Management Online REview

Hiring Chances Are Bad For Older Workers

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Abstract

It is often claimed that work opportunities decline with age, that hiring chances of older persons are poor. We investigate this by collecting questionnaire responses from personnel managers of German manufacturing firms, eliciting a hypothetical hiring decision based on three fictitious candidates. We rely on an age-neutral job and a small age-gap of 14 years between the youngest and the oldest candidate. The quasi-experimental design of the questionnaire allows us to control for possible productivity differences and other economic explanations for declining hiring chances. The data show a 60 percentage point difference in hiring probabilities between the youngest and oldest candidate.

Keywords: Discrimination, Hiring Decision, Labor Market, Questionnaire Study

1 Introduction

Many countries face an ageing society. Due to lower fertility rates and longer life expectancies the dependency ratio (number of individuals older than 65 years divided by number of individuals between 20 and 65 years) has risen over the years and is anticipated to rise even more in the next years and decades (Härdle and Mysickova, 2009). Concerns regarding the stability of social security systems are justified and have set the retirement age on the political agenda.

While the legal retirement age remained unchanged for a long time, actual retirement is much earlier today than a few decades ago. Although the decline of the actual retirement age in OECD countries was recently reversed - it had declined from about 65 in 1965 to less than 60 in 1995 - the current employment rate in Germany for older workers (defined here as all workers aged 55-64) is only 52 percent (OECD, 1999 and 2006). This may reflect a desire of employees for early retirement, but it may also be caused by poor employment opportunities for older persons. If older workers are less likely than younger workers to be hired, this might be due to purely economic reasons, like productivity differences, fixed hiring costs and long term incentives provided by deferred compensation (Hutchens, 1986 and 1988). But it might as well indicate discrimination in the sense of Becker (1957) – i.e., employers or fellow workers or customers exhibit a preference for younger workers and consequently induce different hiring probabilities.

While many countries prohibit discriminatory practices in the labor market, discrimination may nevertheless occur in subtle forms that are hard to detect. The World Labour Report 1995 states that age discrimination in advertising for vacancies starts at the age of 40 or even earlier (ILO 1995, p. 49). Taylor and Walker (1993) present an opinion poll run in all EU countries according to which 73% of the respondents think that there is age discrimination in

the recruitment of staff. Lee and Clemons (1985) study age discrimination for persons of age 61, and Arrowsmith and McGoldrick (1996) do so already for persons of age 40.

In our study we investigate the hiring chances of older applicants relative to younger ones. The results may be seen as evidence for taste-based age discrimination even though we cannot completely rule out economic reasons. However, we take great care to control for other factors that may influence hiring probabilities. We report a questionnaire study using techniques from controlled experiments featuring a hypothetical recruitment decision in which respondents have to suggest which one out of three candidates should be hired for a fictitious job. Since the candidates may differ in productivity and since perceived productivity differences - that are not due to taste-based age discrimination but to expected utility maximizing statistical discrimination (Phelps, 1972) - may bias the respondents' answers, we use a randomization technique to control for such differences. Furthermore, we vary the average age of the group of candidates. These issues are explained in more detail below. The respondents are students (sample 1) and personnel managers of German manufacturing firms (sample 2).

Using these data we provide measures of the hiring probabilities of young, middle-aged and older workers. Our main result is that job candidates who exhibit exactly the same personal characteristics, qualifications, and perceived productivity differ in hiring probability just because of differences in age. Comparing hiring probabilities without controlling for other factors that influence hiring decisions we find a hiring probability of an older candidate of about 25% while that of the middle-aged candidate is 36% and that of the younger candidate is 39%. Furthermore, when controlling for moderating factors the hiring probability of an older candidate is even less than 1% while it is about 63% for the younger candidate.

The paper is organized as follows: First we review some related literature (section 2) and explain the design of our study in detail (section 3). Then we provide statistical analyses and test our hypothesis of reduced hiring probability for older workers (section 4). Section 5 concludes.

2 Related Literature

There exists a large body of literature that analyzes the importance of age for the termination of employment relationships (e.g., Gatter and Hartmann 1995, Klauder 1989, Wübbeke 1999). In contrast, we focus on the importance of age in hiring decisions.

"Do job opportunities decline with age?" is the question asked in the study of Hutchens (1988). He found that newly hired mature workers cluster in a smaller set of industries and occupations than newly hired young workers or mature workers in general (see also Hutchens, 1986, Adler and Hilber, 2009). While Hutchens' and Adler and Hilber's studies used US data this pattern was confirmed for data from Hong Kong by Heywood, Ho and Wei (1999). One possible explanation for these findings is that industries and occupations differ with respect to the required training. Jobs requiring substantial training are less attractive for older workers, since the workers or firms or both have less time to recoup the fixed cost entailed in training. Hu (2002) finds that large firms hire relatively more young workers than small firms and argues along the same line. A second explanation is that firms use delayed compensation as incentive schemes to reduce monitoring problems (see Lazear 1979, 1981). Workers' fear of losing long-term compensation serves as a disciplining device, which is more effective for younger workers. In turn this means that the latter are more attractive hires than older workers. Indeed, using combined establishment and employee data Daniel and Haywood (2007) show that firms which defer compensation hire fewer older workers.

A problem with these studies is their lack of control of productivity differences. In some industries and occupations the vintage of human capital acquisition may be important (e.g. consider the IT-industry) inducing different employment opportunities for obvious economic reasons. The question arises whether these differences still exist when productivity is

controlled for. Controlling for productivity differences is, however, difficult with field data especially with data from different industries and occupations. Questionnaire studies might be advantageous in this respect.

Psychologists have run a number of questionnaire studies on negative age stereotyping, with Kirchner and Dunette (1954) being one of the first ones published (according to Hassel and Perrewe, 1995). The respondents, workers from a plant producing naval equipment, provided answers on an attitude scale with respect to 24 items relating to older persons, and with an older person being defined as someone beyond 50 years. Bird and Fisher (1986) ran the same experiment 30 years later to see if attitudes towards older workers had changed over time. Also Hassel and Perrewe (1995) used a similar questionnaire in three companies. In all of these studies the goal of the investigation – whether there is negative age stereotyping – was revealed to the respondents. This obviously triggers "politically correct" answers which is unsatisfactory in our view.

Other questionnaire studies rely mostly on student subjects that may introduce a serious age-bias. An often-cited work on age stereotypes in the workplace is the article by Rosen and Jerdee (1976b) which investigates to what extent age stereotypes influence managerial decisions. They asked 124 students for their decisions on fictitious managerial tasks assuming they were managers of a firm. The authors wanted to find out if older workers were seen as more resistant to changes, less creative, less trainable, etc. than younger workers, and, indeed, found evidence of age stereotyping.

In another study (Rosen and Jerdee, 1976a) the participants – 65 realtors and 50 undergraduate students – had to state for 65 items (on a 10-point scale) what they expect from an average 60-year and an average 30-year old male. Based on these items Rosen and Jerdee determined four work-related attributes (performance capacity, potential for development, stability and interpersonal skills) and found age-stereotyping. Note that the age difference of the evaluated persons (30 versus 60) is rather large and hardly realistic for most hiring decisions. A similar approach was used by Forte and Hansvick (1999) who ran a mail survey on 98 employers. The respondents were asked to evaluate workers of age 50 and older compared to workers of age 49 and younger regarding 12 attributes.

Lyon and Pollard (1997) carried out a study with 221 MBA students. For 17 items like "are reliable" they had to state if an older worker "is less so" or "more so" than a younger worker or if there is no difference. They also found age stereotypes.

That age stereotyping is institutionalized socially and within human resource practices is now a common view (see, e.g., Loretto and White, 2006, Murray and Syed, 2005, and Brooke and Taylor, 2005).

A number of studies addressed the relevance of age for hiring decisions more directly than the ones above, though they mostly rely on large age differences of job candidates and, again, student subjects. Gordon *et al*. (1988) asked 120 students, partitioned into 6 subgroups, to watch a videotaped employment interview of about 4 minutes length. Each subgroup saw a different applicant. The 6 applicants were actually role players, two of age 25, two of age 40 and two of age 55. The respondents had to rate the applicant they had seen in the video on 6 items. Specifically, they had to provide a recommendation whether the candidate should be hired or not. Gordon *et al*. identified age discrimination and investigated furthermore whether this is influenced by the position for which the applicants apply (assistant director or director).

In a study by Fusilier and Hitt (1983) each respondent had to evaluate a single job candidate (overall evaluation of the candidate, evaluation of more specific qualifications, etc.). The group of respondents (523 students) was partitioned into subgroups, and the age of the candidate was randomized across subgroups. This is a between-subjects design to identify age discrimination.

Finkelstein and Burke (1998) applied a between-subjects design as well. Again, each respondent had to evaluate a single fictitious job applicant of either age 28 or age 59. Two other factors were varied: saliency of age as a relevant personal characteristic (high vs. low) and amount of information about the applicant (a lot vs. a little). A final question asked whether the respondents (324 managers) think that gender and age are relevant for the job. As we argued above, this stresses the aim of the study, and the age difference of the job candidates is rather large.

Singer and Sewell (1989) applied a particularly subtle procedure to identify age-stereotyping. They asked a role player to act first as a younger applicant and then as an older applicant, and videotaped both on separate videos. Afterwards they presented the tapes to 114 students. Each student saw only one version of the applicant, "the young" or "the old", and was asked to estimate its age. Note that both, the behavior of the role player and the students' estimates, allow for (and actually exhibited) age-stereotyping. Another group of respondents (61 managers and 119 students) had to fulfill the same task and, in addition, received different introductory treatments. One group had to read an article about older workers. The other group had to read an age-neutral article. Furthermore, they had to rate the applicants on six different items (suitability, fit-in, success, competence, starting salary and hiring).

Another study based on videotaped role-playing was run by Perry *et al*. (1996). Four female role-players acted as candidates in job interviews: one young candidate, one older candidate, one high-qualified middle-aged candidate, and one low-qualified middle-aged candidate. 131 students watched the videos and evaluated (on 7-point scales) how likely each applicant would be hired, their performance in the interview, qualification for the job, expected performance in the job, and so forth.

Perry (1994) and Perry and Bourhis (1998) identify young-type jobs like pizza deliverer and fast-food worker in pilot studies and then investigated whether age influenced the evaluation of applicants for these jobs. In their studies, undergraduate students had to evaluate six applicants (three younger and three older) with respect to three questions ("How desirable is this applicant for this job? How suitable is this applicant for this job? How likely would you be to hire this applicant for this job?"; see Perry (1994), p. 1449) on a 7-point scale. Younger applicants were between 20 and 25. Older applicants were 20 to 36 years older. All were said to possess the necessary skills and qualifications.

We conclude that only four of the questionnaire studies above explicitly address the relation between age and hiring decisions: Perry (1994), Perry *et al*. (1996), Perry and Bourhis (1998), and Finkelstein and Burke (1998). Three of these ran pilot studies to identify whether the investigated job is age-biased. All studies – except Perry *et al*. (1996) – rely on a rather large age gap between the candidates, and most of them had only students as participants. Students form an age-biased sample, which is disadvantageous for the question under investigation. Furthermore, students and managers may differ in their decisions (see Barr and Hitt ,1986).

Finally, age discrimination in the hiring process was also be investigated by field experiments. Such experiments were run by Bendick *et al*. (1996) and more recently by Riach and Rich (2006, 2007a, 2007b). They sent two fictitious application letters to firms that had offered jobs or usually expect unsolicited applications. The two fictitious candidates were described as about equally qualified with respect to job-specific qualification and other characteristics. The only dimension in which the candidates notedly differed was their age. The age gap between the young and older candidate in these studies was rather large and lay between 18 and 25 years. Positive responses were typically more frequent for the young candidate; though they are industry and country specific. In the UK, the older candidate was preferred in retail sales.

These correspondence tests were successfully used to investigate racial (Bertrand and Mullainathan, 2004) and sexual discrimination (Weichselbaumer, 2003) where productivity differences and other economic reasons for differential treatment are only of minor concern. Nevertheless, this method is sometimes heavily criticized (see, Pager, 2007). In the context of age discrimination, controlling for young-type versus old-type jobs and for the perceived productivity of the candidates seems paramount. One additional drawback to questionnaire studies is the lack of background information on decision makers. In our study, we address all these points.

3 Design of Our Study

3.1 Some Methodological Concerns

Our aim is to study the influence of age upon hiring decisions while avoiding some of the methodological problems associated with other studies discussed above. Especially, we want to determine the hiring probability of workers with different age but equal productivity characteristics. This is difficult to achieve with field data. Even if one takes large samples of young and older workers there might be systematic productivity differences between age cohorts. We took the following steps to avoid or, at least, reduce this problem:

1. We ran a questionnaire study in which the respondents had to suggest which out of three fictitious job candidates should be hired. The candidate characteristics were chosen such that obvious productivity differences were avoided.
2. Most importantly, we randomized age across candidates, i.e. different groups of respondents had to evaluate the same set of candidates but for a different assignment of age to the candidates.
3. The fictitious job was relatively age-neutral. We ran a pre-study similar to Cleveland and Landy (1987) to identify an age-neutral job.

It seems natural that productivity concerns are more important the larger the age gap is between candidates and the closer a candidate is to retirement. We therefore chose a moderate age gap and varied the age of the candidate set. We collected not only the respondents' hiring decisions but also their assessments of the candidates' productivities and used these data as control factors in the data analysis. We will describe these points in more detail below.

As argued above age *per se* is an important issue for hiring decisions when a job requires training costs and comprises deferred compensation (see Hutchens, 1986). We cannot completely rule out such issues as we can assess their importance only indirectly but we try to downplay them by describing the fictitious job as one of a project manager (where long-term considerations may be less important) and the job candidates as having the necessary qualifications. This point is relevant for interpreting our results: If the hiring chances of older workers are worse than those of younger workers, and if one rules out considerations of training costs and deferred compensation, the results should be interpreted as age discrimination effects. Otherwise, the results reflect a combined effect of discrimination and economic considerations or economic effects alone. Given the care we take to control for productivity differences and other economic aspects we favor a discrimination view. However, this point is left for discussion. What we are going to show is summarized in the following main Hypothesis:

Main Hypothesis: The hiring probability of older job candidates is lower than that of younger candidates despite equal qualifications.

3.2 Determination of Age-Neutral Jobs

Some jobs are viewed as more appropriate for particular ages (Finkelstein *et al*. 1995). For instance, selling pop music CDs is viewed as a *young* job (Perry *et al*. 1996). Furthermore, it was found that questionnaire respondents prefer younger applicants for jobs that are seen as *young* (Perry 1994) and that older job candidates are evaluated less favorably for *young-type jobs* (Perry and Bourhis 1998). While the authors take this as evidence for age discrimination, an economic explanation suggests itself: Not knowing a CD-seller customers might expect a young seller to know more about pop music than an older seller.

For our study we therefore want to rely on an age-neutral job. To identify a relatively age-neutral job we ran a pre-study applying a method developed by Cleveland and Landy (1987). We collected 20 newspaper advertisements with the following job offers:[1] Buyer (3), Production Planner (1), Supervisor of Customer Service (3), Regional Sales Manager (Assistant) (2), Sales Engineer (3), Director of Accounting (2), Director of Research and Development (2), Junior Accountant (2) and Junior Project Engineer (2).[2] The jobs were offered by different companies. They are similar to those used by Cleveland and Landy (1987). All of them are white-collar jobs that do not require physical strength since there is some evidence that physical strength decreases with age (ILO, 1995, p. 46).

To determine which of these jobs are relatively age-neutral we collected questionnaire responses by two groups of students. One group of 26 students was asked to fill out questionnaire A, a frequency questionnaire with 7 age categories. For each of the 20 jobs the participants were asked to estimate the share of persons below 20, between 20-29, 30-39, etc. of all persons working in that job. Another group of 35 students had to fill out questionnaire B, a graphic rating scale featuring 7 categories ranging from 1 to 7 without any age specification. The students were asked to sort each of the 20 jobs into one of the 7 categories according to what they thought was the predominant age of persons working in that job. Thus, both questionnaires generate an age distribution for the 20 jobs described in the newspaper advertisements.

A job is classified as *young* (*old*) according to questionnaire *i* (*i* = A, B) if 60% of the responses fall into the first three (last four) response categories. Otherwise a job is classified as age-neutral according to questionnaire *i.* Appendix 1 provides the observed frequencies for these categories and both questionnaires as well as the type of each job (*young, neutral,* etc.) according to these criteria. For the final classification of a job the convergence of both questionnaires was important. Overall a job is termed age-neutral if it is classified as age-neutral according to both questionnaires.

Seven jobs were identified as age-neutral (see Appendix 1). We chose one of these seven – Project Engineer[3] – to proceed in our study. The job of a Project Engineer may be seen as a temporary engagement so that it downplays long-term career concerns, which is advantageous for studying age discrimination.

3.3 Design of the Questionnaire and Fictitious Job Candidates

The questionnaire underlying our main study starts with the description of the job (Project Engineer) and three fictitious candidates (see Appendix 2). To provide realistic features of the candidates we had interviewed the personnel manager of the company that had placed the original newspaper advertisement. The candidates are described by short profiles – labeled “Müller”, “Schmidt” and “Koch” – which describe the candidates according to nine characteristics: last name, first name, age, grade of diploma, computer knowledge, stays abroad, additional qualifications, hobbies and reason for application. We tried to balance the

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1 Numbers in parentheses denote the number of respective jobs.

2 Note that some of these jobs are obviously young (e.g. Junior Accountant) or old (e.g. Director of Accounting). This allows for a consistency check of the classification procedure.

3 The job description is provided in the questionnaire in Appendix 2.

three profiles so that no candidate would obviously appear superior to the two others. Furthermore, all three candidates are described as having the required diploma and two years of industry-specific experience. Thus, with respect to the latter two essential qualifications the candidates are equally qualified.

The questionnaire asks, first, to evaluate the relative importance of 12 productivity items for the job under consideration (technological know-how, computer skills, organization ability, foreign language skills, engagement, ability to learn, flexibility, conscientiousness, reliability, capacity for team work, communication ability, persuasive power and commitment) that were selected following the performance capacity scale of Rosen and Jerdee (1976a) and the work of Forte and Hansvick (1999). Second, for each productivity item each of the three fictitious candidates has to be rated on a 9-point bipolar rating scale. Therefore, if any differential treatment of the candidates is driven by statistical discrimination, i.e. the expected productivity, we can control for it by computing and conditioning on the individually weighted sum of the 12 productivity item scores.

Third, the respondents are asked to specify a "suggested wage" (yearly wage) for each candidate in case the candidate is hired. It is said that the suggested wage should reflect the candidates' productivities as perceived by the respondent. Furthermore, the wage has to lie within the range of € 38,000 and € 46,000, which is a realistic range for the considered job. This range was provided by the personnel manager of the company that had placed the newspaper advertisement. Fourth, the respondents have to provide a "hiring decision", i.e., they have to suggest which of the three candidates should be hired assuming that each candidate would earn the same wage in case he is hired. Finally, the questionnaire asks for comments and for some personal data on the respondent himself. Students had to answer questions regarding gender, field of study and age. Managers were asked to provide gender, age, education, job experience, their hierarchical position within the personnel department of their company, whether they had specific training in personnel management, and the number of hiring decisions they were involved in so far. In the statistical analysis below we will use the personal data as control factors.

3.4 Randomization of the Candidates' Ages

The key variable, which we manipulated, was the age of the three fictitious candidates. We used different questionnaires to achieve different assignments of ages to candidates. For instance, the first age group (Müller, Schmidt, Koch) = (27, 34, 41) represents an assignment in which "Müller" is 27 years old, "Schmidt" is 34 and "Koch" is 41. Another questionnaire featured the assignment (41, 34, 27), i.e., a reversed order of ages. For a given set of ages there are six possible assignments. By collecting samples for each of the six assignments we achieve a randomization of age across candidates. Thus, we can determine the hiring probability, e.g., of candidate "Koch" when he is the young, middle-aged or the older candidate in the candidate set; i.e. we can assess the influence of age keeping everything else equal.

Furthermore, we varied the age of the whole group of candidates. Age group II comprised ages 31, 38, 45, in group III 35, 42, 49 and in group IV 39, 46, 53. Thus, within each group the oldest candidate is 14 years older than the young candidate, and the middle-aged candidate is 7 years older than the young candidate. Compared to other studies these age differences are moderate and more realistic. Bendick *et al*. (1996) compared a 32-year old candidate and a 57-year old candidate what is certainly an extreme and rare case in practice. We think that if age discrimination is to be seen as an important socio-economic problem, it should reduce the hiring chances even for less extreme and more realistic age differences as in our case. The four groups vary such that average age increases by four years on each step (from group I to IV). This variation was implemented because one does not know in advance at which age the hiring probability declines. Furthermore, it provides an indirect test for the economic motivations to hire a younger applicant. If the firm faces hiring costs and wants to use deferred compensation schemes, a longer prospective employment period of

the applicant is more beneficial economically. The ratio of the prospective employment periods of two candidates then provides a relative measure of whom the employer should hire *ceteris paribus* if he is driven by these economic concerns. Comparing this ratio for the youngest and oldest applicant over our four age groups, we see that this ratio is increasing from group I to group IV, indicating that to hire the young candidate becomes more beneficial economically. Consequently, if employers' decisions were driven by these economic concerns or statistical discrimination we should observe that hiring probabilities increase for the youngest and decrease for the oldest candidate as we move from group I to group IV.

4 Results

4.1 Productivity Assessments and Wage Ranks

In an initial round of data collection the questionnaire was filled out by 174 students of the Humboldt-Universität zu Berlin. In a second round, the questionnaire was sent out to the personnel departments of 761 West German manufacturing companies, each having more than 200 employees. In a cover letter, we asked for the questionnaire to be completed by an executive of the personnel department. We informed them that the study was on issues of human resource management, but did not reveal its specific aims. 102 questionnaires were returned by the companies. 87 of these had answered the crucial question of which applicant they had suggested for hiring. While we will provide analyses of both samples (student data and manager data), we will focus mainly on the data submitted by the personnel managers. Table 4.1 shows the distribution of returned and completed questionnaires across age groups, and Table 4.2 shows the distribution across candidate types.

Table 4.1. Observations in Sample of Managers

Age groups		Observations
I:	27, 34, 41	23
II:	31, 38, 45	22
III:	35, 42, 49	19
IV:	39, 46, 53	23
Total		87

Table 4.2. Number of Questionnaires

	Young	Middle-aged	Older
Müller	26	29	32
Schmidt	31	29	27
Koch	30	29	28

33% of the responding managers are female, 40% have a degree in economics and 47% are staff executives. The mean age is 40.15. Table 4.3 reports correlations between personal characteristics of the managers.

Table 4.3. Correlation Between the Different Personal Characteristics

	Age of respondent	Female	Degree in economics	Staff executive
Age of respondent	1	–0.283	–0.269	0.367
Female	–0.283	1	0.137	–0.203
Degree in economics	–0.269	0.137	1	0.010
Staff executive	0.367	–0.203	0.010	1

Table 4.4 provides statistics on productivity assessments. It reports the average scores of each candidate on each of the 12 productivity items and the mean values for Productivity and

Wage Ranks according to the personnel managers' evaluation. It also provides p-values of tests (the non-parametric Kruskal-Wallis Test and the one factorial Analysis of Variance) regarding differences between the scores of the three candidates for each item.

With the exception of two items (ability to learn and flexibility), we find no significant differences; thus there is no clear indication of age discrimination in productivity assessments.

Table 4.4. Personnel Managers' Evaluation of the Different Items

	Young	Middle-aged	Older	KW	ANOVA
1. Technological know-how	5.37	5.60	5.79	0.114	0.239
2. Computer skills	6.08	6.05	5.87	0.331	0.442
3. Organization ability	6.01	6.21	5.81	0.234	0.142
4. Foreign language skills	5.98	6.63	5.60	0.300	0.371
5. Ability to learn	5.84	5.84	5.28	0.001	0.006
6. Flexibility	6.03	6.01	5.54	0.009	0.014
7. Conscientiousness	5.47	5.72	5.75	0.104	0.249
8. Reliability	5.57	5.81	5.73	0.242	0.441
9. Capacity for teamwork	6.11	6.26	6.05	0.444	0.456
10. Communication ability	6.19	6.30	6.06	0.340	0.402
11. Persuasive power	5.58	6.01	5.71	0.026	0.055
12. Commitment	5.95	6.06	5.81	0.523	0.423
Mean Productivity Rank	2.03	2.10	1.87	0.151	0.147
Mean Wage Rank	1.69	2.09	2.22	<0.001	<0.001

Note: In the columns KW and ANOVA are reported the p-values of the Kruskal-Wallis Test and the one factorial ANOVA, respectively. In the discussion, we consider only those items whose differences are significant at the 5% level in both tests.

The variable Productivity Rank is a summary statistic of the 12 productivity items. It is calculated as weighted average of the 12 scores with the weights being the respondents' answers to question 1 ("assessment of the relative importance of the productivity items"). Similarly, using the respondents' answers to question 3, the candidates' Wage Ranks (1 = lowest, 2 = intermediate, 3 = highest rank) are determined. The analysis shows that the wage for the older applicant is significantly higher than for the other two, indicating that the managers' responses reflect seniority based wages.

Table 4.5 shows statistics conditional on which candidate is hired. For example, the two variables Mean Productivity Rank and Mean Wage Rank of the hired applicant increase with his relative age. Also, the shares of specific subgroups of respondents hiring a young, middle-aged or older applicant are presented in table 4.5. It is striking that 48% of executive staff hire the young applicant while only 18% hire the older candidate.

Table 4.5. Statistics Conditional on the Hiring Decision

	Youngest is hired	Middle-aged is hired	Older is hired
Mean Productivity Rank	2.63	2.72	2.77
Mean Wage Rank	2.07	2.64	2.89
Mean Age of Respondent	40.68	40.10	39.36
Share of female respondents	0.39	0.54	0.14
Share of respondents with degree in economics	0.49	0.37	0.17
Share of executive staff	0.48	0.38	0.18

Note: The share of female respondents, of respondents with degree in economics and executive staff do not add up to exactly one due to rounding errors and to the fact that some respondents wanted to hire two applicants.

4.2. Analyses of Hiring Decisions

Our main question is whether the hiring probability of a candidate depends on age. To study this question we, first, provide a simple and robust test of hiring frequencies by age ignoring other potential influences on managers' decisions. Second, we report regression analyses that do account for other factors. Table 4.6 reports the observed hiring probabilities for young, middle-aged and older candidates in both samples.

Table 4.6. Hiring Probabilities

Candidate	Managers' data	Students' data
Young	39.1%	46.3%
Middle-aged	35.6%	29.9%
Older	25.3%	23.9%

33 out of 87 personnel managers (39.1%) suggest hiring the young candidate. In contrast, the relative hiring frequencies are 35.6% for the mid-age candidate and 25.3% for the older candidate. If age played no role in hiring decisions, the hiring probability of each candidate would be 1/3. But it is only 25.3% for the older candidate. A Binomial test regarding the discrimination of the older candidate weakly rejects the Null-hypothesis ("age does not influence hiring decisions": prob(old) = 1/3) in favor of the alternative hypothesis (one-tailed, exact test, N=87, p=0.067).

For the data of students we find even stronger effects. The hiring probability of the older candidate is about 24% which is highly significantly less than 1/3 (p=0.003, one-tailed, exact test, N = 174).

Result 1: Ignoring other potential influences on the manager's hiring decision we find a smaller hiring probability for older job candidates.

Table 4.7. Hiring Frequencies, Manager's Data

Candidate	Müller				Schmidt				Koch			
	Age Group											
	I	II	III	IV	I	II	III	IV	I	II	III	IV
Younger	2	1	1	5	4	8	5	4	2	1	1	0
Middle-aged	2	3	3	2	7	3	5	5	0	0	1	1
Older	5	3	2	3	0	2	1	1	1	2	1	1

To assess the importance of economic concerns for hiring the younger rather than the older candidate we need to test whether hiring probabilities for younger applicants increase with the age group while they decrease for older applicants. Table 4.7 reports the hiring frequencies for each candidate and the four age groups in our sample of personnel managers. The Cochran-Mantel-Haenszel test shows that the hiring probabilities are conditionally independent (p_M = 0.879 and p_S = 0.327 for the manager's and students' data), the hiring probabilities are not affected by the age group.[4] Therefore, we conclude that

[4] Before we can test whether there is any association between age group and age of the candidate we need to test whether the assumption of homogeneous conditional odds ratios is violated, i.e. whether there is an interaction effect of candidate and age group and age on the hiring probabilities (see Agresti 2002, p. 231f.). The Woolf test indicates that our data satisfies this assumption (p_M = 0.758 and p_S = 0.843 for the manager's and students' data).

economic concerns like hiring costs or deferred compensation schemes that would favor younger applicants do not drive the decisions of our subjects.

Result 2: Hiring probabilities are independent of the four age groups.

As logistic regressions are the canonical way to study higher dimensional contingency tables, we now report logistic regressions to control for other factors that might influence hiring decisions and to assess the importance of the decision maker's personal characteristics. First, we estimate the hiring probability of the older candidate controlling for the wage and productivity rank as well as respondent's age, gender, position etc. In a second step, we estimate the conditional hiring probability of the middle-aged candidate given that the older candidate was not hired. Since the sample reduction for this second regression is not random, we apply the generalized two-step Heckman procedure to control for selectivity bias; i.e., we use the results of the first regression to compute the inverse Mill's ratio and include this as regressor in the second model (see Lee, 1983). Furthermore, unaccounted heterogeneity of various sorts among the respondents may cause the hiring probabilities to vary somewhat which in turn may lead to over- and under-dispersion, respectively (see Agresti, 2002). We follow the quasi-likelihood approach which leaves the point estimates unaffected and only inflates or deflates the asymptotic covariance matrix accordingly.

To obtain the model presented we applied a stepwise model selection procedure to select a parsimonious regression model that fits best according to the Akaike Information Criterion (AIC). The full model consists of the following regressor variables and all of their first order interactions: the productivity rank and the wage rank of the older candidate, dummies for candidates Schmidt (1 = Schmidt, 0 = else) and Koch (1 = Koch, 0 = else), dummies for the age groups II to IV, the age of the respondent, a dummy that equals one if the respondent is older than the oldest candidate, a dummy for the respondent's gender (1 = female), a dummy indicating whether the respondent holds at least a minor university degree in economics or management science (1 = yes), and a dummy that equals one if the respondent is a top executive of the personnel department.

Statistics for the final model[5] are reported in Table 4.8. Since the marginal effect of a variable in a logit model depends on the values of all other variables it is more convenient to look at how the odds change. The odds increase multiplicatively with the exponential of the coefficient for every one unit increase in the respective variable. We, therefore, also provide the exponential of the estimated coefficient. The coefficients for variables "Wage Rank" and "Productivity Rank" are positive and highly significant. Thus, if the older candidate is perceived as more productive than the other two candidates, his hiring probability is significantly higher than if he is perceived as less productive (intermediately productive) compared to the other two candidates. This effect is, of course, fully consistent with economic theory. Secondly, the hiring probability is lower for candidate Koch than for Müller and Schmidt. A natural explanation for this effect is that candidate Koch is perceived as less competitive than the other two candidates. Furthermore, the hiring probability of an older candidate is *ceteris paribus* higher if the personnel manager himself is an older person ("Age of Respondent"), and if the manager does not have a university degree in economics or management.

[5] We also estimated more complex models that instead of wage and productivity ranks used the relative differences in wage offers and productivities to the mid-aged and young candidate. This increases the number of significant variables considerably without improving the overall fit. Further, the predictions of models with this more complex parametrization do not differ much from the predictions of the reported model. The estimated older candidate's hiring probability at, e.g., the point of no differences to the other candidates and the mean of all other variables is 0.29 % as compared to 0.24 % in the reported model.

Table 4.8. Logistic Regression 1: Decision to Hire Older Candidate (Yes = 1)

Coefficient	Estimate	exp(Estimate)	t-value	p-value
Intercept	-48.994	0.000	–3.966	<0.001
Productivity Rank	16.451	13950139.000	3.766	<0.001
Wage Rank	4.652	104.7944	4.602	<0.001
Dummy Koch	-4.992	0.007	–4.117	<0.001
Age of Respondent	0.696	2.006	3.169	0.002
Gender of Respondent	13.917	1103503.000	2.436	0.017
Economics Degree	–5.195	0.006	-4.173	<0.001
Age*Productivity Rank	–0.289	0.749	-3.339	0.001
Age*Gender of Respondent	–0.486	0.615	-2.859	0.005
Model Statistics				
Null deviance	96.607	on 83 degrees of freedom		
Residual deviance	24.269	on 75 degrees of freedom		
Chi-square Test: <0.001	Estrella R2: 0.796		Dispersion parameter: 0.381	

The negative interaction effects indicate that the influence of perceived productivity differences between the candidates ("Age*Productivity Rank") becomes less important with the respondent's age and that the impact of the respondent's gender ("Age*Gender of Respondent") changes its direction after the respondent's age reaches a certain threshold (about 29 years). Older females discriminate to a higher extent. Note, that consistent with our second result the hiring decision is independent of the age group. The final model does neither include any interaction with the age group dummies nor the dummies themselves after the model selection procedure.

If we fix productivity and wage rank at 2 and all other variables at their mean values, the estimated hiring probability of the older candidate equals 0.0024, i.e. less than 1%. Since we evaluate the model at the center of all variables the hiring probability in the case of no discrimination should be the same for all three candidates and thus should equal 33 %.

Result 3: Controlling for other influences (productivity, respondent's gender, age, educational background, etc.) the older candidate's hiring probability is less than 1% while it should be 33 % if age was irrelevant for hiring decisions.

For the second logistic regression analysis we apply the same stepwise selection procedure to determine the best regression model according to AIC. In addition to the above regressor variables we include the inverse Mill`s ratio computed from the results of the first logit regression to control for a possible selectivity bias (see Lee, 1983). Table 4.9 provides estimation results of the final model. All effects are smaller in size but qualitatively the same as in regression 1.

Table 4.9. Logistic Regression 2: Conditional Decision to Hire Mid-Age Candidate

Coefficient	Estimate	exp(Estimate)	t-value	p-value
Intercept	–31.249	0.000	–2.860	0.006
Inverse Mill`s ratio	5.592	268.272	1.937	0.058
Productivity Rank	10.680	43477.550	2.582	0.013
Wage Rank	2.026	7.584	2.453	0.017
Age of Respondent	0.458	1.581	2.423	0.019
Gender of Respondent	2.003	7.411	1.540	0.129
Age*Productivity Rank	–0.190	0.827	–2.365	0.022
Model statistics				
Null deviance	84.416	on 61 degrees of freedom		
Residual deviance	39.294	on 55 degrees of freedom		
Chi-square test: <0.001	Estrella R2: 0.636		Dispersion parameter: 1.360	

If we fix productivity and wage rank[6] at 2 and all other variables at their mean values the estimated conditional hiring probability of a mid-age candidate equals 36.93%. Since we evaluate the model at the center of all variables the conditional hiring probability in case of no discrimination should be the same for both remaining candidates and thus should equal 50%.

Utilizing both regression analyses we determine each candidate's unconditional hiring probability as predicted by the two models if all candidates exhibit the same perceived productivity (see Table 4.10). The hiring probability of the young candidate is about 63% compared to less than 1% of the older candidate.

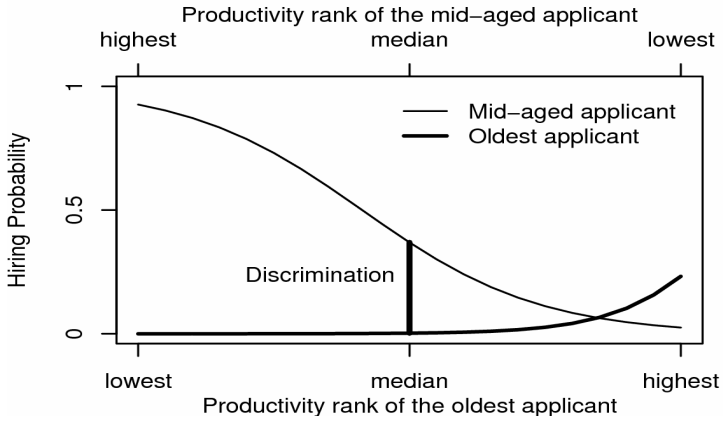
Table 4.10. Hiring Probabilities Predicted by the Regression Models

Candidate	Managers Data
Young	62.92
Mid-age	36.84
Older	0.24

Result 4: The regression analyses reveal lower hiring probabilities of the older and middle-aged candidate compared to the younger candidate. The effects are statistically significant and economically substantial.

Our findings are further illustrated in Figure 4.1. The graphs plot the hiring probabilities of a mid-aged and an older candidate with respect to their productivity rank at the mean values of all other variables. If the mid-aged and older candidate have the median productivity rank the young candidate has necessarily median productivity rank, too. Consequently, if age played no role in hiring decisions the hiring probabilities of all three candidates should be equal to one third at the median productivity rank. The extent of the decrease in hiring chances of the older candidate compared to the mid-aged candidate is illustrated by the vertical distance of the graphs at the median productivity rank. Furthermore, the location of the intersection of the two graphs is a second indicator. An older candidate has to have a much higher productivity rank than a mid-aged candidate to reach the same hiring probability.

Figure 4.1. Influence of Productivity on Hiring Probability According to the Regression Models (for mean values of all other variables)



[6] Note, if the older and the middle-aged candidate have rank 2 the young candidate has necessarily rank 2, too.

5. Summary and Concluding Discussion

In our questionnaire study upon managerial hiring decisions we find a strong and statistically significant decline in hiring chances by candidate age. Controlling for various other influences on hiring decisions the estimated hiring probability of a candidate who is seven years (14 years) older than the mid-aged (young) candidate is less than 1% while it should be 33% if decisions were not biased. In contrast the young candidate is hired with a probability of 63%. The basic effect of reduced hiring chances of older candidates is confirmed not only with sophisticated analyses but even with a simple and robust test.

Compared to other studies on age stereotyping our investigation only relies on moderate age differences (7-year-steps between applicants and a maximum age difference of 14 years). Therefore the result is even more alarming. It is not due to productivity differences between the candidates as we tried to rule out this explanation by identifying age-neutral jobs, randomization of the questionnaires and, furthermore, by using productivity assessments as control variables in regression models. Even if these means do not fully control for productivity differences, the latter can hardly explain the size of the observed differences. The expected duration of employment and, thus, a candidate's age would be important *per se* if training costs and deferred compensation were considered. Therefore the observed decline in hiring chances by age does not necessarily imply taste-based age discrimination. However, given the care we took to control for productivity differences and other factors and the observation that hiring probabilities are independent of the average age of the candidate pool we have considerably narrowed down the space for explanations other than discrimination.

There exists a difference between the concept of discrimination in economics and in legal cases and politics. While it is difficult to identify taste-based discrimination in the sense of Becker (1957) – which represents the economics view of discrimination – (see, e.g. Moser 2008), legal cases of discrimination apply less sophisticated measures of discrimination. For instance, it is seen as problematic to look for a "young applicant" in a job advertisement. Doing so is viewed as politically incorrect and may trigger a legal case of age discrimination although it may mean nothing in the Becker sense of taste-based discrimination. In our opinion the results of our study will certainly be viewed as evidence for age discrimination from a political and legal perspective. Legal rules like, e.g., the directive 2000/78 of the European Community and the German anti discrimination law (Allgemeines Gleichbehandlungsgesetz), have been introduced to prevent age discrimination (among other things). While this may eliminate obvious forms of discrimination, more subtle forms like age stereotyping and discriminatory hiring may continue to exist.

Further findings of our study are that female managers and managers in a leading position show a stronger bias against older candidates than other respondents (see table 4.8). Similar to other studies (e.g. Kirchner and Dunette, 1954, and Lyon and Pollard, 1997) the respondent's age has a significant influence as well.

If one accepts the fact that relatively moderate age differences between job candidates have a large impact on hiring probabilities as a common phenomenon, one might further speculate about its causes. E.g., is it due to a temporary or permanent development in society to strive for and reward youthfulness? Is it country-specific or culture-specific? Is it the same for female job candidates? Does it depend on the unemployment rate of older workers in a country? Some of these questions may be answered by similar studies in other countries.

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Appendix 1: Convergence of Two Questionnaires

Job/Position	Questionnaire A			Questionnaire B			Overall Type
Age Category	C 1-3	C 4-7	Type A	C 1-3	C 4-7	Type B	
Buyer							
10. Head of Purchasing Division	58.97	41.03	neutral	74.29	25.71	young	ambiguous
12. Technology Purchaser	**43.78**	**56.22**	**neutral**	**57.14**	**42.86**	**neutral**	**neutral**
3. Purchaser of Books, Music and Video	84.57	15.43	young	94.29	5.71	young	young
Production Planner							
13. Business-Planning Officer	67.29	32.71	young	88.57	11.43	young	young
Supervisor of Customer Service							
4. Department Manager, Customer Service-OTC	40.60	59.40	neutral	31.43	68.57	old	ambiguous
19. Head of Customer Service Technology	**55.54**	**44.46**	**neutral**	**45.71**	**54.29**	**neutral**	**neutral**
14. Head of Customer Service	64.17	35.83	young	85.71	14.29	young	young
Regional Sales Manager							
16. Regional Sales Consultant	56.47	43.53	neutral	40.00	60.00	old	ambiguous
18. Sales Manager	69.87	30.13	young	97.14	28.57	young	young
Sales Engineer							
17. Sales Engineer Product Range Hydraulic Technology	**49.95**	**50.05**	**neutral**	**51.43**	**48.57**	**neutral**	**neutral**
5. Sales Engineer Electrical Engineering	56.85	43.15	neutral	62.86	37.14	young	ambiguous
20. Sales/Project Engineer	**47.41**	**52.59**	**neutral**	**42.86**	**57.14**	**neutral**	**neutral**
Director of Accounting							
7. Area Controller as Department Manager	36.96	63.04	old	20.00	80.00	old	old
8. Head of Cost Accounting and Controlling	49.89	50.11	neutral	31.43	68.57	old	ambiguous
Director of R&D							
9. Head of Development Control Shaft Handling	48.93	51.07	neutral	42.86	57.14	neutral	*neutral*
1. Manager of Technology, Tools and Equipment	38.83	61.17	old	8.57	91.43	old	old
Accountant							
11. M.B.A.emphasis Accounting and Controlling	69.15	30.85	young	82.86	17.14	young	young
2. Head of Division Corporate Accounting	61.15	38.85	young	68.57	31.43	young	young
Project Engineer							
6. Project Engineer Total-Quality Management	52.31	47.69	neutral	51.43	48.57	neutral	*neutral*
15. Manufacturing Process Engineer	53.53	46.47	neutral	42.86	57.14	neutral	*neutral*

Note: The positions in bold are also seen as age-neutral in the experiment by Cleveland and Landy (1987).

Appendix 2: Questionnaire (Manager)

Xxxxxxx Xxxxx
Institut für Finanzwissenschaft
Xxxxxxxx Str. 1

00000 Xxxxx

Questionnaire

This questionnaire describes a hypothetical employment decision: In the enterprise of the XY group they have to decide whom they would hire and which wage the applicants should receive. On the next page you receive the description of the according job position and a short profile of the three applicants. Afterwards you are asked to evaluate the three applicants regarding 12 items as well as to make suggestions for the level of the salaries. Please do not forget to indicate whom you would hire.

The job description can be seen in the following job advertisement:

Project Engineer in Total-Quality Management

We are an enterprise of the group XY which is the European market leader in the industrial metrology. 5700 employees in more than 50 high tech enterprises worldwide make a turnover of more than 500 Million Euro per year. Among our customers are top enterprises from telecommunication, satellite technology, medical technology and the automobile industry. In the area of circuit boards we are one of the best producers worldwide.
Tasks:

Extension and improvement of quality management

Management and implementation of quality improvement projects
Analysis of processes and statistical summaries
Cooperation in problem-solving teams coming from different departments
Support of ideas of co-workers

All three applicants fulfill the necessary hiring requirements. They have an engineering diploma and two years of sector specific job experience. Below there are further details about the three candidates:

Surname	Müller	Schmidt	Koch
Name	Fred	Anton	Siegfried
Age			
Grade of the diploma	2.0	2.7	2.3
Computer knowledge	All current Microsoft Office programs	Word, Excel, Power Point, Statistics program SPSS	Pascal, Windows standard programs
Stays abroad	1 year USA	6 months UK, 4 months France	No information
Additional qualification	Experience as project leader of two projects	Member of an organisation committee of a conference of IEEE[7]	Several years' work in a development team
	Basic course of quality management at the DGQ[8]	Broad knowledge about ISO 90009	Participant of a workshop of DQS[10]
Hobbies	Tennis coach, reading	Golf, classical music	Volleyball, travelling
Reason for the application	New challenge	Interesting working field	Change of place

1. Please weight the importance you attach to the criteria given below to fulfill the specific job requirements. Please indicate in the second column which weight you would give to these criteria. Please keep in mind that the sum of the percentages has to be 100.

[7] IEEE= Institute of Electrical and Electronic Engineers (world-wide alliance of engineers)

[8] DGQ= Deutsche Gesellschaft für Qualität e.V. (German Society for Quality)

[9] ISO = The standards were published for the first time in 1987 by the International Organization for Standardization (ISO). Today it is one of the internationally accepted systems for Quality Management and Quality Securing.

[10] DQS= Deutsche Gesellschaft zur Zertifizierung von Managementsystemen mbH (German Society for Certification of Management Systems).

Table 1:

Criterion	Weight in %
Technological know-how	
Computer skills	
Organization ability	
Foreign language skills	
Ability to learn	
Flexibility	
Conscientiousness	
Reliability	
Capacity for teamwork	
Communication ability	
Persuasive power	
Commitment	
Sum	100%

2. Please evaluate now each applicant regarding the above mentioned items by making a cross (between "extremely low" (1) and "extremely high"(9)). Please use a separate table for each applicant and make sure that there is only one cross in each row.

Table 2: Name of the applicant: Mr. Müller

Criterion	1 extremely low	2 very low	3 low	4 pretty low	5 middle rate	6 pretty high	7 high	8 very high	9 extremely high
Technological-know how									
Computer skills									
Organization ability									
Foreign language skills									
Ability to learn									
Flexibility									
Conscientiousness									
Reliability									
Capacity for teamwork									
Communication ability									
Persuasive power									
Commitment									

Table 3: Name of the applicant: Mr. Schmidt

Criterion	1 extremely low	2 very low	3 low	4 pretty low	5 middle rate	6 pretty high	7 high	8 very high	9 extremely high
Technological-know how									
Computer skills									
Organization ability									
Foreign language skills									
Ability to learn									
Flexibility									
Conscientiousness									
Reliability									
Capacity for teamwork									
Communication ability									
Persuasive power									

Commitment

Table 4: Name of the applicant: Mr. Koch

Criterion	1 extremely low	2 very low	3 low	4 pretty low	5 middle rate	6 pretty high	7 high	8 very high	9 extremely high
Technological-know how									
Computer skills									
Organization ability									
Foreign language skills									
Ability to learn									
Flexibility									
Conscientiousness									
Reliability									
Capacity for teamwork									
Communication ability									
Persuasive power									
Commitment									

3. Please indicate in table 5, which wage you would offer the candidate in the case where he is to be hired. The wage level should reflect your evaluation of the applicant's productivity. The typical wage in the sector – including benefits like Christmas bonus – lies between 38,000 € and 46,000 €. Please take these limits into account for your answer.

Table 5: Applicants and their wages

Name of the applicant	Annual salary in € (gross)
Mr. Müller	
Mr. Schmidt	
Mr. Koch	

4. Please write now the name of the applicant you would hire, under the assumption that all applicants would receive the same salary.

Name of the applicant:

Please comment shortly on your decision:

Finally we would like to ask you the following questions:

1. Sex
□ female
□ male

2. How old are you?
years

3. What is your highest educational achievement?

4. Professional training (if applicable):.....

5. Field of study (if applicable):.....……

6. How long have you been working for the firm?
years

7. Your position is
□ staff executive
□ clerical assistant
□ else, namely: ……

8. For how many years have you been responsible for personnel decisions?
years

9. How did you qualify for your position?
□ main subject
□ special training
□ main subject and special training
□ else, namely:……

10. In how many hiring decisions (approx.) have you been involved so far?

Here is now space for your additional remarks:

Many thanks for your collaboration!

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