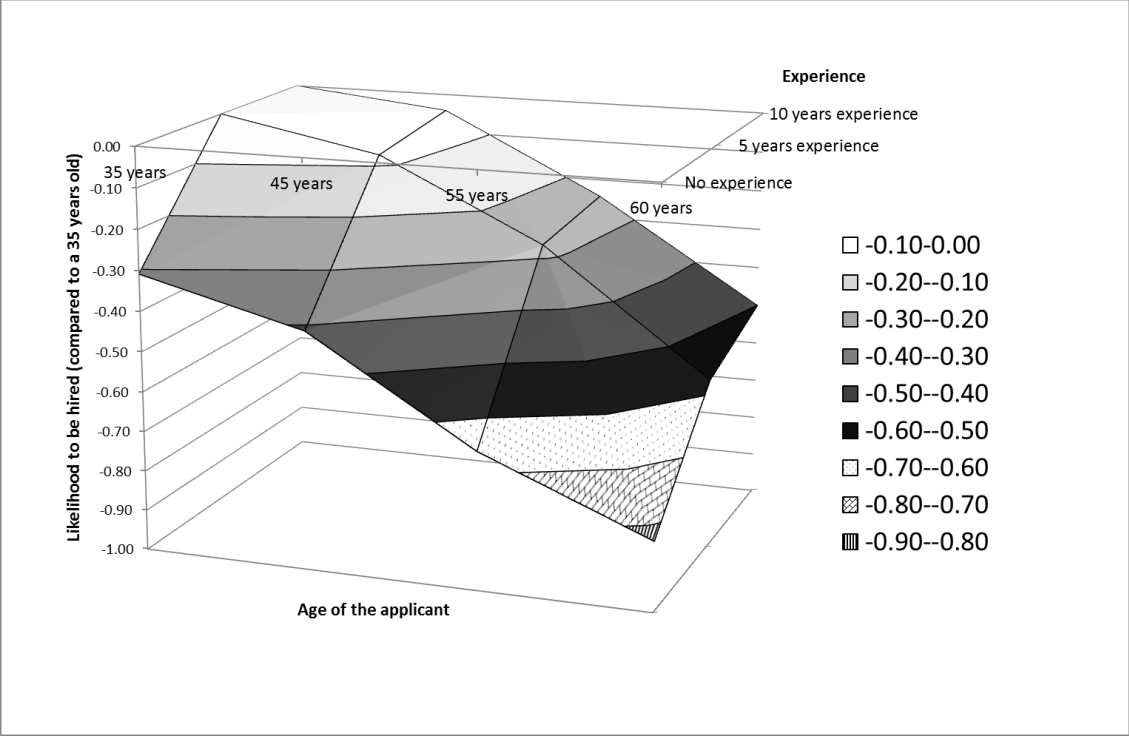


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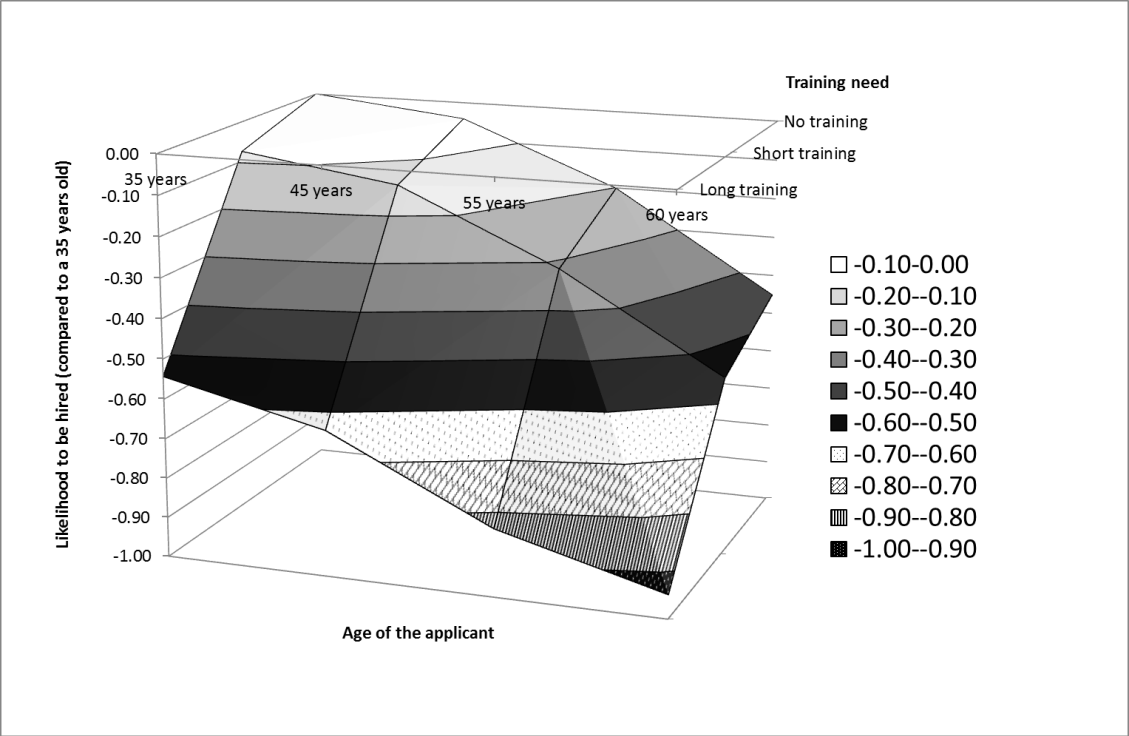
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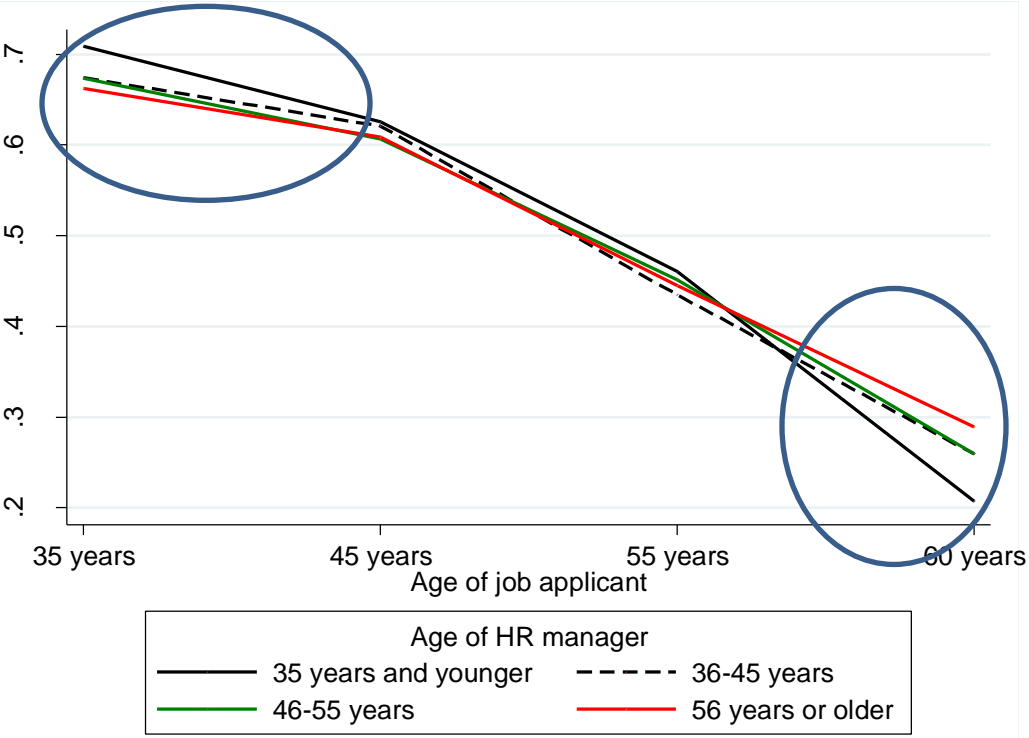
**Figure 1a**  
Likelihood to be hired based on the vignette study



**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	0.4	0.49
Privatized sector	0.29	0.45
Workers with a permanent contract	87.84	14.37
Size of the HR-department	7.66	21.6
Absenteeism	5.34	4.12
Turnover share	5.83	5.87
<b><i>Personal characteristics of employers</i></b>		
Age	50.78	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**  
**Basic results**

Likelihood to be hired	(1) LPM	(2) Fixed effects	(3) Conditional probit 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)
Survey question 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. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

**Table 3**  
**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 4**

***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)
			Fluid cognitive skills	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 5*****Relative assessment of older workers' productivity, wage and labor costs, and the impact of employers' age***

<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 6**

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

<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**  
*All job applicants' characteristics interacted*

Likelihood to be hired	(t)
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 A2**  
**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>Employers characteristics</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>Employers assessments</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)
Fluid cognitive skills employees 35-44 years	7.47 (0.76)	7.57 (0.61)	7.51 (0.84)	7.43 (0.77)	7.48 (0.70)
Fluid cognitive skills employees 45-54 years	7.16 (0.71)	7.15 (0.60)	7.19 (0.70)	7.16 (0.76)	7.15 (0.69)
Fluid cognitive skills 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 A3**

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

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
	Fluid cognitive skills				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	Knowled-ge	Professio-nalism	Planning of work	Supervi-sion	Communi-cation skills	Coopera-tion with colle-gueas
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 A4**

**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)
Fluid cognitive skills	-0.029* (0.016)					-0.013 (0.019)
45 years * Fluid cognitive skills	0.015 (0.014)					0.015 (0.017)
55 years * Fluid cognitive skills	0.032** (0.015)					0.026 (0.018)
60 years * Fluid cognitive skills	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 A2.

**Table A5*****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 A6**  
**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 A7**  
**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 A8**

***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 A9**

***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