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Non-financial
determinants of the retirement age

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1. Introduction

Many countries are reforming their pension schemes due to concerns for fiscal sustainability. This concern stems from the aging of populations. A highly visible feature of pension schemes is the presence of statutory retirement ages. The statutory retirement ages in a pension scheme are the age at which retirement benefits first come available, such as the 'Early Retirement Age' in the American Social Security (62 years of age) and the age at which 'full' retirement benefits are available, such as the 'Full or Normal Retirement Age' in the US. A widely used and highly visible reform in OECD countries is the increase in the statutory retirement age at which 'full' retirement benefits become available (OECD, 2013). This increase of the statutory retirement age has two effects. First, such an increase diminishes government expenditures as individuals receive less pension benefits over their life-times. Second, the increase in the statutory retirement age influences labor market participation decisions as individuals adjust their retirement age in response to such an increase. This thesis focuses on the different mechanisms underlying this behavioral response to an increase of this statutory retirement. Therefore, this work will concentrate at this statutory retirement age.

An important determinant of individual retirement behavior is financial incentives. The neoclassical framework is the traditional way to think about financial incentives and retirement. This framework emphasizes retirement in terms of an intertemporal allocation of time and income. Within such a neoclassical model individuals maximize life-time utility subject to a lifetime budget constraint by optimizing their consumption and leisure paths. Individuals may find it optimal to fully stop working at a certain age and then deplete their accumulated savings. For instance, because they may have an increasing preference for leisure as they grow older. This leads to the presence of a retirement age. In this situation retirement represents an optimal choice in the sense that individuals have maximized their utility, while taking their life-time budget constraint into account.

The presence of a pension scheme induces financial incentives. These incentives determine which retirement ages are feasible and make some retirement ages more attractive than others. The importance of financial incentives for the retirement decision has been widely studied for countries all over the world (see for instance, Gruber and Wise, 2004). But the literature also finds that financial incentives cannot be the whole story (see, for instance,

Lumsdaine et al., 1996). Furthermore, ex-post evaluation studies of the increase in the statutory retirement age in the American Social Security indicate that individuals readily tend to follow the increased statutory retirement age (Behaghel and Blau, 2012; Mastrobuoni, 2009). These behavioral responses are larger than the changes in financial incentives of such pension reforms by themselves would predict. This thesis examines the relevance of other explanations, while taking the importance of financial incentives as given.

A large part of this study examines the influence of bounded rationality on retirement behavior. Why would individuals act or decide in a boundedly rational manner? Nobel laureate Kahneman (2003) argues that cognitive functioning has two modes: reasoning and intuition. Reasoning is slow and effort must be given, but also emotionally neutral and adaptive. Intuition is fast and effortless, but also emotionally laden and slow to adapt. The amount of effort seems to be a key determinant whether a particular decision is reached with 'reasoning' or 'intuition'. A key insight is that "a central characteristic of agents is not that they reason poorly but that they often act intuitively. And the behavior of these agents is not guided by what they are able to compute, but by what they happen to see at a given moment" (Kahneman, 2003).

As argued above, the statutory retirement age is a highly visible or salient feature of pension schemes. The pension scheme is a complex story about retirement benefits that depend on (life-time) income, age and discount factors among others. But one feature is far more salient: the statutory retirement age. This age is often presented as a 'standard' retirement age or 'age anchor' in pension overviews and communicated via the media. In this study a 'standard' retirement age or 'age anchor' means the central retirement age on display in a flexible retirement scheme. Against this retirement age benefits at other ages are compared. In the following this study discusses various possibilities how this particular age influences retirement behavior of boundedly rational individuals.

Boundedly rational individuals make decisions with a reference point in mind. A reference point is a level to which the individual relates gains and losses (Tversky and Kahneman, 1991). A concrete example is the following. Suppose there are two identical individuals A and B with a total wealth of $5. The only difference is that individual A first had $8 and lost $3, while individual B gained $3 and first had $2. In a traditional neoclassical framework both individuals would have the same utility as the end states of wealth are equal. In other words, this framework only considers end points and not how this end state came to be (and is therefore reference-independent). In a framework with initial state of wealth as a reference point individual A experiences less utility than individual B as the three dollar

difference is a gain for individual B and a loss for individual A. Kahneman and Tversky (1979) also found different behavioral responses as individuals confronting a loss would display risk-seeking behavior while individuals with a gain would display risk-averse behavior.

A statutory retirement age can constitute a reference point. Instead of intricately solving the life-cycle model for a particular situation, the individual starts thinking about a suitable retirement age with respect to this reference point. In this sense the individual evaluates different retirement ages close to the statutory retirement age and would consequently retire close to the statutory retirement age. In extremis, an individual could employ a very simple heuristic: retire at the statutory retirement age.

Another possible reference point is the 'age anchor' in pension overviews. Pension overviews in a Defined Benefit setting convey information on the level of benefits starting at a certain retirement age (the age anchor). In a Defined Contribution setting pension overviews contain information about the projected retirement wealth and its conversion into a (life-time) stream of retirement benefits starting at a certain retirement age (the age anchor). Individuals might also conceive this age anchor as a reference point.

Marking a choice as the default among other choices influences individual decision-making. A default is the option that is selected for individuals, when individuals do not explicitly make a choice. In other words, it is a "passive choice". Individuals are sensitive for such default options. Examples include individuals who are more likely to be organ donor in the presumed consent system than in the explicit consent system (Johnson et al., 2003) or who have subscriptions for gym facilities they do not use often (DellaVigna and Malmendier, 2006). Related to the retirement domain is the relevance of defaults with respect to the accumulation of supplementary retirement savings (see, for example, Thaler and Benartzi, 2004; Madrian and Shea, 2001).

A statutory retirement age or an age anchor on a pension overview acts as a default. In the Netherlands retirement at the statutory retirement age is certainly feasible as first pillar benefits come available at this age. Receiving these retirement benefits is even unrelated to labor market status. Retirement at an age anchor presented in a pension overview can work in a similar way as the display of retirement wealth in terms of a standard age (often overlapping with the statutory retirement age) could magnify this effect.

This study also examines the relevance of social interactions and social norms for the individual retirement age. Individual behavior and behavior of people's social environment (peers) seem to be correlated. For instance, exogenous shocks in individual income or

consumption can impact the consumption of other individuals (Angelucci et al., 2009, and Kuhn et al., 2011). Social norms are "a behavioral regularity, that is […] based on a socially shared belief how one ought to behave; which triggers [...] the enforcement of the prescribed behavior by informal social sanctions." (Fehr and Gächter, 2000) and can function as a coordination device. Social norms can be conveyed through media and thus they could operate at a larger scale than social interactions with the immediate social environment.

Social interactions can influence the individual retirement age. Brown and Laschever (2012) find that retirement of teachers has a positive effect on the retirement of other teachers. This can work via different channels. Via social interactions individuals may learn about the retirement plans of other individuals that may well be (somewhat) older. In this way social interactions are a means for the individual to gather relevant information about a suitable retirement age. It could also be that individuals want to spend extra leisure time enabled by spending retirement together with people from their social environment or they might dislike working more after life-long coworkers have retired.

Social interactions can also inform the individual about prevailing social norms and individuals could then choose to conform to the norms. For instance, if a lot of people in the social environment of an individual retire at a specific age, the individual will be inclined to also retire at this age. Conforming to a social norm yields utility and thus people will only deviate from a social norm if their 'intrinsic' preferences are substantially different from the norm (Bernheim, 1994). In this framework a social norm is static. There is no correspondence between the number of individuals following the norm and the 'strength' of the norm. This contrasts with the model of Lindbeck et al. (1999) in which the individual disutility incurred from deviating from the norm is larger if more individuals conform to the norm. Also note that in this framework more individuals will conform to the norm if disutility from norm deviation is larger.

Conforming to social norms can come at the expense of the individual's own wellbeing in the sense that it constrains the number of choices. A social norm can be considered a behavioral public good (Fehr and Gächter, 2000). Such norms regulate behavior when explicit contracts are absent. This happens in many situations: in the neighborhoods, schools, workplace ... Individuals are expected to follow the norm and punish non-followers, even at personal cost. This constrains the choices that individuals have.

The fact that individuals can display reciprocal behavior can explain why they adjust their behavior to the norm. Reciprocity entails that individuals reward behavior of other individuals that conforms to the norm. At the same time they will punish behavior that

deviates from the norm even if this comes at a personal cost to them (Fehr and Gächter, 2000). Such individuals will follow the social norm if they can be certain that others will also do that.

This attitude can also play a role in pension reforms. Perceptions and public opinion may play a central role in social security policy and pension reforms in particular (Cremer and Pestieau, 2000; O'Donnell and Tinios, 2003). For instance, people might be willing to contribute to early retirement schemes of demanding occupations so that people with such occupations can retire earlier. Indeed, Fong et al. (2005) argue that there is support for policies that rely on reciprocation. People are more willing to financially support people hit with bad luck than people who are unwilling to work.

Social interactions and norms, reference points and defaults can be interrelated. A social norm, social interactions or defaults can shape a reference point. Individuals could start thinking about a suitable retirement age with respect to the retirement age of others or what the passive choice is. Furthermore, it is conceivable that this interrelatedness is related to the statutory retirement age or standard pension ages on pension overviews. For instance, the Dutch first pension pillar was unchanged at the age of 65 years for more than 50 years.

As these mechanisms are interrelated and related to the statutory retirement age or to standard pension ages, it is difficult to disentangle them from each other in empirical research using standard data on actual retirement behavior. Such empirical studies based upon "revealed preference" data show that individuals typically more often retire at standard ages than financial incentives would predict, but do not disentangle the various explanations for this (social interactions, defaults and reference points). In principle, natural experiments or field experiments could help to isolate each explanation, but such experimental data are rare. Instead, this study tries to disentangle the various explanations by using stated preference data, directly eliciting survey respondents' preferences in hypothetical situations, where one factor varies at the time and the others are kept constant. The independent variation of social norm, age anchor, and reference point in these hypothetical situations is much larger than in actual retirement scenarios, and are thus indispensable to further our insight in assessing the role of these mechanisms for retirement behavior.

The work in the following chapters uses this type of survey data to gain insight in the various non-financial determinants of the retirement age. To examine the role of social interactions, defaults, reference points and perceptions about demanding occupations in closer detail these studies employ a questionnaire put forward to respondents. These respondents are members of the CentERpanel. This panel is representative of the adult Dutch

population and is administered by CentERdata.[1] The members of the panel answer recurring questions about income, wealth and retirement among others. They also answer psychological questions, such as the perceptions of risk. 2,840 household members were invited to answer the survey. 1,845 respondents did in fact participate, giving a response rate of 65%.

The use of stated preferences enables a study of choices and preferences of respondents, which are typically not available to them in real life. In marketing, transport and environmental economics this is often employed to measure individual preferences (see, for instance, Louviere et al., 2000). For instance, stated preferences have been used to analyze how much individuals are willing to pay for the reduction of pollution or for an improvement in public services. A seminal example in economics is Barsky et al. (1997). They measure risk tolerance of individuals with hypothetical situations and they find that these measures vary over respondents. Furthermore, the measured risk tolerance is related to actual behavior, such as smoking and investing in stocks. Relating this methodology to the retirement process, it is relevant whether individuals want to continue working to a certain age, but are unable to do so. Constraints from various domains, such as institutions or labor demand, can be binding. For instance, individuals could be confronted with mandatory (early) retirement.

In the retirement and pension domain the use of stated preference in empirical research is less common. An example of a study with stated preferences in the field of retirement is Van Soest and Vonkova (2014). They explore the preference for different scenarios that vary in retirement age and retirement replacement rations with stated preferences. With these scenarios they are able to assess the retirement preferences unconstrained by restrictions such as mandatory retirement. Even more importantly, they can gauge the preference for retirement schemes (such as gradual retirement) that are uncommon in practice. They find that income and substitution effects are larger than effects of similar studies with revealed preferences. The research in the following chapters of this thesis also complements their research as they examine financial incentives in fictive retirement scenarios, while the research presented in the following chapters investigates the non-financial determinants of the retirement age. Another example in this domain is the study of Maestas (2010). She studies observed 'unretirement' i.e. the transition from retirement to work. She finds that a vast majority of 'unretiring' individuals anticipated this transition in advance. This indicates that individuals are able to give suitable predictions about their future

[1] For more information, see http://www.centerdata.nl/en

labor market status and that these predictions convey information about labor market activities later in life.

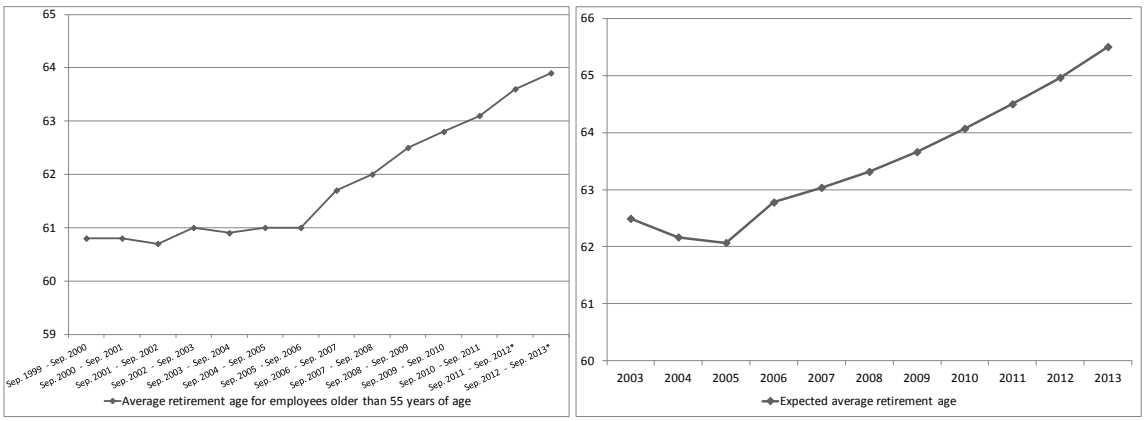
An example in the field of retirement economics where it is possible to compare subjective survey information with actual behavior to gain more insight in the validity of subjective survey data, we look more closely at the connection between expected and actual retirement ages in the Dutch population covered by our sample. We cannot compare expectations and realizations for the same people, since most of the respondents whose expected retirement age is elicited will not retire for the next twenty years. Still, it is worthwhile to see what a comparison between the actual and expected retirement ages *in a given year* shows.

In recent years individuals have tended to retire later.[2] The left panel of figure 1.1 shows that after 2006 the retirement age increased markedly. After this date the average retirement age for 55 year olds and older increased with almost a half year per year. This increase is probably related to the de facto abolishment of actuarially non-neutral early retirement schemes in 2006.

The expected retirement age also increased at the same time as the actual retirement started to increase. The right panel of figure 1.1 shows the increase in the expected retirement age that started in 2006. This happened after a seemingly decline between 2003 and 2006. Notably, this increase amounts 5 months per year and is comparable to the aforementioned increase of almost half a year in the expected retirement age. Of course, these numbers are not directly comparable as one graph is about expected and the other graph gives information about actual retirement age in a given year and thus involve different age cohorts. What it does show, however, is that at first glance the respondents answered the question about expected retirement age in a way that they seem aware that pension schemes are changing.

[2] This observation and other findings about actual retirement ages are discussed in greater detail in Van Erp et al. (2013).

Figure 1.1 Average actual (left) and expected (right) retirement age in a given year

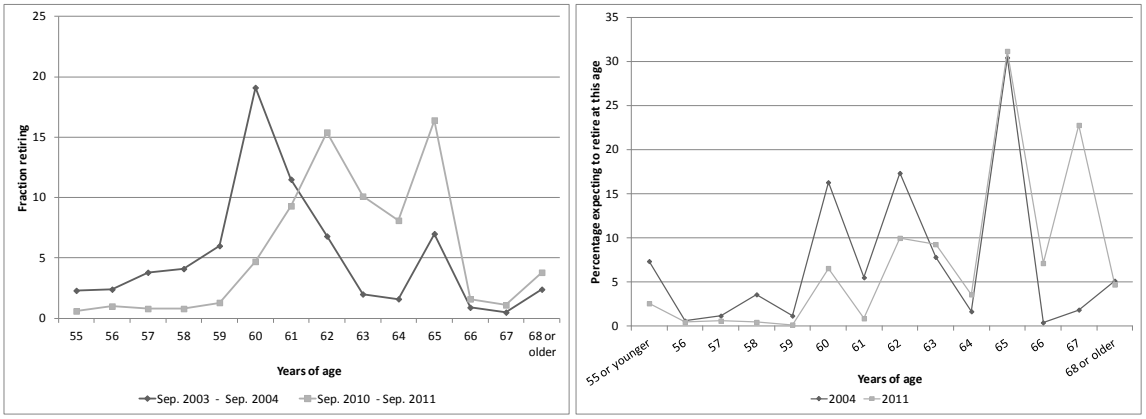


Source: the left panel is based on own calculations with data from Statistics Netherlands (CBS, Sociaal Statistisch Bestand). Retirement is here defined as the transition of employed individuals to retirement. This transition is defined as having labor income as primary income at the beginning of the period and having retirement income at the end of the period. * indicates preliminary data. The right panel shows the averaged responses to the question: "*At what age do you expect to retire, or to make use of the early retirement arrangement (VUT or FPU)?*"(wording in wave 2004) in the DNB Household Survey (DHS) for the waves between 2003 and 2013.

Additionally, both expected and actual retirement ages are sensitive to changes in the statutory retirement age. Figure 1.2 shows that retirement ages peak at certain ages. Both actual and expected retirement ages show peaks at 65 years of age. This is a statutory retirement age in the Dutch first pillar pension provision. The peak in expected retirement age at 67 years of age is probably related to future increases in the statutory retirement age. This shows that the expected retirement age may say something about the future retirement age as the overlap of retirement peaks at 65 years of both actual and expected retirement age may suggest.

This link between statutory retirement ages and expected retirement ages has been studied in greater detail. De Grip et al. (2013) examine the influence of future increases in the statutory retirement age on the expected retirement age with Dutch data. Exploiting age differences they find that the expected retirement age increases more for the individuals who are faced with larger statutory retirement age increase. This implies that individuals adjust expectations when new information is available.

Figure 1.2 Distribution of the actual (left) and expected (right) retirement age in a given year



Source: the left panel is based on own calculations with data from Statistics Netherlands (CBS, Sociaal Statistisch Bestand). In this figure, the exit rate at a certain age is defined as the share of formerly employed retirees leaving the workforce at that age. This transition is defined as having labor income as primary income at the beginning of the period and having retirement income at the end of the period. The right panel shows the responses to the question: "*At what age do you expect to retire, or to make use of the early retirement arrangement (VUT or FPU)?*"(wording in wave 2004) in the DNB Household Survey (DHS) for the waves 2004 and 2011.

Other examples studied in the retirement domain include subjective probabilities. Hurd and McGarry (1995, 2002) study subjective probabilities about surviving to a certain age with the Health and Retirement Study and relate this to actual mortality. They find that the two are related. Respondents, who indicated a lower probability to survive until a certain age, were more likely to die earlier. Furthermore, the subjective probabilities vary across respondents as expected. For instance, respondents that smoke or have lower socio-economic status indicate lower survival probabilities. Smith et al. (2001) also conclude that "longevity expectations are reasonably good predictions of future mortality". Additionally, new health information is taken into account when forming expectations. It is true that stated preferences are different from subjective probability distributions. A 'stated preference' is much more closely related to something an individual wants, while elicited estimations of probabilities about specific events is more like an expectation. But this also shows that individuals are able to give meaningful and useful answers to survey questions, in which individuals must predict something about a future state.

In the end the researcher is interested in a *positive* description of actual behavior or in *normative* preferences to fully understand why people make certain choices. The researcher could examine how people respond to a policy reform, for example. Normative preferences represent the individual preferences that are in the best interest of the individual. Traditionally, normative preferences are equated to revealed preferences in the economics

profession. This is not always the best approach in measuring preferences. Beshears et al. (2008) argue that boundedly rational individuals will not always make choices that are best for themselves. Individuals could be susceptible to time-inconsistent behavior, defaults or limited personal experience among others. For instance, Choi et al. (2011) show that individuals are very sensitive to defaults in retirement savings decisions and show that at least a subsample of the population makes choices that are dominated by other possible choices.

To deal with these limitations complementarities to revealed preference data are necessary. Beshears et al. (2008) discuss some complements to revealed preferences. One of these complements is self-reported preferences as they "reveal something about an agent's goals and values". This study examines self-reported preferences about the individual retirement age to complement other research about revealed preferences and the individual retirement age. In this way this study gives more insight in the relevance of non-financial determinants of the retirement age.

This is not to say that self-reports are perfect and therefore steps must be taken to alleviate concerns. One concern is that 'talk is cheap'. For instance, respondents may give socially desirable answers. We note that respondents answer our survey in the privacy of their own home at their own pace. Furthermore, they have experience filling out surveys as they are members of the CentERpanel and regularly fill out questionnaires. Another concern is that respondents may interpret questions in different manners. If this leads to deviations that are not random, then such systematic deviations obfuscate the findings. To minimize this concern this study applies insights from the vignette methodology.

The vignette methodology enables examination of answers to a hypothetical situation. The work in this thesis is related to Van Beek et al. (1997), who examine labor demand. With fictive persons put forward in a survey to employers they study the determinants of hiring employees and find that qualities such as education or experience matter less than age, health and gender. Other studies have also used vignettes. For instance, to compare attitudes to labor disability (Kapteyn et al., 2007;2011; Van Soest et al., 2012) and job satisfaction (Kristensen et al., 2008) among respondents of different countries.

The work in the following chapters uses the vignette methodology to create hypothetical retirement situations that are as similar as possible among the respondents. For instance, the use of fictive persons encourages to respondents to abstract from their own personal situation. The gender of the fictive persons is randomized via the names. Vignette research consistently found that respondents evaluate fictive male and female persons differently (e.g. Van Beek et al., 1997; Kapteyn et al., 2007). Lastly, at least to some extent

this study includes relevant information. This minimizes the chance that respondents will include private information. In this way, responses are more comparable across respondents.

Chapter two examines the possible relevance of insights of behavioral economics and social norms to explain individual retirement behavior. The insights of behavioral economics studied in this chapter are defaults and reference points. This chapter concludes that financial incentives cannot fully explain retirement 'peaks' in the data and the increases in the individual retirement ages in response to shifts in the statutory retirement age in the US. With a literature survey the chapter concludes that defaults, reference points and social norms are likely explanations to observed retirement patterns. The chapter also concludes that more empirical research is needed to gain more insight in the importance of these non-financial determinants of the retirement age.

Having surveyed the available literature on non-financial determinants of the retirement age in the previous chapter, chapter 3 looks more closely at the role of social interactions for the retirement age. The previous chapter assesses the possible role for social norms for the retirement age. This chapter takes a broader view about the impact of social interactions on the retirement age of the individual.

With a survey including self-assessments and vignette questions this chapter shows that social interactions influence the retirement age. The self-assessments examine for which persons from their social environment they take their possibly unsolicited advice or their personal situation into account for the determination of the individual retirement age. These show that the likelihood and the importance of retirement advice play a role in the retirement decision. The vignette questions portray a fictive situation in which the retirement age of the social environment changes exogenously. A majority of the respondents postpone retirement when the social environment retires later. A one year increase in the social environment's retirement age leads to an average increase of three months in the individual retirement age. Furthermore, an effect is found at 65 years of age, which is the state pension age. Individuals are more likely to postpone retirement towards this age. This could suggest the presence of a social norm at this age.

The next chapter focuses on the presence of standard pension ages in pension overviews and studies its effect on the retirement age. Chapter 2 showed the possible relevance of reference points or defaults for the individual retirement age. Chapter 4 examines this relevance in greater detail and investigates the influence of standard pension ages on the retirement age. In a controlled experimental setting the standard pension ages in

the pension overviews are randomly varied among the respondents. Respondents are exposed to a standard pension age of either 65, 67 or 68 years of age.

Individuals are sensitive to this variation. A standard pension age of 67 or 68 years of age in a pension overview leads to later retirement in comparison to a standard pension age at 65 years of age. This effect is strongest at the age of the standard age itself. In other words, if the standard pension age lists 67 years of age, individuals are more likely to retire at specifically this age instead of another age. This effect is strongest for women. Interestingly, this finding does not seem to differ among various socio-economic classes of women.

This chapter also assesses various explanations for the sensitivity to standard pension ages and examines the role of financial literacy, advice from the pension fund and social interactions in explaining this sensitivity. Financial literacy does not seem to play a role in this explanation, while advice from the pension fund and social interactions may play a limited role. This could imply that the standard pension age in a pension overview has an effect on the individual retirement age, besides these possible mechanisms.

The last chapter focuses on the role of social preferences in the determination of the retirement age. Specifically, it examines the relevance of demanding occupations on aspects of the retirement scheme. Are individuals relating demanding occupations to lower reasonable retirement ages and are they willing to contribute to early retirement schemes of such occupations?

Respondents think that demanding occupations should be able to retire earlier and that they are more willing to contribute to early retirement schemes of such occupations. In particular, a one standard deviation increase in how demanding an occupation is considered to be translates in a one year decrease in the reasonable retirement age for that occupation and a 30 - 40 percentage point increase in the willingness to contribute to the early retirement scheme of that occupation.

Chapter 5 also examines whether self-identification plays a role in the consideration to what extent an occupation is demanding. The largest effect is found for teachers. Compared to other respondents, respondents who self-identify with teachers think that teachers should be able to retire five months earlier. But the role of self-identification appears not to be the main driver of the results. For demanding occupations respondents are also willing to contribute to demanding occupations which are dissimilar to their own occupations.

A main conclusion of this study is that people are sensitive to social interactions and the presence of a standard pension age in a pension scheme. Individuals postpone retirement with three months if their social environment retires one year later. Social norms may also

play a role in this, as the effect is stronger at the statutory retirement age of 65 years. Standard pension ages in a pension overview influence the retirement age, especially of women. A higher standard pension age means later retirement. The effect of a higher standard pension age in a pension overview can only to a very limited extent be explained by financial literacy, by the importance of advice from the pension fund or financial advisor, or by social interactions.

The role of social interactions seems to be distinct from the presentation of a standard pension age in a pension overview. The finding that sensitivity to a standard pension age can only be explained by social interactions in a limited way could mean that the influence of social interactions is more than setting a standard. It could also imply that the presentation of a standard pension age in a pension overview along with information about retirement behavior of other individuals lead to larger effects on the individual retirement age. This is a topic for further research.

Additionally, people differentiate occupations on the basis of more than income and number of years worked. This study finds that individuals are of the opinion that workers with demanding occupation should be able to retire earlier. Furthermore, individuals are willing to contribute to early retirement schemes of such occupations, irrespective of self-identification. The results show that the Dutch public supports special measures facilitating earlier retirement for physically demanding occupations, but do not provide insight in how this can be implemented. Policy measures can vary from the implementation of more differentiation in pension schemes to better access to labor disability or making occupations less demanding.

It is important to emphasize that the demand side of the labor market may also be important. This thesis looks at the supply side of the labor market. For instance, social norms may also influence employers. Employers in this sense may also have an idea, what constitutes a ‘suitable’ retirement age for their employees. For a better insight in the retirement decision more research is needed in the determinants of the retirement age at the demand side of the labor market.

Future empirical work could try to look more closely at actual retirement behavior. This study with stated preferences has found that non-financial determinants are relevant for the individual retirement behavior. But can these determinants be related to the actual retirement age? Recent policy reforms in the Netherlands may be useful in this. The statutory retirement age in the first pillar has started to increase. This process has begun in 2013 with an increase of one month and will accelerate in the future. Will people delay retirement and

are they thus sensitive to this age increase? After all, the wealth effect of such an age increase on total life-time wealth is in general small.

Future work could also examine the standard pension age on pension overviews in larger detail. At the time of writing the standard pension age on pension overviews (UPO) in the Netherlands is still framed in terms of retirement at 65 years of age. What happens to the retirement age if this age in the future would be increased to match the increases in the statutory retirement age? Pension funds could already investigate this question in more detail. For instance, pension funds nowadays provide participants with information via the internet and participants can in this way examine the effects of earlier or later retirement on the level of their retirement benefits. Often this information is shown with a slider to illustrate the trade-off between earlier retirement and the level of retirement benefits. The initial slider position, which correspondents to a certain retirement age, could be randomized among participants (as in Brown et al., forthcoming) and its effect on the retirement age later in time can be examined. Pension funds also administrate when someone starts collecting benefits. However, a large time horizon for such a study is necessary. But it is worthwhile to examine the effect of the standard pension age on the actual retirement age.

2. Non-financial determinants of retirement: a literature review

2.1. Introduction[3]

Many industrialized countries are adjusting their social security and pension schemes in order to reduce government expenditures and increase the labor force. Perhaps the most prominent reform in this respect is raising the standard retirement age. Such a reform affects both government expenditures and participation decisions directly. Financial incentives induced by the retirement scheme are a prime determinant of retirement behavior. This is well documented in the economic literature. Empirical estimates are available for many countries (see, e.g., Gruber and Wise, 2004). Yet, it has become clear from this same literature that individual retirement behavior cannot be fully explained by financial incentives (see, e.g., Lumsdaine, Stock and Wise, 1996). Moreover, the labor supply reaction to an increase in the normal retirement age is much larger than predicted by financial incentives alone (Mastrobuoni, 2009). So next to financial incentives, what are the other relevant determinants of retirement behavior?

An interdisciplinary approach is needed to fully understand the individual retirement decision:

> *"[D]ecisions that involve retirement planning and financial investing are exceedingly complex. [...] At the very least, they require the coordinated interplay of cognitive and personality dimensions at the psychological level, social support mechanisms and normative timing expectations at the societal level, and probabilistic information [...] about the availability and adequacy of multiple streams of future income resources. Clearly, disciplinarily accounts can only tell part of the story [...]"* (Hershey et al., 2010).

In this paper we mainly focus on psychological and sociological explanations for individual retirement behavior. Moreover, we discuss explanations that fit within neoclassical models: individual factors (e.g. health, type of job, household situation) and institutions (other than those causing direct financial incentives). The most important insights from the economic, psychological and sociological literature will be discussed. Rational financial-economic

[3] This chapter is a reproduction of Van Erp et al. (2014).

decision-making is accepted as an important – though not sufficient – determinant of retirement behavior.

The impact of *bounded rationality* on pension behavior has several dimensions. People are sensitive to the presentation of their pension wealth in terms of default retirement ages. Second, loss-averse workers tend to hold on to their originally planned retirement age after a pension reform (Behaghel and Blau, 2012). Financial literacy plays an important role as well. Are individuals capable of understanding their pension plan? Are they able to understand the effects of a pension reform and act in their own interest? For example, Van Rooij et al. (2011) find that individuals with higher financial literacy are more actively engaged in retirement planning.

Apart from bounded rationality, *social norms* may affect retirement decisions as well. The utility of individual workers may incorporate disutility from norm deviation (Lindbeck et al., 1999). If the norm is to participate in the labor market as long as one is able to, then – apart from the utility derived from leisure – early retirement would generate disutility to the individual worker. Therefore, an individual influenced by social norms prefers a retirement age close to the norm. If a social norm changes, then this will lead to an adjustment in individual behavior, and subsequently to a new equilibrium. Existing research suggests an important role for such norm effects.

This paper concludes that the default retirement age and reference points seem to be important psychological factors for explaining retirement behavior. The same holds true for social norms. The way the pension scheme is presented to the individual in terms of default retirement ages may have an important effect on the individual's retirement age. Moreover, individuals show a tendency to stick to their originally planned retirement age (i.e. their reference point). Social norms are likely to be important: individuals are open to 'retirement advice' offered by their direct environment and to more abstract social norms (e.g. from the media).

The remainder of this paper is organized as follows Section 2.2 discusses 'traditional' economic models of retirement and highlights their shortcomings in describing retirement behavior when confronted with the data. Section 2.3 discusses the non-financial determinants within the traditional life-cycle models. Section 2.4 explores the impact of bounded rationality on retirement, and section 2.5 deals with the impact of social norms. Section 2.6 concludes.

2.2. Traditional neoclassical life-cycle model

2.2.1 Introduction

The life-cycle framework is the standard way economists think about the intertemporal allocation of time and income (Browning and Crossley, 2001). Within a neoclassical life-cycle model individuals maximize their lifetime utility subject to a lifetime budget constraint. Consumption and leisure are the choice variables, and the individual's optimal retirement date is implied by his leisure time path. A neoclassical context typically includes the following assumptions:

1. Self-interested and rational agents make choices on consumption and labor supply, giving them the best possible outcome without considering the impact on other individuals (external effects). *Choices are not affected by an external context like preceding decisions, social norms or presentation of options;*
2. Perfect information is available about current and future circumstances, such as prices and institutions. *Individuals are capable of processing the information.* For instance, uncertainty over future outcomes is weighted by objective probabilities;
3. Perfect financial markets exist, where agents may borrow and lend without constraints;
4. There is time-consistent behavior, implying that intended future actions will actually be carried out as planned;
5. Labor and consumption are fully divisible. Aside from the budget constraint, there are no constraints on the amount of hours worked.

The assumptions highlighted in italics are of special interest for this paper. This section reviews the theoretical predicted retirement pattern of traditional life-cycle models and the explanatory strength of financial incentives. Section 2.2.2 presents the theoretical highlights of traditional life-cycle models and section 2.2.3 focuses on the empirical retirement pattern and the impact of financial incentives.

2.2.2 Highlights of retirement pattern according to traditional life-cycle model

This section describes the main predictions of traditional life-cycle models about retirement behavior and shows that age-dependent financial incentives are necessary to predict retirement. Pension schemes can generate these incentives which induce substitution and wealth effects. An increase in the statutory retirement age generates a wealth effect and leads to a limited response in individual retirement behavior.

The main prediction of traditional life-cycle models is a smooth time pattern of marginal utilities. In the absence of age-dependent preferences, wages and social security arrangements (including taxation) this leads to a flat profile of consumption and labor supply over the residual life-span.[4] In such an oversimplified setting, retirement will never occur. Furthermore, net savings as the counterpart of consumption and labor supply are not present.

The absence of retirement in a traditional neoclassical life-cycle model conflicts with the data. Gruber and Wise (1999) contain a collection of papers describing retirement hazard rates in several industrialized countries at the end of the previous century. In many cases, these hazard rates show two typical peaks which coincide with (i) the standard retirement age of the social security pension scheme and (ii) the 'standard early retirement option'. More recent data for the US suggest a shifted average retirement age, but leave the profile of two peaks unaltered (Johnson et al., 2010).

So, how do traditional neoclassical life-cycle models then account for the fact that individuals retire? Financial incentives are the standard explanation of economists. If these incentives differ over the individual life-cycle, the profile of labor supply is not flat and may reduce to zero. This is equivalent with retirement. Besides financial incentives arising from tax systems, these incentives may also be caused by the system of social benefits for the elderly. Many countries have financial provisions for the elderly. For instance, pension schemes of countries can provide a basic income for the elderly starting at a particular fixed age. This is true for the first pillar in The Netherlands. In other schemes, like Social Security in the US, the height of retirement benefits depends on the level of contributions and gives the possibility to choose the date of take-up between 62 and 70 years of age. Such age-dependent financial incentives influence individual decision-making in favor for leisure and lead to retirement.

Age-dependent financial incentives lead to a combination of substitution and income effects. Substitution effects change the trade-off between consumption and leisure. For instance, early retirement schemes in the Netherlands were not actuarial fair in the past. This generated a large implicit tax on working past the entitlement age of these schemes. Pension schemes can also induce wealth effects. A stream of pension benefits starting at a particular age, such as the statutory retirement age, can be discounted into a lump sum amount. In other words, a stream of retirement benefits is equivalent with a certain amount of retirement

[4] The discussion so far abstracts from the presence of a pension scheme.

wealth. Consequently, an increase in the statutory retirement age means a decrease of retirement wealth and thus constitutes a wealth effect.

Traditional neoclassical life-cycle models typically predict a modest reaction in response to wealth shocks. Individuals 'smooth' the impact of a shock on consumption and labor supply among all periods of their residual lifetime. In case of a negative shock, consumption and leisure will fall. This implies an increase in labor supply through a rise in the hours worked (intensive margin) or postponement of the retirement age (extensive margin). In 1983 the US government announced the increase in the normal retirement rate, starting in 2003. Applying empirical neoclassical economic models, Gustman and Steinmeier (1985, 2006) and Fields and Mitchell (1984) describe expected changes in labor supply and retirement age in response to this change in the normal retirement rate. Roughly speaking, these studies predict an increase in the retirement age of about only two months in response to a two-year rise in the normal retirement age (De Hek and Van Erp, 2009, pp. 93-94).

Other empirical literature also supports the prediction of a limited impact of wealth effects on retirement behavior. Lumsdaine and Mitchell (1999) conclude that the impact of financial incentives on early retirement in the United States is important, but that not more than half of the observed variation in retirement patterns in the US can be explained from these incentives. Euwals et al. (2010) looked at the impact of a reform in the Dutch early retirement scheme and conclude that the loss of an annual salary results in a shift of retirement of about one-and-a-half to two months.[5] Banks et al. (2007) find virtually the same effect for the UK. For working individuals above age 50, they find that a reduction of pension wealth of about one year of salary leads to a retirement postponement of about two months. French (2005) and Bloemen (2011) also find limited effects of pension wealth on labor supply. Bloemen studies the influence of private wealth on the retirement decision and his estimates imply that a reduction in pension wealth by one year of salary leads to later retirement by a month and a half. In a more general context — not specifically focused on retirement — Imbens et al. (2001) estimate that lottery winners consume just 11% of their winnings on leisure, which is in the same order of magnitude as the studies specifically focusing on pension wealth effects.[6] Therefore, we may conclude that merely the financial incentive of a raised entitlement age has a limited effect on retirement behavior.

[5] This is the magnitude of the income effect. The study disentangles the income effect from the price effect as both are affected in the reform. The price effect is found to be larger. This implies that the price effect could explain retirement peaks in past pension schemes with actuarial unfair benefits. As the income effect is smaller, it is more difficult to explain shifts in retirement peaks as a consequence of a rise in the statutory retirement age.

[6] It has been argued that many studies even overestimate the pension wealth effect on retirement (Van Ooijen et al., 2010). If individuals have at least some freedom of choice in their pension wealth, then a high preference for retirement will go together with high pension wealth.

2.2.3 Empirical retirement patterns

2.2.3.1 Introduction

This section confronts the predictions of traditional life-cycle models with retirement patterns observed in the data. The retirement pattern in the Netherlands shows the relevance of substitution effects in the past and the continued importance of early retirement age despite the removal of implicit taxes on continued working (section 2.2.3.2), while the pattern of the US is relevant for a demonstration of the wealth effect as the US has begun to increase the statutory retirement age of Social Security (section 2.2.3.3). Both case studies show that financial incentives cannot be the whole story when it comes to explaining retirement behavior.

2.2.3.2 Empirical retirement patterns in The Netherlands

Exit rates from work to retirement contain peaks at the 'standard' early retirement ages. Figure 2.1 shows exit rates from work to retirement for two different periods, 09/1999-09/2000 and 09/2008-09/2009 in the Netherlands.[7] The largest peaks are found at the ages of 60 (in 2000) and 62 (in 2009). These peaks are related to the standard ages in early retirement schemes. Between 2000 and 2009 the exit rate distribution shifts to higher ages. The peak at age 60 declines, whereas the exit rate at age 62 becomes much larger. Moreover, all exit rates before age 62 decline, and all exit rates after that age increase.[8]

This combination of a parameter (preference) and explanatory variable (change in pension wealth) causes an endogeneity problem that is often not properly taken into account in empirical research.

[7] In the following we assume that retirement is an 'absorbing state'. In other words, individuals make the transition from working life to retirement once in their life-times. Kantarci and Van Soest (2008) show that older workers prefer to work fewer hours, but are unable to do this. Apparently, employers or institutions constrain the option of working less and thus of phased retirement. It is likely that when individuals do retire later on, they will remain retired.

[8] Preliminary data of Statistics Netherlands show that this trend continues markedly after 2009: the peak at age 60 disappears, and the peaks at 62 and 65 show a further increase.

Figure 2.1 Exit rates to retirement in the Netherlands shift to higher ages

Source: own calculations based on data from Statistics Netherlands (CBS, Sociaal Statistisch Bestand). In this figure, the exit rate at a certain age is defined as the share of formerly employed retirees leaving the workforce at that age. This transition is defined as having labor income as primary income at the beginning of the period and having retirement income at the end of the period.

In 1999/2000 most Dutch workers were entitled to early retirement through so-called VUT schemes, which were financed on a pay-as-you-go basis and had a large implicit tax on working beyond the standard VUT-retirement age. Moreover, these schemes had a standard early retirement around the age of 60 years. This implies that financial incentives could explain to a large extent the peak at 60 years of age in 1999/2000.

Within the period 2000-2009 early retirement schemes in the Netherlands have shifted towards actuarial neutrality, implying that implicit taxes on working beyond the standard retirement age have been importantly reduced.[9] Simultaneously, the standard early retirement age shifted in this period to 62 years of age.[10] The actuarial neutrality in the new early retirement schemes implies that financial incentives cannot explain the observed retirement peak at 62 years of age in 2009/2010. This peak requires a different explanation as early retirement is to a large degree still concentrated at the 'standard' early retirement age without the accompanying financial incentives.[11]

2.2.3.3 Empirical retirement patterns in The United States

Workers in the US, like the Netherlands, also generate peaks in their retirement pattern. Figure 2.2 shows peaks at the ages of 62 and 65 in the exit rate out of the labor force in the

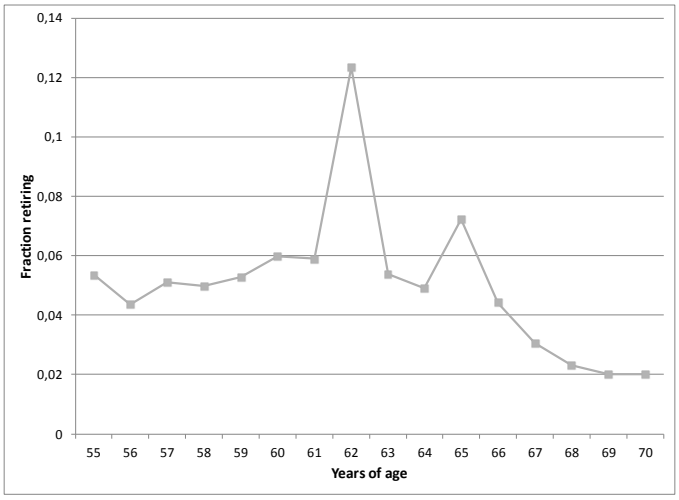
[9] Since the end of the 1990s, the VUT schemes were gradually replaced by so-called Flexible pension schemes (FPS). The introduction of a new law in 2006 (in Dutch: wet VPL) accelerated the transition towards the new FPS's, and in fact the VUT schemes were abolished from that year. These FPS schemes were capital-funded and largely actuarially fair, and therefore hardly generated implicit subsidies or taxes for deviation from the standard retirement age.

[10] Van Erp et al. (2013) explain the shift in the collective labor agreements in finer detail.

[11] The retirement peak at age 65 may be related to financial incentives as the actuarial fairness in the FPS schemes was largely established *between* early retirement ages, but in general not when retirement was postponed until after the state pension age. Take-up after the age of 65 may lead to either a loss or a gain of early retirement benefits, as the result of a different fiscal regime after this age.

United States.[12] The age of 62 coincides with the early retirement age for social security, and 65 was the normal retirement age. The early retirement peak in the US is likely related to market imperfections or individual irrationalities (Gruber and Wise, 1999). Individuals with a preference for retirement before the early retirement age could be unable to borrow against their Social Security wealth. Consequently, such liquidity-constrained individuals will retire at the early retirement age and thus contribute to the presence of the retirement peak on the early retirement age. There is a small implicit tax on continued work beyond the early retirement age, but it is not comparable to the large work disincentive in the Netherlands before 2006. Since 1986 there is no longer mandatory retirement in the US. The combination of an actuarial fair pension scheme and absence of mandatory retirement, while retirement peaks are present, show the likely importance of non-financial determinants of retirement.

Figure 2.2 Exit rate from employment into retirement in the US, 2000-2010



Source: own calculations on basis of RAND HRS data (2010).[13] HRS records the retirement and birth month and year of the respondents. The figure shows the number of respondents retiring at a particular age as a fraction of the total number of retirees in the given period. Weighted data have been used.[14]

In general, the empirical literature underestimates retirement at such ages. For instance, Stock and Wise (1990) underestimate the retirement peaks at the ages of 62 and 65 by 28 and 51 percent, respectively. Lumsdaine, Stock and Wise (1996) examine 'excess

[12] Note that this figure may give a somewhat less complete picture for the US than figure 1 for the Netherlands. Retirement in the US is a less absorbing state than in the Netherlands. Maestas (2010) shows that at least 26 percent of the retirees returns to work ('unretires') later in life.

[13] RAND HRS Data, Version L. Produced by the RAND Center for the Study of Aging, with funding from the National Institute on Aging and the Social Security Administration. Santa Monica, CA (December 2011). The HRS (Health and Retirement Study) is sponsored by the National Institute on Aging (grant number NIA U01AG009740) and is conducted by the University of Michigan.

[14] The shift in the normal retirement age is not visible in this graph as the retirement ages have been rounded down (e.g. 65 months and 8 months is depicted as 65 years of age).

retirement' at the age of 65 more closely. By eliminating other explanations such as Medicare availability at the age of 65, they conclude that the peak at age 65 is attributable to 'the influence of custom or accepted practice'. Later studies used employment records at the firm level less often. Instead, the attention shifted more towards the usage of data sets at the household level to include characteristics such as health or household composition. Samwick (1998) was one of the first to use such a data set. The author underestimates the retirement peaks at the ages of 62 and 65 by 64 and 19 percent, respectively. In the same vein, both studies of Coile and Gruber (2000, 2007) also underpredict the retirement peaks at age 62 and 65. Interestingly, Asch et al. (2005) do not find retirement peaks at the ages of 62 and 65, but at the ages of 55 and 60. In their estimations they use a sample of employees for whom the regular provisions of Social Security do not apply.[15] In their estimations they underpredict the retirement peak at the age of 55 and at the age of 60.

The recent change in US retirement scheme provides a policy reform to study directly the influence of an increase in the statutory retirement age on retirement behavior. In 1983 a cut in retirement benefits was announced. This benefit cut was framed as an upward shift in the normal retirement age in steps of two months and would start in 2003. The cohort born in 1937 experienced a normal retirement age of 65, while the cohort of 1938 experienced a normal retirement age of 65 years and two months. This increase continued until the new normal retirement age of 66 was reached. In other words, the policy reform had a differential treatment on the various birth cohorts.

Ex-post evaluation studies show a large influence of this increase in the statutory retirement age. Behaghel and Blau (2012) find that the retirement peak at 65 years shifts along with the increase of the normal retirement age for each cohort. For instance, the cohort of 1938 shows a retirement peak at 65 years of age and two months. Mastrobuoni (2009) finds an increase in the mean retirement age of a half year when the increase of the normal retirement age amounts one year. [16] This is a larger effect than the aforementioned neoclassical prediction of a two month increase in response to a two year increase in the statutory retirement age.

2.2.3.4 Conclusion

Retirement peaks seem to be associated to institutional ages. In the Netherlands individuals retire more on 62 years of age, even while there are no financial incentives attached to this

[15] The data set is composed of permanent federal civil service personnel for the Department of Defense during the fiscal years of 1982 through 1996.

[16] Hanel and Riphahn (2012) achieve a comparable result based on a Swiss reform that entailed an increase in the normal retirement age in the (first-pillar) public pension scheme for women of ages 62 to 64 years.

age. In the US individuals tend to follow their Normal Retirement Age. Institutional ages seem to be important for retirement.

Traditional life-cycle models underpredict retirement at such institutional key ages. Moreover, such models predict moderate labor supply responses to increases in the statutory pension age. Empirical studies evaluating the increase in the statutory retirement age find larger responses. So, traditional neoclassical life-cycle models focusing on financial incentives are not sufficient for predicting the retirement behavior of individuals. There are two broad categories of potential explanations for discrepancies between the data and the predictions of traditional neoclassical models: age-dependent non-financial incentives within neoclassical framework, such as specific individual (e.g. preferences, health) and institutional (e.g. mandatory retirement) factors and explanations that challenge the neoclassical assumptions of the traditional lifecycle model. Examples of these challenges are bounded rationality and social norms. We will briefly discuss the age-dependent financial incentives in the next section. But the focus in the remainder of the article is on the non-financial incentives and explanations beyond the scope of the neoclassical assumptions.

2.3. Non-financial determinants in traditional neoclassical models of retirement

2.3.1 Introduction

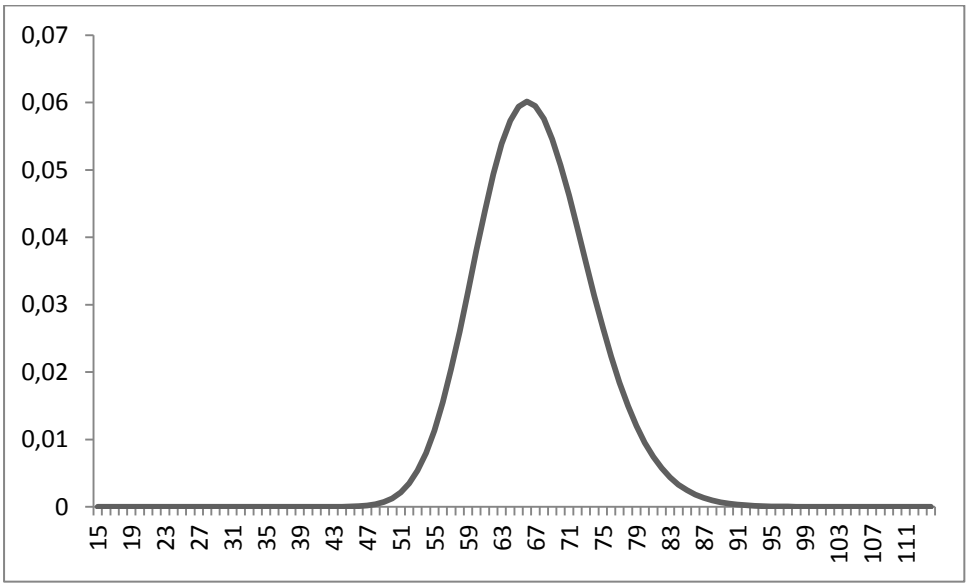
In order to explain retirement behavior traditional neoclassical life-cycle models may be extended with individual and institutional features (other than financial incentives) in order to explain the observed retirement patterns. Non-financial determinants of retirement behavior can be subdivided into four categories: individual factors (e.g. health, type of job, household situation, preferences), limited rationality of individuals, socio-cultural influences and institutions (other than those causing direct financial incentives). This paper addresses limited rationality and socio-cultural influences in sections 2.4 and 2.5. The focus in this section is on individual and (non-financial) institutional factors.

2.3.2 Individual factors

Age-dependent individual preferences may explain retirement. For instance, an increasing preference for leisure with age will – ceteris paribus – increase the marginal utility of leisure. The life-cycle profile is then adjusted such that the marginal utility is again made constant over time. An increasing preference for leisure will thus result in a decreasing age-profile of labor supply instead of a flat profile. If labor supply becomes very small, this will lead to retirement. In addition, this moment of retirement will be equal for all individuals if individuals are identical. Consequently, we then observe a common retirement age in the data.

However, if individuals differ with respect to their preference for leisure or preference for current vs. future consumption, then retirement ages differ as well. In the case of heterogeneous individuals and so a distribution of preferences, the aggregate pattern of retirement ages might then look like a normal or lognormal distribution. People start retiring from a certain age, and the majority of the labor force retires between, say, 55 and 70 years of age (Figure 2.3).

Figure 2.3 Stylized example of what the aggregate retirement pattern may look like, on basis of a life-cycle model



Besides an age-dependent preference for leisure, individual health status and spousal preferences are, for instance, other important individual determinants of retirement. For instance, disability may lead to early retirement.[17] Women often leave the workforce early following the retirement of their older partners (Henkens and Van Solinge, 2002; Gustman and Steinmeier, 1994). In that case, the preference for leisure depends on the participation of the partner. But again heterogeneity is relevant over these and other individual dimensions and so these individual factors do in general not result in retirement peaks. An aggregate retirement pattern like Figure 2.3 seems more plausible.

The retirement pattern in Figure 2.3 is not consistent with patterns observed in actual data (see section 2.2). The data show a tendency to retire at specific ages (with much higher

[17] Behncke, 2012 (page 2) contains a list of references.

frequency than the top of Figure 2.3). For the Netherlands, we observed two retirement peaks concentrated at institutional retirement ages (section 2.2).

But even if individual factors such as preferences for leisure, health status, spousal preferences, result in retirement peaks, they do not explain the observed shift in those peaks in response to a shift in the statutory retirement age. After all, a change in the statutory retirement age does not alter individual or spousal preferences, or health status. If preferences or health status are the main cause of retirement, the smoothing feature of traditional neoclassical model predicts an almost unaltered retirement age in response to an increasing statutory retirement age. As described earlier, within these models the negative lifetime income effect of less pension benefits results in less consumption in each period, a rise in the hours worked in the periods at work (intensive margin) and additional savings in this stage to facilitate consumption at the ages between the old and new statutory retirement ages.

2.3.3 Institutional factors

In addition to individual factors institutions may affect retirement decisions, and may in some cases help explain retirement peaks. In this section we focus on institutions on the labor market, financial markets and pension schemes. In all cases the institutions impose constraints on individual choices.

Various constraints on the labor market may be relevant. *Constraints on hours worked* may lead to peaks in labor market exit rates. Disallowing individuals to adjust their hours worked, so that they are forced to retire fully, may help to explain the retirement peaks (Van der Klaauw and Wolpin, 2008).[18] A change in *employment protection* when reaching the pension age may also lead to retirement peaks. Older employees often have more employment protection. This leads to a stronger bargaining position, especially if the older workers have a larger vote in trade unions. This will lead to wage profiles increasing with age. As older workers are unlikely to vote for lower wages, it is not expected that these wages are downward flexible. In turn, the lack of flexibility of these wage profiles distort the labor market for older employees, as their wage is less representative for their productivity (De Hek and van Vuuren, 2011) and can adapt to a lesser degree to productivity shocks. The lack of employment protection after the pension age will therefore lead to unemployment/retirement. In contrast to the aforementioned individual factors describing retirement behavior, each of these constraints points to an important influence of the demand side of the labor market (employer) as well. For instance, Van Dalen et al. (2013) find that

[18] Fouarge et al. (2012) find a preference for partial retirement.

Dutch employers prefer to use early retirement to downsize organizations in the current economic circumstances. In this case unwillingness of employers to allow employees to continue working stimulates retirement at institutional ages.

Particular *institutions related to standard pension ages* may also partly explain retirement peaks. For instance, in the US the age of 65 implies health care coverage by Medicare (Rust and Phelan, 1997). Furthermore, US data show that workers retire significantly more often in January and at their birthday (Kopczuk and Song, 2008). The January effect reflects the impact of earning tests in the Social Security system.[19]

Imperfect financial markets may limit the opportunity to lend against second-tier pension benefits and may help to explain (a part of) the retirement peaks (French, 2005; Rust and Phelan, 1997; and De Hek and Van Erp, 2009). This may be magnified by the lack of a flexible retirement age. Van Vuuren (2014) argues that a flexible retirement age not only serves as insurance against health and productivity shocks of the individual but also provides a hedge for the risk of falling pension assets.

Historical data for the US support the important relation between retirement peaks and the institutional age(s). Before 1920, there were no retirement peaks in the US. In 1940, five years after the introduction of Social Security, a peak had emerged at the standard Social Security age of 65 (Costa, 1998). The size of the peak rose to 30% in the 1980s and then declined to 19% after 2000 (Perrachi and Welch, 1994; Behaghel and Blau, 2012). Furthermore, several studies have shown that the financial incentives of pension schemes cannot entirely explain the observed (changes in) labor supply responses at these particular ages. So, a typical large unexplained retirement 'spike' remains at these ages (Lumsdaine et al., 1996; Duflo and Saez, 2003). This was also strongly suggested by data for the Netherlands in section 2.3.2. Non-financial institutional factors may provide an explanation for these unexplained spikes.

However, the data also show a shift in the retirement pattern in response to a change in the statutory retirement age. Just a single change in this age does not alter the aforementioned constraints on labor or financial markets and so their influence on the retirement decision. Without changes in these other institutions, traditional neoclassical model just predict an altered labor supply in response to a reduced lifetime income and a

[19] In the US, individuals between the early and normal retirement age are subject to an earnings test. Suppose an individual prefers retirement in November and already worked the past year. It is conceivable that earned income crosses the threshold and finds his benefits reduced. The individual may then prefer postponing retirement until next year, for which the soonest possibility is January.

minor shift in the retirement age. So, at least a simultaneous change in a set of other institutions seems necessary to explain the empirically observed shifting retirement patterns.

2.4. Bounded rationality

2.4.1 Introduction

The distinction between defaults, reference dependence and social norms is not entirely straightforward.[20] In this section, the description 'defaults' refers to cases where individuals do not (have to) make an active choice. By not taking action, the individual passively chooses the 'default option'. 'Reference points' have to do with decision-making whereby gains and losses are related to the particular points of departure of individuals. Financial illiteracy is not separately mentioned in this list as it does not provide a standalone explanation of retirement peaks. However, financial illiteracy challenges the neoclassical assumption of individuals who are able to collect and process properly all available information— and it might explain why people are guided by defaults, reference points or social norms.

With bounded rationality as a common feature, this section discusses two potential explanations for the residual retirement peak: default options (section 2.4.2) and reference dependence (section 2.4.3). For each, the main difference compared to the traditional neoclassical framework is briefly addressed, followed by a discussion of the empirical literature. The discussion on social norms is left for section 2.5. Of the explanations involving bounded rationality, default options and reference dependence seem to be particularly promising candidates for explaining retirement peaks.[21] Empirical evidence is still very scarce, however, and much more research is needed to fully understand their precise importance in explaining individual retirement behavior.

2.4.2 Default options

The availability of large micro data sets has resulted in an extensive literature on the influence of default options. According to this literature, individuals often prefer the (implicit) choice for which no further action is required. This is referred to as the tendency to choose a 'default option', to focus at a 'reference point', or 'status quo bias' (see, e.g., Kahneman et al., 1991). This may play a role in the retirement decision, where loss-averse individuals prefer to choose the standard option rather than taking up their pension benefits earlier or later. In

[20] Defaults, reference points and social norms sometimes overlap. For instance, the standard renewal of insurances acts as a default, but also as a reference point.

[21] Hyperbolic discounting has provided valuable insights into some empirical puzzles with respect to consumption and saving. However, policy simulations with life-cycle models show that, compared with neoclassical individuals, hyperbolic discounters react not very differently to a change in the retirement age and is not an important answer to the 'retirement peak puzzle' (see Gustman and Steinmeier (2010) and Van Erp (2011)). An exception is Diamond and Köszegi (2003), which is a theoretical attempt to introduce the retirement decision within a traditional hyperbolic discounting framework of consumption and savings. They show that the undersaving caused by hyperbolic discounting model may result in a postponed retirement if people are poor enough (SeeVan Erp et al. (2013) for further details).

addition, financially illiterate workers may be unable to judge whether early or late take-up of pension benefits is beneficial to them, and therefore stick to the standard retirement age.[22] Empirical evidence on the effect of the default retirement option on the retirement age is still scarce. Recent results suggest that its relevance is limited (Behaghel and Blau, 2012). On the other hand, a great deal of evidence from other fields – including pension savings decisions – suggests that it may be too early to reject the default option explanation for retirement behavior.

Main difference compared to traditional neoclassical framework

Within the neoclassical framework, an individual chooses between different options by comparing their costs and benefits. Individual choices are not affected by an external context (such as preceding decisions or presentation of choice). Following the default means that individuals do not actively search for an optimal result—and hence they do not make an explicit choice. This attitude conflicts with the first assumption of the traditional neoclassical model in which an individual is self-interested and makes choices that give him the best possible outcome. With default options, the individual attaches some additional costs to deviation from the default.[23] A well-known example is organ donation. It has been shown that the presumed consent system results in a larger amount of donors than the explicit consent case (Johnson and Goldstein, 2003). A second example of defaults is the automatic renewal of contracts such as insurances, periodicals and memberships.

One of the explanatory factors of the influence of defaults on financial decisions is a limited capability to decide properly on financial issues. Using survey results Van Rooij and Teppa (2008) find that procrastination and financial literacy explain choices for default options in general well. During the past decade this 'financial illiteracy' has been extensively investigated (see Lusardi and Mitchell (2011) for an overview). Many people do not understand basic economic concepts such as inflation and risk. A significant majority is unable to conduct simple interest rate calculations and make projections of future income and consumption in order to determine the required amount of pension saving and/or the optimal retirement decision. These findings may help explaining two empirical observations: the lack of pension wealth accumulation in countries like the US and the modest changes in labor supply in response to a change in pension wealth. If people are unable to predict future consumption, to assess the impact of the inflation rate on future consumption and the present value of future income and consumption, then it will be impossible to develop a proper

[22] The fiscal regimes before and after the Dutch state pension age differ. This makes retirement-age decisions even more complicated and increases the relevance of financial illiteracy.

[23] This may be rational to the extent that transaction costs are involved.

savings plan to obtain the required amount of pension wealth at the desired retirement age. In some countries, like The Netherlands, many employees are obliged to participate in company retirement plans. In that case, wealth accumulation is to a large extent guaranteed. Participants still overestimate their replacement rate (Van Els et al., 2007), however, which indicates deficiencies in pension scheme knowledge. Dutch employees are allowed to determine their own retirement age, but only a small fraction gives serious thought to retirement planning (Van Rooij et al. 2011). This literature challenges the neoclassical assumption of individuals who are able to collect and process properly all available information. This lack of ability may lead people to make decisions on defaults in the confidence that those defaults will be good for them.

The way of presenting choices to individuals also affects their decisions. Framing can influence decision-making by presenting one or more reference points. We consider framing complementary to other behavioral economics mechanisms. Brown et al. (forthcoming) studied retirement behavior using framing experiments and they find significant effects from framing on the retirement decision. Participants are asked to state their preferred retirement age within a given frame. The frames differ in wording across three dimensions: age anchors, consumption versus investments and gains versus losses. The monthly benefits associated with a retirement age are the same in every frame. Results show respondents claiming retirement significantly later when faced with a higher age anchor. The consumption frame presents the monthly benefits as insurance against longevity risk and the investment frame focuses on the illiquid nature of the monthly benefits and the low returns. Retirement behavior is not significantly different between these frames. Finally, the authors find a significant effect on retirement behavior of framing in terms of gains and losses. Individuals prefer to delay claiming retirement benefits when the benefits are framed as a gain instead of a loss.

Empirical applications

Default options have been studied mainly in the context of savings and pension portfolio decisions of individuals and households rather than retirement age. In that context, there is overwhelming evidence that default options play an important role (see, e.g. Thaler and Benartzi, 2004; Madrian and Shea, 2001; Carroll et al., 2009). Thaler and Benartzi (2004) investigated the impact of a savings program in which individuals commit themselves to savings rates in the near future. Instead of a commitment to save today, individuals participate in programs of committed future savings. The commitment to future savings and the possibility to opt out in the future induces the individual to join the program. The

individual in the future, however, faces the default of remaining in the program. In short, the individual must make an active choice to quit this program. The empirical results show that 71 percent of those who were offered the plan joined the program and that 80 percent of those who enrolled were still in the program after the fourth pay rise. This program was introduced in several US companies and in different forms. Pension savings rates increased in systems with automatic enrollment (*i.e.* 'participation unless'). Among others, Madrian and Shea (2001) investigated the impact of automatic enrollment in the US 401(k) pension plans. They conclude that 401(k) participation is significantly higher under automatic enrollment compared to non participation as default. Furthermore, the results show that participants hardly adjust the savings rate, even if it is in their own interest. With respect to pension savings, active decisions are preferred over default options if (i) people have a strong propensity to procrastinate savings decisions, (ii) (savings) preferences are heterogeneous and (iii) people are financially literate (Carroll et al., 2009). In the case of homogenous preferences, the tailor-made advantage disappears, and the financial literacy of individuals determines the preference for standard enrollment or automatic enrollment.

Regarding the influence of defaults on the retirement decision, less empirical research has taken place so far. Only recently Behaghel and Blau (2012) looked at the impact of the US Social Security reform of 1983. This reform implied an increase in the full retirement age from 65 to 66 years of age in two monthly increments per year of birth for cohorts born from 1938 to 1943. The authors find strong evidence that the peak in retirement at age 65 moved along with the full retirement age instead of smoothing the income shock over the residual lifetime.[24] Taking into account the educational level of respondents, the data of Behaghel and Blau (2012, p. 65) suggest that "although one cannot fully rule out alternative behavioral explanations such as social norms or reliance on SSA "advice", the latter explanations seem at odds with the fact that workers with higher cognitive ability respond more to the FRA change. Responsiveness to the FRA does not seem to be due to unsophisticated decision making."

The impact of a default option is probably larger in case of the retirement decision than with savings decisions. The retirement decision is a once-in-a-lifetime decision for most individuals, whereas savings decisions are made for many years, and individuals are able to learn from their earlier mistakes.

[24] The underlying identifying assumption relies on the attribution of changes in the claiming hazard to changes in the Full Retirement Age (FRA). The authors test for other changes during the period such as the Delayed Retirement Credit and abolition of the earnings test of Social Security at the FRA. They conclude that the impact of reaching the FRA itself is much larger than these other factors.

2.4.3 Reference dependence with loss aversion

Kahneman and Tversky's (1979) prospect theory is often mentioned as the starting point of behavioral economics. Although originally developed to explain decisions under uncertainty, elements of prospect theory also seem relevant for decisions in a riskless environment. This has resulted in so-called reference dependence models.

Main difference compared to traditional neoclassical framework

Neoclassical models can allow for uncertainty. The individual decision is then based on maximum *expected* utility instead of maximum utility. Expected utility is a weighted average of the utilities of all possible circumstances, where the weight equals the probability of each circumstance. This way of dealing with uncertainty in individual decision-making, however, has its drawbacks. The concept of maximum expected utility assumes that the utility of a possible outcome is independent of the probability. The violation of this assumption has been known since the 1950s (Allais, 1953). Applying experimental economics in which individuals choose repeatedly between two gambles, Allais proved the inconsistency of observed preferences with the probability weighting of utilities. Since the 1950s, many other authors have confirmed this so-called Allais-paradox in other experiments.

There seem to be more violations of expected utility theory. The Ellsberg paradox (Ellsberg, 1961) and the seminal paper of Kahneman and Tversky (1979) on prospect theory showed a large set of discrepancies between observed human behavior and predicted behavior by the neoclassical expected utility framework. Among those discrepancies, Kahneman and Tversky mentioned the reflection effect, according to which decision-makers act as risk seekers if they face losses, and risk-averse agents if they face gains. In other words, individual behavior seems to depend on the reference point. In this respect, observed behavior conflicts with the first assumption of the traditional neoclassical model on independence between the optimal outcome and the external context.[25] Apart from its application to decisions under uncertainty, the possible impact of reference points on economic decisions may also exist in riskless circumstances. These models are known as reference dependence models (Tversky and Kahneman, 1991). A recent study based on survey data in the Netherlands suggests that workers are much more responsive to a deterioration of pension income than to an increase (Henkens et al., 2009).

[25] This does not mean that each neoclassical framework excludes an external context. As a synthesis, individuals could optimize (neoclassical framework) conditionally on their reference points. In that case, deviations from the reference point determine utility.

Empirical applications

In an attempt to reconcile the empirics on economic behavior and predictions of theoretical economics, many authors have extended the traditional approach with a weighting function of the probabilities and/or a benchmark as a reference point. Although frequently tested within laboratories, application of the prospect theory on actual economic issues is still limited. A first exception was the application to the equity premium puzzle. This puzzle was raised by Mehra and Prescott (1985), who concluded that a large and implausible rate of risk aversion was required to reconcile the observed portfolio shares of bonds and stocks, expected utility theory and historical yields on bonds and stocks. Benartzi and Thaler (1993) used the insights of prospect theory to introduce an annual assessment of the portfolio performance by investors instead of a long-term assessment. The shorter horizon results in an additional risk aversion and so a larger reward for stock investments.

The structure of the lifetime wage profile was another application. Many wage profiles show an upward pattern that seems to exceed productivity growth. In addition to other possible explanations, Loewenstein and Sicherman (1991) showed the influence of reference dependence. Respondents were asked to choose between seven different wage profiles during the next few years. Without discounting, each profile returns a similar amount of total income, while the present value of the decreasing wage profile exceeds that of the increasing profile. Despite the profile's loss in terms of the present value of wages, the majority of respondents prefer the increasing profile with arguments such as "pleasure of increase" and "aversion to decrease". In terms of reference dependence, historical wages might serve as a reference point and positive deviations have a larger value.

Regarding the influence of reference dependence on the retirement decision, less empirical research has taken place so far. Quite recently, Behaghel and Blau (2012) looked at the impact of the US Social Security reform of 1983. This reform implied an increase in the full retirement age from 65 to 66 years of age by increments of two months per year of birth for cohorts born from 1938 to 1943. The authors find strong evidence that the peak in retirement at age 65 moved along with the full retirement age instead of smoothing the income shock over the residual lifetime. Although they conclude that loss aversion has a huge impact on the change in the retirement age, it is not enough to explain the occurring changes in the retirement age.

An unexpected loss in retirement wealth may affect the wellbeing of individuals. De Grip et al. (2012) consider the effects of a policy reform involving a reduction of pension rights of public sector employees born after 1 January 1950 on their retirement age, amount

of savings and depression rates. Public sector employees born before 1 January 1950 retained their pension rights. The authors conclude that employees born after 1 January 1950 had higher depression rates, saved more and retired later. A possible explanation is that employees born shortly after 1 January 1950 implicitly assumed to have the same retirement benefits as the employees born shortly before 1 January 1950. The policy reform with its discontinuous assignment rule introduced a loss for these employees with respect to their reference point.

2.4.4 Conclusion

Traditional neoclassical models are not always successful at predicting the individual retirement age. This section examined the influence of additional explanations that are not part of such models: defaults and reference points. Default retirement ages and reference points seem important for the explanation of retirement behavior. The way the pension scheme is presented ('framed') to the individual in terms of default retirement ages may influence retirement behavior. Individuals also show a tendency to stick to their original retirement income and thus respond by working longer to avoid deterioration of pension wealth.

2.5. Social norms

Social norms affect consumption and labor supply decisions of individuals, and are important for the welfare state. The social norm makes a person's preferences depend on the behavior of others, either directly by affecting taste or indirectly via social pressure. A social norm can be defined as "a behavioral regularity; that is [...] based on a socially shared belief how one ought to behave; which triggers [...] the enforcement of the prescribed behavior by informal social sanctions" (Fehr and Gächter, 2000). Economists often model a social norm as a reference point in the individual's utility function. Deviation from the reference point results in disutility (Lindbeck et al., 1999).

Social norms may change over time. For instance, older generations may at first be hesitant to claim social insurance or early retirement benefits, to avoid stigma. Younger generations may, however, become used to the availability of social insurance and pensions, experience less stigma, and make more use of benefits (Lindbeck et al., 2003; Ljunge, 2010). It is therefore possible that institutional changes endogenously change social norms in the longer run. The causality between institutional changes and social norms goes both ways: institutional reform may in the longer run change social norms, and social norms may obviously also impact policy. The feedback effects of social norms often amplify shocks. For

instance, as an extreme example, an unemployment shock may become permanent if the social norm on unemployment is adjusted together with the shock. In that case, there are multiple equilibria in the economy, depending on the size of the unemployment shock. Another example is that increasing the pension age may in the longer run have a stronger effect than implied by financial incentives alone. The reason is that social norm development will generate a feedback effect. Social norms need not be uniform across different groups in society. Some regions or groups may well develop their own norms (see, e.g., Krauth, 2006). This is relevant in the context of heterogeneous pension schemes across sectors and firms, where employees in each different sector or firm may develop their own retirement norms.

Social norms are not necessarily beneficial to society, and may in fact even be harmful.[26] Akerlof (1980) refers to the 'norm' that employers should not hire unemployed persons at a lower wage rate than the current wage rate. Such a social norm leads to higher unemployment, which makes both unemployed persons and the employer worse off. It is certainly possible that a similar norm has played a role in the early retirement preferences of many European workers. Early retirement was for a long time considered something 'good', not only for the large amounts of leisure received at a 'low price', but also because it was believed by many that it would help to lower youth unemployment (Van Dalen and Henkens, 2005; Kalwij et al., 2010). According to De Vroom (2004), this has led to a strong 'early exit culture' in the Netherlands. Doubts have arisen about the effectiveness of early retirement as a means to save jobs for the young (Barr and Diamond, 2009; Gruber and Wise, 2010), and governments are nowadays encouraging the participation of older workers in order to improve their fiscal sustainability in the face of the graying of the population. The norm of early retirement may be disappearing in most western countries. As a result, the participation effects of increasing the pension age could be much larger now than they would have been in the 1980s and '90s.

Main difference compared to traditional neoclassical framework

It is likely that social norms play a relatively important role within the context of retirement. People cannot learn from their own experience, as retirement is a typical once-in-a-lifetime event. Therefore, they look at the experiences of friends and colleagues in order to get some idea about a 'proper' age of retirement.[27] More generally, the determination of one's optimal age of retirement is quite complicated. The life-cycle model discussed in section 2.3

[26] A beneficial effect of social norms may be their role as coordination device. For instance, employer and employee can start thinking about a reasonable retirement age with a 'socially accepted' retirement age as a starting point. This might lead to efficiency gains.

[27] Social interactions may complement the importance of social norms. For instance, retirement of coworkers, that worked many years with the individual, could influence the disutility of working and in turn have an impact on the individual retirement decision.

is not easy to solve for most individuals, and even this intricate model is a simplified version of reality. This might again be a reason for workers to be inspired by retirement decisions in their environment. Financial illiteracy may strengthen the social norm effect. People who are not able to evaluate financial information will more likely take advice from their social environment. This way, it is likely that workers are sensitive to a social norm on retirement if there is one – be it at the national level or in the direct environment of the worker. Traditional neoclassical models of retirement, however, do not allow for interdependencies between different agents or between an individual and some external group of agents (possibly society as a whole).

Interdependencies between different actors may affect their retirement decisions. Van Solinge and Henkens (2007) distinguish between direct interdependencies, which they term 'social embeddedness', and indirect interdependencies, also known as the 'social norm on the timing of retirement'. *Direct interdependencies* are typically linked to the preferences of persons in the worker's direct environment, such as his/her spouse, coworkers and supervisor. [28] It is has been shown in the sociological literature that low levels of coworker and supervisor support increase the likelihood of early retirement. It is important to mention that this effect cannot be fully explained from the neoclassical lifecycle model. People seem to weigh the preferences of some close individuals within their own utility, and sometimes even seem to act against their own personal preferences. *Indirect interdependencies* occur when the worker is influenced by a more abstract social norm that is not tied to a physical person. People have a feeling about the 'right' time for a transition out of paid work, and attach negative utility to deviations from this 'norm age'.

It is important to note that social norms may also be important at the demand side. That is, employers may stimulate retirement at particular 'norm ages'. For instance, Van Dalen et al. (2010) examine perceptions about the productivity of older workers. They find that both employers as employees assess the productivity of older workers to be lower than of younger workers. Such perceptions could shape social norms about retirement on the demand side and encourage early retirement. Thus the retirement peaks observed in section 2.2 may also in part be caused by such norms on the demand side.

Empirical applications

A problem with the empirical analysis of social norms is that they are difficult to measure. Norms cannot be directly observed, so that empirical studies either use proxy variables or

[28] For instance, Duflo and Saez (2002) show that an individual's participation in a retirement plan is affected by the participation of his or her direct colleagues.

interview individuals directly. An example of directly questioning respondents on their retirement norms is Van Solinge and Henkens (2007). Based on a panel survey of 778 respondents, they find empirical evidence for both direct and indirect interdependencies. In the first wave — which occurred before retirement — their sampled individuals were asked about their retirement preferences and the 'social embeddedness' of their retirement decision. The second wave was collected after retirement. Individuals' behavior depends on their environment, even to the extent that their retirement decision is characterized as 'involuntary'. Involuntary retirement may result from employer- or spousal influences. The authors conclude, however, that "robust social norms exist about the appropriate time for retirement".

In the economic literature, direct empirical evidence on social norms in retirement is absent.[29] Some 'circumstantial evidence' indicates that social norms are potentially a very important explanation for the retirement peaks at standard pension ages, but there are competing explanations as well (Behaghel and Blau, 2012).[30] Furthermore there is some empirical evidence, however, on the relevance of social norms on the use of welfare benefits in the context of western welfare states (Bertrand et al., 2000), unemployment insurance (Clark, 2003; Stutzer and Lalive, 2004) and sickness benefits (Ljunge, 2010). These studies all confirm that social norms are relevant for the use of social insurance. The residual 'retirement peak' discussed in section 2.2, together with Mastrobuoni's findings, however, suggest that social norms play a role in retirement behavior. Moreover, in a recent survey Brown (2006) finds that many individuals tend to retire at the age which they consider the "usual retirement age". About half of the (American) individuals in his sample consider the ages 62 or 65 as the 'usual' retirement ages, one-sixth consider another age as the usual retirement age, and the remaining one-third does not consider any retirement age to be usual.

The relevance of a uniform social norm in the retirement decision may have decreased since the 1960s and 1970s. At that time, the life course of workers and their spouses was more 'standardized'— and this included a uniform timing of retirement. According to Han and Moen (1999), the age-graded norm in retirement "has become blurred" during the past decades as a result of three trends: institutional, economic and demographic. Institutions have gradually facilitated more flexible retirement decisions. Important examples in the US are the elimination of mandatory retirement and the facilitation of early retirement by private pension funds. The economic trend refers to changes in the labor market, which—according to the

[29] It is difficult to distinguish empirically between social norms and habits, even with survey data. If many people have the same habit, then it could be interpreted as a social norm. On the other hand, a social norm may lead to individual habit formation.

[30] They offer various explanations for the shift in retirement peaks following the reform in Social Security. They contemplate social norms as well as reference dependence. They distinguish between the explanations by relating the findings to cognition.

authors— has moved away from the 'implicit contract' to more flexible relationships between employer and employee. Finally, the demographic trend refers to health and life-expectancy. A wider range of retirement ages was made possible as a result of improvements in both health and life-expectancy. These three trends have probably weakened the society-wide social norm on retirement. This of course does not exclude the persistence of sector- or region-specific social norms on retirement.

Behaghel and Blau (2012) find that workers with higher cognitive skills respond more strongly to a change in the 'standard pension age' than do others. Presuming that low-cognitive workers are more sensitive to social norms, they speculate that the social norm effect is not the main driver of the retirement peaks at standard pension ages.

2.6. Conclusion

The retirement pattern in the Netherlands shows peaks at 'standard retirement ages' in pension schemes. These peaks coincide with the standard early retirement ages and have remained in place even after the introduction of actuarially neutral schemes. Traditional neoclassical economic models focusing on financial incentives cannot fully account for this. In financial terms, the ages surrounding the standard early retirement age are equivalent, and therefore not much difference would be expected in the exit rates at these ages. These retirement peaks provide an indication that non-financial determinants of retirement are also important.

Retirement peaks are also observed in the US at the standard early retirement age and the normal retirement age, whereas the US Social Security system is close to actuarial neutrality.

More precise evidence on the unexplained retirement peaks is provided in micro-econometric studies. Studies focusing on financial incentives are not able to explain the large share of individuals retiring precisely at standard retirement ages. Evaluations of the effect of pension age reform on the retirement age are also not able to align responses with income and substitution elasticities found in the empirical literature. For instance, the increase in the US Social Security age has led to an increase in the labor force participation rate of senior citizens that is considerably higher than predicted by the income elasticities commonly found in the empirical literature.

The default retirement age and reference points might be important psychological factors for explaining retirement behavior. The way the pension scheme is presented to the individual in terms of default retirement ages may have an important effect on the

individual's retirement age. Moreover, individuals show a tendency to stick to their originally planned retirement income (i.e. their reference point). Third, social norms are likely to be important. Individuals are open to 'retirement advice' by their direct environment and more abstract social norms (e.g. from the media). In empirical studies, it is typically difficult to distinguish between a 'social norm effect' and a 'default effect'.

Institutional factors – such as age-related compulsory dismissal – and capital market imperfections may lead to retirement peaks. Individual factors are important but they cannot explain the observed shift of retirement patterns in response to a change in the statutory retirement age. It is unlikely that the distribution among the population of individual factors (like health and spousal influences) results in large retirement peaks.

In conclusion, there is still an important gap between observed retirement peaks and what can be explained by traditional economic analyses. Some non-financial determinants of retirement are known to be important, but have not been quantified yet. This paper has sketched the potential of psychological and sociological arguments to fill up this gap, but it is clear that much research needs to be done. In particular, disentangling and quantifying the various determinants of retirement, such as reference points, social norms and habits, are valuable research goals. Research with survey data seems to be indispensable for this. The incremental increase of the statutory retirement age in the Netherlands started in 2013 provides an opportunity for future empirical research.

3. Social interactions and the retirement age

3.1 Introduction[31]

Worldwide, governments are reforming pension schemes to tackle concerns about fiscal sustainability due to aging populations. The concerns are exacerbated by the recent economic downturn. Many countries are increasing the statutory retirement age (see OECD, 2011 for an overview). Typically, this is the age at which individuals are entitled to full retirement benefits.[32] The purpose of higher statutory retirement ages is to reduce government expenditures and to raise labor force participation.

Increases in the statutory retirement age have substantial impact on the labor participation rates of older workers. Aggregate retirement patterns show 'retirement peaks' at key institutional ages in the US (Gruber and Wise, 1999) and many other countries including the Netherlands (Van Erp et al., 2013). Indeed, the evidence shows that an increase of the statutory retirement age leads to an increase of the mean retirement age. Mastrobuoni (2009) documents a raise of six months in the mean retirement age in the US after a reform that increased the statutory retirement age with one year.

Why is the statutory retirement age important for retirement behavior? An obvious explanation is that it serves as a 'focal point'. Individuals consider their planned retirement age in relation to the statutory retirement age. Deviations may lead to disutility due to both financial and non-financial reasons. The design of retirement schemes is not always actuarially neutral and retirement at different ages than the standard age may entail an implicit financial penalty. Workers can perceive the statutory retirement age as an implicit advice to retire at that specific age. Or they take this age as a reference point when starting to think about and plan for retirement. They perhaps perceive an early retirement plan with lower benefits as a loss compared to a plan with higher benefits starting at the statutory retirement age. We explore yet another explanation and study whether social interactions affect individual retirement behavior.

The goal of this paper is to gain more insight in the relation between retirement behavior of the social environment and individual retirement plans. For this purpose, we

[31] This chapter is based on Vermeer et al. (2014a)

[32] In some countries it is possible to choose the date when to start collecting benefits. In other countries, the retirement age may depend on the number of years contributed.

collect data in a controlled experimental setting. This setting creates independent variation in retirement of an individual's social environment, enabling us to more thoroughly investigate the role of social interactions in the context of the retirement age. With administrative or survey data on actual retirement behavior it is very difficult to disentangle various non-financial determinants of the retirement age, such as reference points, a social norm, or an age anchor. We have designed a survey with self-assessments and a series of vignette questions. The self-assessments examine from whom respondents expect to receive explicit or implicit advice about the decision when to retire and whose personal situation they take into account. The vignette questions portray a fictive person making a retirement plan and describe a change in retirement behavior by the social environment. The vignettes are designed to keep financial incentives constant and to vary the retirement age of the social environment only. Changes in the retirement age from vignette to vignette for a given respondent sheds light on the sensitivity of the individual retirement age to the retirement age of the social environment.

To deepen our knowledge on the mechanisms behind the influence of the social environment somewhat, we vary the format of the vignette questions between respondents. The reason for the social environment to retire at a later age is framed in four different ways. Each respondent is confronted with either a male or a female fictive person and a different composition of the social environment. This enables an investigation of what factors are relevant for social interactions and retirement planning.

To preview our main conclusions: we show that social interactions play an important role in retirement decisions. First, individuals receive advice from a broad social environment, including family, friends and coworkers, and often, take the advice into account in their retirement plans. Moreover, they take the personal situation of their social environment into account, in particular of those who stand more close to them. Second, workers are influenced by the retirement age of the social environment. An increased retirement age of the social environment of one year leads to approximately three months later retirement of the individual. We identify a special role for the age of 65 years, which has been the statutory pension age in the Netherlands for over fifty years. This may be related to the formation of social norms connected to specific retirement ages such as the statutory retirement age. As a consequence an increase in the statutory retirement age, while raising the labor participation in the short run, may have an additional effect in the long run through slow adjustment of the social norm.

These findings have important implications for public policy. An increase in the statutory retirement age will first persuade a certain group of individuals to retire later (e.g. as

a result of financial incentives or framing). Social interactions create a spill-over effect and change the retirement decision of other individuals as well. In the longer run, social norms may shift along with the increase in the statutory retirement age, increasing the effectiveness of this policy instrument. All in all, the long run labor participation effect of an increase in the statutory retirement age goes beyond the direct short run impact of the change in financial incentives.

The paper is organized as follows. Section 3.2 considers the theoretical framework and reviews previous studies. Section 3.3 briefly discusses the Dutch retirement institutions. Section 3.4 describes our data and research design. Section 3.5 presents the empirical results. Section 3.6 concludes with a discussion of the implications.

3.2 Literature overview

3.2.1 Theoretical framework

Social interactions influence individual decision making; individual decisions and peer group behaviors are correlated.[33] Natural experiments for example show an influence of shocks in individual income or consumption on the consumption of other individuals (Angelucci and Giorgi, 2009 and Kuhn et al., 2011). Manski (1993) and Duflo and Saez (2002) distinguish three distinct social effects: exogenous, endogenous and correlated social effects. Exogenous social effects entail the influence of observable characteristics of the peer group on individual behavior, conditional on observable characteristics of the individual. Older coworkers (the peer group in this case) could influence the individual retirement age. As they are older and could be at the verge of retirement, this might induce somewhat younger individuals to think about retirement and plan accordingly. In other words, individual behavior is guided by background characteristics of peers and not by actions or behavior of the peer group. Endogenous social effects mean that peer group behavior influences individual behavior. This implies a direct link between peer group and individual actions that is not related to observable characteristics. For instance, the retirement of coworkers (the peer group) sets an example and influences the individual retirement age. As an example, he or she could imitate the typical retirement age of the coworkers. Finally, common factors among individual and peer group can determine both behavior of the peer group and the individual. These are called correlated social effects. For instance, the presence of common retirement plans can influence the retirement age of both the individual as the peer group (in this case the co-workers).

[33] For instance, Hanushek et al. (2003) highlight the role of peer effects on student achievement. Topa (2001) finds that individuals are more likely to be employed if the members of their social networks are employed and attributes this to sharing job information throughout social networks.

Changing the peer group of an individual does not lead to changes in other individual outcomes in this case.

In the case of endogenous social interactions policy interventions can have multiplier effects. For instance, an informational intervention applied to some participants can lead to a higher retirement age for those participants. The changed behavior of these participants may cause the retirement age of non-informed individuals to increase as well. This means that policy interventions have a 'spill-over' effect on non-targeted individuals. In general, policies may indirectly influence the behavior of untreated individuals via a direct effect on treated individuals and the overall effect of a policy intervention is then larger than the effect on the targeted individuals alone.

But this does not automatically imply that a multiplier effect is always present in the case of endogenous social effects. Bernheim (1994) discusses a model in which individuals want to conform to a social norm. Conformance to a social norm has impact on the status that individuals care about, and they will only depart from the social norm when their own preference is vastly different. If the social norm itself is static then there is no link between the number of individuals following the norm and the norm itself. Actions of individuals inform other individuals about the prevailing norm but do not alter the norm. Policy interventions will not influence behavior of untreated individuals; provided the policy intervention does not change the norm as individuals already make optimal choices given incentives and the social norm (see Duflo and Saez, 2002). In such a case, multiplier effects will be absent.

If the social norm is not static and its 'strength' increases in the number of individuals adhering to the particular social norm, a multiplier exists. In this sense social norms become endogenous: the social norm depends on the number of individuals following the norm. As public policy could influence the behavior of a number of individuals directly, it can influence the norm in this way. A policy intervention then impacts other individuals via the changed social norm. The literature provides several examples. For instance, Fischer and Huddart (2008) discuss the relevance of social norms with regard to the design of contracts and Lindbeck, Nyberg and Weibull (1999, 2003) consider the relation between social norms and collecting welfare benefits. But to what extent are social norms 'sticky'? This matters for the feasibility of interventions. Does the alteration of social norms take generations or does it change almost immediately? There is no agreement in the literature on this issue. Lindbeck et al. (2003) investigate both instantaneous and lagged stigma in the collection of welfare benefits. Lagged stigma introduces dynamics in the alteration of the social norm and leads to

more generous benefits and longer lasting effects than instantaneous stigma. Ljunge (2010) studies the take-up of sick leave benefits by different generations in Sweden. He assumes that for a given cohort the reference group is formed by individuals born 2-4 years earlier living in the same county. Lindbeck and Nyberg (2006) and Corneo (2013) study social norms in the context of the welfare state and focus on the link between parents and children. The link between generations represents a much longer time span than in the case of Ljunge.

3.2.2 Empirical findings

Much research focuses at the retirement age, mainly the relation between financial incentives and retirement decisions using structural or reduced-form models (see for instance, Coile and Gruber, 2007, and Gustman and Steinmeier, 2013). These studies rely on the variation in retirement wealth (e.g. claims on Social Security) among individuals and may include forward-looking measures.[34]

A central difficulty in estimating retirement age choices is the role of retirement at key institutional ages. Retirement schemes across countries typically feature institutional ages, like the 'normal retirement age' (i.e. the age at which 'full' retirement benefits are available) and the 'early retirement age' (i.e. the age at which retirement benefits are first available). For instance, in the United States the early (normal) retirement age amounted 62 (65) years of age until 2003. Consequently, the observed retirement pattern shows many individuals retiring at these ages, leading to 'retirement peaks'. These ages are often linked to other institutional features, like the availability of Medicare at the age of 65 that need to be taken into account in explaining retirement decisions. Inclusion of these factors still leaves unexplained 'retirement peaks'. Lumsdaine et al. (1996) systematically investigated a variety of explanations but found no particular reasons for 'excess retirement' at the peaks of 62 and 65 years of age. They conclude that the particular popular retirement ages must function as 'the influence of custom or accepted practice'.

Various countries have begun to increase their statutory retirement age. The Social Security reform in the United States of 1983 increased the normal retirement age (NRA) of Social Security from 65 to 66 years in six steps of two months for cohorts born between 1938 and 1943. In 2003 the first cohort reached the raised normal retirement age. In Switzerland the normal retirement age for females was raised in two steps. In 2001 it was raised from 62 to 63 years, followed by a further increase to 64 years in 2005.[35] The US and Swiss examples

[34] For instance, it can be taken into account that Social Security benefits in the US increase roughly 7 percentage points for each year retirement is postponed

[35] The reform introduced the possibility for early retirement. Hence, it was still possible to retire at age 62. The benefits were cut 3.4% if collected one year earlier. In case benefits were collected two years earlier the permanent cut amounts 6.8%.

imply that different birth cohorts are faced with different normal retirement ages and endogenous selection into treatment is not possible.

The raise in statutory retirement ages for different birth cohorts in these reforms is exploited for treatment evaluations. Mastrobuoni (2009) finds that individuals are sensitive to increases in the normal retirement age (NRA) of Social Security in the US. For every two months increase in the NRA individuals retire on average one month later. Hanel and Riphahn (2012) study the effect of the reform for Swiss female workers. An increase of the NRA with one year (from 62 to 63 years of age) generates an increase of 2.3 months in expected retirement age; an increase with two years (from 62 to 64 years of age) generates an increase of 7.7 months.[36]

3.3 Dutch retirement institutions

The Dutch retirement system consists of different 'pillars'. The first pillar consists of flat state pension benefit, unrelated to the earnings history. Eligibility is determined by age and the number of years one lived in the Netherlands.[37] Contributions paid over the life-cycle are not taken into account for eligibility nor for the level of the benefits. The payment of benefits starts at the statutory retirement age. It is not possible to claim earlier (later) and to receive lower (higher) benefits for the rest of the lifetime.

Since the introduction of old age state pensions in 1957 in the Netherlands, the first pillar statutory retirement age was fixed at 65 years. In 2010 it was announced that the statutory retirement age would eventually be coupled to the life-expectancy. A transitional agreement phases this coupling in gradually, starting in 2013. This means that different birth cohorts are confronted with different statutory pension ages. In 2021 the statutory retirement age will be 67 years (Table 3.1). Cohorts reaching the age of 67 after 2021 will face higher statutory retirement ages, depending on further increases in life-expectancy.

[36] The magnitude of the results of Mastrobuoni and Hanel and Riphahn are larger than predicted in simulation studies (see for instance Coile and Gruber, 2000). These studies included only the impact of changed financial incentives by the reform, while Mastrobuoni and Hanel and Riphahn measure the total effect of an increase in the NRA including non-financial determinants of retirement behavior.

[37] Every year lived in the Netherlands when being between 15 and 65 years of age entitles one to 2% of the total state pension benefits.

Table 3.1 **Details on increasing the statutory retirement age**

Year	2013	2014	2015	2016	2017	2018	2019	2020	2021
Statutory retirement age	65 + 1 month	65 + 2 months	65 + 3 months	65 + 6 months	65 + 9 months	66	66 + 4 months	66 + 8 months	67

Source: Ministry of Social Affairs and Employment (http://www.rijksoverheid.nl/onderwerpen/algemene-ouderdomswet-aow/wijzigingen-in-de-aow, in Dutch)

The second pillar of the pension scheme consists of mandatory retirement savings. These schemes are often organized at the company or the sectoral level. Employment in a specific company or branch determines enrollment in the accompanying pension fund or insurer. Individuals have no say in the level of pension contributions or the investment policy in these retirement plans (Van Rooij et al., 2007). This pillar enables early or late retirement depending on individual preferences and the retirement plan. The age of the benefit take-up has consequences on the expected number of years of collecting benefits and thus for the level of benefits. The pension plans in pillar can be either defined-contribution (DC) or defined-benefit (DB). So the level of benefits depends also on paid contributions or income during the life-cycle. Contributions are tax-deductible and taxes are levied during the pay-out phase. In general, the tax deferral leads to a clear tax advantage. Benefits are paid in the form of a lifelong annuity.

The third pillar concerns voluntary individual retirement savings with special fiscal treatment. This pillar is relatively small. It is directed at individuals who do not have access to the second pillar (e.g. the self-employed) of have accumulated little savings with their employer. Savings in the third pillar pension plans are tax-deductible to take advantage of the same tax treatment as in the second-pillar pensions. Collecting benefits during retirement is taxed and pay-out is only allowed in the form of an annuity.

3.4 Data and study design

Our survey was fielded among the members of the CentERpanel. This panel is representative of the Dutch population and answers on a recurring basis questions mainly related to their broad financial situation (e.g. income, wealth holdings, pensions but also expectations on income, etc.) and some psychological questions, perceptions of risk for example. These data, known as the DHS (DNB Household Survey) are available for academic research.[38] Our survey was put forward to 2,840 household members that are 16 years or older. 1,845 took

[38] For more information, see http://www.centerdata.nl/en.

part in the survey, giving a response rate of 65%. Data collection took place from 11th - 15th of May 2012. Main background characteristics of the respondents are given in appendix 3.A. The appendix also shows the background characteristics of all members of the CentERpanel. Overall, non-response does not seem to be related to observable characteristics. We do find a lower response rate for young individuals in particular, which is a common feature in surveys on retirement. To account for this the descriptive statistics in this paper have been weighted with regard to age, gender, education and individual yearly income to obtain a representative view of the Dutch population. As we are especially interested in future retirement behavior, we will restrict the analysis to respondents younger than 65 years who are not retired and completed the whole survey. This leaves us with a sample size of 1,113 respondents.

The first part or our survey examines whether the social environment of respondents influences their retirement age decisions and which persons in the social environment are most relevant in this decision. The first set of questions is asked to the respondents who currently work or have worked before. We start asking the respondents who is likely to provide them with retirement advice:

What persons do you expect to give you advice when to retire?

	Not at all	*Some*	*Certainly*
Spouse			
Children			
Friends			
Family			
Coworkers			
Neighbors			
Financial advisor / pension fund			

Advice may take different forms: it can be actively sought for hiring a financial advisor but it can also be casually given by for example a lunch with coworkers. The latter unsolicited advice may be less meaningful for the respondents than advice and information they have asked for themselves. More in general, advice and information may have more value depending on the source. To explore the relevance of advice, respondents who indicate to receive advice are asked how much weight they attach to this advice.

In the previous question we asked you which persons give you advice. What weight do you attach to the advice of the following persons?

	None	*A little*	*Some*	*Much*
Spouse				
Children				
Friends				
Family				
Coworkers				
Neighbors				
Financial advisor / pension fund				

The impact of the social environment can go beyond giving advice and providing information Individuals may take the personal situation of other people in their social environment into account. In particular, we ask

Of what persons do you take the personal situation into account for your decision when to retire?

	Not at all	*A little*	*Somewhat*	*Most certainly*
Spouse				
Children				
Friends				
Family				
Coworkers				
Neighbors				

The second part of the survey studies the response to changes in the retirement age of the social environment using vignettes. These vignettes offer the possibility to study the sensitivity of the individual retirement age to the retirement age of the social environment in a controlled setting. The possible concern about external validity is alleviated by letting the respondent answer the questions for a fictive person with a given initially planned retirement age. The use of a fictive person with a given initially planned retirement age is a parsimonious way to summarize all other possible relevant features of the fictive person, such as retirement wealth and health, for determining of the individual retirement age. In this way, respondents abstract from their personal situation. This is important as this study aims to investigate the role of social interactions, not confounded by the direct effects of background characteristics of respondents that may also affect their social environment. Van Beek et al. (1997) offer an example of a study exploiting vignettes in a similar way, in order to elicit preferences of employers regarding the hiring of employees.

Before the respondents answer the vignettes questions, they are given a fictive flexible retirement scheme. This scheme emphasizes the availability of choice options around a standard retirement age. Earlier take-up leads to lower retirement benefits, and later take-up yields higher benefits for the remainder of the life-time. The wording of the retirement scheme is as follows (the percentages coincide roughly with actuarial fairness):

Nowadays, policy makers discuss a new retirement scheme. Current plans provide the possibility to decide when to start receiving pension entitlements. If you have worked forty years and retire at the standard retirement age, the pension entitlements (including state pensions) equal 70% of average gross income. The standard retirement age is at this moment 65 years. Retiring a year before the standard retirement age implies approximately 7% less pension entitlements per month for the remainder of your life. Retiring a year after the standard retirement age implies an increase of approximately 7% in pension entitlements.

The vignettes involve a fictive person, who is faced with the question how to adjust her/his retirement age. At the moment that retirement is still far away, this person has a planned retirement age. Later once the person turns older, it appears that the typical age of retirement of individuals in her or his social environment has changed. The respondent is then asked to evaluate whether she/he would change the retirement planning being the vignette person. Below, we provide an example:

John (or Lisa) are not yet eligible for retiring. He (or she) does think about it from time to time. John plans to retire at 65 years of age considering this retirement scheme. At this time many of his older coworkers (or friends and family members) retire at 65 years of age. When John turned 60 years old, most coworkers retire at 66 years of age. This is a consequence of people experiencing longer and healthier lives.
What would you do in the situation of John?
1 Retire before 65 years of age
2 Retire at 65 years of age
3 Retire at 65.5 years of age
4 Retire at 66 years of age
5 Retire at 66.5 years of age
6 Retire at 67 years of age
7 Retire after 67 years of age

The questions are designed to elicit variation both within and between respondents. Between respondents the vignettes differ in the gender of the vignette person (male or female), the nature of the social environment (friends and family or colleagues), the reason for other individuals to adjust their retirement age (individuals living longer and healthier lives (given in preceding example), more need for experienced workers by employers, longer working due to the financial consequences of the economic crisis, and a one year increase in the statutory standard retirement age). Out of the four different reasons, only one reason

induces financial incentives in terms of a change in the available retirement schemes (the increase in the standard retirement age).

The variation within respondents follows from asking each respondent four vignettes. These vignettes vary the retirement ages of the vignette person and the social environment. Differences between the retirement ages of the vignettes shed light on the influence of the retirement age of the social environment on the planned retirement age. Table 3.2 provides the different variations. For instance, note that vignette 1 and 2 are equal except for the new retirement age of the social environment. The different answers to these two vignette questions show the effect of the increase of one year in the retirement age of the social environment on the respondent's preferred retirement age. Appendix 3.B gives a complete listing of all the questions.

Table 3.2 The different retirement ages in the vignettes

	Original retirement age plan of vignette person	Original retirement age of social environment	New retirement age of social environment
Vignette 1	**65**	**65**	**66**
Vignette 2	**65**	**65**	**67**
Vignette 3	**64**	**65**	**66**
Vignette 4	**64**	**64**	**65**

3.5 Empirical results

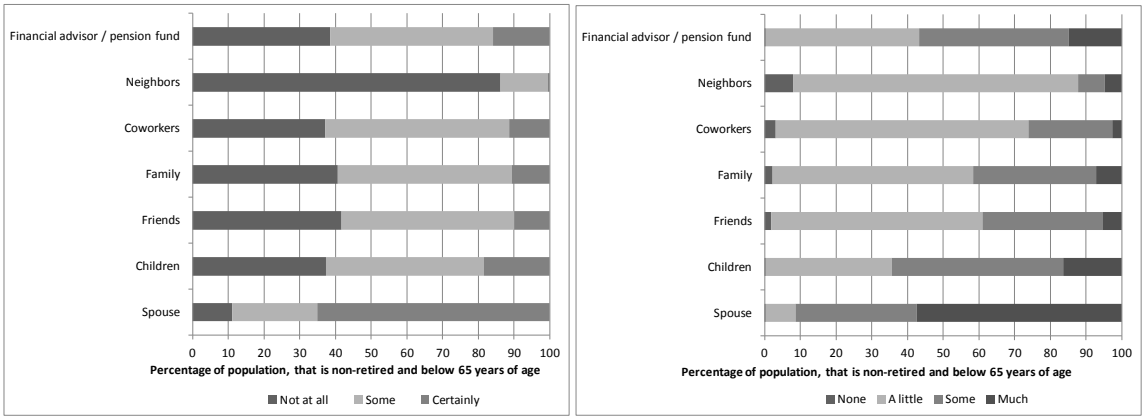
3.5.1 Advice and the personal situation of the social environment

We first explore the role of advice given by different groups in the social environment. As potential advisors, we distinguish the spouse, children, friends, family, coworkers, neighbors and the professional financial advisor. The answers by our respondents show that the propensity to give advice varies among the advisors as well as the impact on the planned retirement behavior (Figure 3.1). Approximately 90% of the non-retired respondents indicate that they discuss retirement plans with their spouse. Around 90% of this group states they attach some or much weight to this advice. Looking at the subgroup of the respondents that

are cohabiting (married or unmarried) 97% indicate to receive advice from their spouse and only 7% state that they attach none or little weight to the advice from their spouse.[39]

Children, friends, family, coworkers and the financial advisor or pension fund are also important in retirement decision making: around 60% of the respondents indicate to receive advice from these groups. In particular the advice from children and the financial advisor is viewed as important: around 60% of the respondents attach some or much weight to their advice.[40] The advice of friends, family and coworkers is somewhat less important as respondents give it less weight. Advice from neighbors, who are typically neither experts nor very closely related to the respondents, is relatively unimportant.

Figure 3.1 Influence and importance of different groups in the social environment on retirement plans



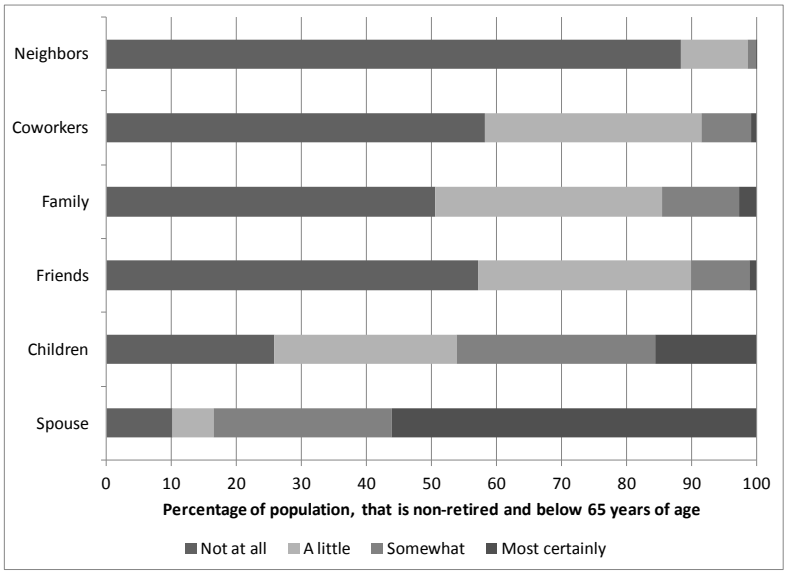
Which persons do you expect to provide you with retirement advice? (Left)
Which weight do you attach to the advice of the following persons? (Right)

The role of the social environment is not limited to giving advice, as the utility that individuals derive from work or retirement is not independent from the situation of the social environment. Coile (2004) finds that 62% of men, who are to retire in the near future, look forward to retirement only if the partner will retire as well. Schirle (2008) finds that the increased labor force participation of older married males can be explained from the increased female labor force participation. These studies show that leisure apparently has more value when it can be enjoyed with other members of the household. Indeed, our results show that the personal situation of the partner is very important for retirement decisions (Figure 3.2). More than 80% take the personal situation of the spouse at least somewhat into

[39] For respondents that do not cohabit currently, the number that expects to receive advice from a partner when nearing retirement is 62%, while 19% attach little or no weight to this advice.
[40] The impact of having children does not vary substantially with the age of the respondent.

consideration[41], and more than 50% most certainly. More than 40% of the respondents take the personal situation of the children into account. The personal situation of others is less important. Nonetheless, the personal situation of family, friends and coworkers is still given little consideration by 40 to 50% of the respondents. For coworkers, it is less likely that this preference is related to the enjoyment of joint leisure. But culture or social norms at the work place may play a role. The fact that Dutch pension schemes are mostly organized at the company or the sector level could contribute to this.

Figure 3.2 Taking the personal situation of other people into account in planning for retirement



Do you take the personal situations of these persons into account in deciding when to retire?

3.5.2 The retirement age of the social environment

The social environment does not only give advice, but sets an example by their retirement decisions as well. We examine this relation using vignette questions (introduced in 3.4). Recall that respondents indicate how they would decide in the case of a fictive person faced with a hypothetical situation in which the social environment changes its retirement behavior. As the retirement age of the social environment increases from 65 to 66 years, almost 35% of the respondents indicate to retire at 66 years as well (Figure 3.3, left panel).[42] In case the increased retirement age of the social environment is 67 years, more than 25% of the respondents retire at 67. Interestingly, the number of respondents that indicates to retire at 66

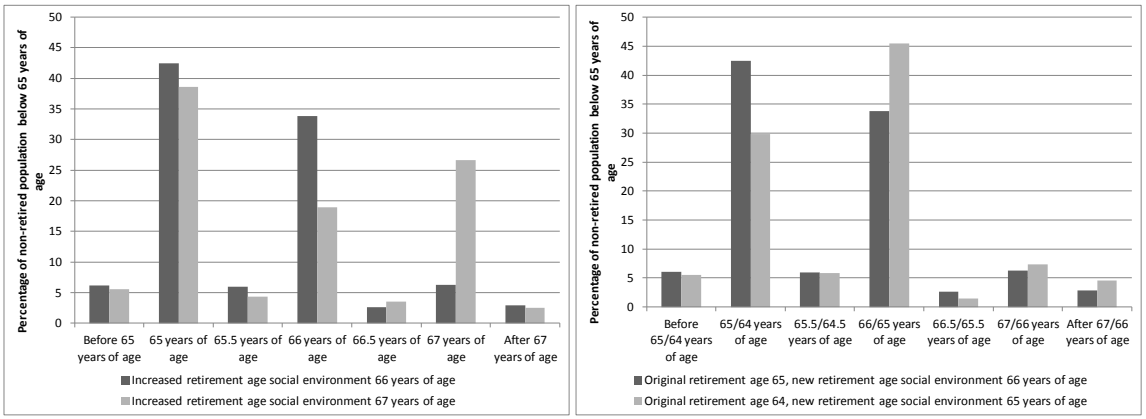
[41] This number varies substantially between respondents that do (98%) and do not cohabit (64%).
[42] Vignette 3 is not shown in Figure 3, but is presented as a robustness check at the end of the section.

drops substantially to less than 20%. As the only difference between these two vignettes is whether the social environment increases its retirement age to 66 or 67, the different answers show that the retirement behavior of the social environment does matter for decisions on the individual retirement age.

Regardless of the new retirement age, between 35% and 45% of respondents indicate that they will retire at 65, the original planned retirement age in both vignette questions. This group does not seem sensitive to the change in retirement age by the social environment. The decision to stick to the original retirement age plan is expected in a framework that puts financial incentives central in decision making as financial incentives have not changed.[43] An alternative explanation for the choice to stick to 65 is that this particular age constitutes a reference point in retirement decision making. Since the introduction of state pensions in the Netherlands in 1957 until 2013, the statutory retirement age was equal to 65. To explore the relevance of both explanation, we compare the answers to vignette questions 1 and 3 (Figure 3.3, right panel). Vignette 3 is based on a planned retirement age of 64 and an increased retirement age for the social environment of 65 (compared to 65 respectively 66 in vignette 1). 45% of respondents retire at 65 when this is the new retirement age of the social environment and 64 is the original planned retirement age. This is more than the 33% when the original retirement age is increased from 65 to 66. At the same time, 29% sticks to the 64 retirement plan (versus 42% when the original plan is 65). Thus one third of respondents in vignette 1 stick to 65 because it is an important reference point in the current retirement practice and two third of this group seems to be insensitive to the retirement behavior of the social environment.

[43] This is true for at least for 75% of the respondents. Recall that the reasons varied between respondents and one of the four reasons does include a financial incentive as it mentions that the pension scheme would be less generous.

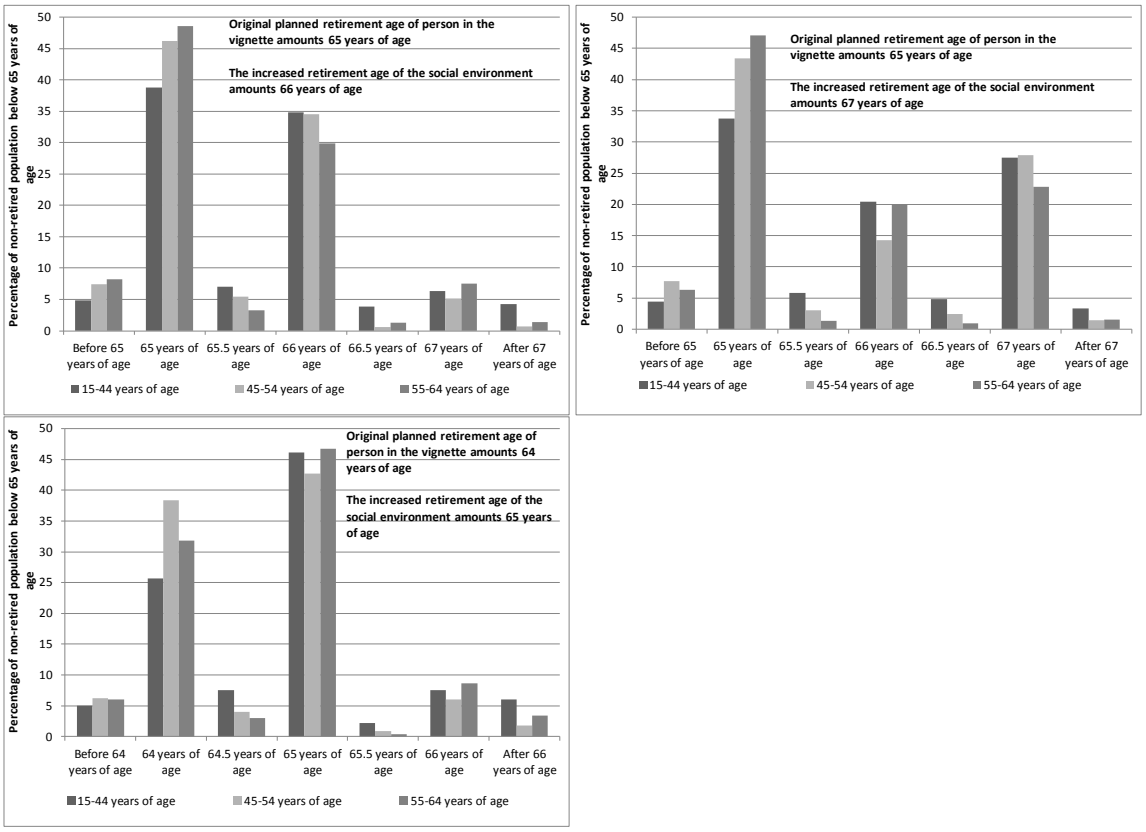
Figure 3.3 The impact of changes in the retirement age of the social environment



The left panel compares different increases in the retirement age. One question increases the retirement age of the social environment to 66, while the other question increases the retirement age to 67. The right panel compares a shift in all retirement ages with one year. See vignettes 1, 2 and 4 in Table 3.2.

To better understand the role of behavior of the social environment for respondents, we examine the vignette responses for a number of important characteristics of the respondents. The *age* of the respondents matters for their reaction to a change in the retirement behavior of the social environment. Figure 3.4 shows that respondents aged between 55 and 64 more often stick to retirement at 65 in comparison to younger age groups, irrespective whether this is the original or the increased retirement age of the social environment. Thus the special role of 65 in retirement decisions seems more important for older respondents for who 65 has been the official retirement age for almost their whole working career.

Figure 3.4 Respondents aged between 55 and 64 more often focus on retirement age of 65

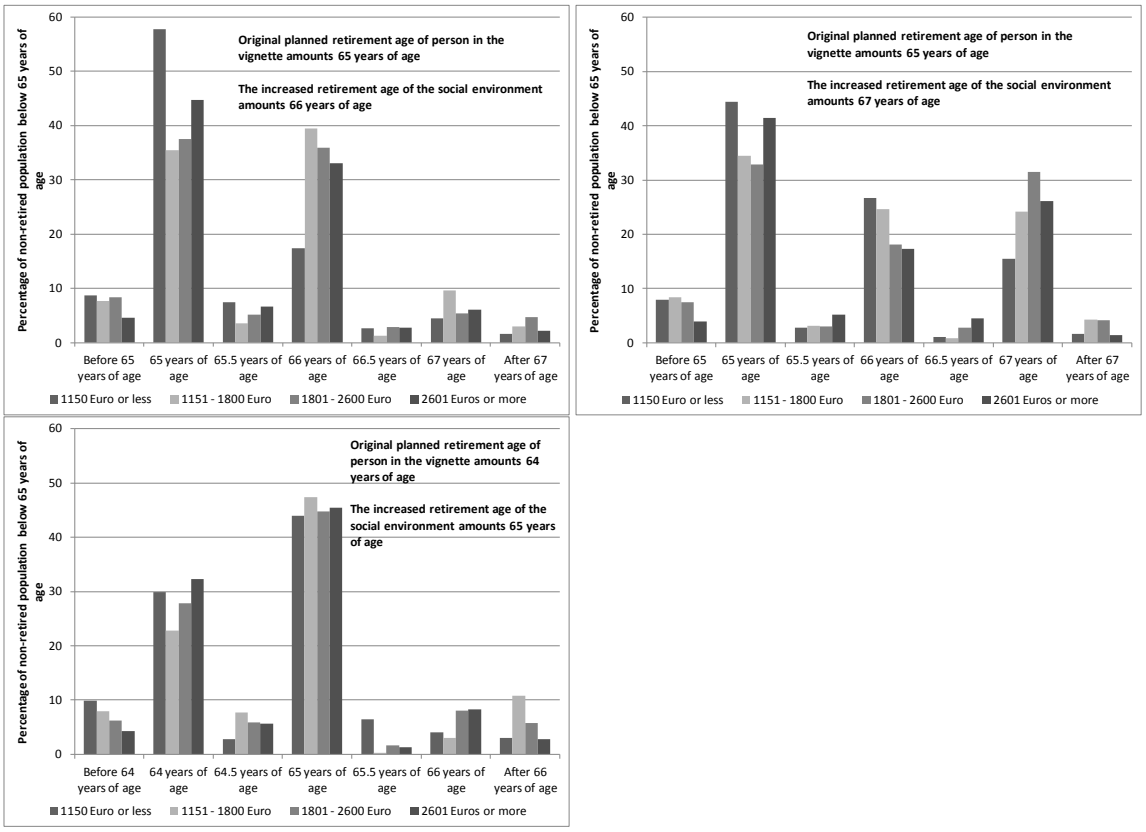


The figure shows the comparison over age when the social environment increases their retirement age to 66 (top left panel, vignette 1), or to 67 (top right panel, vignette 2) and when the original retirement age is 64 (bottom panel, vignette 4). The vignette numbers refer to Table 3.2.

Respondents from households with *net household income* in two middle income classes follow the increased retirement age of the social environment more closely than respondents from lower or higher income households who rather prefer the original plan with a lower retirement age (Figure 3.5). Higher income households can more easily afford retirement at an earlier age. Lower income households may have a stronger preference for earlier retirement because they are in worse health and working in more demanding professions.[44]

[44] Life expectancy is lower among low income individuals (see for instance Kalwij et al., 2013).

Figure 3.5 Lower income households more attached to retirement at 65

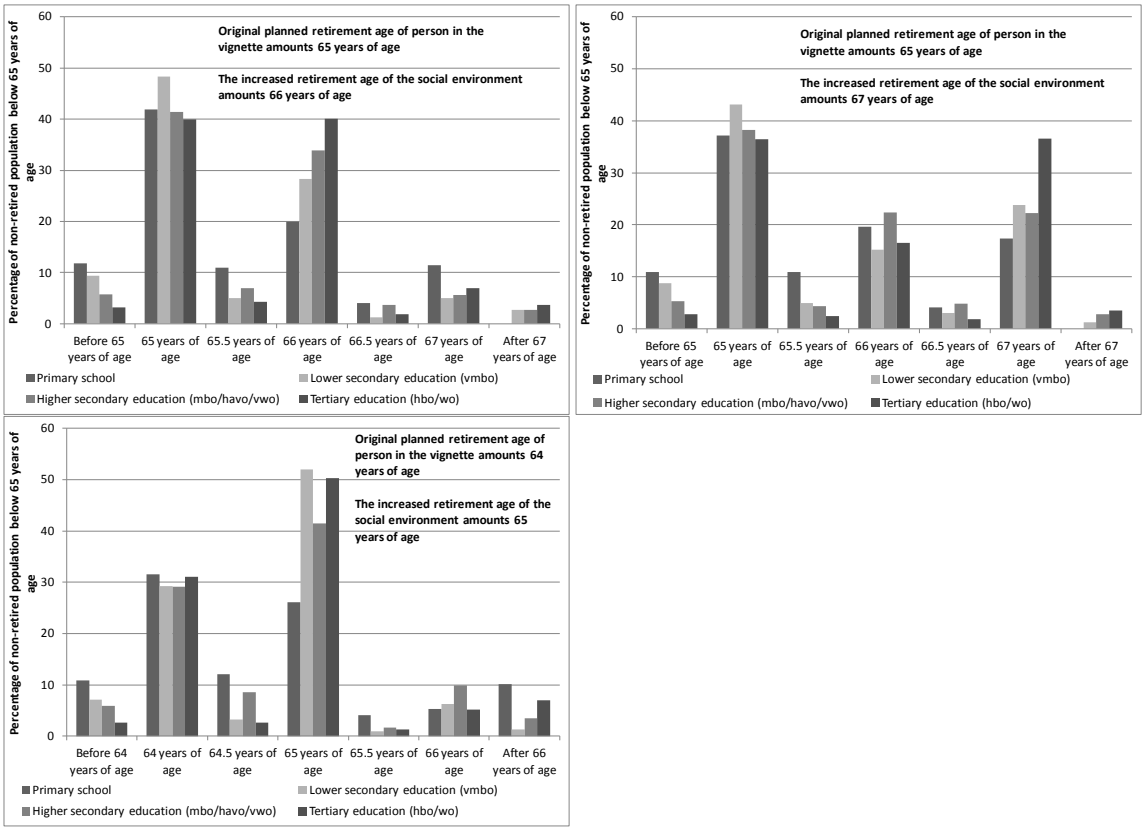


The figure shows the comparison over net household income when the social environment increases their retirement age to 66 (top left panel, vignette 1), or to 67 (top right panel, vignette 2) and when the original retirement age is 64 (bottom panel, vignette 4). The vignette numbers refer to Table 3.2.

Higher educated individuals follow the increased retirement age of the social environment more closely than lower educated individuals (Figure 3.6). 35% to 50% of the respondents with the highest, tertiary education degree follow the increased retirement age of the social environment. A possible explanation is that they show a faster adaptation to changing circumstances.[45] Respondents with lower secondary education stay closer to the age of 65 disregarding whether it is the original planned retirement age or the increased age of the social environment. This suggests that in particular among this subgroup the age of 65 is an important anchor in retirement decisions.

[45] We have investigated whether there is a direct connection with job satisfaction, but higher educated respondents are as happy with their job as other respondents.

Figure 3.6 Higher educated individuals follow an increased in retirement age in the social environment more closely than low educated individuals



The figure shows the comparison over education level when the social environment increases their retirement age to 66 (top left panel, vignette 1), or to 67 (top right panel, vignette 2) and when the original retirement age is 64 (bottom panel, vignette 4). The numbers of the vignettes refer to Table 3.2.

All in all, the results show that the retirement age of the social environment matters for decisions on the individual retirement age. In particular, the influence of the social environment is heterogeneous among subgroups of respondents. Higher educated, middle income and younger individuals are affected more by the social environment than their counterparts.

3.5.3 Modeling and empirical estimates

The previous analysis has documented the impact of the retirement of the social environment qualitatively. Below, we provide estimates for the size of the influence of changes in the retirement age of the social environment. These estimates are obtained with two models. One model treats the dependent variable as cardinal, while the other model takes the dependent variable as an ordinal variable.

Preferred retirement age as a cardinal variable

We introduce a model exploiting the fact that every respondent answers all four vignettes. For respondent i and vignette question j ($j = 1, \dots, 4$) this model treats the dependent variable (the preferred retirement age of the respondents) R_{ij} as a cardinal variable. For the estimations this dependent variable is rescaled in such a way that it measures the number of years relative to the initially planned retirement age of the fictive person of the corresponding vignette.[46]

$$R_{ij} = X_i'\eta_j + F_i'\beta_j + \vartheta_j + \rho_i + \varepsilon_{ij} \tag{3.1}$$

The dependent variable R_{ij} depends on a vignette specific constant ϑ_j and question characteristics F_i. The vignette specific constant captures the age-specifics of each vignette (i.e. the original plan for the retirement age and the change in the retirement age of the social environment). The question characteristics only vary between and not within respondents. In particular, three question characteristics vary between respondents: the gender of the person in the vignette, the reason the social environment increases their retirement age, and whether the social environment is termed in 'friends and family' or 'coworkers'. Background characteristics X_i are also included. These include gender, age, age squared, household income, education, employment status, region of the Netherlands, home ownership and financial literacy. Our literacy measure is based on three benchmark questions in the financial literacy literature (Lusardi and Mitchell, 2011).[47] Unobserved characteristics of the respondents are denoted by ρ_i. Respondents may have a tendency to consistently give low or high answers due to unobserved factors, like the motivation in answering the survey or their health situation. This term captures this unobserved heterogeneity. The unobserved characteristics are assumed to be uncorrelated with the observed characteristics and are assumed to be drawn from a normal distribution $N(0, \sigma_\rho^2)$. Finally, ε_{ij} presents an idiosyncratic error term. For identification purposes the error term is assumed to be normally distributed $N(0, \sigma_{\varepsilon_j}^2)$. The model is estimated with maximum likelihood.

Table 3.3 shows the coefficient estimates for the differences in question and vignette characteristics for this model. The negative sign for gender indicates that the stated retirement age for female vignette persons is in three of the four vignettes smaller than for male vignette persons, but the difference is not statistically significant (at the 5% level). If the social

[46] The first answer 'before 65 (or 64) years of age' and the last answer 'after 67 (or 66) years of age' on the answer scale are assigned the value of -1 and 3, respectively. The specific numerical value of these answers can be debated and is one of the reasons to treat the dependent variable as ordinal in the model discussed later.

[47] The distribution of individual characteristics and the answers to the financial literacy questions is listed in appendix A.

environment consists of coworkers instead of friends individuals report an extra increase in their retirement age of somewhat more than one month. Furthermore, individuals retire later with reasons being more 'financial'. The reason with a cut in benefits elicits the strongest response. A reduction of pension rights equal to one year of benefits leads to a delay in retirement of somewhat more than two months. The reason 'Consequences of the financial crisis' which the respondents may interpret as a financial incentive that applies to their situation as well leads to a comparably higher retirement age.

But these coefficient estimates do not seem to differ a lot between the vignettes. Appendix 3.C shows the results of the model in which the coefficients of the question characteristics (i.e. gender fictive person, composition social environment and the reason of retirement postponement) are equal across the vignettes. As this model is nested in the aforementioned model, a LR-test is possible to test this restriction. Appendix 3.C shows the estimates of this model and shows that this restriction is not too restrictive. As the sensitivity to the retirement age of the social environment is considered as difference between different vignettes, this means that the different question characteristics (including a reason in which benefit levels were lowered) do not seem to influence the sensitivity to the retirement age of the social environment.

Individuals seem to postpone retirement on average three months when the social environment increase their retirement age with one year. This result is obtained by comparing the individual retirement ages in the case the retirement age of the social environment increases from 65 to 66 with case in which the retirement age increases from 65 to 67 (Table 3.4). This response to changes in the retirement age of the social environment is quite sizeable when compared to other estimates from the literature. Mastrobuoni (2009), for instance, finds an increase of 6 months in response to an increase in the US Normal Retirement Age of one year. Our results suggest that social interactions could explain a substantial part of this increase.

Table 3.4 also shows that respondents postpone retirement with an additional two months when the retirement age of the social environment increases from 64 to 65 compared to an increase from 65 to 66. In both cases the difference in retirement age of the social environment is one year but nevertheless respondents retire later in the latter case. This could be related to the special role of the age of 65 being the statutory retirement age in the Netherlands for over half of a century.

Table 3.3 Model estimates for the effect of question and vignette characteristics on the cardinal retirement age

	Vignette 1	Vignette 2	Vignette 3	Vignette 4
Gender vignette person (= 1 if female)	-0.0504	0.0161	-0.0527	-0.0375
	(0.0466)	(0.0513)	(0.0491)	(0.0479)
Composition social environment (= 1 if 'Friends and family')	-0.1301***	-0.1435***	-0.1447***	-0.1076**
	(0.0478)	(0.0523)	(0.0503)	(0.0490)
More need for experienced employees	-0.0040	0.0166	0.0373	-0.0454
	(0.0698)	(0.0763)	(0.0733)	(0.0715)
Financial consequences of the economic crisis	0.0977	0.1959***	0.1809***	0.0535
	(0.0660)	(0.0723)	(0.0694)	(0.0677)
Reduction of pension rights by one year	0.1754***	0.2707***	0.2356***	0.1687**
	(0.0651)	(0.0715)	(0.0686)	(0.0668)
Vignette constant (ϑ_j)	1.4107***	1.4367***	1.7540***	1.6063***
	(0.3361)	(0.3709)	(0.3550)	(0.3452)
Log likelihood	-4020			
Number of respondents	1113			

Dependent variable is the number of years increase in the retirement age relative to the initial planned retirement age of the fictive person. *** Statistical significance at 1%, ** Statistical significance at 5%, * Statistical significance at 10%. Number of vignette relates to numbering in Table 3.2. The baseline respondent answers the vignette questions with a male vignette person, coworkers as the reference group and as reason for postponement of retirement of the social environment that 'people live longer and healthier lives'. Full estimation results are listed in Appendix 3.C.

Table 3.4 Magnitude of vignette effects (different retirement ages of social environment) on average retirement age

	Effect on average retirement age	
	Magnitude	Standard error
Increase of retirement age of social amounts one year (social environment increases retirement age from 65 to 67 instead of to 66, Vignette 2 vs. 1)	0.25***	0.03
Original planned retirement age of vignette person amounts 64 instead of 65 years of age (Vignette 3 vs. 1)	0.42***	0.03
One year decrease in all retirement ages (planned retirement ages amount 65 and increased retirement age of social environment amounts 65, Vignette 4 vs. 1)	0.19***	0.02

Results are obtained with bootstrapping and 500 replications. Larger number of replications does not affect the results. *** Statistical significance at 1%, ** Statistical significance at 5%, * Statistical significance at 10%. Vignette numbers refer to Table 3.2.

Preferred retirement age as ordinal variable

In contrast to the previous model this model treats the dependent variable (preferred retirement age) as an ordinal variable. The reasons for this are threefold. First, possible answers of the respondents can include a possible retirement age in terms of 'before 65 (or 64)

years of age' and 'after 67 (or 66) years of age' on the answer scale. These answers of the respondents can be properly accounted for if the dependent variable is taken as an ordered variable. Secondly, descriptive statistics (see for instance figure 3.3) show that the respondents seem to focus on integer ages. Thirdly, the respondents have the possibility to follow the retirement age of the social environment exactly. This means that a retirement age that coincides exactly with the retirement age of the social environment may seem more attractive.

In this model the dependent variable is the preferred retirement age in the vignette questions in an ordinal way. The respondents answer on a seven-point scale ranging from 'before 65 years of age' to 'older than 67 years of age' in the case of the first vignette. Respondent *i* answers vignette *j* ($j = 1, \dots, 4$) on the answer scale ($l = 1, \dots, 7$) as follows:

$$R_{ij}^{*} = F_i'\beta + \vartheta_j + \varepsilon_{ij} \tag{3.2}$$

$$R_{ij} = l \; if \; \tau_i^{l-1} < R_{ij}^{*} \leq \tau_i^{l} \; with \; 1 \leq l \leq 7 \tag{3.3}$$

$$\text{with } \tau_i^0 = -\infty \text{ and } \tau_i^7 = \infty$$

The latent answer R_{ij}^{*} depends on a vignette specific constant ϑ_j and question characteristics F_i.[48] Again, the vignette specific constant captures the age-specifics of each vignette and ε_{ij} presents an idiosyncratic error term. For identification purposes the error term is assumed to be standard normally distributed $N(0,1)$.

Individual background characteristics are likely to influence the respondents' evaluation of the different vignettes. For instance, individuals with certain background characteristics could be more likely to follow the retirement age of the social environment. Ceteris paribus, this would imply that these background characteristics shift the thresholds for a higher retirement age downwards. Therefore, we allow the thresholds τ to vary over the respondents. The thresholds differ in both observable and unobservable characteristics. For instance, younger individuals may be more inclined to follow the retirement age of the social environment. Ceteris paribus, this would mean their thresholds are lower in comparison to older individuals. The thresholds are modelled in the following way:

$$\tau_i^1 = X_i\alpha_1 + \rho_i \tag{3.4}$$

$$\tau_i^l = \tau_i^{l-1} + e^{X_i'\alpha_l} \text{ for } l = 2, 3, 4, 5 \text{ and } 6 \tag{3.5}$$

[48] Notice that the coefficient of the question characteristics does not vary across vignettes but between respondents only. Appendix D lists the estimation results for each vignette separately and shows that these coefficients do not vary much among vignettes. Moreover, note that this model is nested in a larger model in which these coefficients vary across the vignettes. We have run a LR-test between the two models that indicates that the constraints on the coefficients are not restrictive.

In these equations X_i are the respondents' observable characteristics and include the same observable background characteristics of the previous model. Unobservable characteristics are denoted by ρ_i. The unobservable characteristics only influence the individual-specific threshold level and not the difference between thresholds. Also in this model the unobservable characteristics are assumed to be uncorrelated with the observable characteristics. This model is based on the literature about vignette estimations (Van Soest et al., 2012). The exp-function ensures that the differences between thresholds are positive.

Combining equations (3.2) and (3.3) gives:

$$R_{ij} = l \; if \; \tau_i^{l-1} < F_i'\beta + \vartheta_j + \varepsilon_{ij} \leq \tau_i^l \; with \; 1 \leq l \leq 7 \tag{3.6}$$

The unobserved heterogeneity ρ_i is assumed to be drawn from a normal distribution. Therefore, we can write the individual contribution to the maximum likelihood function as follows:

$$L_i = \int_{-\infty}^{\infty} \prod_{l=1}^{4} P\left(r_{ij} = R_{ij} | \rho_i\right) \frac{1}{\sigma_\rho} \varphi\left(\frac{\rho_i}{\sigma_\rho}\right) d\rho_i$$

The probabilities are calculated for given $\tau_{y_i^l}$ as:

$$P\left(r_{ij} = R_{ij} | \rho_i\right) = \Phi\left(\tau_{R_{ij}}(\rho_i) - F_i'\beta - \vartheta_j\right) - \Phi(\tau_{R_{ij}-1}(\rho_i) - F_i'\beta - \vartheta_j)$$

$$\text{for } 1 \leq R_{ij} \leq 7$$

The model is estimated using simulated maximum likelihood. The unobserved heterogeneity is approximated by drawing 50 times from a standard normal distribution and using Halton draws.[49]

The results of this model are comparable with the results from the model in which the dependent variable is cardinal. Table 3.5 shows the estimates for the coefficients of the vignette constants and the question characteristics. The threshold estimation results for the model with the ordinal model are listed in appendix 3.E. The sign corresponds with the signs of Table 3.3. Table 3.6 reports how these coefficient estimates can be translated in an estimated effect on the retirement age.[50] These magnitudes are comparable to the magnitudes

[49] For Halton draws mdraws is used (Cappellari and Jenkins, 2006). We have verified that a higher number of draws does not affect the results. Alternatively, the integral can be numerically approximated with a Riemann sum. We calculated this with an upper (lower) bound of (-)10 and a number of intervals equal to 2000. The result is very similar to the simulation with Halton draws.

[50] The estimated model provides us with a predicted probability for each of the 7 answers corresponding to retirement at a particular age. This probability distribution enables us to calculate the expected change in retirement once we attach a numerical value for this change to each answer option. The attached values indicate the difference between the retirement age corresponding to the answer option and the original retirement age. For instance, the answer option '66.5 years of age' was assigned the value 1.5 for questions where the original retirement age is 65. Table 4 shows the resulting expected change in retirement age given a change in question or vignette characteristics.

of the previous model. Table 3.6 also includes the magnitude of the question characteristics and these are also comparable with the estimates from the linear model (table 3.3).

Table 3.5 Model estimates for the effect of question and vignette characteristics on the retirement age

	Retirement age	
	Coefficient	Standard error
Gender vignette person (= 1 if female)	-0.0317	0.1354
Composition social environment (= 1 if 'Friends and family')	-0.3317**	0.1349
More need for experienced employees	0.1075	0.1986
Financial consequences of the economic crisis	0.4318**	0.1912
Reduction of pension rights by one year	0.5042***	0.1898
θ^2(Social environment increases retirement age from 65 to 67)	0.7270***	0.0569
θ^3(Planned retirement age of vignette person amounts 64)	1.2185***	0.0591
θ^4(Social environment increases retirement age from 64 to 65)	0.5723***	0.0559
Log likelihood	-4766	
Number of respondents	1113	

Dependent variable is the new retirement age (in the answer categories 1-7 where, for instance, 2 coincides with an unchanged retirement age compared to the initial plan of the fictive person and 4 by an increase of one year). *** Statistical significance at 1%, ** Statistical significance at 5%, * Statistical significance at 10%. The baseline vignette has a male vignette person, coworkers as reference group and as reason to postpone retirement that 'people live longer and healthier lives'. The reference vignette involves an increase in the retirement behavior of the social environment from 65 to 66 and an original planned retirement age of 65.

Table 3.6 Magnitude of question and vignette effects on average retirement age

	Effect on average retirement age	
	Magnitude	Standard error
Question characteristics		
Female vignette name instead of male vignette name	-0.05	0.05
Social environment consists of friends instead of coworkers	-0.11**	0.05
More need for experienced employees instead of longer and healthier lives	0.02	0.07
Financial consequences of economic crisis instead of longer and healthier lives	0.18**	0.07
Reduction of pension rights vs. longer and healthier lives	0.19***	0.07
Different retirement behavior of social environment (differences between vignettes)		
Increase of retirement age of social amounts one year (social environment increases	0.25***	0.02
Original planned retirement age of vignette person amounts 64 instead of 65 years	0.43***	0.02
One year decrease in all retirement ages (planned retirement ages amount 65 and	0.19***	0.02

Results are obtained with bootstrapping and 500 replications. Larger number of replications does not affect the results. Effects of question characteristics are shown for vignette 1. But these show little variation over the different vignettes as our model implies. *** Statistical significance at 1%, ** Statistical significance at 5%, * Statistical significance at 10%. Vignette numbers refer to Table 3.2.

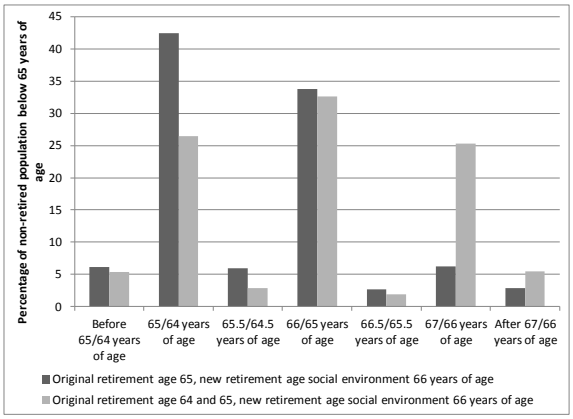
3.6 Sensitivity analysis

The vignette results highlight that the retirement age of the social environment is an important determinant for many individuals in planning their retirement age. In this section, we investigate the robustness of our findings. So far, we have considered vignettes in which

For instance, the difference between a male and female vignette name is the difference in expected change in retirement age between having a male and a female vignette name respectively. The standard errors of these estimates are based upon bootstrapping with 200 replications.

the planned retirement age of the fictive vignette person and the current retirement age of the social environment coincide. A possible concern is that the respondents interpret this as an implicit signal that the fictive person wants to retire at the same age as the social environment which would bias the results in favor of finding a social environment effect. For that reason, we have included a vignette question with different retirement ages (see Table 3.2, vignette 3). In particular the social environment in this vignette currently retires at age 65, while the fictive vignette person plans an earlier retirement at age 64. The effect on the mean retirement age of the individual once the social environment increases is retirement age to 66 in this question is quite large: around 5 months (see Table 3.6). A catch-up effect seems to be present. Figure 3.7 illustrates this point further. 25% of the respondents indicate to retire at 66 when the original retirement ages differ which corresponds to an increase in the planned retirement age of 2 years instead of the increase of 1 year for the social environment. The implication is that individuals are more sensitive to the level of the retirement age of the social environment than to the change in this level, which emphasizes the finding that the retirement age of the social environment of an individual is an important determinant in planning for his or her retirement.

Figure 3.7 Respondents largely insensitive to original retirement age of fictive person



The dark color indicates the answers to the question in which the original retirement age was 65 for both the social environment and the fictive person plan (vignette 1, Table 3.2). The light color indicates the answers to the question in which the original retirement age differs between the social environment and the fictive person (vignette 3, Table 3.2). The answer scales differ between these two questions, as in both cases the answer scales begin just before the planned retirement age of the fictive person.

A possible concern is that respondents are not (yet) interested in their retirement and do not have a clear thought on when one should retire. Therefore, we check whether the results are sensitive to the confidence of respondents in their answers. After having answered

the four vignette questions, respondents indicate how certain they are of their given answers on a 5 points scale ranging from 'very uncertain' to 'very certain'. Indeed a quarter of the respondents indicate they are 'very uncertain' or 'uncertain' about their answers. Table 3.7 (column 2) shows that the results are very similar once these respondents are dropped from the sample. As a consequence of the reduced number of observations, the standard errors are somewhat larger. However, the question specific constants are somewhat larger as well. Thus respondents that are certain of their answers tend to follow the retirement behavior of their social environment more closely. This means that the estimated effects of retirement behavior of the social environment on individual retirement behavior could even be somewhat larger than reported above.

It was noted in the discussion of the sample characteristics that young respondents seem to be underrepresented. Retirement is a distant concept for younger individuals and they are not likely to think much about retirement (Van Rooij et al., 2007). It is not clear how this will affect the results, although the descriptive statistics in Figure 3.4 show that younger cohorts are more likely to follow changes in the behavior of the social environment than older cohorts nearing the retirement age. Therefore, elder respondents may be less sensitive to the behavior of the social environment. Table 3.7 (columns 3 and 4) shows however significant results for respondents younger and older than 50 years of age.

Next, we include the expected retirement age of the respondents. In the vignette questions, respondents are asked what they would do being that person given the information provided. A concern is that they have a firm preference for retiring at a certain age and will reveal this preference regardless of the information provided in the vignette question. To test whether this type of behavior is driving our result, we include information on when the respondents themselves expect to retire. This information is available for 465 respondents. Table 3.7 shows that the inclusion of this variable in the threshold estimations leads qualitatively to the same estimates.

Table 3.7 Sensitivity checks on the most elaborate model

	Original model	Restriction to respondents that are certain of their answers	Respondents younger than or equal to 50 years of age	Respondents older than 50 years of age	Inclusion of the expected retirement age
Gender vignette person (=1 if female)	-0.0317 (0.1354)	-0.3213* (0.1754)	-0.3405* (0.1981)	0.0832 (0.1959)	0.0577 (0.1977)
Composition social environment (=1 if 'Friends and family')	-0.3317** (0.1349)	-0.2890 (0.1816)	-0.4847** (0.2013)	-0.1977 (0.1990)	-0.3609* (0.1949)
More need for experienced employees	0.1075 (0.1986)	0.2212 (0.2630)	-0.1922 (0.3036)	0.0410 (0.2763)	-0.0521 (0.2878)
Financial consequences of the economic crisis	0.4318** (0.1912)	0.7066*** (0.2546)	0.5367* (0.2863)	0.5786** (0.2831)	0.3418 (0.2657)
Reduction of pension rights by one year	0.5042*** (0.1898)	0.9783*** (0.2526)	0.4074 (0.2882)	0.4889* (0.2623)	0.7872*** (0.2766)
Log likelihood	-4766	-3385	-2431	-2231	-1908
Number of respondents	1113	833	578	535	465

Dependent variable is the retirement age in the answer categories 1, ..., 7 where, for instance, 2 coincides with an unchanged retirement age compared to the initial plan of the fictive person and 4 by an increase of one year. Standard errors in parentheses *** Statistical significance at 1%, ** Statistical significance at 5%, * Statistical significance at 10%, the baseline vignette has a male vignette person, coworkers as reference group and as reason that 'people live longer and healthier lives'. The reference vignette involves an increase in the retirement behavior of the social environment from 65 to 66 years of age and an original planned retirement age of 65 years. The first column with results presents the estimates from Table 3.5. The estimates in the second column are based on a sample without respondents who indicate to be (very) uncertain about their given answers. The estimates in the third column are based on a sample with solely respondents younger than or equal to 50 years of age. The fourth column presents the results for the sample with respondents older than 50 years of age. The estimates in the fourth column are based on the same sample as Table 3.5 but include the actual expected retirement age of the respondents, if available, to the background characteristics of the threshold equations in the original model with unobserved heterogeneity.

Table 3.7 Sensitivity checks on the most elaborate model (continued)

	Original model	Restriction to respondents that are certain of their answers	Respondents younger than or equal to 50 years of age	Respondents older than 50 years of age	Inclusion of the expected retirement age
θ^2(Social environment increases retirement age from 65 to 67)	0.7270*** (0.0569)	0.7336*** (0.0688)	0.8625*** (0.0809)	0.6101*** (0.0823)	0.6864*** (0.0882)
θ^3(Planned retirement age of vignette person amounts 64)	1.2185*** (0.0591)	1.3256*** (0.0722)	1.1486*** (0.0827)	1.3519*** (0.0873)	1.1984*** (0.0916)
θ^4(Social environment increases retirement age from 64 to 65)	0.5723*** (0.0559)	0.6745*** (0.0678)	0.4797*** (0.0785)	0.6845*** (0.0820)	0.5338*** (0.0865)
Log likelihood	-4766	-3385	-2431	-2231	-1908
Number of respondents	1113	833	578	535	465

Dependent variable is the retirement age in the answer categories 1, ..., 7 where, for instance, 2 coincides with an unchanged retirement age compared to the initial plan of the fictive person and 4 by an increase of one year. Standard errors in parentheses *** Statistical significance at 1%, ** Statistical significance at 5%, * Statistical significance at 10%, the baseline vignette has a male vignette person, coworkers as reference group and as reason that 'people live longer and healthier lives'. The reference vignette involves an increase in the retirement behavior of the social environment from 65 to 66 years of age and an original planned retirement age of 65 years. The first column with results presents the estimates from Table 3.5. The estimates in the second column are based on a sample without respondents who indicate to be (very) uncertain about their given answers. The estimates in the third column are based on a sample with solely respondents younger than or equal to 50 years of age. The fourth column presents the results for the sample with respondents older than 50 years of age. The estimates in the fourth column are based on the same sample as Table 3.5 but include the actual expected retirement age of the respondents, if available, to the background characteristics of the threshold equations in the original model with unobserved heterogeneity.

As a final robustness check, we estimate a model with less restrictive assumptions. Equation (3.4) assumes that impact of the background characteristics is equal for the four different vignettes. We relax this assumption by making the thresholds constant:

$$\tau_i^1 = c^1 \tag{3.7}$$

$$\tau_i^l = \tau_i^{l-1} + e^{c^l} \text{ for } l = 2, 3, 4, 5 \text{ and } 6 \tag{3.8}$$

We modify latent variable equation (3.2) to include observed characteristics and unobserved heterogeneity. Moreover, the coefficients of the question characteristics are allowed to vary over the different vignettes. The modified latent variable equation is as follows:

$$R_{ij}^{*} = X_i^{'}\eta_j + F_i{'}\beta_j + \vartheta_j + \rho_i + \varepsilon_{ij} \tag{3.9}$$

This model is estimated with simulated maximum likelihood with 50 Halton draws. Appendix 3.E lists the estimation results and the results are qualitatively similar to the previous estimation results.[51] If we calculate the retirement age impact, we find that when the social environment retires one year later, individuals will retire about three months later. The special role of 65 years of age is present again and estimated at two to three months. All in all, the estimation results prove to be robust to alternative samples, covariates and models supporting the finding that the retirement behavior of the social environment could be relevant for the retirement plans of an individual.

3.7 Conclusion

This study examines variation in the individual retirement age using survey questions where respondents give their preferred retirement age in several hypothetical situations. Disentangling various non-financial mechanisms that play a role in the decision-making process concerning retirement is very difficult with revealed preferences on actual retirement. In contrast, the use of stated preferences enables a study of choices and preferences, which are not easily observed in real life. An example of such a study with the use of stated preferences on retirement is Van Soest and Vonkova (2014). Their research examines retirement preferences unconstrained by restrictions such as mandatory retirement or preferences for retirement scenarios that are uncommon in practice, such as (in the Netherlands) gradual retirement. In our study we ask respondents in a direct way whether and from whom they receive advice and of which persons they take the personal situation into account. In addition, our study elicits the retirement age following changes in the retirement age of the social environment. In this way our study tries to shed more light on the specific relevance of social interactions for the individual retirement age.

We find that social interactions could matter for the individual retirement decision. Individuals indicate to receive advice and information from their friends, spouse, children, other family, coworkers and their financial advisor or pension fund. In addition, individual retirement preferences depend somewhat on the personal situation of family, friends, and coworkers.

[51] The simulation is done in the similar way as before.

In addition, vignette experiments show the relevance of retirement behavior of the social environment with regard to the retirement age. Model estimates controlling for individual specific thresholds and unobserved individual heterogeneity confirm this result. Based on the model estimates, respondents would increase their retirement age with three months in response to an increase of the retirement age of the social environment by one year. Mastrobuoni (2009) documents a half year increase in the mean retirement age following a year increase in the statutory retirement age in the US. Our findings suggest that, apart from the financial incentive, a large part of this effect would be driven by social interactions.

The vignette experiments also show that respondents seem to stick more to the state pension age of 65 than to other retirement ages. An increase in the retirement age of the social environment from 64 to 65 years of age elicits a two months larger increase in the individual retirement age than a similar increase from 65 to 66 years of age. This finding might point at the presence of a norm for retirement at the state pension age. The statutory retirement age of 65 of the state pension in the Netherlands has remained unchanged over half a century after its introduction in 1957, and may have developed into a social norm. If social norms develop slowly, the current reform gradually raising the statutory retirement age could have a long term effect on labor participation exceeding the immediate effect (a social multiplier in terms of Glaeser et al, 2003). The short run effect is associated with the adaptations of the individual to the retirement behavior of the social environment. The long run effect is associated with the development of social norms with regard to retirement behavior that has been in place for a long time.

The sensitivity of the individual retirement age to the retirement age of the social environment can be explained in different ways. Our study is not able to directly show which of these explanations is most suitable. A first explanation is that the decision to retire is a complex decision that is typically taken once in a lifetime. Individuals learn from other people, including their observed behavior and their (unsolicited) advice. In other words, the social environment provides information about suitable retirement ages. Our study finds that advice from the social environment plays a role in the determination of the retirement age.

A second explanation is that individuals have a preference for conforming to the behavior of their environment. In this case individuals do not want to deviate from the retirement age of the social environment. This would be especially relevant if the initially planned retirement age of individuals does not differ a lot from the retirement age of the social environment (Bernheim, 1994). In this case social interactions reveal something about the prevailing retirement age norm. Individual preference could also depend on the social

interactions more directly. Brown et al. (2012) found that individuals are susceptible to the retirement age of their peers. In both cases individuals want to conform to the retirement age of their social environment.

Sensitivity to social norms may also be grounded in reciprocity. Reciprocity means that individuals reward behavior of other individuals that conforms to a norm. At the same time they will punish behavior that deviates from the norm even if this comes at a personal cost to them (Fehr and Gächter, 2000). In this case the norm could be the contribution to the sustainability of the pension scheme by working longer and can be regarded as the contribution to 'a public good'. Such individuals will follow the social norm if they can be certain that others will also do that. In other words, if reciprocal individuals note that other people work longer and thereby contribute to the sustainability of the pension scheme, they could also be more inclined to retire later.

Irrespective of the specific mechanisms that can explain this, the results of this study point to the relevance of social interactions which may strengthen the effect of financial incentives. The impact of the social environment's retirement behavior is relatively large when it is a consequence of financial conditions. Consequently, policy reforms strengthening financial incentives for later retirement (such as a raise in the statutory retirement age) may have an additional participation effect through social interactions.

Appendix 3.A Sample Statistics

Table 3.A.1 Descriptive statistics of the (estimation) sample and CentER panel

	Sample		CentER panel	Estimation sample	
	Frequency	Percentage	Percentage	Frequency	Percentage
Gender					
Male	1,022	55.39	49.29	564	50.67
Female	823	44.61	50.71	549	49.33
Age (years)					
15 - 24	50	2.71	11.51	37	3.32
25 - 34	95	5.15	7.43	84	7.55
35 - 44	290	15.72	16.31	276	24.80
45 - 54	355	19.24	18.14	340	30.55
55 - 64	475	25.75	21.43	376	33.78
65 years and older	580	31.44	25.16	0	0
Education					
Primary education	87	4.73	10.77	35	3.14
Lower secondary education (VMBO)	504	27.38	26.38	252	22.64
Upper secondary education (HAVO/VWO)	236	12.82	12.00	143	12.85
Lower vocational (MBO)	293	15.92	16.57	221	19.86
Upper vocational (HBO)	478	25.96	22.96	295	26.50
University (WO)	243	13.20	11.31	167	15.00
Income (gross primary income individual)					
Less than 10,000 euro	342	18.54	20.25	201	18.06
Between 10,000 and 30,000 euro	636	34.47	28.13	368	33.06
Between 30,000 and 50,000 euro	563	30.51	31.54	347	31.18
More than 50,000 euro	304	16.48	20.08	197	17.70
Income (Nett monthly income household)					
1150 euro or less	124	6.72	.	73	6.56
1151 - 1800 euro	276	14.96	.	152	13.66
1801 - 2600 euro	513	27.80	.	282	25.34
2601 euro or more	929	50.35	.	606	54.45
Employment status					
Employed at the moment	948	51.69	.	902	81.04
Not working at the moment, but worked in	225	12.27	.	211	18.96
(Early) retired	614	33.48	.	0	0
Never worked	47	2.56	.	0	0
Region of the Netherlands					
North	240	13.09	.	151	13.57
West	761	41.49	.	466	41.87
East	390	21.26	.	249	22.37
South	443	24.15	.	247	22.19

Region of the Netherlands: West = Noord- and Zuid-Holland, Utrecht and Zeeland; North = Groningen, Friesland and Drenthe; East = Overijssel, Flevoland and Gelderland; South = Noord-Brabant and Limburg.

Financial Literacy questions (**correct answers bold**):

(Compound interest) Suppose you had $100 in a savings account and the interest rate was 2% per year. After 5 years, how much do you think you would have in the account if you left the money to grow?

1) More than $102 2) Exactly $102 3) Less than $102 4) Do not know 5) Refuse to answer

(Inflation) Imagine that the interest rate on your savings account was 1% per year and inflation was 2% per year. After 1 year, how much would you be able to buy with the money in this account?

1) More than today 2) Exactly the same **3) Less than today** 4) Do not know 5) Refuse to answer

(Stock risk) Please tell me whether this statement is true or false. 'Buying a single company's stock usually provides a safer return than a stock mutual fund'.

1) True **2) False** 3) Do not know 4) Refuse to answer

Table 3.A.1 Descriptive statistics of the (estimation) sample and CentER panel (continued)

	Sample		CentER panel	Estimation sample	
	Frequency	Percentage	Percentage	Frequency	Percentage
Home ownership					
Home owner	1,403	76.04	.	867	77.90
Renting home	438	23.74	.	246	22.10
Sub renting home	2	0.11	.	0	0
Living for free	2	0.11	.	0	0
Compound interest					
Correct	1,615	88.54	.	999	89.76
Incorrect	112	6.14	.	66	5.94
Do not know	85	4.66	.	42	3.78
Refuse to answer	12	0.66	.	5	0.45
Inflation					
Correct	1,546	84.76	.	935	84.08
Incorrect	118	6.47	.	79	7.10
Do not know	147	8.06	.	92	8.27
Refuse to answer	13	0.71	.	6	0.54
Stock risk					
Correct	894	49.01	.	565	50.81
Incorrect	164	8.99	.	89	8.00
Do not know	750	41.12	.	448	40.29
Refuse to answer	16	0.88	.	10	0.90

Region of the Netherlands: West = Noord- and Zuid-Holland, Utrecht and Zeeland; North = Groningen, Friesland and Drenthe; East = Overijssel, Flevoland and Gelderland; South = Noord-Brabant and Limburg.

Financial Literacy questions (**correct answers bold**):

(Compound interest) Suppose you had $100 in a savings account and the interest rate was 2% per year. After 5 years, how much do you think you would have in the account if you left the money to grow?

1) More than $102 2) Exactly $102 3) Less than $102 4) Do not know 5) Refuse to answer

(Inflation) Imagine that the interest rate on your savings account was 1% per year and inflation was 2% per year. After 1 year, how much would you be able to buy with the money in this account?

1) More than today 2) Exactly the same **3) Less than today** 4) Do not know 5) Refuse to answer

(Stock risk) Please tell me whether this statement is true or false. 'Buying a single company's stock usually provides a safer return than a stock mutual fund'.

1) True **2) False** 3) Do not know 4) Refuse to answer

Appendix 3.B The Survey

Your retirement timing is an important decision in the course of your life. Various factors influence this decision. In this part of the survey we want to ask you questions about your retirement decision and the role of your social environment in this.

What persons do you expect to give / gave you advice in deciding when to retire?

	Not at all	Somewhat	Certainly
Spouse			
Children			
Friends			
Family			
Coworkers			
Neighbours			
Financial advisor / pension fund			

In the previous question we asked you what persons (will) advise you. What wheight do you attach to the advice of the following persons?
If already retired: What weight did you attach to the advice of the following persons?

	None	A little	Much	Very much
Spouse				
Children				
Friends				
Family				
Coworkers				
Neighbours				
Financial advisor / pension fund				

The personal situation of what persons do / did you take into account when contemplating when to retire?

	None	A little	Much	Very much
Spouse				
Children				
Friends				
Family				
Coworkers				
Neighbours				

Among policy makers there is a lot of discussion about reforming the pension scheme.
In the present plans it will be possible to decide at what age you will receive retirement benefits (both state and occupation benefits). If you worked for forty years and you will retire at the standard retirement age, the retirement benefits will amount 70% of your average gross income. The standard retirement age now amounts 65 years of age. One year earlier retirement means that your retirement benefits will be 7% lower for the rest of your life. One year later retirement means 7% higher retirement benefits for the rest of your life time.

We now would like to ask you questions about a fictive person.

Vignette 1
John / Lisa is not yet eligible for retirement. He / She does think about it from time to time. Given this retirement scheme John / Lisa plans to retire at 65 years of age. The most of his / her co-workers / family and friends retire at 65 years of age. When John / Lisa has turned 60, the most of his / her coworkers / family and friends retire at 66 years of age. This is a consequence of longer and healthier lives of individuals. / This is a consequence of a larger need for experienced employees by employers. / This is a consequence of financial consequences of the economic crisis. / This is a consequence of the raise in the standard retirement age in the pension scheme by one year. If John / Lisa wants to retire at the same age, he / she will receive 7% lower retirement benefits for the rest of his / her life.

What would you do in the situation of John / Lisa?
1 To retire earlier than 65 years of age
2 To retire at 65 years of age
3 To retire at 65.5 years of age
4 To retire at 66 years of age
5 To retire at 66.5 years of age
6 To retire at 67 years of age
7 To retire later than 67 years of age

Vignette 2
Arnold / Marlous is not yet eligible for retirement. He / She does think about it from time to time. Given this retirement scheme Arnold / Marlous plans to retire at 65 years of age. The most of his / her co-workers / family and friends retire at 65 years of age. When Arnold / Marlous has turned 60, the most of his / her coworkers / family and friends retire at 67 years of age. This is a consequence of longer and healthier lives of individuals. / This is a consequence of a larger need for experienced employees by employers. / This is a consequence of financial consequences of the economic crisis. / This is a consequence of the raise in the standard retirement age in the pension scheme by one year. If Arnold / Marlous wants to retire at the same age, he / she will receive 7% lower retirement benefits for the rest of his / her life.

What would you do in the situation of Arnold / Marlous?
1 To retire earlier than 65 years of age
2 To retire at 65 years of age
3 To retire at 65.5 years of age
4 To retire at 66 years of age
5 To retire at 66.5 years of age
6 To retire at 67 years of age
7 To retire later than 67 years of age

Vignette 3
Wim / Els is not yet eligible for retirement. He / She does think about it from time to time. Given this retirement scheme Wim / Els plans to retire at 64 years of age. The most of his / her co-workers / family and friends retire at 65 years of age. When Wim / Els has turned 60, the most of his / her coworkers / family and friends retire at 66 years of age. This is a consequence of longer and healthier lives of individuals. / This is a consequence of a larger need for experienced employees by employers. / This is a consequence of financial consequences of the economic crisis. / This is a consequence of the raise in the standard retirement age in the pension scheme by one year. If Wim / Els wants to retire at the same age, he / she will receive 7% lower retirement benefits for the rest of his / her life.

What would you do in the situation of Wim / Els?
1 To retire earlier than 64 years of age
2 To retire at 64 years of age
3 To retire at 64.5 years of age
4 To retire at 65 years of age
5 To retire at 65.5 years of age
6 To retire at 66 years of age
7 To retire later than 66 years of age

Vignette 4
Frans / Rachel is not yet eligible for retirement. He / She does think about it from time to time. Given this retirement scheme Frans / Rachel plans to retire at 64 years of age. The most of his / her co-workers / family and friends retire at 64 years of age. When Frans / Rachel has turned 60, the most of his / her coworkers / family and friends retire at 65 years of age. This is a consequence of longer and healthier lives of individuals. / This is a consequence of a larger need for experienced employees by employers. / This is a consequence of financial consequences of the economic crisis. / This is a consequence of the raise in the standard retirement age in the pension scheme by one year. If Frans / Rachel wants to retire at the same age, he / she will receive 7% lower retirement benefits for the rest of his / her life.

What would you do in the situation of Frans / Rachel?
1 To retire earlier than 64 years of age
2 To retire at 64 years of age
3 To retire at 64.5 years of age
4 To retire at 65 years of age
5 To retire at 65.5 years of age
6 To retire at 66 years of age
7 To retire later than 66 years of age

How certain are respondents to vignette questions?
How sure are you of your answers to the previous questions?
1 Very uncertain
2
3
4
5 Very certain

Appendix 3.C Estimation Results Linear Model

Table 3.C.1 All estimation results for the model that treats dependent variable as cardinal

	Vignette 1	Vignette 2	Vignette 3	Vignette 4
gender (=1 if female)	0.0183	0.0226	0.0105	-0.0274
	(0.0512)	(0.0560)	(0.0538)	(0.0525)
age	-0.0263*	-0.0165	-0.0338**	-0.0332**
	(0.0149)	(0.0164)	(0.0157)	(0.0153)
age squared	0.0002	0.0001	0.0004**	0.0003**
	(0.0002)	(0.0002)	(0.0002)	(0.0002)
Family income less than 1150 Euro	-0.0318	-0.1293	-0.0611	0.0400
	(0.1091)	(0.1195)	(0.1148)	(0.1119)
Family income between 1151 and 1800 Euro	0.1194	0.1054	0.0641	0.1059
	(0.0748)	(0.0822)	(0.0788)	(0.0767)
Family income between 1801 and 2600 Euro	-0.0221	0.0249	0.0204	-0.0178
	(0.0569)	(0.0626)	(0.0600)	(0.0584)
Primary school	-0.0733	-0.0502	0.0671	0.0656
	(0.1403)	(0.1546)	(0.1481)	(0.1441)
lower secondary school (vmbo)	-0.1977***	-0.2263***	-0.0751	-0.1526**
	(0.0672)	(0.0731)	(0.0704)	(0.0687)
upper secondary school (mbo+havo/vwo)	-0.1511***	-0.1562***	-0.1234**	-0.1224**
	(0.0532)	(0.0588)	(0.0563)	(0.0547)
Region North	-0.0726	-0.0889	-0.0303	-0.0505
	(0.0723)	(0.0796)	(0.0763)	(0.0743)
Region East	-0.0427	-0.0323	0.0467	-0.0220
	(0.0639)	(0.0697)	(0.0670)	(0.0654)
Region South	-0.1769***	-0.1939***	-0.0983	-0.1093*
	(0.0634)	(0.0693)	(0.0666)	(0.0649)
Not in a job now, but worked before	-0.0135	0.0369	-0.0181	-0.0065
	(0.0670)	(0.0732)	(0.0704)	(0.0686)
Rental home	0.0962	0.0777	0.1728**	0.0843
	(0.0649)	(0.0709)	(0.0681)	(0.0665)
Compound interest incorrect/RF/DK	0.1253	0.0512	0.0596	0.0825
	(0.0863)	(0.0943)	(0.0907)	(0.0884)
Inflation incorrect/RF/DK	-0.2274***	-0.1976**	-0.1310	-0.1418*
	(0.0765)	(0.0832)	(0.0802)	(0.0783)
Stock risk incorrect/RF/DK	-0.0278	-0.0038	-0.0171	0.0091
	(0.0506)	(0.0556)	(0.0533)	(0.0519)
Number of observations		1113		
log likelihood		-4020		

Dependent variable is the number of years increase in the retirement age relative to the initial planned retirement age of the fictive person. Standard errors in parentheses *** Statistical significance at 1%, ** Statistical significance at 5%, * Statistical significance at 10%. Baseline respondent is male, completed tertiary education, has an income higher than 2601 euro, lives in the West of the Netherlands, has a job, is a homeowner, answers all three literacy questions about compound interest, inflation and stock risk correctly and answers the vignette questions with a male vignette person, coworkers as the reference group and as reason for postponement of retirement of the social environment that 'people live longer and healthier lives'. Number of vignette relates to numbering in Table 3.2.

Table 3.C.1 All estimation results for the model that treats dependent variable as cardinal (continued)

	Vignette 1	**Vignette 2**	**Vignette 3**	**Vignette 4**
Gender vignette person (=1 if female)	-0.0504	0.0161	-0.0527	-0.0375
	(0.0466)	(0.0513)	(0.0491)	(0.0479)
Composition social environment (=1 if 'friends and family')	-0.1301***	-0.1435***	-0.1447***	-0.1076**
	(0.0478)	(0.0523)	(0.0503)	(0.0490)
More need for experienced employees	-0.0040	0.0166	0.0373	-0.0454
	(0.0698)	(0.0763)	(0.0733)	(0.0715)
Financial consequences of the economic crisis	0.0977	0.1959***	0.1809***	0.0535
	(0.0660)	(0.0723)	(0.0694)	(0.0677)
Reduction of pension rights by one year	0.1754***	0.2707***	0.2356***	0.1687**
	(0.0651)	(0.0715)	(0.0686)	(0.0668)
Constant	1.4107***	1.4367***	1.7540***	1.6063***
	(0.3361)	(0.3709)	(0.3550)	(0.3452)
$\ln(\sigma_{\varepsilon_1})$		-0.9925***		
		(0.0322)		
$\ln(\sigma_{\varepsilon_2})$		-0.6738***		
		(0.0257)		
$\ln(\sigma_{\varepsilon_3})$		-0.7986***		
		(0.0278)		
$\ln(\sigma_{\varepsilon_4})$		-0.8907***		
		(0.0293)		
$\ln(\sigma_{\rho})$		-0.2317***		
		(0.0181)		
Number of observations		1113		
log likelihood		-4020		

Dependent variable is the number of years increase in the retirement age relative to the initial planned retirement age of the fictive person. Standard errors in parentheses *** Statistical significance at 1%, ** Statistical significance at 5%, * Statistical significance at 10%. Baseline respondent is male, completed tertiary education, has an income higher than 2601 euro, lives in the West of the Netherlands, has a job, is a homeowner, answers all three literacy questions about compound interest, inflation and stock risk correctly and answers the vignette questions with a male vignette person, coworkers as the reference group and as reason for postponement of retirement of the social environment that 'people live longer and healthier lives'. Number of vignette relates to numbering in Table 3.2.

Table 3.C.2 All estimation results for the model that treats dependent variable as cardinal and restricts the coefficients of the question characteristics to be equal among vignettes

	Vignette 1	**Vignette 2**	**Vignette 3**	**Vignette 4**
gender (=1 if female)	0.0190	0.0193	0.0095	-0.0253
	(0.0512)	(0.0560)	(0.0538)	(0.0525)
age	-0.0263*	-0.0163	-0.0346**	-0.0327**
	(0.0149)	(0.0165)	(0.0157)	(0.0153)
age squared	0.0002	0.0001	0.0004**	0.0003**
	(0.0002)	(0.0002)	(0.0002)	(0.0002)
Family income less than 1150 Euro	-0.0309	-0.1314	-0.0593	0.0389
	(0.1091)	(0.1197)	(0.1148)	(0.1119)
Family income between 1151 and 1800 Euro	0.1188	0.1060	0.0650	0.1055
	(0.0748)	(0.0823)	(0.0788)	(0.0768)
Family income between 1801 and 2600 Euro	-0.0205	0.0217	0.0192	-0.0162
	(0.0569)	(0.0626)	(0.0600)	(0.0585)
Primary school	-0.0747	-0.0462	0.0646	0.0641
	(0.1403)	(0.1548)	(0.1482)	(0.1442)
lower secondary school (vmbo)	-0.1972***	-0.2289***	-0.0758	-0.1515**
	(0.0672)	(0.0732)	(0.0704)	(0.0688)
upper secondary school (mbo+havo/vwo)	-0.1510***	-0.1566***	-0.1215**	-0.1240**
	(0.0532)	(0.0589)	(0.0563)	(0.0547)
Region North	-0.0719	-0.0907	-0.0318	-0.0496
	(0.0724)	(0.0797)	(0.0764)	(0.0743)
Region East	-0.0430	-0.0300	0.0440	-0.0211
	(0.0639)	(0.0697)	(0.0670)	(0.0654)
Region South	-0.1748***	-0.1985***	-0.0984	-0.1093*
	(0.0634)	(0.0693)	(0.0666)	(0.0649)
Not in a job now, but worked before	-0.0128	0.0341	-0.0213	-0.0025
	(0.0670)	(0.0732)	(0.0703)	(0.0686)
Rental home	0.0953	0.0794	0.1731**	0.0836
	(0.0649)	(0.0709)	(0.0682)	(0.0665)
Compound interest incorrect/RF/DK	0.1239	0.0547	0.0575	0.0841
	(0.0863)	(0.0944)	(0.0907)	(0.0884)
Inflation incorrect/RF/DK	-0.2274***	-0.1973**	-0.1338*	-0.1398*
	(0.0765)	(0.0833)	(0.0802)	(0.0783)
Stock risk incorrect/RF/DK	-0.0278	-0.0049	-0.0168	0.0088
	(0.0506)	(0.0557)	(0.0534)	(0.0520)
Number of observations		1113		
log likelihood		-4029		
LR test		0.3262		

Dependent variable is the number of years increase in the retirement age relative to the initial planned retirement age of the fictive person. Standard errors in parentheses *** Statistical significance at 1%, ** Statistical significance at 5%, * Statistical significance at 10%. Baseline respondent is male, completed tertiary education, has an income higher than 2601 euro, lives in the West of the Netherlands, has a job, is a homeowner, answers all three literacy questions about compound interest, inflation and stock risk correctly and answers the vignette questions with a male vignette person, coworkers as the reference group and as reason for postponement of retirement of the social environment that 'people live longer and healthier lives'. Number of vignette relates to numbering in Table 3.2. LR test refers to the p-value of the Likelihood Ratio test in which this model is nested in the model of Table 3.C.1

Table 3.C.2 All estimation results for the model that treats dependent variable as cardinal and restricts the coefficients of the question characteristics to be equal among vignettes (continued)

	Vignette 1	Vignette 2	Vignette 3	Vignette 4
Gender vignette person (=1 if female)		-0.0360		
		(0.0429)		
Composition social environment (=1 if 'friends and family')		-0.1297***		
		(0.0442)		
More need for experienced employees		-0.0024		
		(0.0646)		
Financial consequences of the economic crisis		0.1215**		
		(0.0608)		
Reduction of pension rights by one year		0.2036***		
		(0.0598)		
Constant		1.3853***		
		(0.3355)		
$\ln(\sigma_{\varepsilon_1})$		-0.9923***		
		(0.0322)		
$\ln(\sigma_{\varepsilon_2})$		-0.6698***		
		(0.0257)		
$\ln(\sigma_{\varepsilon_3})$		-0.7960***		
		(0.0278)		
$\ln(\sigma_{\varepsilon_4})$		-0.8876***		
		(0.0292)		
$\ln(\sigma_{\rho})$		-0.2321***		
		(0.0181)		
Number of observations		1113		
log likelihood		-4029		
LR test		0.3262		

Dependent variable is the number of years increase in the retirement age relative to the initial planned retirement age of the fictive person. Standard errors in parentheses *** Statistical significance at 1%, ** Statistical significance at 5%, * Statistical significance at 10%. Baseline respondent is male, completed tertiary education, has an income higher than 2601 euro, lives in the West of the Netherlands, has a job, is a homeowner, answers all three literacy questions about compound interest, inflation and stock risk correctly and answers the vignette questions with a male vignette person, coworkers as the reference group and as reason for postponement of retirement of the social environment that 'people live longer and healthier lives'. Number of vignette relates to numbering in Table 3.2. LR test refers to the p-value of the Likelihood Ratio test in which this model is nested in the model of Table 3.C.1

Appendix 3.D Ordered Probit Regressions

Table 3.D.1 shows the ordered probit estimation for the four questions separately. The coefficients are not statistically significantly different from each other across the different vignettes. This lends support to the assumption that the coefficients of these question characteristics are the same.

Table 3.D.1 Ordered probit estimation for the four vignettes separately.

	Vignette 1	**Vignette 2**	**Vignette 3**	**Vignette 4**
Gender vignette person (=1 if female)	-0.1072*	-0.0202	-0.0944	-0.1043
	(0.0644)	(0.0645)	(0.0630)	(0.0644)
Composition social environment (=1 if 'Friends and family')	-0.1706***	-0.1467**	-0.1497**	-0.1369**
	(0.0644)	(0.0645)	(0.0630)	(0.0643)
More need for experienced employees	0.0096	0.0294	0.0506	-0.0242
	(0.0941)	(0.0941)	(0.0915)	(0.0933)
Financial consequences of the economic crisis	0.2612***	0.3087***	0.2745***	0.1836**
	(0.0905)	(0.0907)	(0.0883)	(0.0900)
Reduction of pension rights by one year	0.3146***	0.3294***	0.2890***	0.2972***
	(0.0906)	(0.0906)	(0.0885)	(0.0904)
C1	-1.5487***	-1.5068***	-1.5853***	-1.6546***
	(0.0951)	(0.0951)	(0.0949)	(0.0968)
C2	0.0459	0.0525	-0.3907***	-0.3259***
	(0.0836)	(0.0838)	(0.0825)	(0.0838)
C3	0.1781**	0.1171	-0.3042***	-0.2136**
	(0.0838)	(0.0838)	(0.0823)	(0.0837)
C4	1.2784***	0.5807***	0.5280***	1.1884***
	(0.0905)	(0.0850)	(0.0828)	(0.0887)
C5	1.3839***	0.6459***	0.5878***	1.2444***
	(0.0920)	(0.0852)	(0.0830)	(0.0893)
C6	2.0624***	2.1779***	1.7596***	1.7718***
	(0.1127)	(0.1155)	(0.0986)	(0.1002)
Number of observations	1113	1113	1113	1113
log likelihood	-1526	-1591	-1716	-1512

Standard errors in parentheses *** Statistical significance at 1%, ** Statistical significance at 5%, * Statistical significance at 10%. Baseline respondent answers the vignette questions with a male vignette person, coworkers as the reference group and as reason for postponement of retirement of the social environment that 'people live longer and healthier lives'. Number of vignette relates to numbering in Table 3.2.

Appendix 3.E Threshold Estimates

This appendix shows the estimations for the thresholds of the model in which the dependent variable is ordinal.

Table 3.E.1 Estimation of the thresholds

	τ_i^1	τ_i^2	τ_i^3	τ_i^4	τ_i^5	τ_i^6
gender (=1 if female)	-0.5865***	0.1884***	0.1253	0.1030**	-0.0687	-0.0295
	(0.2086)	(0.0498)	(0.1578)	(0.0504)	(0.2492)	(0.0796)
age	-0.0439	0.0389**	-0.0295	0.0141	-0.1233**	0.0200
	(0.0622)	(0.0166)	(0.0436)	(0.0157)	(0.0535)	(0.0262)
age squared	0.0007	-0.0004**	0.0002	-0.0002	0.0011*	-0.0002
	(0.0007)	(0.0002)	(0.0005)	(0.0002)	(0.0006)	(0.0003)
Family income less than 1150	0.6999	-0.1295	-0.1145	-0.0166	-0.1651	-0.0121
	(0.4710)	(0.1101)	(0.3318)	(0.1171)	(0.4660)	(0.1937)
euro						
Family income between 1151 and	0.3081	-0.2221***	-0.1000	0.1996***	-0.7741*	-0.0577
	(0.2972)	(0.0773)	(0.2324)	(0.0740)	(0.4303)	(0.1121)
1800 euro						
Family income between 1801 and	0.4284*	-0.0921	-0.2593	-0.0300	-0.4201	0.0186
	(0.2283)	(0.0577)	(0.1944)	(0.0588)	(0.2788)	(0.0957)
2600 euro						
Primary school	-0.0768	0.1284	0.6951*	-0.0459	-0.2597	0.5849
	(0.6015)	(0.1543)	(0.3700)	(0.1431)	(0.5941)	(0.5437)
lower secondary school (vmbo)	0.8809***	-0.1862***	0.4123*	-0.0067	0.1906	0.1332
	(0.2644)	(0.0653)	(0.2134)	(0.0663)	(0.3019)	(0.1114)
upper secondary school	0.1543	0.0444	0.5747***	0.0318	0.1129	0.0709
	(0.2279)	(0.0561)	(0.1886)	(0.0559)	(0.2732)	(0.0891)
(mbo+havo/vwo)						
North	0.5166*	-0.0809	0.3811*	-0.2001***	0.1997	-0.0472
	(0.2922)	(0.0730)	(0.2230)	(0.0765)	(0.3608)	(0.1179)
East	0.2110	-0.0720	0.4110**	-0.1549**	0.5151*	-0.0932
	(0.2637)	(0.0653)	(0.1917)	(0.0622)	(0.2670)	(0.1005)
South	0.2132	0.0662	-0.0467	-0.0597	0.1367	0.0584
	(0.2452)	(0.0596)	(0.2211)	(0.0660)	(0.3463)	(0.1071)
Not in a job now, but worked	-0.1442	0.0648	0.1514	-0.0684	0.9781***	-0.0793
	(0.2755)	(0.0672)	(0.1956)	(0.0686)	(0.2716)	(0.1075)
before						
Rental home	-0.4694*	0.0267	-0.3604*	-0.0014	0.4624	-0.1676
	(0.2703)	(0.0640)	(0.2118)	(0.0621)	(0.2929)	(0.1073)
Compound interest	0.2653	-0.2093**	0.4922**	0.0515	-0.1529	-0.1212
	(0.3244)	(0.0921)	(0.2286)	(0.0888)	(0.4006)	(0.1484)
incorrect/RF/DK						
Inflation incorrect/RF/DK	0.9140***	-0.1270*	0.0598	-0.1292*	0.2652	-0.0908
	(0.2725)	(0.0743)	(0.2068)	(0.0785)	(0.3314)	(0.1460)
Stock risk incorrect/RF/DK	0.2308	-0.0401	-0.0972	-0.0254	-0.1130	-0.0249
	(0.2176)	(0.0525)	(0.1693)	(0.0529)	(0.2688)	(0.0849)
Constant	-3.2685**	0.5208	-0.8062	0.5006	0.9274	0.4500
	(1.3831)	(0.3710)	(0.9274)	(0.3468)	(1.0448)	(0.5759)
$\ln(\sigma_\rho)$			0.8536***			
			(0.0296)			

Standard errors in parentheses *** Statistical significance at 1%, ** Statistical significance at 5%, * Statistical significance at 10%, Baseline respondent is male, completed tertiary education, has an income higher than 2601 euro, lives in the West of the Netherlands, has a job, is a homeowner and answers all three literacy questions about compound interest, inflation and stock risk correctly.

Appendix 3.F An Unrestricted Model

This appendix shows the estimation results of the unrestricted model in section 3.6

Table 3.F.1 Estimation of the unrestricted model

	Vignette 1	Vignette 2	Vignette 3	Vignette 4
Gender vignette person (=1 if female)	-0.0140	0.0682	0.1604	0.1549
	(0.2193)	(0.2188)	(0.2174)	(0.2177)
Composition social environment (=1 if 'friends and family')	-0.5352**	-0.1261	-0.3422	-0.1973
	(0.2155)	(0.2141)	(0.2133)	(0.2135)
More need for experienced employees	-0.3629	-0.4925	-0.0674	-0.5344*
	(0.3146)	(0.3154)	(0.3120)	(0.3141)
Financial consequences of the economic crisis	-0.1836	0.0790	0.3098	-0.2720
	(0.3004)	(0.2990)	(0.2983)	(0.2988)
Reduction of pension rights by one year	0.3347	0.3261	0.5780*	0.3179
	(0.3007)	(0.2995)	(0.2983)	(0.2980)
gender (=1 if female)	0.0065	0.0660	-0.0472	-0.2151
	(0.2341)	(0.2335)	(0.2320)	(0.2325)
age	-0.1885*	-0.0994	-0.2062**	-0.1374
	(0.1006)	(0.0998)	(0.0998)	(0.0999)
age squared	0.0020*	0.0011	0.0024**	0.0016
	(0.0011)	(0.0011)	(0.0011)	(0.0011)
Family income less than 1150 euro	-0.6667	-0.6748	0.1419	0.4125
	(0.8179)	(0.8106)	(0.8030)	(0.7987)
Family income between 1151 and 1800 euro	0.7954**	0.7566**	0.4644	0.4603
	(0.3464)	(0.3448)	(0.3436)	(0.3424)
Family income between 1801 and 2600 euro	0.0203	0.2064	0.1351	-0.0012
	(0.2546)	(0.2548)	(0.2531)	(0.2539)
Primary school	0.0232	1.9924**	0.9568	0.8242
	(0.9691)	(0.9582)	(0.9603)	(0.9645)
lower secondary school (vmbo)	-0.9146***	-0.7010**	-0.5395*	-0.6322**
	(0.2978)	(0.2966)	(0.2934)	(0.2948)
upper secondary school (mbo+havo/vwo)	-0.2900	-0.1354	-0.1329	-0.1411
	(0.2508)	(0.2498)	(0.2490)	(0.2489)
Region North	-0.3935	-0.2459	0.0413	-0.0244
	(0.3340)	(0.3364)	(0.3333)	(0.3311)
Region East	-0.1243	-0.1274	0.0045	0.0260
	(0.2907)	(0.2901)	(0.2894)	(0.2891)
Region South	-0.4155	-0.2345	0.3163	0.1250
	(0.2794)	(0.2770)	(0.2742)	(0.2765)
Not in a job now, but worked before	-0.7651*	-0.8272*	-0.9361**	-0.6451
	(0.4352)	(0.4386)	(0.4370)	(0.4336)
Rental home	0.1175	0.0604	0.5376*	0.4692
	(0.3032)	(0.3024)	(0.3027)	(0.3015)
Compound interest incorrect/RF/DK	0.3279	-0.5760	-0.2218	-0.0940
	(0.4685)	(0.4685)	(0.4628)	(0.4622)
Inflation incorrect/RF/DK	-1.2297***	-1.1132***	-0.7179*	-0.4180
	(0.4199)	(0.4147)	(0.4116)	(0.4090)
Stock risk incorrect/RF/DK	-0.2155	-0.5051**	-0.1629	0.1284
	(0.2305)	(0.2297)	(0.2283)	(0.2288)
Log likelihood		-1978		
Number of observations		465		

Standard errors in parentheses *** Statistical significance at 1%, ** Statistical significance at 5%, * Statistical significance at 10%, Baseline respondent is male, completed tertiary education, has an income higher than 2601 euro, lives in the West of the Netherlands, has a job, is a homeowner and answers all three literacy questions about compound interest, inflation and stock risk correctly and expects to retire before 64 years of age.

Table 3.F.1 Estimation of the unrestricted model (continued)

	Vignette 1	**Vignette 2**	**Vignette 3**	**Vignette 4**
expected retirement age 64	0.9455	1.8247***	0.7699	1.0067*
	(0.6064)	(0.6084)	(0.6023)	(0.5989)
expected retirement age 65	1.2442***	1.5353***	1.6047***	1.3058***
	(0.2787)	(0.2790)	(0.2768)	(0.2760)
expected retirement age 66	0.9764**	1.3045***	0.5806	0.5542
	(0.4273)	(0.4236)	(0.4217)	(0.4245)
expected retirement age 67	1.1133***	1.6333***	1.2119***	0.9468***
	(0.3235)	(0.3238)	(0.3213)	(0.3220)
expected retirement age above 67	2.4701***	3.0363***	2.9938***	2.5846***
	(0.6368)	(0.6334)	(0.6349)	(0.6331)
Constant	-	-1.9863	0.0996	-1.4256
	-	(1.8059)	(1.8117)	(1.8045)
c^1		-7.2056***		
		(2.3497)		
c^2		1.1685***		
		(0.0400)		
c^3		-1.3465***		
		(0.1142)		
c^4		0.7665***		
		(0.0402)		
c^5		-2.0024***		
		(0.1795)		
c^6		0.9218***		
		(0.0604)		
$\ln(\sigma_\rho)$		0.6567***		
		(0.0455)		
Log likelihood		-1978		
Number of observations		465		

Standard errors in parentheses *** Statistical significance at 1%, ** Statistical significance at 5%, * Statistical significance at 10%, Baseline respondent is male, completed tertiary education, has an income higher than 2601 euro, lives in the West of the Netherlands, has a job, is a homeowner and answers all three literacy questions about compound interest, inflation and stock risk correctly and expects to retire before 64 years of age

4. Age anchors and the individual retirement age: an experimental study

4.1. Introduction

Countries around the world are adjusting pension schemes to ensure fiscal sustainability. Concerns about the sustainability of current retirement arrangements are a consequence of aging of the population and the financial crisis. For individuals, this could mean that income from public retirement provisions will be a smaller share of their total retirement income in the future (OECD, 2013). Individuals are expected to take more responsibility for their own pensions and are increasingly exposed to risks of financial markets. This is especially true for the part of the income in addition to the public pensions. The question is whether individuals are able to cope with this responsibility and these risks.

Concerns have been raised that individuals save too little for retirement. For instance, Bernheim et al. (2001) attribute empirical wealth and consumption profiles to explanations consistent with "'rule of thumb', 'mental accounting' or hyperbolic discounting theories of wealth accumulation." For complex financial decisions, such as whether and with what amount to annuitize retirement wealth, this is even more the case. Benartzi et al. (2011) show that retirees in the US are under annuitized and therefore exposed to longevity risk. Consequently, individuals are at risk to have insufficient resources to meet their expenditure goals during retirement.

Individual decision-making is fraught with bounded rationality. Individuals have time-inconsistent preferences (e.g. hyperbolic discounting), they are sensitive to defaults or reference points and are sensitive to framing, among other things. In the pension domain such behavioral phenomena may be even more important as the results of many decisions related to pensions and retirement are only visible in the future. This paper studies the relevance of standard pension ages on pension overviews for the retirement age decision (i.e. the age to exit the labor market and enjoy retirement benefits). Different 'frames' of the same pension overview allow a study into this relevance.

To what extent are individuals susceptible to the framing of standard ages in a pension overview? Anecdotal evidence suggests that people have clear cut plans how they will spend their increased leisure time in retirement. This could make the retirement age less sensitive to

framing than decisions related to complex financial decisions on, e.g., retirement savings. Besides framing, this study takes it as a given that the retirement age depends on constraints on individual decision-making, such as the amount of retirement savings or health status.

This paper examines the role of 'age anchors' or standard ages in a fictive flexible pension scheme for the retirement age. The flexibility of the fictive pension scheme means that individuals can choose their own retirement age. Earlier retirement comes at a price, in the form of a cut in the benefits over the remainder of the life-time, while later retirement means a higher level of benefits over the remainder of the life-time. The pension overview contains the level of benefits at a specific retirement age. Such a central age is called an 'age anchor' in this study. Respondents are randomized in different groups, each exposed to a different standard age in a pension scheme or different 'age anchor'. Earlier and later retirement is with respect to this reference age. But this is done in such a way that all respondents have the same benefit levels at the same retirement ages, so the only difference between the groups is the way in which the pension scheme is presented.

This study focuses on when to exit the labor market and enter retirement. Brown et al. (forthcoming) is similar to our work but their work focuses on the claiming decision. Of course, these decisions are closely related but the claiming decision can be construed more as a financial decision, while the retirement decision is a decision about labor supply. In addition, this study also adds to the literature with the examination of the relevance of social interactions and advice from the pension fund for the role of age anchors in explaining the retirement age decision. The novel contribution of this paper is to estimate the sensitivity of the retirement age to framing and to examine possible underlying causes: financial literacy, the role of (implicit) advice and social interactions or social norms. Financially literate individuals plan and save more for retirement (Lusardi et al., 2007; Van Rooij et al., 2011). If they are more likely to plan for retirement, it stands to reason they have a thought-out idea of a suitable retirement age. Consequently, they may be less susceptible to framing. An 'age anchor' can be considered as implicit advice of the pension fund for a suitable age for retirement. A standard age on a pension overview may also give an idea about the expected retirement age of other individuals or it might even give information about the existence of a social norm.

This study finds that higher age anchors lead to a higher retirement age. The effect of the age anchors on the retirement age is stronger for women than for men. Interestingly, the effect does not seem to differ among socioeconomic subgroups, such as lower-educated and higher-educated women or single and married or cohabiting women. Financial literacy does

not explain the sensitivity to age anchors in the retirement decision. Advice from pension funds and social interactions play a limited role in this explanation. This could suggest that the presence of different standard ages on a pension overview has a separate effect on the individual retirement age.

Section 4.2 reviews the literature. Section 4.3 discusses the relevant retirement institutions in the Netherlands. Section 4.4 shows the research setup, while section 4.5 shows the empirical results. Section 4.6 concludes.

4.2. Literature

The timing of retirement is only one of the many decisions in the retirement process. Rational individuals with perfect foresight choose a consumption and leisure path for the remainder of their lifetime and take various constraints (budget, institutional, health, …) into account. Such assumptions are central in structural life-cycle models (e.g. Gustman et al.,1985; 2005; 2006; Rust et al., 1997; French, 2005). Calculation of an optimal consumption and leisure path over the remainder of the life-time implies a retirement age. Consequently, individuals plan their retirement age and how much to put aside in a retirement account to finance their consumption after retirement.

But individuals are sensitive to standard ages in retirement schemes. Retirement rates tend to peak at certain ages (e.g. see Gruber and Wise, 1999). Lumsdaine et al. (1996) looked into American retirement rates at the age of 65 (the Normal Retirement Age in Social Security until 2003) and attribute high retirement rates at this age to "the influence of custom or accepted practice". Pension reforms with an increase of the standard pension age magnify this effect. The reform of Social Security undertaken in 1983 induces different Normal Retirement Ages (NRA's) for different birth cohorts. Consequently, individuals exposed to different NRA's seem to adjust their retirement decision in lock step with the increase of the NRA (Behaghel and Blau, 2012). Mastrobuoni (2009) found a large effect of half a year per year increase in the NRA. Hanel et al. (2012) find similar results for Swiss female workers following a pension reform in Switzerland.

What can explain the large behavioral effects following an increase in the standard pension age? In any case, such large effects are not expected in standard structural life-cycle models with an assumption of complete rationality. Gustman et al. (2006) estimate such a model. With the results from this model and some additional assumptions Euwals et al. (2009) predict an increase of the mean retirement age with two months following an increase in the NRA of two years. Van Erp et al. (2014) consider other explanations and discuss the possible

relevance of defaults, reference points and social norms for the retirement age, and conclude that more research into the influence of defaults is needed.

Defaults and reference points may partly explain the sensitivity of the individual retirement age to standard pension ages or anchor ages. Beshears et al. (2009) show that defaults determine contribution rates, participation and choice of investment portfolios in company retirement savings plans in the US. Standard options in retirement decisions are also relevant for the Netherlands (Teppa et al., 2011). In addition, the evaluation of an appropriate retirement age may lead individuals to start thinking about their retirement age starting from a reference point (Tversky et al.,1991). An age anchor in a pension scheme may form such a reference point. But retirement behavior of other individuals or social norms could also bring about a reference point. Beshears et al. (2009) name transaction costs, procrastination because of a lack of financial literacy, procrastination because of preferences for the present and default as an endorsement for certain outcomes as likely reasons for susceptibility for the default option in retirement savings decisions.[52] This paper focuses on the relationship of age anchors with regard to financial literacy, (implicit) advice and social interactions.

This paper examines the relevance of financial literacy for the retirement age. Financial literacy plays a prominent role in retirement decision-making. Individuals with higher financial literacy have more (retirement) wealth (Rooij et al., 2012) and plan more for retirement (Alessie et al., 2011; Lusardi et al., 2011). Individuals who arduously plan for retirement, can also be expected to have a clear retirement age in mind and thus to be less susceptible to framing. Indeed, Brown et al. (forthcoming) find a negative association between financial literacy and the susceptibility to framing. This literature in general also finds that men are more financially literate than women and that, in particular, women more often indicate that they do not know the answer to the questions measuring financial literacy.

People may perceive a default as an endorsement. For instance, Benartzi (2001) shows that individuals may direct additional discretionary employee retirement contributions to company stock (i.e. stocks of the firm where the employee works) in the case that the employer's contributions to the employee's retirement plan are automatically directed to company stock. With regard to the retirement age, Dominitz et al. (2007) include advice in two of their frames ('it would be to your advantage to delay your retirement'). They find that these frames increase the probability to delay claiming compared to the other frames. Somewhat related is Druckman (2001) who even claims that providing individuals with

[52] Choi et al. (2011) find that transaction costs matter less than financial literacy and procrastination in the decision how much to contribute in a retirement savings plan.

credible advice can overcome framing effects, and Kooreman (2000) who finds that parents spend a considerable amount of child benefits on clothing for children and calls this 'the labeling effect of child benefits'. The last study could imply that a name such as '*Normal* Retirement age' in a flexible retirement scheme can be considered as an endorsement to retire at this age.

An age anchor may lead retirement behavior to concentrate at a certain age as individuals anticipate that this age is the retirement age of others. In this sense an age anchor constitutes a 'focal point' for the retirement age of others (see also Brown, 2006). Vermeer et al. (2014a) show the relevance of social interactions in the retirement age decision and find a possible role for social norms. They show that individuals are open to retirement advice from their social environment and are willing to postpone retirement if the social environment retires later. In the aftermath of announcing a Dutch pension reform that raised the statutory retirement age De Grip et al. (2013) also found that the expected retirement age shifted upwards. This would lead to the hypothesis that an age anchor set at a statutory or perhaps norm age may elicit a larger effect than a more 'arbitrary' age anchor. The reason for this is that for an age anchor at institutional ages the perception may exist that it is more 'credible', i.e., individuals are more likely to expect others will also retire at that age.

4.3. Retirement institutions in the Netherlands

The first pillar in the Dutch retirement schemes is the state pension. This pillar (AOW) ensures a basic income for Dutch residents. Age and whether one lives in the Netherlands determine eligibility.[53] The number of years one has lived in the Netherlands determines the level of the benefits, which is therefore not related to the amount of contributions paid. This pillar is funded through Pay-as-you-go.

To ensure sustainability of this pillar, the statutory retirement scheme has increased. Since the inception of the AOW in 1956 until 2013, the statutory retirement age was 65 years of age. In recent years a discussion centered on the question how to ensure sustainability of the pension scheme to cope with aging of the population. In 2011 the government and the social partners agreed on an increase in the statutory retirement age: in 2020 the statutory retirement age would amount 66 years of age, followed by a further increase in 2025 to 67 years of age. This did not settle the debate as in April 2012 it was decided to start increasing

[53] For instance, individuals living in the Netherlands and working abroad do not accrue first pillar pension rights.

the statutory retirement age in 2013 and attain 67 in 2023.[54] This statutory retirement age is important as flexible take-up around this age is not possible.

The other main component, the second pillar, of the retirement scheme in the Netherlands consists of the mandatory fully funded occupational pension savings. The retirement schemes of companies or economic sector can be either Defined Contribution (DC) or Defined Benefit (DB). The contributions are directly linked to earnings over the whole career, and determine the level of the retirement benefits. Individuals are not able to choose the pension fund or insurer or the amount of the contributions. Employment in a particular sector or with a specific employer determines which pension fund or insurer the individual is enrolled in. The retirement benefits are taxed, whereas the contributions are not.

Finally, there are individual retirement plans in the third pillar. Individuals can choose participation and specific details, such as the level of their contributions. To the extent that tax advantages are not used in the second pillar, these advantages can be accessed in this pillar. This is especially relevant for the self-employed who do not build up an occupational pension.

4.4. Research design and data

To elicit the effects of framing with regard to the retirement age respondents answered a survey about the preference for a certain retirement age. The respondents are members of the CentERpanel, who regularly answer questions about income, wealth and other financial matters, as part of the DNB Household Survey (DHS). Consequently, many background characteristics of the respondents are known. The CentERpanel is representative for the Dutch population and it is an internet-based survey.[55] The questionnaire for this study was fielded between 11 and 16 May 2012. At this time increases in the statutory retirement age were contemplated and communicated to the public (see section 4.3). 2,840 individuals were asked to participate and 1,845 in fact did participate. In the following, the focus is on future retirement behavior. This means that individuals older than 65 years of age and those that are (early) retired are excluded. This leads to a sample of 1,175 individuals. The descriptive statistics are weighted with regard to age, gender, education and individual yearly income to obtain a representative view of individual retirement behavior.

[54] With the start of the new coalition government later that year (Rutte-Asscher, Autumn 2012) the statutory retirement age of 67 was announced to be reached in 2021.

[55] Households without an internet connection are provided with an easy-to-use computer and internet connection to ensure the sample is representative.

The survey exposed the respondents to a fictive retirement scheme. Respondents were asked to imagine the situation that the whole pension scheme would be made flexible. For every year they work longer they obtain 7% higher benefits, while every year of earlier retirement means 7% lower benefits. It is emphasized that the level of the benefits is for the remainder of their lifetime. The pension scheme also explains at one retirement age what the level of benefits is in terms of a replacement ratio. This retirement age functions as an 'anchor' as it sets the level of benefits at one specific age. This age anchor in the scheme was randomized among the respondents. One group of respondents received the anchor at 65 years and a replacement ratio of 65%, the next group had the anchor at 67 years of age and a replacement ratio of 79%, while the last group had the anchor at 68 years of age and a replacement ratio of 86%. This replacement ratio was defined as a percentage of average gross income. Appendix 4.A lists the exact question.

The questions are constructed such that retirement preferences should not be influenced if individuals are not sensitive to framing. The flexible nature of the pension scheme with differences of 7% implies that all possible retirement ages have the same replacement ratio, irrespective of the received age anchor. For instance, retirement at 67 years of age entails the same replacement ratio of 79% regardless of the age anchor. This implies that the age anchor should not influence the preferences of a completely rational individual. In addition, all age anchor variations employ the same answer scale in the question. In this way issues with the scale and the ordering of the answers are avoided.[56]

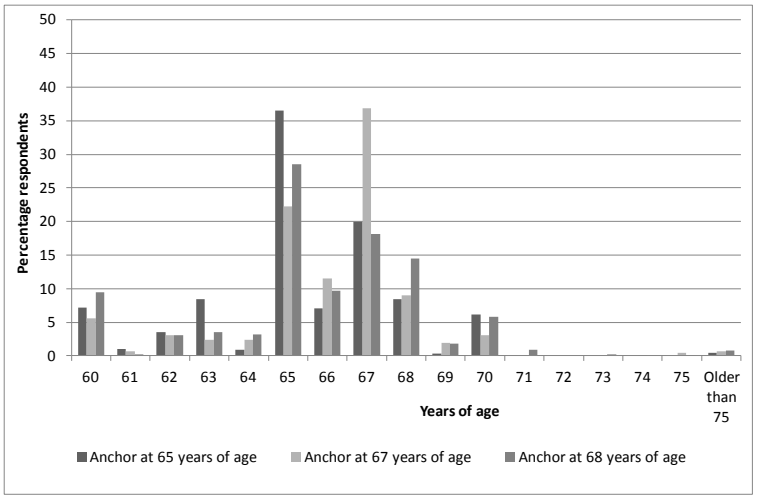
Respondents seem susceptible to the age anchor. Figure 4.1 shows the correspondence of the age anchor with the retirement age. When the age anchor is placed at 65 years of age, 37% of the respondents decide to retire at this age. But only 22% or 29% of the individuals retire at this age if they are exposed to one of the other two anchors. This leads to a difference of 8 to 15 percentage points. If the age anchor is present at the age of 67, then 37% of the respondents decide to retire at this age. But with another age anchor 18 to 20% retire at this age, leading to a difference of 17 to 19 percentage points. These differences indicate that age anchors matter for the retirement decision.

Interestingly, the anchor at 68 years of age seems to have a somewhat smaller effect. 14% of the respondents indicate to retire at 68 years of age with this anchor. Retirement at this age amounts around 8% if the age anchor is set at 65 or 67 years of age. The difference at 67 years of age is almost three times larger than this difference of 6 percentage points. This

[56] For instance, Keren (2012) finds the relevance of the ordering of answer categories in surveys.

might be related to the notion that 65 and 67 are more salient retirement ages both in the past retirement scheme and in plans for the future Dutch retirement scheme.

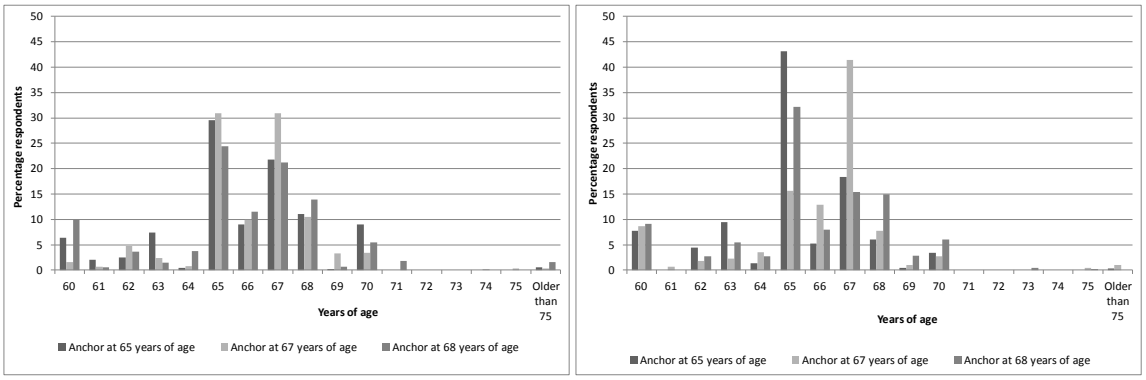
Figure 4.1 **Respondents are sensitive to age anchor, especially at the age of 65 and 67 years of age**



Distribution of the answers to the question: "At what age do you think you will retire?" Sample restricted to non-retired and less than 65 years of age and weighted with regard to age, gender, education and individual yearly income. *N = 1,175*

Another interesting fact is that the age anchors seem to have a larger effect on the retirement age of women than on the retirement age of men. Figure 4.2 shows that 43% of the female respondents will retire at 65 years of age when the age anchor is at that age but this amounts to only 15% or 32% when the age anchor is at 67 or 68, respectively. This leads to a difference between 11 and 28 percentage points. This difference is smaller for men as it amounts around 5 percentage points at most. The difference at 67 years of age between having an age anchor at that age and not also varies with gender: at least 25 percentage points for women and around 10 percentage points for men. The difference at the age of 68 years of age is smaller: almost 10 percentage points and 5 percentage points for women and men, respectively.

Figure 4.2 Framing effects are larger for female (right) than for male (left) respondents



Distribution of the answers to the question: "At what age do you think you will retire?" Sample restricted to non-retired and less than 65 years of age and weighted with regard to age, gender, education and individual yearly income. *N = 593* for the male sample and *N = 582* for the female sample

Information about the retirement age and its sensitivity to age anchors is first related to the financial literacy of the respondents. The financial literacy of the respondents was measured with five questions. Three of these questions are benchmark questions from the financial literacy literature (see for instance Lusardi and Mitchell, 2011). The five questions measure knowledge about 'compound interest', 'inflation', 'stock risk', 'debt' and 'stocks versus bonds'. The questions and descriptive statistics are listed in Appendix 4.B. The descriptive statistics show that individuals find the three questions related to 'stocks' and 'debt' more difficult than the two questions about 'compound interest' and 'inflation'. The percentage of respondents that answer correctly varies from 40.1% (question about 'debt') to 89.8% (question about 'compound interest'). Furthermore, women answer the questions less often correctly and they more often indicate that they 'do not know' the answer. This last finding is in line with the literature about financial literacy (e.g. Lusardi and Mitchell, 2011).

Second, the sensitivity of the retirement age to the various age anchors is related to the role of advice from the pension fund or the financial advisor. The survey included two questions about the expected likelihood and importance of advice from different people or institutions. One of those institutions was the 'pension fund / financial advisor'. Appendix 4.C shows the wording of the questions and the descriptive statistics for the likelihood and the importance of advice given by the pension fund or financial advisor.[57] 35% of the respondents indicate they expect to receive advice and attach a (very) large weight to it. These results do not vary substantially with gender.

[57] Vermeer et al. (2014a) discusses the role of advice in the individual retirement decision much more thoroughly.

Thirdly, we take the retirement behavior of the social environment into account in studying the sensitivity to age anchors in retirement schemes. The respondents were given a fictive retirement scheme. After this they were given a situation of a fictive person. They were then asked how they would react to a change in the retirement age of the social environment given the initial retirement age of the fictive person. Each respondent answered four such questions. From question to question the retirement age of the social environment and the initial retirement age of the fictive person were different. Some question elements were also randomized *within* respondent: the composition of the social environment (friends and family or colleagues), the gender of the name of the fictive person and the reason why the social environment increased their retirement age. Appendix 4.D lists the wording of the questions and shows the descriptive statistics of the index of the social interactions in detail. This index counts the number of occasions where respondents choose to exactly follow the retirement age of their social environment. As there are four vignette questions, the minimum of the index is zero and the maximum is four. Around 40% of the respondents never follow the retirement age of the social environment exactly, while approximately 10% of the respondents follow the retirement age of the social environment all four times. The number of times respondents follow the retirement age of the social environment does not vary with gender. Vermeer et al. (2014a) describe the influence of social interactions on the retirement age in much larger detail.

4.5. Results

This section examines the sensitivity of respondents to the age anchor displayed centrally in the question. In addition, this section examines which respondents are particularly sensitive to the age anchor and looks at various explanations for the sensitivity to the age anchor. As section 4.2 argues there are different explanations for this sensitivity: financial literacy, advice and social interactions or possibly social norms could all play a role in the importance of framing and in this particular case the age anchor.

4.5.1 Sensitivity to age anchors

Does a higher age anchor lead to later retirement? To this end the effect on the age anchor on the individual retirement is studied in the following way. First, the answer categories to the questions are taken together in six categories (in years of age): ‘Before 65’, ‘65’, ‘66’, ‘67’, ‘68’, ‘after 68’. Figure 4.1 shows that answers lower (larger) than 65 (68) are less prevalent and that respondents focus more on these answers than on other answers. Equation (4.1) describes the effect of the different age anchors on the individual retirement age:

$$R^*_{framing,i} = \alpha D67_i + \beta D68_i + X_i{}'\kappa + \varepsilon_i$$

$$R_{framing,i} = k \; if \; d_{k-1} < R^*_{framing,i} \leq d_k \tag{4.1}$$

$$with \; 1 \leq k \leq 6, d_0 = -\infty \; and \; d_6 = \infty$$

The individual retirement age ($R_{framing,i}$) depends on the age anchors $D67_i$ and $D68_i$ and individual background characteristics X_i (e.g. education, income, age, ...). Note that this implies that the baseline respondent has an age anchor at 65 years of age. The error term ε_i is assumed to be standard normally distributed and thus equation (4.1) describes an ordered probit model. The latent variable equation is also directly estimated with the observed retirement age answer $R_{framing,i}$ (ranging from 60 to 76) as a cardinal dependent variable in a linear model. More specifically, the following equation is estimated with OLS:

$$R_{framing,i} = \alpha_{linear} D67_i + \beta_{linear} D68_i + X_i{}'\kappa_{linear} + \varepsilon_{i,linear}$$

A higher age anchor relates to a higher retirement age. Table 4.1 shows that the anchor at 67 years leads to a higher retirement age than the age anchor at 65.[58] An anchor at 67 years of age also has a larger effect on the retirement age than an anchor at 68 years of age, but this difference is insignificant. These findings hold both for the estimations with a cardinal and an ordinal dependent variable. The estimations with the cardinal dependent variable point to an increase in the retirement age of almost half a year when the age anchor is 67 instead of 65 years of age. The fact that 67 years of age plays a central role in the new pension reforms may make this age anchor much more plausible. Consequently, this age anchor may elicit a larger effect on the individual retirement age compared to the age anchor of 68 years of age. The magnitude of the coefficient of the age anchor at 67 years of age (α) corresponds to a marginal effect of an increase of around 9 percentage points in the probability of retirement beyond 65 years of age. Table 4.1 also shows that the effects do not vary much with age, but they vary much more with gender: the age anchors affect the retirement age of the female respondents more. For women the magnitude of the effect of both age anchors on the retirement age amounts to an increase of around 14 percentage points in the probability to retire later than at 65 years of age.

[58] We find similar results for respondents that are retired and those that are above 65 years of age.

Table 4.1 Estimates for the effect of the age anchors at 67 and 68 years of age (α and β in eq(1)) at the individual retirement age

	Cardinal dependent variable		Ordinal dependent variable					
	Whole sample	Whole sample	Whole sample	Whole sample	Age below 45 years of age	Age 45 and above	Male	Female
Anchor 67 years of age (α)	0.393**	0.481***	0.212***	0.256***	0.289**	0.222**	0.145	0.385***
	(0.181)	(0.178)	(0.075)	(0.076)	(0.127)	(0.095)	(0.107)	(0.109)
Anchor 68 years of age (β)	0.211	0.193	0.141*	0.143*	0.238*	0.082	-0.059	0.336***
	(0.183)	(0.179)	(0.076)	(0.076)	(0.129)	(0.095)	(0.107)	(0.112)
Controls	no	yes	no	yes	yes	yes	yes	yes
Number of Observations	1175	1160	1175	1160	422	738	587	573

Cardinal dependent variable: answer to the question "at what age do you think you will retire?" Ordinal dependent variable: answer to the question "At what age do you think you will retire?"(in the six answer categories, ranging from 'before 65' to 'after 68'). Standard errors in parentheses, *** Significant at 1% level, ** Significant at 5% level, * Significant at 10% level. Baseline respondent has the age anchor at 65 years of age. Controls: gender, income, homeowner, age, region and education. Gender is omitted in the male and female sample, while age is omitted in the 'age below/above 45 years of age' sample. Estimation with sample restricted to the non-retired and under the age of 65 years. The models with the dependent variable as a cardinal variable are estimated with OLS. The models with the dependent variable as an ordinal variable are estimated with Maximum Likelihood. See Table 4.E.1 in appendix 4.E for full list of results.

But is a certain group of women more sensitive to the framing of the age anchor than other groups of women? For different subsamples equation (4.1) is re-estimated. Marital status can have an effect on the retirement age as complementarities in leisure may arise and such complementarities may lead to couples to have a strong preference to retire jointly. Consequently, the situation may arise that one person of the couple simply follows the other person's retirement age. This would lead to the hypothesis that married or cohabiting women may be more sensitive to framing than non-cohabiting women as they may be less knowledgeable about retirement decisions. This may also work the other way around. Married or cohabiting women may have a more clear idea about an appropriate retirement age. This could be based on the planned retirement age of the spouse. Table 4.2 shows these explanations do not play a role. The age anchors at 67 and 68 years of age affect the retirement age of both groups in the same way as this effect of the anchoring on the retirement age does not significantly differ.

Differences in education, earnings and age may also affect sensitivity to age anchors. The higher educated and those with more (gross individual) earnings may be less prone to framing. The same holds for older women as it is more likely they thought about retirement

more. Table 4.2 shows that such differences do not matter in the sensitivity for age anchors. If anything, higher educated women may be more susceptible, although the difference in the effect of the age anchor on retirement age between higher and lower educated women is not statistically significant.

Table 4.2 The effect of age anchors on the retirement age of female respondents broken down in different groups based on background characteristics

	Non-Cohabiting	**Married or cohabiting**	**Lower earning**	**Higher earning**	**Lower educated**	**Higher educated**	**Age below 45 years of age**	**Age 45 and above**
Anchor 67 years of age (α)	0.425* (0.233)	0.288** (0.129)	0.313* (0.166)	0.413** (0.147)	0.323* (0.170)	0.411*** (0.144)	0.388** (0.170)	0.385*** (0.145)
Anchor 68 years of age (β)	0.583** (0.245)	0.196 (0.132)	0.275 (0.168)	0.369** (0.152)	0.223 (0.172)	0.414*** (0.150)	0.372** (0.185)	0.324** (0.142)
Controls	yes	yes	yes	yes	yes	yes	yes	yes
Number of Observations	136	408	270	305	253	320	230	343
p-value LR-test	0.7392		0.4374		0.7898		0.4411	

Dependent variable: answer to the question "At what age do you think you will retire?"(in six answer categories). Standard errors in parentheses, *** Significant at 1% level, ** Significant at 5% level, * Significant at 10% level. Baseline respondent has the age anchor at 65 years of age. Controls: gender, income, homeowner, age, region and education, where appropriate. 'Non-cohabiting' and 'cohabiting' takes cohabiting or non-cohabiting household heads from the data to attain a fair comparison. In this way, children living at home for example are omitted. 'Lower earning' and 'higher earning' contrasts women with individual gross earnings less and more than 1500 Euros per month. 'Higher educated' consists of those who completed at most tertiary education (hbo or wo) or upper secondary education (havo or vwo). 'Lower' educated attained at most primary school, lower secondary education (vmbo) or vocational tertiary education (mbo). 'p-value LR-test' shows the p-value of the LR-test in which two models are compared. The first model estimates equation (4.1) for the women. The other model adds interaction terms with every variable from the previous model and the variable that distinguishes the subsamples (such as earnings and education). Additionally, the interaction terms between such variables and the age anchor dummies are small and statistically insignificant for every subsample. See Table 4.E.2 in appendix 4.E for full list of results.

Another interesting issue is the change in the probability to retire at a specific age induced by a change in the age anchor. Figure 4.1 showed that an age anchor induces more retirement at the particular age the age anchor targets. New binary dependent variables $R^*_{spec,i}$ are introduced, taking the value one if the individual retires at the specific age *spec*, and zero

otherwise. Different age anchors can change the probability to retire at each specific age ($spec$). Equation (4.2) shows this more formally.

$$R^*_{spec,i} = \alpha_{spec} D67_i + \beta_{spec} D68_i + X_i{}' \kappa_{spec} + \varepsilon_i$$

$$R_{spec,i} = 1 \; if \; R^*_{spec,i} > 0 \tag{4.2}$$

With $spec \in \{< 65, 65, 66, 67, 68, > 68\}$

In contrast to equation (4.1) the coefficients (α_{spec} and β_{spec}) now denote the propensity to retire at a specific age. The error term ε_i is again assumed to be standard normally distributed. Equation (4.2) is a probit model and is separately estimated for each specific age.

The age anchor effect concentrates predominantly on the age on which it is targeted. Table 4.3 shows that the age anchor mainly influences the probability to answer the same age as the age anchor. There are no significant effects in the whole sample at other ages (i.e. <65, 66, >68). An age anchor at 67 years diminishes the probability with around 13 percentage points to retire at 65 years of age and increases the probability to retire at 67 years of age relative to an age anchor at 65 years with the same amount. Putting the age anchor at 68 years of age increases the probability of retirement at 68 years of age with 18 percentage points and decreases the probability of retirement at 65 years of age relative to an age anchor at 65 years with 9 percentage points. Interestingly, this anchor also decreases the probability of retirement at 67 years of age relative to the anchor at 65 years of age (with an amount of 8 percentage points). A similar effect for retirement at 68 years of age with an age anchor set at 67 years of age is not observed.

Table 4.3 The effect of the age anchors on the probability to retire at a specific age for the whole sample and the male and female subsample

	Retirement at … ($spec$) years of age					
	<65	**65**	**66**	**67**	**68**	**>68**
Whole sample						
Anchor 67 years of age	-0.107	-0.348***	0.113	0.342***	-0.108	0.256*
(α_{spec})	(0.108)	(0.095)	(0.122)	(0.099)	(0.144)	(0.144)
Anchor 68 years of age	0.061	-0.249***	0.155	-0.228**	0.449***	0.192
(β_{spec})	(0.106)	(0.095)	(0.122)	(0.108)	(0.127)	(0.147)
Male sample						
Anchor 67 years of age	-0.156	-0.077	0.089	0.224	-0.244	0.069
(α_{spec})	(0.160)	(0.133)	(0.167)	(0.143)	(0.197)	(0.184)
Anchor 68 years of age	0.154	-0.178	0.195	-0.172	0.277	-0.190
(β_{spec})	(0.152)	(0.135)	(0.165)	(0.152)	(0.172)	(0.198)
Female sample						
Anchor 67 years of age	-0.065	-0.656***	0.152	0.445***	0.068	0.631**
(α_{spec})	(0.148)	(0.139)	(0.182)	(0.140)	(0.218)	(0.256)
Anchor 68 years of age	-0.014	-0.341**	0.122	-0.283*	0.649***	0.732***
(β_{spec})	(0.150)	(0.136)	(0.186)	(0.158)	(0.198)	(0.256)

Dependent variable is a dummy indicating retirement at the age in the column under consideration. Suppose a respondent indicates to retire at 66 years of age. Then the dummy for retirement at 66 years of age equals one (the case for the column '66', while the dummies for retirement at other ages (and thus columns) equal zero. Standard errors in parentheses, *** Significant at 1% level, ** Significant at 5% level, * Significant at 10% level. Controls are included: gender (only in whole sample), income, homeowner, age, region of the Netherlands and education. Baseline respondent has the age anchor at 65 years of age. Probit model of equation (4.2) is estimated with Maximum Likelihood. See table 4.E.3 in appendix 4.E for a full list of results.

The effects of framing on the retirement age are stronger for women than for men. Table 4.3 shows the absence of significant effects of the age anchors on the specific retirement age for male respondents. This is in line with the estimations found earlier in Table 4.1. Women are around 17 (25) percentage points more likely to retire at 67 (68) years of age if that age corresponds to the anchor age. Also notable is the increased tendency to retire later than 68 years of age when the age anchor amounts to 67 or 68 years of age.

The retirement age appears to be sensitive to the presence of age anchors. In addition, the effect of different age anchors on the individual retirement age differs between female and male respondents. In the following, the sensitivity to the age anchor in relation to financial literacy and the importance of advice from the pension fund or financial advisor is examined, as well as the possible role of social interactions in the explanation of this sensitivity.

4.5.2 The role of financial literacy

A possible explanation for the difference between men and women in the sensitivity of the retirement age to age anchors relates to differences in financial literacy. Financial illiteracy is also more pronounced for women than for men (see Section 4.2). Lower financial literacy may explain why people would retire at the age corresponding to the age anchor.

To measure financial literacy, an index is constructed based upon five standard financial literacy questions. As discussed before, appendix 4.B lists the questions with the distribution of the answers and elaborates on the construction of the index to measure financial literacy. In short, the index is constructed with a principal factor analysis. The index is increasing in the number of the correct answers and also accounts for 'Do not know' answers. The last distinction could be important as women tend to answer 'Do not know' more often than men do.

Financial literacy is not the leading explanation for understanding the effect of age anchors on the individual retirement age. Table 4.4 shows the model estimates with the addition of the financial literacy index and interaction terms between the financial literacy index and the age anchors to equation (4.1). The two interaction terms are jointly insignificant. This result also holds when the sample is split between men and women. An explanation could be that the question on the retirement age is not as difficult as questions on complex financial decisions.

Table 4.4 Estimation results for the effect of financial literacy and the age anchor on the individual retirement age

	Whole sample		**Male**		**Female**	
Anchor 67 years of age (α)	0.253***	0.254***	0.136	0.147	0.385***	0.396***
	(0.076)	(0.076)	(0.107)	(0.115)	(0.109)	(0.111)
Anchor 68 years of age (β)	0.147*	0.147*	-0.057	-0.003	0.339***	0.360***
	(0.076)	(0.076)	(0.107)	(0.112)	(0.112)	(0.115)
fin. lit. index	0.063*	0.120*	0.116*	0.242**	0.056	0.002
	(0.038)	(0.066)	(0.065)	(0.109)	(0.047)	(0.088)
Age anchor 67 years of age * fin. lit. index	-	-0.051	-	-0.074	-	0.056
		(0.089)		(0.163)		(0.114)
Age anchor 68 years of age * fin. lit. index	-	-0.102	-	-0.255*	-	0.091
		(0.086)		(0.140)		(0.115)
log likelihood	-1900	-1899	-962.8	-961.1	-925.0	-924.7
p-value LR-test	0.4852		0.1680		0.7294	
Observations	1160		587		573	

Dependent variable: answer to the question "At what age do you think you will retire?"(in six answer categories). Standard errors in parentheses, *** Significant at 1% level, ** Significant at 5% level, * Significant at 10% level. Controls: gender, income, homeowner, age, region and education. Gender is omitted in the male and female sample. Sample restricted to the non-retired and under the age of 65 years. Baseline respondent has the age anchor at 65 years of age. The financial literacy index is increasing in the number of correct answers. Estimation results obtained with re-estimation of the ordered probit model of equation (4.1) with either the inclusion of the financial literacy index or with the inclusion of the financial literacy index and the interaction between this index and the age anchor dummies. The p-value of the Likelihood Ratio-test shows the p-value that tests the joint significance of the two interaction terms. See Table 4.E.4 in appendix 4.E for full list of results.

4.5.3 The role of advice from the pension fund

The respondents could take the age anchor as (implicit) advice from the pension fund for a reasonable retirement age. Consequently, they would consider retirement at or near the age anchor a suitable retirement age. The more value an individual attaches to advice from the pension fund the more sensitive an individual could be to age anchors. This means that the individuals who attach the largest value to advice from the pension fund are also most likely to follow the provided age anchor. The respondents indicated whether they expect to receive advice from different persons in the social environment and what value they attach to it. This also included advice from a pension fund or financial advisor.

Advice from pension funds plays a limited role in the sensitivity of individuals to the age anchor. Table 4.5 shows the estimation results of equation (4.1) with the addition of a dummy for 'a lot of value attached to advice from the pension fund' and two interaction terms between this dummy and the age anchors at 67 and 68 years of age. It shows that for the whole sample and the sample restricted to women these interaction terms are jointly significant. Notable is that the effect of the age anchor of 67 does not change when the interaction terms are included, while the coefficient for the effect of the age anchor at 68 years of age changes. Individuals who attach a lot of value to the advice from pension funds are more sensitive to the age anchor at 68. This relevance of the interaction between the age anchor at 68 and a lot of value for advice is more pronounced for women.

Table 4.5 **Study into the role of advice of the pension fund or financial advisor**

	Whole sample		Male		Female	
Anchor 67 years of age (α)	0.236***	0.280***	0.107	0.123	0.383***	0.466***
	(0.077)	(0.096)	(0.109)	(0.135)	(0.111)	(0.137)
Anchor 68 years of age (β)	0.145*	0.016	-0.071	-0.104	0.354***	0.126
	(0.078)	(0.096)	(0.110)	(0.133)	(0.114)	(0.140)
A lot of value attached to advice	0.060	-0.030	0.033	0.012	0.085	-0.073
	(0.066)	(0.121)	(0.094)	(0.169)	(0.094)	(0.176)
Age anchor 67 years * A lot of value	-	-0.091	-	-0.036	-	-0.144
attached to advice		(0.163)		(0.231)		(0.233)
Age anchor 68 years * A lot of value	-	0.371**	-	0.100	-	0.644***
attached to advice		(0.166)		(0.233)		(0.242)
log likelihood	-1837	-1832	-930.4	-930.2	-893.0	-886.2
p-value LR-test	0.0091		0.8260		0.0012	
Observations	1119		567		552	

Dependent variable: answer to the question "At what age do you think you will retire?"(in six answer categories). Standard errors in parentheses, *** Significant at 1% level, ** Significant at 5% level, * Significant at 10% level. Controls: gender, income, homeowner, age, region and education. Gender is omitted in the male and female sample. Sample restricted to the non-retired and under the age of 65 years. Baseline respondent has an age anchor at the age of 65 years of age and expects to receive no advice from the pension fund or financial advisor or attaches none or little value to it. Estimation results obtained with re-estimation of the ordered probit model of equation (4.1) with either the inclusion of an advice index dummy (=1 if respondent indicates to attach a lot of value to advice from pension fund) or with the inclusion of the advice index and the interaction between this index and the age anchor dummies. The Likelihood Ratio-test tests the joint significance of the two interaction terms. See Table 4.E.5 in appendix 4.E for full list of results.

The role of advice and the sensitivity to the age anchors seems to be directed only on retirement before 65 years of age. Advice and interaction terms between age anchors and advice are added to equation (4.2). Table 4.6 shows that an age anchor at 68 years of age and attaching weight to advice from the pension fund lead to a smaller probability for retirement at 66 years of age. At 65 and 66 years of age the coefficients for the value of advice and the interaction terms are statistically significant. But the coefficients that indicate that the respondent attaches a lot of value to advice and the interaction between the age anchors and a lot of value attached to advice are similar. This implies that an individual with an age anchor at 67 or 68 who attaches little or no value to advice and an individual with the same age anchor who attaches a lot of value to advice still have roughly the same probability for retirement at 65 and 66 years of age. This is not expected as individuals who are more sensitive to advice from the pension fund were expected to be more inclined to take the age of the age anchor as appropriate advice and retire at that age.

Table 4.6 **Study into the role of advice of the pension fund or financial advisor at each specific retirement age**

	Retirement at (years of age)					
	Before 65	**65**	**66**	**67**	**68**	**After 68**
Whole sample						
Anchor 67 years of age	-0.125	-0.479***	0.356**	0.447***	-0.217	0.169
	(0.139)	(0.121)	(0.161)	(0.124)	(0.186)	(0.178)
Anchor 68 years of age	0.241*	-0.357***	0.327**	-0.194	0.367**	-0.027
	(0.131)	(0.119)	(0.161)	(0.135)	(0.158)	(0.189)
A lot of value attached to	0.177	-0.374**	0.534***	0.075	-0.134	-0.142
advice	(0.165)	(0.152)	(0.187)	(0.163)	(0.229)	(0.251)
Age anchor 67 * A lot of	-0.018	0.486**	-0.638**	-0.293	0.301	0.133
value attached to advice	(0.227)	(0.207)	(0.254)	(0.214)	(0.313)	(0.318)
Age anchor 68 * A lot of	-0.614***	0.396*	-0.436*	-0.121	0.261	0.557*
value attached to advice	(0.234)	(0.210)	(0.253)	(0.235)	(0.284)	(0.321)
Observations	1119	1119	1119	1119	1119	1119
Log likelihood	-517.9	-670.3	-399.6	-574.9	-319.7	-270.7

Dependent variable is a dummy indicating retirement at the age in the column under consideration. Suppose a respondent indicates to retire at 66 years of age. Then the dummy for retirement at 66 years of age equals one (the case for the column '66', while the dummies for retirement at other ages (and thus columns) equal zero. Standard errors in parentheses, *** Significant at 1% level, ** Significant at 5% level, * Significant at 10% level. Controls: gender, income, homeowner, age, region and education. Sample restricted to the non-retired and under the age of 65 years. Baseline respondent has an age anchor at the age of 65 years of age and expects to receive no advice from the pension fund or financial advisor or attaches none or little value to it. Estimation results obtained with re-estimation of the probit model of equation (4.2) with the inclusion of the advice index dummy (=1 if respondent indicates to attach a lot of value to advice from pension fund) and the interaction between this index and the age anchor dummies. See appendix 4.E for full list of results.

4.5.4 The role of social interactions

Finally, individuals could be sensitive to framing because they expect that others will also retire at the anchor age: If individuals are indeed sensitive to retirement behavior of the social environment, then individuals can also be sensitive to an anchor in a pension overview on the grounds that they expect others also to retire at this age. Information about the role of social interactions in the retirement decision-making is studied in relation to the sensitivity to framing in a single model.

The variable measuring the importance of social interactions could be endogenous in the equation for the preferred retirement age. The reason for this is that the answers to both the vignette questions measuring the influence of social interactions and the fictive pension overview are in terms of a preferred retirement age. But this concern may be alleviated somewhat by not considering the answer of the question directly (the retirement age in response to a change in the retirement age of the social environment). Instead, an index constructed out of these questions is used. This index simply counts the number of times the

respondent retires exactly at the retirement age of the social environment in the vignette questions, as was discussed in Section 4.4.

The model consists of two equations, one for the number of times the retirement age of the respondent corresponds to the retirement age of the social environment and the other for the retirement age in response to the age anchor question. Equation (4.3) shows for respondent *i* that the number of times retirement of the respondent and the social environment corresponds with each other (soc_i) depends on vignette (F_i) and background characteristics (X_i). As discussed in section 4.4, the vignette characteristics only vary among respondents and do not change from vignette question to vignette question.

$$soc_i^* = F_i^{'}\delta + X_i^{'}\lambda + \varepsilon_i$$

$$soc_i = l \; if \; f_{l-1} < soc_i^* \leq f_l \tag{4.3}$$

$$\text{With } 0 \leq l \leq 4, f_{-1} = -\infty \; and \; f_4 = \infty$$

Equation (4.4) below relates the retirement age ($y_{framing,i}$) to the index of the social interactions. In particular, the equation describes how the social interactions index influences the individual retirement age and shows that the influence is allowed to work via the anchor age at 67 or 68 years of age. The coefficient γ describes the direct influence of the index of social interactions on the retirement age (if the age anchor is 65 years of age) directly.

An exclusion restriction is needed to identify equation (4.4). This is the omission of a direct effect of the vignette characteristics on the retirement age in equation (4.4). This is very reasonable assumption as the vignette characteristics are randomly assigned and only play a role in the *vignette* questions and not in the age anchor questions.

In principle the index soc_i^* tells us little about the preferred retirement age, but only about the willingness to follow retirement behavior of the social environment. A direct influence of the index on the retirement age cannot be excluded, however. The coefficients α' and β' relate to the interaction between the age anchor and the index of social interactions to the individual retirement age. In the absence of an effect due to the interaction between social interactions and the age anchor both coefficients α' and β' are equal to zero. The other coefficients, aside from the error terms, have the same interpretation as in equation (4.1).

$$R_{framing,i}^* = \gamma soc_i^* + (\alpha + \alpha' soc_i^*)D67_i + (\beta + \beta' soc_i^*)D68_i + X_i^{'}\kappa + \eta_i$$

$$R_{framing,i} = k \; if \; d_{k-1} < R_{framing,i}^* \leq d_k \tag{4.4}$$

$$\text{with } 1 \leq k \leq 6, d_0 = -\infty \; and \; d_6 = \infty$$

In each of the two equations an error terms is present (ε_i and η_i, respectively). These error terms are assumed to be distributed as follows: $\binom{\varepsilon_i}{\eta_i} \sim N(\binom{0}{0}, \begin{pmatrix} 1 & \tau \\ \tau & 1 \end{pmatrix})$. So both error terms are allowed to be correlated, with correlation coefficient τ.

First, equation (4.4) is estimated under the assumption that the social interaction index is exogenous. Such an estimation is similar how the aforementioned results about the role of financial literacy and advice are obtained and is basically an estimation of equation (4.1) with the addition of the social interaction index and interactions between that term and the age anchors at 67 and 68 years of age. The first column in Table 4.7 shows that the social interaction index influences the individual retirement age. Adherence to the retirement age of the social environment implies later retirement in the framing question. The column in the table also shows that the interaction between the social interaction index and the age anchor at 68 years of age is positive and significantly different from zero (at the 5% level).

Second, the complete model with equations (4.3) and (4.4) is estimated. The coefficients δ determine the social interaction index (also see appendix 4.F) and thus allow determination of the coefficient γ. In this complete model (column (2), Table 4.7) the coefficient γ and the correlation coefficient τ are not significantly different from zero (at the 5% level). Column (2) in Table 4.7 shows the same results for the interaction between the social interaction index and the age anchor at 68 years of age as the coefficient β' is positive and significantly different from zero (at the 5% level) also for this model. It implies that respondents who more often follow the retirement age of the social environment are also more likely to retire later if they are exposed to the age anchor 68 years of age instead of 65 years of age. On the other hand, the coefficient α' is not significant so there is no evidence for a similar effect for the age anchor of 67. Note that the anchor at 67 years of age still elicits later retirement in comparison with an age anchor at 65 years of age as the coefficient α is significantly positive. This would be consistent with the idea that both 65 and 67 are 'standard' retirement ages in the Dutch retirement scheme, while the age of 68 years is not. Interestingly, the lack of an interaction effect of the index of social interactions and the age anchor at 67 years of age and the positive effect of the interaction effect of the index of social interactions and the age anchor at 68 years of age seem to be present for both men and women (column 3 and 4 in Table 4.7).

Table 4.7 The role of social interactions

	(1)	(2)	(3)	(4)
	whole sample		male sample	female sample
Anchor at 67 years of age (α)	0.1801*	0.2566***	0.1334	0.4032***
	(0.1068)	(0.0779)	(0.1098)	(0.1194)
Anchor at 68 years of age (β)	-0.0370	0.1870**	-0.0715	0.4457***
	(0.1064)	(0.0897)	(0.1327)	(0.1311)
γ	0.1480***	0.1299	0.1123	0.3633
	(0.0396)	(0.1860)	(0.2408)	(0.2429)
τ	-	0.1177	0.1367	-0.1372
		(0.1778)	(0.2287)	(0.2457)
α'	0.0530	0.0537	-0.0574	0.1578
	(0.0550)	(0.0828)	(0.1158)	(0.1179)
β'	0.1561***	0.2139**	0.2598**	0.2096*
	(0.0558)	(0.0847)	(0.1149)	(0.1251)
Observations	1130	1130	571	559
log likelihood	-1805	-3435	-1733	-1678

Dependent variables: answers to the questions: "At what age do you think you will retire?" and the index that counts how many times the respondent follows retirement behavior of the social environment exactly. Standard errors in parentheses, *** Significant at 1% level, ** Significant at 5% level, * Significant at 10% level. Baseline respondent has an age anchor at the age of 65 years of age. The first column shows the estimates from the ordered probit model from equation (4.4), where the observed social interaction index *soc* replaces the unobserved variable soc^*. The second column shows the results of the full model (of equation (4.3) and (4.4)). The third and fourth columns show the estimation results restricted to men and women, respectively. See appendix table 4.F.1 for full list of results.

4.6. Discussion

This paper examined the role of standard retirement ages in pension overviews (age anchors) in the individual retirement decision, in particular to the individual retirement age. The main finding is that age anchors are relevant for the individual retirement decision. Individuals appear to be sensitive to the frame of the age anchor. An age anchor at 67 instead of 65 years of age leads to an increase in the probability to retire later than at age 65 of 9 percentage points. This finding contrasts with the study of Brown et al. (forthcoming). They found no effect of an age anchor at 70 years of age versus an age anchor at 66 years of age *(the new Normal Retirement Age)*, although they found an effect of an age anchor at 62 years of age (versus an age anchor at the later ages). This study is not concerned with earlier retirement than the original Dutch statutory retirement age of 65 years or the various common early retirement ages.

The effect of the age anchor on the retirement age is concentrated at the age of the age anchor. So for instance, individuals are more likely to retire at 67 years of age if the age anchor also mentions 67 years of age compared to an age anchor at 65 years of age. With an age anchor at 67 years of age as opposed to an age anchor at 65 years of age the increase in the probability to retire at the age of 67 years of age amounts 13 percentage points.

Women are more sensitive to framing with an age anchor than men are. This study finds that for women an age anchor at 67 years of age leads to an increase in the probability of retirement later than 65 years of age of around 14 percentage points vis-à-vis an age anchor at 65 years of age. Surprisingly, observed heterogeneity among women does not drive these results. For instance, lower educated women are as susceptible to framing as higher educated women. A closer inspection of the probability to retire at a specific age reveals that women are more likely to retire precisely at the anchor age.

Financial literacy is not able to provide an explanation for the sensitivity to age anchors. It is clear that the question about the individual retirement age is not a very financial question. This can be contrasted with the 'framing' of the question in Brown et al. (forthcoming) as they explicitly focus on when an individual would start 'to claim Social Security benefits'. Our frame is much closer to the question 'when to exit the labor market'. Therefore, it is possible that financial literacy plays a smaller role in explaining the sensitivity to age anchors in this context. Financial literacy also cannot explain the difference between men and women in the sensitivity to age anchors. Financial illiteracy is more widespread among women, but an analysis restricted to women shows no significant interaction between financial literacy and the age anchors.

Attaching value to the advice from pension funds (or financial advisor) seems to play a specific, albeit small, role in the sensitivity to age anchors. Advice does not seem to play a large role in explaining the sensitivity to the age anchor of 67 years of age. The role of advice is more important for 68 years of age. Individuals with an age anchor at 68 years of age who attach a lot of value to advice prefer to retire at a later age than those who do not value or attach little value to advice. This effect seems to be stronger among women. It could also be conjectured that individuals who are open to advice and get this age anchor, are more likely to retire at the age of 68 years of age. For this hypothesis, however, this study finds no support.

The study also finds a specific role for social interactions in explaining the sensitivity to the age anchors of 68 years of age. With a social interaction index this paper examined the sensitivity to age anchors in relation to social interactions. A higher sensitivity to the retirement age of the social environment explains sensitivity to the age anchor of 68 years of age. This remains the case when allowing for potential endogeneity of the social interaction index in the preferred retirement age following the framing question.

The relevance of advice from the pension fund and social interactions for the age anchor of 68 years of age seems to suggest that an age anchor of 68 is different from an age

anchor at 65 or 67. In comparison to an age anchor of 65 years of age, an age anchor at 67 means that individuals retire later, perhaps even later than with an age anchor of 68 years of age. Additionally, the age anchor at 68 years of age seems to be connected with attaching value to advice from the pension fund or to the retirement age of the social environment. It could be that this is related to salience of 65 and 67 years of age in the Dutch retirement schemes. The age of 68 years is less salient. Consequently, such an age anchor may elicit more varied responses among individuals. This might also explain why Brown et al. (forthcoming) find no effect for an age anchor of 70 years of age versus an age anchor at 62 or 66 years of age. Ages 62 and 66 are the Early and Normal Retirement Age in Social Security, respectively. They are far more salient than age 70.

More research is needed, especially to understand the difference between men and women, who seem to react quite differently to age anchors. This study explores some mechanisms that could help to explain this difference, such as differences in financial literacy and the role of advice from pension funds. Furthermore, the lack of a differing sensitivity to age anchors among subgroups (e.g. marital status, education) seems to indicate that further research is needed.

Further research could also more explicitly focus on the role of social interactions or advice. Hallsworth et al. (2014) find that individuals pay their taxes sooner if they are reminded that they belong to a minority that pays late. To this end individuals could be randomized into groups in which some receive information about retirement behavior of others. Another approach is to make the function of advice more explicit. In this sense, it would also relate to Dominitz et al. (2007) who, for example, explicitly state in one of their survey questions 'if you expect to live beyond age ..., then it would be to *your advantage to delay your retirement*' (emphasis mine).

Another avenue for research could be to expose the individuals to a pension reform in which the benefits in the flexible system are lowered in such a way that they have to work one year longer to attain the same level of retirement benefits. The question then becomes whether they want to keep the amount of retirement benefits constant (working one year longer) or keep their planned retirement age the same (and thus enduring a cut in benefits). In other words, do individuals exhibit loss aversion in the level of benefits or in the number of years worked and what exactly forms their reference point in this?

Policymakers should be aware that seemingly neutral statements can influence individual decision-making. People are sensitive to age anchors for their retirement decision. A flexible pension scheme allowing earlier and later retirement must also show the level of

benefits at a certain age. This paper suggests that the effect of such an age anchor is larger when people consider it a 'plausible' retirement age. In this sense the display of a statutory retirement age on a pension overview may effect the retirement age the most. Further research is needed, but a name such as '*Normal* or *Full* Retirement Age' may amplify this effect. Policy makers can take such notions in the construction of pension overviews into account.

Appendix 4.A Wording of retirement age question

Below we show the variant 65 years of age. In brackets the other two variants are shown.

Imagine yourself the following situation. You have just become 50 [52, 53] years of age and have worked in total 25 years. The entire pension scheme (state pensions and supplementary pensions) is made flexible. This means that you will decide at what age you will receive pension benefits. If you choose to retire later, you will receive more retirement benefits for the remainder of your life. If you choose retire earlier, you will receive less retirement benefits for the remainder of your life.

If you have worked for forty years and retire at 65 [67, 68] years of age, you will receive 65 [79, 86]% of your average gross income. Every year you retire earlier, you will receive 7% less retirement benefits for the remainder of your lifetime. Every year you retire past this age, you will receive 7% more retirement benefits for the remainder of your lifetime.

At what age do you think you will retire?

1 60 years of age
2 61 years of age
3-14 .. years of age
15 74 years of age
16 75 years of age
17 Older than 75 years of age

Appendix 4.B Financial literacy questions wording and descriptive statistics

Financial Literacy questions (**correct answers bold**):

(Compound interest) Suppose you had 100 Euros in a savings account and the interest rate was 2% per year. After 5 years, how much do you think you would have in the account if you left the money to grow?

1) More than 102 Euros 2) Exactly 102 Euros 3) Less than 102 Euros 4) Do not know 5) Refuse to answer

(Inflation) Imagine that the interest rate on your savings account was 1% per year and inflation was 2% per year. After 1 year, how much would you be able to buy with the money in this account?

1) More than today 2) Exactly the same **3) Less than today** 4) Do not know 5) Refuse to answer

(Stock risk) Please tell me whether this statement is true or false. 'Buying a single company's stock usually provides a safer return than a stock mutual fund'.

1) True **2) False** 3) Do not know 4) Refuse to answer

(Debt) Suppose you will take out a loan of 3000 Euros with a bank. Each month you pay 30 Euros to the bank. How many years does it take to pay back the debt assuming the interest rate on the loan amounts 12% (1% a month)?

1) Less than 5 years 2) Between 5 and 10 years 3) Between 10 and 15 years **4) Never, the debt will not be repaid** 5) Do not know 6) Refuse to answer

(Stocks versus bonds) Stocks are normally riskier than bonds. True or false?

1) True 2) False 3) Do not know 4) Refuse to answer

Table 4.B.1 shows the distribution of the answers over the respondents. This information is used to construct a financial literacy index with iterated principal factor analysis. To this end dummies, those indicate whether a question is correct and whether a respondent does not know the answer to the question, are generated. Table 4.B.2 shows the factor loadings for the ten dummies.

Table 4.B.1 Descriptive statistics financial literacy questions in percentages of total number

	Compound interest			Inflation			Stock Risk		
	Whole	Male	Female	Whole	Male	Female	Whole sample	Male	Female
Correct	89.8	92.0	87.5	84.3	88.9	79.6	50.8	64.8	36.6
Incorrect	6.0	5.7	6.5	7.0	6.2	7.9	8.1	5.7	10.6
Do not know	3.7	1.9	5.6	8.2	4.4	12.0	40.2	28.4	52.2
Refusal	0.4	0.4	0.5	0.5	0.5	0.5	0.9	1.1	0.7

	Debt			Stocks versus bonds		
	Whole	Male	Female	Whole	Male	Female
Correct	40.1	47.4	32.6	54.5	65.3	43.4
Incorrect	48.8	46.9	50.7	10.2	8.3	12.0
Do not know	10.0	4.6	15.4	34.6	25.3	44.0
Refusal	1.2	1.1	1.3	0.8	1.1	0.5

Sample sizes: *N = 1,124* for the whole sample, *N = 558* for the sample restricted to female respondents, *N= 566* for the sample restricted to males

Table 4.B.2 Factor loadings for construction of financial literacy index

Financial literacy questions		Factor loadings
Compound interest	Correct	0.5575
	Do not know	-0.5698
Inflation	Correct	0.6927
	Do not know	-0.6979
Stock risk	Correct	0.4353
	Do not know	-0.0927
Debt	Correct	0.3932
	Do not know	-0.5188
Stock versus bonds	Correct	0.5374
	Do not know	-0.4912

Appendix 4.C Wording and descriptive of questions about likelihood and importance of advice from the pension fund

The likelihood and the importance of the advice questions were worded as follows:

Your retirement timing is an important decision in the course of your life. Various factors influence this decision. In this part of the survey we want to ask you questions about your retirement decision and the role of your social environment in this.

What persons do you expect to give / gave you advice in deciding when to retire?

	Not at all	Somewhat	Certainly
Spouse			
Children			
Friends			
Family			
Coworkers			
Neighbors			
Financial advisor / pension fund			

In the previous question we asked you what persons (will) advise you. What weight do you attach to the advice of the following persons?
If already retired: What weight did you attach to the advice of the following persons?

	None	A little	Much	Very much
Spouse				
Children				
Friends				
Family				
Coworkers				
Neighbors				
Financial advisor / pension fund				

This paper focuses on the 'financial advisor / pension fund' part of both questions. Furthermore, we restrict our discussion to individuals that are not retired. Table 4.C.1 gives the descriptive statistics of the answer to this question.

Table 4.C.1 Descriptive statistics likelihood and importance advice pension fund / financial advisor in percentages of total number

	What persons do you expect to give you advice in deciding when to retire?		
	Whole sample	Male	Female
Not at all	40.1	38.6	41.5
Somewhat	44.3	44.2	44.4
Certainly	15.7	17.2	14.1
Number of observations	*1,131*	*570*	*561*
	What weight do you attach to the advice of the financial advisor / pension fund		
	Whole sample	Male	Female
None	0.7	0.9	0.6
A little	40.4	43.4	37.2
Much	46.0	42.0	50.3
Very much	12.8	13.7	11.9
Number of observations	*678*	*350*	*328*

Note: The question 'What weight do you attach to the advice of the financial advisor / pension fund' is only asked if the respondent indicates to expect to get 'somewhat' or 'certainly' advice from the pension fund or pension advisor.

Appendix 4.D Question wording vignettes social interactions and the retirement age

Below the vignette questions for the relation between the retirement age of the social environment and the individual retirement age are shown. Out of the four answers an index is constructed. This index simply counts the number of times that the individual retirement age corresponds to the increased retirement age of the social interaction. Table D.1 shows the descriptive statistics for this index.

Among policy makers there is a lot of discussion about reforming the pension scheme.
In the present plans it will be possible to decide at what age you will receive retirement benefits (both state and occupation benefits). If you worked for forty years and you will retire at the standard retirement age, the retirement benefits will amount 70% of your average gross income. The standard retirement age now amounts 65 years of age. One year earlier retirement means that your retirement benefits will be 7% lower for the rest of your life. One year later retirement means 7% higher retirement benefits for the rest of your life time.

We now would like to ask you questions about a fictive person.

Vignette 1
John / Lisa is not yet eligible for retirement. He / She does think about it from time to time. Given this retirement scheme John / Lisa plans to retire at 65 years of age. The most of his / her co-workers / family and friends retire at 65 years of age. When John / Lisa has turned 60, the most of his / her coworkers / family and friends retire at 66 years of age. This is a consequence of longer and healthier lives of individuals. / This is a consequence of a larger need for experienced employees by employers. / This is a consequence of financial consequences of the economic crisis. / This is a consequence of the raise in the standard retirement age in the pension scheme by one year. If John / Lisa wants to retire at the same age, he / she will receive 7% lower retirement benefits for the rest of his / her life.

What would you do in the situation of John / Lisa?
1 To retire earlier than 65 years of age
2 To retire at 65 years of age
3 To retire at 65.5 years of age
4 To retire at 66 years of age
5 To retire at 66.5 years of age
6 To retire at 67 years of age
7 To retire later than 67 years of age

Vignette 2
Arnold / Marlous is not yet eligible for retirement. He / She does think about it from time to time. Given this retirement scheme Arnold / Marlous plans to retire at 65 years of age. The most of his / her co-workers / family and friends retire at 65 years of age. When Arnold / Marlous has turned 60, the most of his / her coworkers / family and friends retire at 67 years of age. This is a consequence of longer and healthier lives of individuals. / This is a consequence of a larger need for experienced employees by employers. / This is a consequence of financial consequences of the economic crisis. / This is a consequence of the raise in the standard retirement age in the pension scheme by one year. If Arnold / Marlous wants to retire at the same age, he / she will receive 7% lower retirement benefits for the rest of his / her life.

What would you do in the situation of Arnold / Marlous?
1 To retire earlier than 65 years of age
2 To retire at 65 years of age
3 To retire at 65.5 years of age
4 To retire at 66 years of age
5 To retire at 66.5 years of age
6 To retire at 67 years of age
7 To retire later than 67 years of age

Vignette 3
Wim / Els is not yet eligible for retirement. He / She does think about it from time to time. Given this retirement scheme Wim / Els plans to retire at 64 years of age. The most of his / her co-workers / family and friends retire at 65 years of age. When Wim / Els has turned 60, the most of his / her coworkers / family and friends retire at 66 years of age. This is a consequence of longer and healthier lives of individuals. / This is a consequence of a larger need for experienced employees by employers. / This is a consequence of financial consequences of the economic crisis. / This is a consequence of the raise in the standard retirement age in the pension scheme by one year. If Wim / Els wants to retire at the same age, he / she will receive 7% lower retirement benefits for the rest of his / her life.

What would you do in the situation of Wim / Els?
1 To retire earlier than 64 years of age
2 To retire at 64 years of age
3 To retire at 64.5 years of age
4 To retire at 65 years of age
5 To retire at 65.5 years of age
6 To retire at 66 years of age
7 To retire later than 66 years of age

Vignette 4

Frans / Rachel is not yet eligible for retirement. He / She does think about it from time to time. Given this retirement scheme Frans / Rachel plans to retire at 64 years of age. The most of his / her co-workers / family and friends retire at 64 years of age. When Frans / Rachel has turned 60, the most of his / her coworkers / family and friends retire at 65 years of age. This is a consequence of longer and healthier lives of individuals. / This is a consequence of a larger need for experienced employees by employers. / This is a consequence of financial consequences of the economic crisis. / This is a consequence of the raise in the standard retirement age in the pension scheme by one year. If Frans / Rachel wants to retire at the same age, he / she will receive 7% lower retirement benefits for the rest of his / her life.

What would you do in the situation of Frans / Rachel?

1 To retire earlier than 64 years of age
2 To retire at 64 years of age
3 To retire at 64.5 years of age
4 To retire at 65 years of age
5 To retire at 65.5 years of age
6 To retire at 66 years of age
7 To retire later than 66 years of age

How certain are respondents to vignette questions?

How sure are you of your answers to the previous questions?

1 Very uncertain
2
3
4
5 Very certain

Table 4.D.1 Descriptive statistics index for the number of times the retirement age of the social environment and the individual retirement age coincide

Index values	Whole sample (%)	Male (%)	Female (%)
0	41.24	39.72	42.78
1	22.15	23.52	20.77
2	14.27	15.16	13.38
3	10.68	10.28	11.09
4	11.65	11.32	11.97
Number of observations	1,142	574	568

Appendix 4.E Tables with full estimation results

This appendix shows the complete tables of the various estimations.

Table 4.E.1 Study into the effect of the age anchor on the stated retirement age (complete table 4.1)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Cardinal dependent variable		Ordinal dependent variable					
	Whole sample; effect age anchor only	Whole Sample; effect age anchor and controls	Whole sample; effect age anchor only	Whole Sample; effect age anchor and controls	Sample: younger than 45 years of age	Sample: older than 45 years of age	Sample: men only	Sample: women only
Anchor 67 years of age	0.393**	0.481***	0.212***	0.256***	0.289**	0.222**	0.145	0.385***
	(0.181)	(0.178)	(0.075)	(0.076)	(0.127)	(0.095)	(0.107)	(0.109)
Anchor 68 years of age	0.211	0.193	0.141*	0.143*	0.238*	0.082	-0.059	0.336***
	(0.183)	(0.179)	(0.076)	(0.076)	(0.129)	(0.095)	(0.107)	(0.112)
gender respondent	-	-0.341**	-	-0.132**	-0.285***	-0.051	-	-
		(0.146)		(0.062)	(0.105)	(0.078)		
25 - 34 years of age	-	-0.203	-	-0.129	-	-	-0.055	-0.129
		(0.466)		(0.197)			(0.290)	(0.274)
35 - 44 years of age	-	-0.453	-	-0.226	-	-	-0.360	-0.093
		(0.413)		(0.175)			(0.258)	(0.242)
45 - 54 years of age	-	-0.825**	-	-0.484***	-	-	-0.717***	-0.275
		(0.405)		(0.172)			(0.252)	(0.239)
55 - 64 years of age	-	-0.536	-	-0.348**	-	-	-0.500**	-0.200
		(0.402)		(0.170)			(0.251)	(0.236)
vmbo	-	0.062	-	0.013	-0.011	-0.163	-0.159	0.213
		(0.440)		(0.187)	(0.302)	(0.231)	(0.271)	(0.261)
mbo+havo/vwo	-	0.324	-	0.115	0.251	-0.149	-0.083	0.348
		(0.432)		(0.183)	(0.279)	(0.230)	(0.267)	(0.256)
hbo+wo	-	0.795*	-	0.327*	0.419	0.117	0.266	0.466*
		(0.435)		(0.184)	(0.278)	(0.229)	(0.269)	(0.258)
Number of observations	1175	1160	1175	1160	422	738	587	573
Log likelihood	-	-	-1960	-1901	-676.9	-1207	-964.4	-925.7

Dependent variable: answer to the question "At what age do you think you will retire?"(in six answer categories). Standard errors in parentheses, *** Significant at 1% level, ** Significant at 5% level, * Significant at 10% level. Controls: gender, income, homeowner, age, region and education. Gender is omitted in the male and female sample, while age is omitted in the 'age below/above 45 years of age' sample. Sample restricted to the non-retired and under the age of 65 years.

Table 4.E.1 Study into the effect of the age anchor on the stated retirement age (complete table 4.1; continued)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Cardinal dependent variable		Ordinal dependent variable					
	Whole sample; effect age anchor only	Whole Sample; effect age anchor and controls	Whole sample; effect age anchor only	Whole Sample; effect age anchor and controls	Sample: younger than 45 years of age	Sample: older than 45 years of age	Sample: men only	Sample: women only
Family income between 1151 and 1800 Euro	-	0.520 (0.347)	-	0.182 (0.148)	0.186 (0.257)	0.123 (0.182)	0.031 (0.239)	0.271 (0.191)
Family income between 1801 and 2600 Euro	-	0.334 (0.329)	-	0.119 (0.140)	0.263 (0.244)	0.013 (0.173)	0.009 (0.225)	0.189 (0.183)
Family income more than 2600 Euro	-	0.184 (0.321)	-	0.050 (0.137)	0.086 (0.240)	0.007 (0.167)	-0.095 (0.221)	0.132 (0.176)
Rental home	-	0.399** (0.192)	-	0.197** (0.081)	0.478*** (0.139)	0.062 (0.102)	0.219* (0.118)	0.213* (0.115)
Region North	-	-0.144 (0.228)	-	-0.106 (0.097)	-0.321** (0.154)	0.005 (0.126)	-0.130 (0.136)	-0.080 (0.139)
Region East	-	-0.054 (0.192)	-	-0.063 (0.081)	-0.286** (0.131)	0.020 (0.104)	-0.032 (0.115)	-0.079 (0.116)
Region South	-	-0.732*** (0.192)	-	-0.274*** (0.082)	-0.475*** (0.146)	- (0.101)	-0.291** (0.115)	-0.259** (0.119)
Constant	65.480* (0.131)	65.579*** (0.588)	-	-	-	-	-	-
d1	-	-	-0.794*** (0.061)	-0.990*** (0.252)	-0.729** (0.363)	- (0.290)	-1.542*** (0.358)	-0.327 (0.356)
d2	-	-	0.093 (0.057)	-0.070 (0.251)	0.160 (0.362)	0.089 (0.289)	-0.574 (0.356)	0.557 (0.357)
d3	-	-	0.395*** (0.058)	0.243 (0.252)	0.351 (0.362)	0.478* (0.290)	-0.220 (0.356)	0.835** (0.358)
d4	-	-	1.102*** (0.064)	0.972*** (0.253)	1.217*** (0.364)	1.129** (0.292)	0.455 (0.356)	1.638*** (0.360)
d5	-	-	1.584*** (0.072)	1.465*** (0.254)	1.735*** (0.369)	1.612** (0.294)	0.953*** (0.358)	2.140*** (0.365)
Number of observations	1175	1160	1175	1160	422	738	587	573
Log likelihood	-	-	-1960	-1901	-676.9	-1207	-964.4	-925.7

Dependent variable: answer to the question "At what age do you think you will retire?"(in six answer categories). Standard errors in parentheses, *** Significant at 1% level, ** Significant at 5% level, * Significant at 10% level. Controls: gender, income, homeowner, age, region and education. Gender is omitted in the male and female sample, while age is omitted in the 'age below/above 45 years of age' sample. Sample restricted to the non-retired and under the age of 65 years.

Table 4.E.2 Effect of age anchors on the individual retirement age of female respondents broken down in different categories based on background characteristics (complete table 4.2)

	Single women (and who are head of a household)	Cohabiting women (and who are household head or spouse)	lower-earning women	Higher-earning women	lower educated women	higher educated women	Below 45 years of age	Above 45 years of age
Anchor 67 years of age	0.425*	0.288**	0.313*	0.413***	0.323*	0.411***	0.388**	0.385***
	(0.233)	(0.129)	(0.166)	(0.147)	(0.170)	(0.144)	(0.170)	(0.145)
Anchor 68 years of age	0.583**	0.196	0.275	0.369**	0.223	0.414***	0.372**	0.324**
	(0.245)	(0.132)	(0.168)	(0.152)	(0.172)	(0.150)	(0.185)	(0.142)
25 - 34 years of age	-0.110	-0.757	0.257	-1.143	0.442	-0.383	-	-
	(1.162)	(0.512)	(0.379)	(0.760)	(0.469)	(0.392)		
35 - 44 years of age	-0.506	-0.606	-0.030	-0.900	0.090	-0.180	-	-
	(1.101)	(0.486)	(0.269)	(0.749)	(0.309)	(0.373)		
45 - 54 years of age	-0.741	-0.835*	-0.222	-1.072	-0.133	-0.402	-	-
	(1.112)	(0.487)	(0.270)	(0.747)	(0.307)	(0.372)		
55 - 64 years of age	-0.612	-0.757	-0.162	-1.011	0.061	-0.449	-	-
	(1.109)	(0.485)	(0.260)	(0.745)	(0.298)	(0.373)		
vmbo	-1.443**	0.339	0.360	-1.383*	-	-	0.458	-0.041
	(0.683)	(0.340)	(0.288)	(0.760)			(0.435)	(0.325)
mbo+havo/vwo	-1.094	0.387	0.445	-1.244*	-	-	0.634	0.037
	(0.668)	(0.342)	(0.287)	(0.747)			(0.403)	(0.322)
hbo+wo	-1.242*	0.551	0.389	-0.994	-	-	0.702*	0.215
	(0.666)	(0.346)	(0.308)	(0.740)			(0.404)	(0.323)
Number of observations	136	408	270	305	253	320	230	343
Log likelihood	-213.1	-653.0	-433.1	-486.6	-393.4	-521.7	-358.0	-554.5

Dependent variable: answer to the question "At what age do you think you will retire?"(in six answer categories). Standard errors in parentheses, *** Significant at 1% level, ** Significant at 5% level, * Significant at 10% level. Controls: gender, income, homeowner, age, region and education, where appropriate. 'Non-cohabiting' and 'cohabiting' takes cohabiting or non-cohabiting household heads from the data to attain a fair comparison. In this way, children living at home for example are omitted. 'Lower earning' and 'higher earning' contrasts women with individual gross earnings less and more than 1500 Euros per month. 'Higher educated' consists of those who completed at most tertiary education (hbo or wo) or upper secondary education (havo or vwo). 'Lower' educated attained at most primary school, lower secondary education (vmbo) or vocational tertiary education (mbo).

Table 4.E.2 Effect of age anchors on the individual retirement age of female respondents broken down in different categories based on background characteristics (complete table 4.2; continued)

	Single women (and who are head of a household)	Cohabiting women (and who are household head or spouse)	lower-earning women	Higher-earning women	lower educated women	higher educated women	Below 45 years of age	Above 45 years of age
Family income between 1151 and 1800 Euro	0.258	0.244	-	-	0.102	0.456	0.212	0.297
	(0.253)	(0.413)			(0.266)	(0.285)	(0.301)	(0.254)
Family income between 1801 and 2600 Euro	0.332	0.222	-	-	0.109	0.259	0.227	0.165
	(0.315)	(0.381)			(0.248)	(0.276)	(0.289)	(0.238)
Family income more than 2600	0.436	0.208	-	-	0.193	0.100	0.009	0.213
	(0.385)	(0.373)			(0.236)	(0.270)	(0.279)	(0.232)
Rental home	0.068	0.320**	0.211	0.256	0.322**	0.098	0.418**	0.045
	(0.215)	(0.156)	(0.145)	(0.157)	(0.162)	(0.167)	(0.179)	(0.152)
Region North	-0.029	-0.063	0.022	-0.201	0.061	-0.130	-0.308	0.079
	(0.354)	(0.161)	(0.195)	(0.201)	(0.207)	(0.192)	(0.215)	(0.186)
Region East	-0.144	-0.054	0.022	-0.125	-0.139	-0.060	-0.307*	0.065
	(0.240)	(0.141)	(0.169)	(0.163)	(0.184)	(0.152)	(0.179)	(0.154)
Region South	-0.109	-0.221	-0.433**	-0.096	-0.181	-0.261	-0.252	-0.311**
	(0.258)	(0.144)	(0.180)	(0.162)	(0.178)	(0.162)	(0.197)	(0.153)
d1	-2.444*	-0.753	-0.353	-2.828***	-0.357	-0.946**	-0.043	-0.357
	(1.326)	(0.707)	(0.354)	(1.062)	(0.388)	(0.469)	(0.507)	(0.397)
d2	-1.567	0.152	0.579	-1.971*	0.593	-0.094	0.842*	0.545
	(1.321)	(0.707)	(0.354)	(1.059)	(0.389)	(0.468)	(0.509)	(0.397)
d3	-1.265	0.438	0.834**	-1.666	0.879**	0.185	0.981*	0.925**
	(1.319)	(0.708)	(0.355)	(1.058)	(0.390)	(0.469)	(0.509)	(0.399)
d4	-0.228	1.199*	1.507***	-0.724	1.607***	1.053**	1.920***	1.635***
	(1.315)	(0.709)	(0.363)	(1.053)	(0.397)	(0.470)	(0.516)	(0.404)
d5	0.483	1.618**	1.976***	-0.184	2.308***	1.473***	2.406***	2.152***
	(1.322)	(0.711)	(0.371)	(1.055)	(0.419)	(0.472)	(0.524)	(0.412)
Number of observations	136	408	270	305	253	320	230	343
Log likelihood	-213.1	-653.0	-433.1	-486.6	-393.4	-521.7	-358.0	-554.5

Dependent variable: answer to the question "At what age do you think you will retire?"(in six answer categories). Standard errors in parentheses, *** Significant at 1% level, ** Significant at 5% level, * Significant at 10% level. Controls: gender, income, homeowner, age, region and education, where appropriate. 'Non-cohabiting' and 'cohabiting' takes cohabiting or non-cohabiting household heads from the data to attain a fair comparison. In this way, children living at home for example are omitted. 'Lower earning' and 'higher earning' contrasts women with individual gross earnings less and more than 1500 Euros per month. 'Higher educated' consists of those who completed at most tertiary education (hbo or wo) or upper secondary education (havo or vwo). 'Lower' educated attained at most primary school, lower secondary education (vmbo) or vocational tertiary education (mbo).

Table 4.E.3 Study into the effect of the age anchor broken down by years (complete table 4.3)

	Retirement at … years of age					
	<65	**65**	**66**	**67**	**68**	**>68**
Whole sample						
Anchor 67 years of age	-0.107	-0.348***	0.113	0.342***	-0.108	0.256*
	(0.108)	(0.095)	(0.122)	(0.099)	(0.144)	(0.144)
Anchor 68 years of age	0.061	-0.249***	0.155	-0.228**	0.449***	0.192
	(0.106)	(0.095)	(0.122)	(0.108)	(0.127)	(0.147)
gender respondent	0.169*	-0.000	-0.121	0.063	-0.106	-0.198*
	(0.087)	(0.078)	(0.098)	(0.084)	(0.107)	(0.116)
Age 45 or older	0.132	0.134	0.414***	-0.309***	-0.161	-0.232**
	(0.093)	(0.083)	(0.110)	(0.086)	(0.110)	(0.117)
Higher educated	-0.071	-0.236***	0.179	0.022	0.223*	0.257*
	(0.099)	(0.088)	(0.114)	(0.097)	(0.131)	(0.142)
1801 Euros or higher	-0.017	0.014	0.130	-0.041	-0.098	0.025
	(0.117)	(0.104)	(0.135)	(0.111)	(0.139)	(0.150)
Rental home	-0.082	-0.189*	0.150	-0.034	0.078	0.324**
	(0.115)	(0.102)	(0.125)	(0.109)	(0.134)	(0.137)
Region North	-0.023	0.156	-0.092	0.116	-0.168	-0.286
	(0.140)	(0.121)	(0.157)	(0.127)	(0.179)	(0.183)
Region East	-0.034	0.159	-0.172	0.023	0.126	-0.292*
	(0.117)	(0.102)	(0.134)	(0.108)	(0.134)	(0.151)
Region South	0.290***	0.014	0.066	-0.158	-0.010	-0.425**
	(0.110)	(0.104)	(0.124)	(0.114)	(0.143)	(0.166)
Constant	-1.050***	-0.240	-1.745***	-0.622***	-1.459***	-1.521***
	(0.181)	(0.159)	(0.213)	(0.171)	(0.222)	(0.242)
Observations	1160	1160	1160	1160	1160	1160
log likelihood	-537.8	-703.3	-410.1	-594.5	-336.0	-286.2

Dependent variable is a dummy indicating retirement at the age in the column under consideration. Suppose a respondent indicates to retire at 66 years of age. Then the dummy for retirement at 66 years of age equals one (the case for the column '66', while the dummies for retirement at other ages (and thus columns) equal zero. Standard errors in parentheses, *** Significant at 1% level, ** Significant at 5% level, * Significant at 10% level. Controls are included: gender (only in whole sample), income, homeowner, age, region of the Netherlands and education.

Table 4.E.3 Study into the effect of the age anchor broken down by years (complete table 4.3; continued)

	Retirement at … years of age					
	<65	**65**	**66**	**67**	**68**	**>68**
Male sample						
Anchor 67 years of age	-0.156	-0.077	0.089	0.224	-0.244	0.069
	(0.160)	(0.133)	(0.167)	(0.143)	(0.197)	(0.184)
Anchor 68 years of age	0.154	-0.178	0.195	-0.172	0.277	-0.190
	(0.152)	(0.135)	(0.165)	(0.152)	(0.172)	(0.198)
Age 45 or older	0.223	0.247**	0.298**	-0.319**	-0.221	-0.335**
	(0.142)	(0.120)	(0.151)	(0.125)	(0.152)	(0.161)
Higher educated	-0.108	-0.233*	0.272*	-0.046	0.326*	0.191
	(0.141)	(0.123)	(0.160)	(0.136)	(0.188)	(0.185)
1801 Euros or higher	-0.115	0.139	-0.135	0.166	-0.199	-0.016
	(0.174)	(0.156)	(0.183)	(0.172)	(0.200)	(0.208)
Rental home	-0.081	-0.153	-0.011	0.056	-0.130	0.443**
	(0.167)	(0.146)	(0.175)	(0.157)	(0.196)	(0.185)
Region North	-0.044	0.350**	-0.283	-0.111	-0.014	-0.141
	(0.204)	(0.167)	(0.227)	(0.186)	(0.231)	(0.240)
Region East	-0.065	0.144	-0.102	0.078	0.053	-0.298
	(0.173)	(0.144)	(0.178)	(0.151)	(0.191)	(0.209)
Region South	0.324**	0.026	0.099	-0.301*	0.040	-0.279
	(0.157)	(0.145)	(0.167)	(0.165)	(0.193)	(0.214)
Constant	-1.028***	-0.573***	-1.484***	-0.683***	-1.283***	-1.259***
	(0.251)	(0.217)	(0.273)	(0.237)	(0.289)	(0.302)
Observations	587	587	587	587	587	587
log likelihood	-252.6	-357.5	-224.3	-292.2	-178.7	-157.7
Female sample						
Anchor 67 years of age	-0.065	-0.656***	0.152	0.445***	0.068	0.631**
	(0.148)	(0.139)	(0.182)	(0.140)	(0.218)	(0.256)
Anchor 68 years of age	-0.014	-0.341**	0.122	-0.283*	0.649***	0.732***
	(0.150)	(0.136)	(0.186)	(0.158)	(0.198)	(0.256)
Age 45 or older	0.075	0.020	0.557***	-0.271**	-0.095	-0.169
	(0.126)	(0.117)	(0.167)	(0.122)	(0.163)	(0.178)
Higher educated	-0.041	-0.272**	0.092	0.096	0.157	0.458*
	(0.140)	(0.129)	(0.169)	(0.142)	(0.190)	(0.236)
1801 Euros or higher	0.051	-0.129	0.431**	-0.199	0.042	0.103
	(0.159)	(0.144)	(0.205)	(0.150)	(0.200)	(0.228)
Rental home	-0.094	-0.272*	0.379**	-0.131	0.315*	0.261
	(0.160)	(0.148)	(0.185)	(0.154)	(0.190)	(0.214)
Region North	-0.014	-0.062	0.120	0.303*	-0.376	-0.384
	(0.193)	(0.179)	(0.224)	(0.178)	(0.300)	(0.288)
Region East	-0.011	0.179	-0.273	-0.038	0.207	-0.261
	(0.160)	(0.144)	(0.211)	(0.157)	(0.190)	(0.223)
Region South	0.235	0.017	0.035	-0.037	-0.059	-0.621**
	(0.156)	(0.151)	(0.190)	(0.160)	(0.218)	(0.283)
Constant	-0.900***	0.137	-2.213***	-0.562**	-1.861***	-2.289***
	(0.240)	(0.220)	(0.324)	(0.234)	(0.332)	(0.408)
Observations	573	573	573	573	573	573
log likelihood	-283.6	-337.6	-180.9	-296.5	-153.3	-122.6

Dependent variable is a dummy indicating retirement at the age in the column under consideration. Suppose a respondent indicates to retire at 66 years of age. Then the dummy for retirement at 66 years of age equals one (the case for the column '66', while the dummies for retirement at other ages (and thus columns) equal zero. Standard errors in parentheses, *** Significant at 1% level, ** Significant at 5% level, * Significant at 10% level. Controls are included: gender (only in whole sample), income, homeowner, age, region of the Netherlands and education.

Table 4.E.4 Study into the influence of financial literacy on the effect of the age anchor (complete Table 4.4)

	Whole sample		Male		Female	
Anchor 67 years of age	0.253***	0.254***	0.136	0.147	0.385***	0.396***
	(0.076)	(0.076)	(0.107)	(0.115)	(0.109)	(0.111)
Anchor 68 years of age	0.147*	0.147*	-0.057	-0.003	0.339***	0.360***
	(0.076)	(0.076)	(0.107)	(0.112)	(0.112)	(0.115)
fin. lit. index	0.063*	0.120*	0.116*	0.242**	0.056	0.002
	(0.038)	(0.066)	(0.065)	(0.109)	(0.047)	(0.088)
Age anchor 67 years of age * fin. lit. index	-	-0.051	-	-0.074	-	0.056
		(0.089)		(0.163)		(0.114)
Age anchor 68 years of age * fin. lit. index	-	-0.102	-	-0.255*	-	0.091
		(0.086)		(0.140)		(0.115)
gender respondent	-0.104	-0.105	-	-	-	-
	(0.064)	(0.064)				
25 - 34 years of age	-0.134	-0.135	-0.014	-0.036	-0.150	-0.147
	(0.197)	(0.197)	(0.291)	(0.292)	(0.274)	(0.275)
35 - 44 years of age	-0.243	-0.245	-0.364	-0.383	-0.117	-0.111
	(0.175)	(0.175)	(0.258)	(0.261)	(0.243)	(0.243)
45 - 54 years of age	-0.502***	-0.506***	-0.736***	-0.750***	-0.292	-0.283
	(0.172)	(0.172)	(0.253)	(0.255)	(0.240)	(0.241)
55 - 64 years of age	-0.371**	-0.379**	-0.517**	-0.546**	-0.230	-0.218
	(0.171)	(0.171)	(0.251)	(0.253)	(0.237)	(0.238)
vmbo	0.012	0.014	-0.194	-0.169	0.227	0.225
	(0.186)	(0.186)	(0.272)	(0.274)	(0.261)	(0.261)
mbo+havo/vwo	0.099	0.104	-0.146	-0.128	0.348	0.340
	(0.183)	(0.183)	(0.269)	(0.270)	(0.256)	(0.258)
hbo+wo	0.294	0.299	0.176	0.197	0.451*	0.448*
	(0.185)	(0.185)	(0.273)	(0.275)	(0.258)	(0.259)
Family income between 1151 and 1800 Euro	0.194	0.188	0.026	0.017	0.290	0.294
	(0.148)	(0.148)	(0.239)	(0.240)	(0.192)	(0.192)
Family income between 1801 and 2600 Euro	0.122	0.117	0.002	-0.001	0.193	0.198
	(0.140)	(0.141)	(0.225)	(0.226)	(0.183)	(0.183)
Family income more than 2600 Euro	0.048	0.043	-0.119	-0.126	0.135	0.139
	(0.137)	(0.137)	(0.221)	(0.222)	(0.177)	(0.177)
Rental home	0.215***	0.211**	0.241**	0.233*	0.233**	0.240**
	(0.082)	(0.082)	(0.119)	(0.119)	(0.116)	(0.117)
Region North	-0.103	-0.101	-0.119	-0.114	-0.080	-0.080
	(0.097)	(0.097)	(0.136)	(0.136)	(0.139)	(0.139)
Region East	-0.058	-0.056	-0.027	-0.020	-0.073	-0.073
	(0.081)	(0.082)	(0.115)	(0.115)	(0.116)	(0.117)
Region South	-0.268***	-0.265***	-0.277**	-0.265**	-0.257**	-0.256**
	(0.082)	(0.082)	(0.115)	(0.115)	(0.119)	(0.119)
d1	-1.007***	-1.011***	-1.604***	-1.584***	-0.353	-0.334
	(0.252)	(0.252)	(0.360)	(0.360)	(0.357)	(0.357)
d2	-0.084	-0.088	-0.629*	-0.607*	0.532	0.552
	(0.252)	(0.252)	(0.357)	(0.357)	(0.357)	(0.358)
d3	0.230	0.227	-0.274	-0.251	0.811**	0.831**
	(0.252)	(0.252)	(0.357)	(0.357)	(0.358)	(0.359)
d4	0.959***	0.956***	0.401	0.428	1.614***	1.634***
	(0.253)	(0.253)	(0.358)	(0.358)	(0.361)	(0.362)
d5	1.451***	1.449***	0.898**	0.927***	2.115***	2.136***
	(0.255)	(0.255)	(0.359)	(0.359)	(0.365)	(0.366)
log likelihood	-1900	-1899	-962.8	-961.1	-925.0	-924.7
p-value LR-test	0.4852		0.1680		0.7294	
Observations	1160		587		573	

Dependent variable: answer to the question "At what age do you think you will retire?"(in six answer categories). Standard errors in parentheses, *** Significant at 1% level, ** Significant at 5% level, * Significant at 10% level. Controls: gender, income, homeowner, age, region and education. Gender is omitted in the male and female sample. Sample restricted to the non-retired and under the age of 65 years. The Likelihood Ratio-test tests the joint significance of the two interaction terms.

Table 4.E.5 Study into the influence of advice from the pension fund or financial advisor on the effect of the age anchor (complete Table 4.5)

	Whole sample		Male		Female	
Anchor 67 years of age	0.236***	0.280***	0.107	0.123	0.383***	0.466***
	(0.077)	(0.096)	(0.109)	(0.135)	(0.111)	(0.137)
Anchor 68 years of age	0.145*	0.016	-0.071	-0.104	0.354***	0.126
	(0.078)	(0.096)	(0.110)	(0.133)	(0.114)	(0.140)
A lot of value attached to advice	0.060	-0.030	0.033	0.012	0.085	-0.073
	(0.066)	(0.121)	(0.094)	(0.169)	(0.094)	(0.176)
Anchor 67 * A lot of value attached to advice	-	-0.091	-	-0.036	-	-0.144
		(0.163)		(0.231)		(0.233)
Anchor 68 * A lot of value attached to advice	-	0.371**	-	0.100	-	0.644***
		(0.166)		(0.233)		(0.242)
gender respondent	-0.129**	-0.131**	-	-	-	
	(0.063)	(0.063)				
25 - 34 years of age	-0.158	-0.178	-0.061	-0.077	-0.214	-0.226
	(0.214)	(0.214)	(0.341)	(0.342)	(0.281)	(0.281)
35 - 44 years of age	-0.222	-0.245	-0.398	-0.411	-0.111	-0.135
	(0.191)	(0.191)	(0.308)	(0.308)	(0.247)	(0.248)
45 - 54 years of age	-0.496***	-0.515***	-0.768**	-0.779**	-0.322	-0.339
	(0.189)	(0.189)	(0.303)	(0.303)	(0.246)	(0.246)
55 - 64 years of age	-0.363*	-0.385**	-0.553*	-0.567*	-0.240	-0.258
	(0.187)	(0.187)	(0.301)	(0.302)	(0.243)	(0.243)
vmbo	-0.039	-0.024	-0.273	-0.268	0.180	0.215
	(0.195)	(0.196)	(0.289)	(0.289)	(0.269)	(0.269)
mbo+havo/vwo	0.075	0.091	-0.216	-0.212	0.357	0.401
	(0.191)	(0.192)	(0.285)	(0.285)	(0.263)	(0.264)
hbo+wo	0.288	0.306	0.162	0.166	0.457*	0.515*
	(0.192)	(0.193)	(0.285)	(0.286)	(0.264)	(0.266)
Family income between 1151 and 1800 Euro	0.201	0.196	0.070	0.069	0.280	0.270
	(0.153)	(0.153)	(0.240)	(0.240)	(0.200)	(0.201)
Family income between 1801 and 2600 Euro	0.077	0.086	-0.034	-0.034	0.155	0.184
	(0.146)	(0.146)	(0.227)	(0.227)	(0.193)	(0.194)
Family income more than 2600 Euro	0.021	0.025	-0.119	-0.118	0.092	0.101
	(0.142)	(0.142)	(0.222)	(0.222)	(0.186)	(0.186)
Rental home	0.163*	0.168**	0.187	0.190	0.164	0.171
	(0.084)	(0.084)	(0.120)	(0.120)	(0.120)	(0.120)
Region North	-0.118	-0.114	-0.187	-0.189	-0.058	-0.036
	(0.099)	(0.099)	(0.139)	(0.140)	(0.141)	(0.142)
Region East	-0.075	-0.069	-0.064	-0.058	-0.082	-0.101
	(0.083)	(0.083)	(0.116)	(0.117)	(0.118)	(0.119)
Region South	-0.267***	-0.259***	-0.314***	-0.309***	-0.234*	-0.242**
	(0.083)	(0.083)	(0.117)	(0.117)	(0.122)	(0.122)
d1	-1.054***	-1.082***	-1.754***	-1.766***	-0.363	-0.380
	(0.272)	(0.274)	(0.408)	(0.412)	(0.363)	(0.366)
d2	-0.151	-0.175	-0.795*	-0.805**	0.498	0.491
	(0.271)	(0.273)	(0.406)	(0.410)	(0.363)	(0.366)
d3	0.171	0.148	-0.432	-0.443	0.787**	0.782**
	(0.271)	(0.274)	(0.405)	(0.410)	(0.364)	(0.367)
d4	0.909***	0.888***	0.250	0.239	1.606***	1.613***
	(0.272)	(0.274)	(0.405)	(0.409)	(0.367)	(0.370)
d5	1.401***	1.383***	0.770*	0.758*	2.083***	2.101***
	(0.273)	(0.276)	(0.406)	(0.410)	(0.371)	(0.374)
log likelihood	-1837	-1832	-930.4	-930.2	-893.0	-886.2
p-value LR-test	0.0091		0.8260		0.0012	
Observations	1119		567		552	

Dependent variable: answer to the question "At what age do you think you will retire?"(in six answer categories). Standard errors in parentheses, *** Significant at 1% level, ** Significant at 5% level, * Significant at 10% level. Controls: gender, income, homeowner, age, region and education. Gender is omitted in the male and female sample. Sample restricted to the non-retired and under the age of 65 years. The Likelihood Ratio-test tests the joint significance of the two interaction terms.

Table 4.E.6 Estimation of the relevance of advice for the sensitivity to age anchors at different retirement ages

	Retirement at (years of age)					
	Before 65	**65**	**66**	**67**	**68**	**After 68**
Whole sample						
Anchor 67 years of age	-0.125	-0.479***	0.356**	0.447***	-0.217	0.169
	(0.139)	(0.121)	(0.161)	(0.124)	(0.186)	(0.178)
Anchor 68 years of age	0.241*	-0.357***	0.327**	-0.194	0.367**	-0.027
	(0.131)	(0.119)	(0.161)	(0.135)	(0.158)	(0.189)
A lot of value attached to advice	0.177	-0.374**	0.534***	0.075	-0.134	-0.142
	(0.165)	(0.152)	(0.187)	(0.163)	(0.229)	(0.251)
Anchor 67 * A lot of value attached to advice	-0.018	0.486**	-0.638**	-0.293	0.301	0.133
	(0.227)	(0.207)	(0.254)	(0.214)	(0.313)	(0.318)
Anchor 68 * A lot of value attached to advice	-0.614***	0.396*	-0.436*	-0.121	0.261	0.557*
	(0.234)	(0.210)	(0.253)	(0.235)	(0.284)	(0.321)
gender respondent	0.178**	-0.017	-0.115	0.073	-0.145	-0.166
	(0.089)	(0.080)	(0.099)	(0.085)	(0.110)	(0.119)
Age 45 or older	0.122	0.165*	0.380***	-0.298***	-0.182	-0.245**
	(0.096)	(0.086)	(0.112)	(0.088)	(0.113)	(0.121)
Higher educated (mbo+havo/vwo+hbo+wo)	-0.105	-0.192**	0.125	0.008	0.258*	0.273*
	(0.101)	(0.092)	(0.117)	(0.100)	(0.138)	(0.150)
household income 1801 Euros or higher	0.032	0.030	0.106	-0.067	-0.122	0.007
	(0.121)	(0.108)	(0.137)	(0.114)	(0.144)	(0.154)
Rental home	-0.024	-0.214**	0.150	-0.040	0.032	0.332**
	(0.118)	(0.107)	(0.128)	(0.112)	(0.140)	(0.141)
Region North	-0.030	0.158	-0.109	0.142	-0.134	-0.392*
	(0.143)	(0.125)	(0.160)	(0.130)	(0.182)	(0.200)
Region East	-0.028	0.157	-0.194	0.053	0.101	-0.280*
	(0.120)	(0.104)	(0.138)	(0.110)	(0.138)	(0.153)
Region South	0.287**	-0.006	0.065	-0.138	0.006	-0.413**
	(0.113)	(0.106)	(0.126)	(0.116)	(0.145)	(0.168)
Constant	-1.114***	-0.207	-1.847***	-0.630***	-1.398***	-1.466***
	(0.192)	(0.168)	(0.229)	(0.180)	(0.236)	(0.257)
Observations	1119	1119	1119	1119	1119	1119
Log likelihood	-517.9	-670.3	-399.6	-574.9	-319.7	-270.7

Dependent variable is a dummy indicating retirement at the age in the column under consideration. Suppose a respondent indicates to retire at 66 years of age. Then the dummy for retirement at 66 years of age equals one (the case for the column '66', while the dummies for retirement at other ages (and thus columns) equal zero. Standard errors in parentheses, *** Significant at 1% level, ** Significant at 5% level, * Significant at 10% level. Controls: gender, household income, homeowner, age, region and education. Sample restricted to the non-retired and under the age of 65 years.

The following tables study the influence of advice from the pension fund or financial advisor on the effect of the age anchor for each retirement age in more detail and for both male and female respondents.

Table 4.E.7 Retirement before 65 years of age

	Male		Female	
25 - 34 years of age	0.391	0.455	-0.072	-0.072
	(0.642)	(0.647)	(0.397)	(0.402)
35 - 44 years of age	0.576	0.636	-0.014	0.005
	(0.589)	(0.593)	(0.346)	(0.350)
45 - 54 years of age	0.912	0.966*	0.157	0.170
	(0.578)	(0.581)	(0.341)	(0.345)
55 - 64 years of age	0.583	0.651	-0.079	-0.066
	(0.578)	(0.581)	(0.341)	(0.344)
vmbo	0.035	0.032	-0.079	-0.095
	(0.418)	(0.423)	(0.373)	(0.378)
mbo+havo/vwo	0.082	0.076	-0.146	-0.176
	(0.413)	(0.417)	(0.366)	(0.372)
hbo+wo	-0.380	-0.370	-0.205	-0.245
	(0.417)	(0.421)	(0.370)	(0.375)
Family income between 1151 and 1800 Euro	-0.306	-0.284	-0.423	-0.398
	(0.348)	(0.351)	(0.279)	(0.282)
Family income between 1801 and 2600 Euro	-0.249	-0.259	-0.137	-0.157
	(0.329)	(0.331)	(0.263)	(0.265)
Family income more than 2600 Euro	-0.199	-0.195	-0.130	-0.121
	(0.328)	(0.330)	(0.258)	(0.261)
Rental home	-0.080	-0.086	-0.022	-0.028
	(0.180)	(0.182)	(0.171)	(0.173)
Not in a job now, but worked before	-0.193	-0.174	0.046	0.060
	(0.231)	(0.234)	(0.154)	(0.157)
Region North	0.020	0.029	-0.050	-0.086
	(0.212)	(0.213)	(0.200)	(0.203)
Region East	-0.061	-0.081	-0.005	0.008
	(0.182)	(0.184)	(0.165)	(0.167)
Region South	0.381**	0.375**	0.197	0.198
	(0.164)	(0.164)	(0.161)	(0.163)
Anchor 67 years of age	-0.241	-0.257	-0.058	-0.208
	(0.167)	(0.281)	(0.152)	(0.237)
Anchor 68 years of age	0.184	0.387	-0.051	0.067
	(0.158)	(0.239)	(0.155)	(0.232)
Little value attached to advice	-0.223	-0.258	0.060	-0.054
	(0.172)	(0.311)	(0.161)	(0.266)
A lot of value attached to advice	-0.026	0.218	-0.088	-0.004
	(0.152)	(0.259)	(0.144)	(0.261)
Anchor 67 * Little value attached to advice	-	0.175	-	0.173
		(0.449)		(0.395)
Anchor 68 * Little value attached to advice	-	-0.039	-	0.200
		(0.409)		(0.388)
Anchor 67 * A lot of value attached to advice	-	-0.104	-	0.226
		(0.388)		(0.350)
Anchor 68 * A lot of value attached to advice	-	-0.575	-	-0.559
		(0.362)		(0.373)
Constant	-1.319*	-1.456**	-0.532	-0.509
	(0.675)	(0.694)	(0.489)	(0.506)
Observations	567	567	552	552
Log Likelihood	-236.4	-234.8	-271.8	-268.4
p-value LR test	0.5209		0.1442	

Dependent variable: binary answer to the question "At what age do you think you will retire?" Before 65 years of age is given the value one, while the other values are given zero. Standard errors in parentheses, *** Significant at 1% level, ** Significant at 5% level, * Significant at 10% level. Sample with the non-retired and under the age of 65 years. The p-value of the L(ikelihood) R(atio)-test lists the joint significance of the interaction terms and is obtained by testing the restricted model (first and third column) versus the full model (second and fourth column), respectively.

Table 4.E.8 Retirement at 65 years of age

	Male		Female	
25 - 34 years of age	-0.581	-0.641	0.309	0.303
	(0.452)	(0.456)	(0.380)	(0.383)
35 - 44 years of age	-0.244	-0.316	0.298	0.312
	(0.394)	(0.397)	(0.339)	(0.342)
45 - 54 years of age	-0.077	-0.128	0.247	0.257
	(0.387)	(0.389)	(0.336)	(0.338)
55 - 64 years of age	0.053	-0.005	0.368	0.382
	(0.383)	(0.385)	(0.333)	(0.335)
vmbo	0.162	0.114	-0.262	-0.262
	(0.369)	(0.372)	(0.344)	(0.346)
mbo+havo/vwo	0.010	-0.010	-0.397	-0.390
	(0.366)	(0.368)	(0.338)	(0.340)
hbo+wo	-0.038	-0.074	-0.533	-0.517
	(0.366)	(0.368)	(0.340)	(0.342)
Family income between 1151 and 1800 Euro	0.133	0.096	-0.012	-0.022
	(0.321)	(0.322)	(0.260)	(0.262)
Family income between 1801 and 2600 Euro	0.204	0.199	-0.080	-0.085
	(0.305)	(0.306)	(0.255)	(0.257)
Family income more than 2600 Euro	0.277	0.254	-0.116	-0.106
	(0.303)	(0.304)	(0.248)	(0.250)
Rental home	-0.099	-0.133	-0.336**	-0.333**
	(0.155)	(0.157)	(0.162)	(0.163)
Not in a job now, but worked before	-0.024	-0.032	-0.034	-0.024
	(0.183)	(0.186)	(0.143)	(0.145)
Region North	0.356**	0.347**	-0.063	-0.060
	(0.175)	(0.176)	(0.186)	(0.186)
Region East	0.174	0.175	0.206	0.193
	(0.149)	(0.151)	(0.151)	(0.152)
Region South	0.031	0.025	0.009	0.010
	(0.148)	(0.150)	(0.158)	(0.159)
Anchor 67 years of age	0.020	-0.286	-0.736***	-0.988***
	(0.138)	(0.223)	(0.145)	(0.221)
Anchor 68 years of age	-0.132	-0.481**	-0.387***	-0.522**
	(0.140)	(0.220)	(0.143)	(0.214)
Little value attached to advice	0.090	-0.124	-0.351**	-0.509**
	(0.141)	(0.241)	(0.160)	(0.242)
A lot of value attached to advice	-0.130	-0.651***	-0.064	-0.335
	(0.134)	(0.242)	(0.132)	(0.235)
Anchor 67 * Little value attached to advice		0.284		0.251
		(0.344)		(0.402)
Anchor 68 * Little value attached to advice		0.411		0.257
		(0.344)		(0.377)
Anchor 67 * A lot of value attached to advice		0.745**		0.535
		(0.334)		(0.326)
Anchor 68 * A lot of value attached to advice		0.790**		0.263
		(0.339)		(0.325)
Constant	-0.675	-0.355	0.171	0.271
	(0.543)	(0.563)	(0.481)	(0.489)
Observations	567	567	552	552
Log Likelihood	-341.1	-337.5	-315.5	-314.1
p-value LR test	0.1277		0.5670	

Dependent variable: binary answer to the question "At what age do you think you will retire?" The answer at '65 years of age' is given the value one, while the other values are given zero. Standard errors in parentheses, *** Significant at 1% level, ** Significant at 5% level, * Significant at 10% level. Sample restricted to the non-retired and under the age of 65 years. The p-value of the L(ikelihood) R(atio)-test lists the joint significance of the interaction terms and is obtained by testing the restricted model (first and third column) versus the full model (second and fourth column), respectively.

Table 4.E.9 Retirement at 66 years of age

	Male		Female	
25 - 34 years of age	-0.672	-0.680	0.252	0.248
	(0.713)	(0.723)	(0.476)	(0.491)
35 - 44 years of age	0.191	0.195	-0.494	-0.480
	(0.575)	(0.580)	(0.459)	(0.474)
45 - 54 years of age	0.299	0.298	0.354	0.380
	(0.568)	(0.572)	(0.421)	(0.435)
55 - 64 years of age	0.345	0.346	0.326	0.356
	(0.564)	(0.570)	(0.418)	(0.432)
vmbo	0.412	0.440	-0.113	-0.135
	(0.549)	(0.553)	(0.425)	(0.440)
mbo+havo/vwo	0.606	0.604	-0.081	-0.112
	(0.543)	(0.547)	(0.415)	(0.431)
hbo+wo	0.599	0.614	-0.075	-0.125
	(0.543)	(0.547)	(0.420)	(0.435)
Family income between 1151 and 1800 Euro	-0.250	-0.223	0.492	0.585
	(0.366)	(0.368)	(0.420)	(0.441)
Family income between 1801 and 2600 Euro	-0.392	-0.402	0.666	0.702
	(0.354)	(0.355)	(0.413)	(0.431)
Family income more than 2600 Euro	-0.476	-0.479	0.986**	0.994**
	(0.352)	(0.354)	(0.405)	(0.423)
Rental home	-0.060	-0.036	0.505**	0.524***
	(0.189)	(0.191)	(0.197)	(0.201)
Not in a job now, but worked before	-0.379	-0.389	0.205	0.113
	(0.252)	(0.253)	(0.188)	(0.201)
Region North	-0.304	-0.318	0.116	0.109
	(0.237)	(0.239)	(0.236)	(0.247)
Region East	-0.180	-0.168	-0.251	-0.220
	(0.186)	(0.188)	(0.219)	(0.223)
Region South	0.051	0.070	0.071	0.062
	(0.171)	(0.173)	(0.197)	(0.204)
Anchor 67 years of age	0.104	0.272	0.136	1.207***
	(0.172)	(0.282)	(0.192)	(0.418)
Anchor 68 years of age	0.193	0.273	0.114	0.886**
	(0.170)	(0.270)	(0.194)	(0.427)
Little value attached to advice	-0.122	-0.257	-0.076	0.892**
	(0.182)	(0.361)	(0.210)	(0.449)
A lot of value attached to advice	0.161	0.435	0.063	1.121**
	(0.158)	(0.282)	(0.172)	(0.437)
Anchor 67 * Little value attached to advice		0.179		-1.937***
		(0.468)		(0.681)
Anchor 68 * Little value attached to advice		0.140		-0.871
		(0.468)		(0.574)
Anchor 67 * A lot of value attached to advice		-0.519		-1.553***
		(0.397)		(0.517)
Anchor 68 * A lot of value attached to advice		-0.270		-1.133**
		(0.384)		(0.527)
Constant	-1.511*	-1.616*	-2.368***	-3.128***
	(0.807)	(0.836)	(0.663)	(0.761)
Observations	567	567	552	552
Log Likelihood	-215.3	-213.8	-172.4	-165.1
p-value LR test	0.5820		0.0057	

Dependent variable: binary answer to the question "At what age do you think you will retire?" The answer at '66 years of age' is given the value one, while the other values are given zero. Standard errors in parentheses, *** Significant at 1% level, ** Significant at 5% level, * Significant at 10% level. Sample restricted to the non-retired and under the age of 65 years. The p-value of the L(ikelihood) R(atio)-test lists the joint significance of the interaction terms and is obtained by testing the restricted model (first and third column) versus the full model (second and fourth column), respectively.

Table 4.E.10 Retirement at 67 years of age

	Male		Female	
25 - 34 years of age	0.635	0.601	-0.016	-0.003
	(0.500)	(0.499)	(0.376)	(0.377)
35 - 44 years of age	0.447	0.444	-0.014	-0.013
	(0.463)	(0.460)	(0.337)	(0.338)
45 - 54 years of age	0.120	0.107	-0.380	-0.375
	(0.460)	(0.458)	(0.340)	(0.342)
55 - 64 years of age	0.138	0.117	-0.151	-0.147
	(0.455)	(0.453)	(0.335)	(0.336)
vmbo	0.354	0.392	0.703	0.698
	(0.460)	(0.462)	(0.458)	(0.457)
mbo+havo/vwo	0.186	0.202	0.635	0.629
	(0.458)	(0.460)	(0.453)	(0.451)
hbo+wo	0.296	0.324	0.847*	0.836*
	(0.458)	(0.459)	(0.453)	(0.452)
Family income between 1151 and 1800 Euro	-0.102	-0.094	0.068	0.065
	(0.344)	(0.345)	(0.270)	(0.271)
Family income between 1801 and 2600 Euro	0.080	0.070	-0.258	-0.262
	(0.327)	(0.328)	(0.268)	(0.268)
Family income more than 2600 Euro	0.132	0.129	-0.263	-0.276
	(0.323)	(0.326)	(0.262)	(0.264)
Rental home	0.063	0.090	-0.156	-0.165
	(0.165)	(0.167)	(0.165)	(0.166)
Not in a job now, but worked before	0.185	0.170	-0.122	-0.123
	(0.197)	(0.200)	(0.156)	(0.157)
Region North	-0.053	-0.053	0.330*	0.326*
	(0.192)	(0.194)	(0.183)	(0.184)
Region East	0.097	0.107	-0.027	-0.023
	(0.156)	(0.157)	(0.161)	(0.163)
Region South	-0.272	-0.255	-0.011	-0.014
	(0.168)	(0.170)	(0.166)	(0.166)
Anchor 67 years of age	0.215	0.511**	0.533***	0.602***
	(0.147)	(0.238)	(0.147)	(0.228)
Anchor 68 years of age	-0.238	-0.099	-0.172	-0.085
	(0.156)	(0.249)	(0.164)	(0.255)
Little value attached to advice	0.082	0.268	0.275*	0.342
	(0.153)	(0.267)	(0.159)	(0.265)
A lot of value attached to advice	-0.043	0.256	0.010	0.125
	(0.145)	(0.255)	(0.142)	(0.271)
Anchor 67 * Little value attached to advice		-0.333		-0.029
		(0.365)		(0.367)
Anchor 68 * Little value attached to advice		-0.233		-0.199
		(0.388)		(0.419)
Anchor 67 * A lot of value attached to advice		-0.604*		-0.171
		(0.349)		(0.342)
Anchor 68 * A lot of value attached to advice		-0.241		-0.132
		(0.369)		(0.382)
Constant	-1.407**	-1.570**	-1.283**	-1.323**
	(0.658)	(0.673)	(0.582)	(0.590)
Observations	567	567	552	552
Log Likelihood	-279.6	-278.0	-283.4	-283.2
p-value LR test	0.5246		0.9716	

Dependent variable: binary answer to the question "At what age do you think you will retire?" The answer at '67 years of age' is given the value one, while the other values are given zero. Standard errors in parentheses, *** Significant at 1% level, ** Significant at 5% level, * Significant at 10% level. Sample restricted to the non-retired and under the age of 65 years. The p-value of the L(ikelihood) R(atio)-test lists the joint significance of the interaction terms and is obtained by testing the restricted model (first and third column) versus the full model (second and fourth column), respectively.

Table 4.E.11 Retirement at 68 years of age

	Male		Female	
25 - 34 years of age	0.332	0.373	-0.553	-0.562
	(0.532)	(0.544)	(0.471)	(0.473)
35 - 44 years of age	-0.303	-0.217	-0.295	-0.305
	(0.504)	(0.516)	(0.383)	(0.384)
45 - 54 years of age	-0.457	-0.386	-0.325	-0.324
	(0.501)	(0.511)	(0.378)	(0.379)
55 - 64 years of age	-0.252	-0.193	-0.545	-0.546
	(0.486)	(0.499)	(0.391)	(0.392)
vmbo	-0.892*	-0.944**	-0.082	-0.073
	(0.477)	(0.476)	(0.496)	(0.499)
mbo+havo/vwo	-0.563	-0.619	0.188	0.195
	(0.457)	(0.455)	(0.469)	(0.472)
hbo+wo	-0.367	-0.448	0.241	0.262
	(0.453)	(0.452)	(0.475)	(0.480)
Family income between 1151 and 1800 Euro	4.932	4.957	0.235	0.229
	(173.768)	(166.486)	(0.372)	(0.374)
Family income between 1801 and 2600 Euro	4.599	4.689	0.209	0.226
	(173.768)	(166.486)	(0.370)	(0.371)
Family income more than 2600 Euro	4.504	4.573	0.086	0.095
	(173.768)	(166.486)	(0.362)	(0.363)
Rental home	-0.026	-0.010	0.231	0.231
	(0.211)	(0.215)	(0.211)	(0.212)
Not in a job now, but worked before	0.032	0.028	0.089	0.094
	(0.267)	(0.271)	(0.204)	(0.206)
Region North	-0.064	-0.032	-0.290	-0.283
	(0.242)	(0.246)	(0.308)	(0.309)
Region East	-0.032	-0.038	0.180	0.174
	(0.206)	(0.208)	(0.203)	(0.204)
Region South	-0.032	-0.017	0.017	0.015
	(0.202)	(0.205)	(0.227)	(0.228)
Anchor 67 years of age	-0.240	-0.126	0.114	-0.045
	(0.210)	(0.375)	(0.228)	(0.377)
Anchor 68 years of age	0.295	0.450	0.657***	0.521
	(0.183)	(0.311)	(0.212)	(0.337)
Little value attached to advice	0.294	0.660**	0.309	0.143
	(0.196)	(0.334)	(0.215)	(0.397)
A lot of value attached to advice	0.147	0.041	0.137	-0.050
	(0.185)	(0.366)	(0.195)	(0.426)
Anchor 67 * Little value attached to advice		-0.883		0.361
		(0.600)		(0.557)
Anchor 68 * Little value attached to advice		-0.462		0.128
		(0.449)		(0.519)
Anchor 67 * A lot of value attached to advice		0.297		0.185
		(0.511)		(0.555)
Anchor 68 * A lot of value attached to advice		0.018		0.273
		(0.460)		(0.507)
Constant	-5.245	-5.418	-1.859***	-1.767***
	(173.768)	(166.486)	(0.635)	(0.657)
Observations	567	567	552	552
Log Likelihood	-163.3	-160.8	-140.1	-139.8
p-value LR test	-		0.9446	

Dependent variable: binary answer to the question "At what age do you think you will retire?" The answer at '68 years of age' is given the value one, while the other values are given zero. Standard errors in parentheses, *** Significant at 1% level, ** Significant at 5% level, * Significant at 10% level. Sample restricted to the non-retired and under the age of 65 years. The p-value of the L(ikelihood) R(atio)-test lists the joint significance of the interaction terms and is obtained by testing the restricted model (first and third column) versus the full model (second and fourth column), respectively.

Table 4.E.12 Retirement at 'after 68 years of age'

	Male		Female	
25 - 34 years of age	-0.530	-0.479	-0.149	-0.185
	(0.523)	(0.532)	(0.549)	(0.566)
35 - 44 years of age	-0.523	-0.512	0.182	0.204
	(0.456)	(0.465)	(0.470)	(0.489)
45 - 54 years of age	-0.904**	-0.896*	-0.097	-0.064
	(0.458)	(0.466)	(0.472)	(0.488)
55 - 64 years of age	-0.836*	-0.811*	-0.050	-0.006
	(0.444)	(0.451)	(0.476)	(0.491)
vmbo	-0.388	-0.423	-0.105	-0.039
	(0.484)	(0.489)	(0.551)	(0.559)
mbo+havo/vwo	-0.332	-0.363	0.368	0.430
	(0.467)	(0.472)	(0.515)	(0.526)
hbo+wo	0.144	0.124	0.361	0.454
	(0.463)	(0.468)	(0.523)	(0.533)
Family income between 1151 and 1800 Euro	-0.289	-0.278	-0.021	-0.066
	(0.404)	(0.405)	(0.399)	(0.404)
Family income between 1801 and 2600 Euro	-0.256	-0.259	0.261	0.263
	(0.378)	(0.379)	(0.396)	(0.401)
Family income more than 2600 Euro	-0.376	-0.389	-0.027	-0.021
	(0.379)	(0.381)	(0.390)	(0.393)
Rental home	0.414**	0.390*	0.266	0.310
	(0.207)	(0.209)	(0.232)	(0.237)
Not in a job now, but worked before	0.239	0.260	-0.101	-0.124
	(0.244)	(0.248)	(0.246)	(0.251)
Region North	-0.336	-0.355	-0.403	-0.396
	(0.282)	(0.286)	(0.303)	(0.313)
Region East	-0.235	-0.245	-0.296	-0.342
	(0.219)	(0.221)	(0.231)	(0.236)
Region South	-0.292	-0.315	-0.658**	-0.704**
	(0.225)	(0.227)	(0.294)	(0.301)
Anchor 67 years of age	0.049	-0.190	0.653**	0.613
	(0.199)	(0.313)	(0.267)	(0.380)
Anchor 68 years of age	-0.219	-0.242	0.957***	0.466
	(0.208)	(0.301)	(0.283)	(0.394)
Little value attached to advice	-0.250	-0.558	0.188	0.144
	(0.222)	(0.401)	(0.299)	(0.482)
A lot of value attached to advice	-0.015	-0.078	0.133	-3.754
	(0.189)	(0.324)	(0.198)	(142.656)
Anchor 67 * Little value attached to advice	-	0.640	-	-0.273
		(0.542)		(0.617)
Anchor 68 * Little value attached to advice	-	0.266	-	
		(0.573)		
Anchor 67 * A lot of value attached to advice	-	0.269	-	3.592
		(0.459)		(142.656)
Anchor 68 * A lot of value attached to advice	-	-0.064	-	4.378
		(0.478)		(142.656)
Constant	-0.171	-0.069	-2.344***	-2.215***
	(0.657)	(0.692)	(0.747)	(0.786)
Observations	567	567	518	518
Log Likelihood	-140.1	-139.3	-115.6	-111.8
p-value LR test	0.8041			

Dependent variable: binary answer to the question "At what age do you think you will retire?" The answers larger than '68 years of age' are given the value one, while the other values are given zero. Standard errors in parentheses, *** Significant at 1% level, ** Significant at 5% level, * Significant at 10% level. Sample restricted to the non-retired and under the age of 65 years. The p-value of the L(ikelihood) R(atio)-test lists the joint significance of the interaction terms and is obtained by testing the restricted model (first and third column) versus the full model (second and fourth column), respectively.

Appendix 4.F Details derivation likelihood function

For the derivation of the likelihood function the joint probability is computed:

$$Pr\left(y_{framing,i} = k, soc_i = l\right)$$
$$= \Pr\left(y^*_{fram,i} \leq d_k, soc^*_i \leq f_l\right) - \Pr\left(y^*_{fram,i} \leq d_{k-1}, soc^*_i \leq f_l\right)$$
$$- \Pr\left(y^*_{fram,i} \leq d_k, soc^*_i \leq f_{l-1}\right) + \Pr(y^*_{fram,i} \leq d_{k-1}, soc^*_i \leq f_{l-1})$$

The latent variables are given by equations (4.3) and (4.4). The probabilities are from a bivariate standard normal distribution and lead to:

$$P\left(y^*_{fram,i} \leq d_{k+x}, soc^*_i \leq f_{l+x}\right)$$
$$= \Phi_2(\mathrm{f}_{l+x} - \overline{soc^*_i}, \frac{\mathrm{d}_{k+x} - \bar{\psi}_i \overline{soc^*_i} - \alpha D67_i - \beta D68_i - X_i{}' \kappa}{sd_{y_{framing,i}}}, \frac{\tau + \overline{\psi_i}}{sd_{y_{framing,i}}})$$

where x$\in \{0, -1\}$ and the following identities hold:

$$\overline{soc^*_i} = F_i' \delta + X_i{}' \lambda$$
$$\overline{\psi_i} = \gamma + \alpha' D67_i + \beta' D68_i$$
$$sd_{y_{framing,i}} = \sqrt{1 + (\gamma + \alpha' D67_i + \beta' D68_i)^2 + 2(\gamma + \alpha' D67_i + \beta' D68_i)\tau}$$

Table 4.F.1 lists all estimation results for this model.

Table 4.F.1 Complete estimation results for the model with framing and social interactions

	(1)	(2)	(3)	(4)
	Whole sample		**male sample**	**female sample**
Gender vignette person	-	-0.0216	0.0427	-0.0885
		(0.0657)	(0.0922)	(0.0934)
Composition social environment (=1 'friends and family')	-	-0.1440**	-0.0381	-0.2520***
		(0.0659)	(0.0952)	(0.0937)
More need for experienced employees	-	0.1237	0.0736	0.0877
		(0.1009)	(0.1418)	(0.1474)
Financial consequences of the economic crisis	-	0.3497***	0.4442***	0.2031
		(0.0949)	(0.1326)	(0.1406)
Reduction of pension rights by one year	-	0.4518***	0.4680***	0.4349***
		(0.0925)	(0.1307)	(0.1394)
gender respondent	-	-0.0253		
		(0.0659)		
45 - 54 years of age	-	-0.0987	-0.0913	-0.1359
		(0.0812)	(0.1159)	(0.1158)
55 - 64 years of age	-	-0.0599	-0.0462	-0.0539
		(0.0803)	(0.1147)	(0.1147)
mbo+havo/vwo	-	-0.0041	0.0223	-0.0433
		(0.0880)	(0.1228)	(0.1280)
hbo+wo	-	0.1729**	0.2174*	0.1401
		(0.0841)	(0.1180)	(0.1217)
Family income between 1801 and 2600 Euro	-	0.0453	-0.1518	0.1939
		(0.1006)	(0.1466)	(0.1408)
Family income more than 2600 Euro	-	-0.0198	-0.2827**	0.2022
		(0.0926)	(0.1357)	(0.1290)
Rental home	-	-0.0045	-0.0540	0.0670
		(0.0854)	(0.1205)	(0.1231)
Region North	-	-0.1104	-0.0548	-0.1459
		(0.1035)	(0.1457)	(0.1484)
Region East	-	-0.0868	-0.1515	-0.0182
		(0.0856)	(0.1200)	(0.1227)
Region South	-	-0.2496***	-0.4024***	-0.0799
		(0.0874)	(0.1226)	(0.1264)
Framing equation				
gender respondent	-0.1219*	-0.1214*	-	-
	(0.0631)	(0.0636)		
45 - 54 years of age	-0.3097***	-0.3102***	-0.5001***	-0.1407
	(0.0781)	(0.0793)	(0.1135)	(0.1186)
55 - 64 years of age	-0.1722**	-0.1765**	-0.2624**	-0.1125
	(0.0769)	(0.0778)	(0.1108)	(0.1127)
Observations	1130	1130	571	559
log likelihood	-1805	-3435	-1733	-1678

Dependent variables: answers to the questions: "At what age do you think you will retire?" and the index that counts how many times the respondent follows retirement behavior of the social environment. Standard errors in parentheses, *** Significant at 1% level, ** Significant at 5% level, * Significant at 10% level. The first column shows the model from equation (4.1) with the addition of the social interaction index and the interaction between the social interaction index and the age anchors. The second column shows the results of the full model (of equation (4.3) and (4.4)). The third and fourth column show the estimation results restricted to men and women, respectively.

Table 4.F.1 Complete estimation results for the model with framing and social interactions (continued)

	(1)	(2)	(3)	(4)
	Whole sample		**male sample**	**female sample**
mbo+havo/vwo	0.0830	0.0892	0.0057	0.1577
	(0.0841)	(0.0846)	(0.1186)	(0.1252)
hbo+wo	0.2705***	0.2890***	0.3684***	0.2133*
	(0.0812)	(0.0857)	(0.1217)	(0.1285)
Family income between 1801 and 2600 Euro	-0.0580	-0.0528	-0.0449	-0.0941
	(0.0972)	(0.0978)	(0.1473)	(0.1424)
Family income more than 2600 Euro	-0.1165	-0.1098	-0.1212	-0.1716
	(0.0894)	(0.0899)	(0.1443)	(0.1319)
Rental home	0.1703**	0.1663**	0.2233*	0.1416
	(0.0825)	(0.0829)	(0.1193)	(0.1223)
Region North	-0.1297	-0.1286	-0.2241	-0.0056
	(0.0996)	(0.1019)	(0.1433)	(0.1486)
Region East	-0.0517	-0.0526	-0.0542	-0.0434
	(0.0822)	(0.0843)	(0.1214)	(0.1202)
Region South	-0.2126**	-0.2245**	-0.2569*	-0.1830
	(0.0834)	(0.0944)	(0.1494)	(0.1277)
d1	-0.6959***	-1.0396***	-1.3029***	-0.7979***
	(0.1686)	(0.1413)	(0.1951)	(0.2162)
d2	0.2548	-0.0814	-0.2869	0.1206
	(0.1685)	(0.1373)	(0.1987)	(0.2278)
d3	0.5970***	0.2610*	0.1043	0.4208*
	(0.1692)	(0.1375)	(0.2025)	(0.2333)
d4	1.3758***	1.0393***	0.8257***	1.2786***
	(0.1715)	(0.1409)	(0.2126)	(0.2534)
d5	1.8755***	1.5384***	1.3418***	1.7711***
	(0.1749)	(0.1470)	(0.2248)	(0.2693)
f1	-	-0.3228	-0.3038	-0.4123
		(0.2033)	(0.2896)	(0.2803)
f2	-	0.2633	0.3270	0.1369
		(0.2033)	(0.2897)	(0.2805)
f3	-	0.6964***	0.7928***	0.5448*
		(0.2041)	(0.2905)	(0.2823)
f4	-	1.1384***	1.2336***	0.9994***
		(0.2058)	(0.2925)	(0.2853)
Anchor at 67 years of age (α)	0.1801*	0.2566***	0.1334	0.4032***
	(0.1068)	(0.0779)	(0.1098)	(0.1194)
Anchor at 68 years of age (β)	-0.0370	0.1870**	-0.0715	0.4457***
	(0.1064)	(0.0897)	(0.1327)	(0.1311)
γ	0.1480***	0.1299	0.1123	0.3633
	(0.0396)	(0.1860)	(0.2408)	(0.2429)
τ	-	0.1177	0.1367	-0.1372
		(0.1778)	(0.2287)	(0.2457)
α'	0.0530	0.0537	-0.0574	0.1578
	(0.0550)	(0.0828)	(0.1158)	(0.1179)
β'	0.1561***	0.2139**	0.2598**	0.2096*
	(0.0558)	(0.0847)	(0.1149)	(0.1251)
Observations	1130	1130	571	559
log likelihood	-1805	-3435	-1733	-1678

Dependent variables: answers to the questions: "At what age do you think you will retire?" and the index that counts how many times the respondent follows retirement behavior of the social environment. Standard errors in parentheses, *** Significant at 1% level, ** Significant at 5% level, * Significant at 10% level. The first column shows the model from equation (4.1) with the addition of the social interaction index and the interaction between the social interaction index and the age anchors. The second column shows the results of the full model (of equation (4.3) and (4.4)). The third and fourth column show the estimation results restricted to men and women, respectively.

5 Demanding occupations and the retirement age in the Netherlands

5.1. Introduction[59]

Nowadays many governments are reforming pension schemes to tackle concerns about their fiscal sustainability. A widely employed and highly visible reform is to increase the statutory retirement age (OECD, 2011). This institutional feature determines at what age individuals are entitled to 'full' retirement benefits in the first pillar. Majer et al. (2013) show that not only life expectancy is still increasing, but also "healthy life expectancy", that is, the number of years spent without any serious disability. Equivalently, the trend is that health at a given age tends to increase, so that in most occupations, workers will be able to work and remain productive longer. These facts taken together naturally lead to the generic policy of increasing the statutory retirement age, so that future cohorts can contribute to the sustainability of a pay-as-you-go first pillar pension by paying premiums longer and claiming benefits for a shorter time period.

Concerns, however, have been raised about the consequences of such a generic policy for workers in demanding occupations, who often do not make it already to the current statutory retirement age and retire early or enter unemployment or disability benefits. The policy debate in the Netherlands has, for example, emphasized that low-skilled workers in the construction sector cannot be expected to work longer due to health reasons – their job requires a level of physical health that they often can no longer maintain at an older age, partly because the heavy work they have done during their whole career has accelerated the deterioration of their health. It was suggested that an exception should be made for this kind of physically demanding occupations. Many disagreed with this idea, and pointed to the large costs of such policies in other countries (Boldrin et al. 2004). They suggested making occupations less demanding by investing in technological improvements. Also complains arise when demanding occupations are allowed early retirement because such investments become unattractive (OECD, 2007). In the debate that followed, several other occupational groups have also made their arguments for an exception, not only on the basis of physical demands but also because of the mentally demanding nature of their occupation. This is in line with Borghans and ter Weel (2012) who argue that putting up a (subjective) list of heavy

[59] This chapter is based on Vermeer et al. (2014b)

occupations will not work in practice, since too many groups will claim they have to be included. On the other hand, it is also not easy to define objectively what constitutes a demanding occupation. As a consequence of these practical considerations, Dutch policy makers in the end decided to implement an increase in the statutory retirement age without making any exceptions.

But starting in 2013 the statutory retirement age is increasing and given that this increase will accelerate in the near future, the issue of differentiating among occupations may come back. This study abstracts from the debate about the possible alternatives to this policy and only considers the issue of early retirement of demanding occupations.

The aim of this paper is to examine how the Dutch population thinks about this subject. It analyses whether the Dutch population is willing to contribute to early retirement schemes for certain occupations. Perceived characteristics of occupations may make individuals more willing to contribute to such schemes. This paper examines the effect of the perceived burden of occupations on the reasonable retirement ages and the willingness to contribute to occupation-specific early retirement schemes. Second, answers driven by self-interest and by altruistic behavior are disentangled. For this distinction self-identification is crucial: in case of pure self-interest, the contribution to a retirement scheme for a certain demanding occupation will only be higher if the occupation is similar to the individual's own occupation.

The survey questions used in this study refer to pensions in general and not specifically the first pillar. In the Dutch system, the first pillar pensions of workers with demanding occupations are particularly relevant since (physically) demanding occupations are often low-paid, and first pillar pensions play a much larger role for low income than for higher income groups. This is because the first pillar provides an essentially flat basic income, which is the main source of income for those with low life-time earnings, but only a limited part of total pension income for higher life-time earnings groups who have built up a second pillar occupational pension (mandatory for almost all employees). This implies that the effects of an increase in the statutory retirement age are heterogeneous. Such an increase reduces total retirement wealth by a much larger fraction for low income than for high income individuals. It also means that "repairing" the increase in the state pension eligibility age through an earlier occupational pension is relatively expensive – this pension has to be much higher in the years before the state pension can be claimed.

Moreover, life expectancy increases with income. For instance, Kalwij et al. (2013) find that low income individuals have an approximately 2.5 years shorter remaining life

expectancy at 65 years of age than high income individuals. To account for this heterogeneity, the statutory retirement age could be differentiated among socio-economic or income groups. Bovenberg et al. (2006) give strong arguments for linking this age to the (remaining) life expectancy of the socio-economic group. Ravesteijn et al. (2013) analyze the relation between occupation and health, and conclude that workers whose poor health was caused by occupational characteristics should be exempted from an increase in the statutory retirement age if their occupational health damage was not compensated through a wage premium.

The link between disability insurance and early retirement makes the issue even more relevant. Older workers with severe health issues may be eligible for disability insurance benefits. Since the 1990's, policy reforms were implemented making entry into the Dutch disability insurance program more difficult, and inflow rates into disability insurance have decreased strongly as a consequence (García-Gómez et al., 2011). As access to disability insurance has become stricter, early retirement became more relevant, particularly for older individuals with demanding occupations, for whom work limiting health problems are more prevalent.

Perceptions and opinions of the general public may play a central role in social security policy and pension reforms in particular (Cremer and Pestieau, 2000; O'Donnell and Tinios, 2003). The political feasibility of a differentiation in the statutory retirement age therefore depends on the public's willingness to accept the life-time income redistribution from occupations with higher retirement ages to occupations with lower retirement ages this implies. In practice, the public may be inclined to differentiate between various occupations on more grounds than income alone. For example, they may think that it is justified that workers in physically demanding jobs or jobs with long working hours retire earlier than others. In other words, does the public think construction workers are entitled to earlier retirement than librarians, even if both receive the same life time wage and other benefits? Such issues have been translated into public statements by politicians and social partners and have led to the policy discussion on the possibility to exempt health-deteriorating occupations from increases in the retirement age.

The willingness to contribute to early retirement schemes for specific occupations can be given two different interpretations that will be disentangled in the analysis. The first is self-interest. Individuals holding occupations that are eligible for earlier retirement may expect to benefit from such schemes. More broadly, individuals expecting to change to such an occupation in the future may also support these schemes, as some kind of insurance device.

An alternative explanation may be social preferences (DellaVigna, 2009).[60] Individuals not only care about their own resources, but also about the resources of others. The possible consequence is that individuals can be willing to contribute to early retirement schemes even if they do not expect to gain from these arrangements themselves. Perceiving such occupations as physically demanding and paying a low wage may magnify the effects of these mechanisms.

Our findings indicate a persistent ranking of the demanding nature of the occupations that are considered. Respondents attach a large weight to physical effort while mental effort or job stress is not important. Construction worker is regarded as a burdensome occupation, while teacher or desk jobs are not. This also implies a lower reasonable retirement age and a higher willingness to contribute to an early retirement scheme for construction workers than to a scheme for other occupations. The data shows that people are willing to contribute to early retirement schemes of construction workers even if they do not identify themselves with this occupation. For other occupations, such as desk jobs or teacher, this is much less the case. This shows that some of the support for early retirement of demanding occupations is driven by self-interest, but another part is driven by social preferences.

The remainder of this paper is organized as follows. Section 5.2 discusses some background literature and section 5.3 describes the relevant institutional framework in the Netherlands. Section 5.4 describes the survey design and the data. In section 5.5, the econometric model is introduced and the empirical results are discussed. Section 5.6 concludes.

5.2. Literature

There is a vast literature on the economic and non-economic determinants of retirement. Gruber and Wise (1999, 2004), among many others, analyzed the interplay between retirement benefits and exit rates from the labor market in various countries. More relevant for the current study is the role of health. Individuals could find themselves unable to continue working due to health problems. Indeed, structural models of retirement behavior often control for health status; see, for instance, Gustman and Steinmeier (2005) and Rust and Phelan (1997). Grossman (1972) argues health takes the form of a capital stock that depreciates over time. To keep the health stock at a certain level, investments are needed. In the Grossman model, the higher educated are expected to invest more in health since they can

[60] In addition to social preferences, DellaVigna distinguishes two other groups of nonstandard preferences, related to time and risk. These are not relevant in our context.

produce health more efficiently. The model implies that the determinants of health are income and education (along with the efficiency of the health care technology).

Case and Deaton (2005) add a link between occupation and health. If workers can generate earnings from their health capital or human capital, lower-educated workers may find it optimal to let their health stock depreciate more quickly as they do not have access to a large stock of human capital. Examples could be stressful or physically demanding occupations. Empirically, they find that health depreciates faster over the life-cycle for individuals in manual occupations. Sindelar et al. (2007) find a link between first occupation and health at later ages, attempting to alleviate concerns about causality. Another contribution on this topic is the longitudinal study of Fletcher et al. (2011) who find a detrimental impact of physically demanding job conditions on health, particularly for females and older workers. The theory of compensating wage differentials predicts that workers in physically demanding jobs would get a higher wage to compensate for this health loss, but the empirical literature does not find convincing evidence for this. In additional estimations Fletcher et al. (2010) add the cumulative number of hours worked and cumulative labor income and find that these measures of income cushion the effect of physical demands on health a little.

In other studies on compensating wage differentials, the evidence is mixed. In a study with Finnish data Böckerman et al. (2006) find that job disamenities have a negative effect on job satisfaction but much less on individual wages. On the other hand, Böckerman et al. (2011) find that higher job insecurity is associated with a higher individual wage in Finland, while it has no effect on job satisfaction. They conclude that the higher wage compensates for this job disamenity. Bryson et al. (2012) find with British data that wages are positively correlated with job anxiety but also with non-pecuniary job satisfaction. This is inconsistent with an explanation of compensating wage differentials, since job characteristics leading to lower non-pecuniary job satisfaction should then be compensated by a higher wage.

A possible absence of compensating wage differentials for demanding occupations, for instance due to the impossibility to properly assess future health costs of current choices, creates scope for policy intervention. The provision of an opportunity for earlier retirement is one way of compensating individuals for their demanding occupations. This paper examines the willingness of the general population to contribute to such early retirement schemes. We focus on early retirement as people in demanding occupations may find it difficult to continue working due to health issues as they get older. Neumark and Song (2012) indeed find that physical challenges in the job form a barrier to extending work lives. Holden (1988) finds that for men in the US, working in a physically demanding job is associated with lower

chances of working after retirement (that is, when receiving retirement benefits), but she finds no such association for women. Filer and Petri (1988), also using US data, find that physical demands and stress both lead to earlier retirement; workers with physically demanding jobs also prepare for this by accumulating higher pensions. Using Danish data from administrative records, Datta Gupta et al. (2012) find that workers with physically demanding jobs more often face a temporary work incapacity, but they find no significant relation with permanent work incapacity. Van Solinge and Henkens (2008) find that Dutch retirees who held physically demanding jobs are more satisfied with their retirement, providing indirect evidence for the negative effects of physical job demands at older ages.

Why would individuals be willing to contribute to early retirement schemes for demanding occupations? As stated in the introduction this can have two reasons: self-interest of social preferences. These social preferences can take various guises, like altruism, inequality aversion or reciprocity. Fehr et al. (2006) define altruism as kindness unconditional on payoffs received by others. This means that individuals will care for the payoff of others regardless of the final distribution of outcomes.[61] On the other hand, inequality averse individuals take the distribution of outcomes into account and will prefer a higher payoff for another individual only if this reduces inequality. Charness et al. (2002) show with lab experiments that individuals are willing to sacrifice own resources to increase the pay-offs of other participants, especially the least well-off participants. Tyran et al. (2006) find that a model with agents who are inequality averse better predicts the voting outcomes in a redistribution experiment than a model with rational and self-interested agents. Fehr and Gächter (2000) define reciprocity as conditional kindness: people are nicer and display more cooperative behavior in response to nice and friendly behavior of others. Unfriendly actions, however, meet uncooperative or even hostile responses.

5.3. Dutch retirement institutions

The retirement system in the Netherlands is relevant as Dutch respondents answer the questions of the survey with these institutions in mind. The retirement system in the Netherlands is organized in three pillars. The first pillar consists of pay-as-you-go state pension benefits. Every resident of the Netherlands is entitled to these benefits at the statutory age. Since 2009 a public policy debate revolved around an increase in this age. In spring 2012 it was decided that this age will increase gradually, starting in 2013. Consequently, the age of eligibility is currently increasing, from 65 years of age in 2013 to 67 years of age in 2021.

[61] Altruism is a broad notion. It can also contain 'impure' altruism: the warm-glow effect (Andreoni, 2006). For instance, individuals may donate money to charity because it makes them feel better about themselves. Put this way giving to charity can be considered as selfish.

After that, the statutory age will be linked to life-expectancy. The benefit level depends on the number of years one has lived in the Netherlands and is independent of (life-time) income. It provides a basic income for the elderly that is usually enough to keep them out of poverty and explains why poverty among the elderly is low (except for specific groups such as immigrants or people with large debts; see Ministry of Social Affairs and Employment, 2013).

Company or sector-level retirement schemes represent the second pillar. Participation in these schemes is generally mandatory for employees. Employment in a particular sector or company implies automatic enrollment in the relevant pension plan. These schemes can be either Defined Contribution (DC) or Defined Benefit (DB). The benefit level is mainly determined by the wage and the number of years of contributions. Earlier or later take-up of pensions is usually possible so that the claiming age can differ from the statutory retirement age of the state pension.

Finally, voluntary contributions are possible in the third pillar. These additional private retirement savings are tax-deductible under certain conditions (implying that income used for these savings is not taxed during the accumulation phase, while the benefits are taxed in the pay-out phase).

The pay-as-you-go nature of the national level first pillar implies that individuals with various backgrounds and occupations contribute to each other's retirement schemes. On the other hand, the second pillar is capital-funded and organized at the company or the sector level.

5.4. Data and study design

We have fielded a one-time survey on demanding occupations (DO) in the CentERpanel. The CentERpanel is based upon a representative sample of the Dutch adult population who are interviewed weekly over the Interne on a large variety of topics. People without access to Internet get the necessary equipment to participate so that also the non-Internet part of the population is covered. The fact that there are no personal interviews minimizes the risk that the answers suffer from social desirability bias. The CentERpanel also incorporates the annual DNB Household Survey (DHS), in which respondents answer questions related to different aspects of their financial situation, like income and wealth. This readily provides us with many background characteristics of the respondents. 2,840 household members above the age of 15 were asked to participate in the DO survey. 1,845 of them took part, giving a participation rate of 65%. Data collection took place in the week of May 11th through May 16th 2012, at a time when an increase of the statutory retirement age was under consideration

(see Section 5.3). The descriptive statistics we present are weighted with regard to age, gender, education and individual annual income to correct for unit-non response and obtain a representative view of the Dutch population.

In the DO survey respondents were directly asked what they think about the demanding nature of specific occupations and about reasonable retirement ages for these occupations. They were also asked whether they would be willing to contribute to an early retirement scheme for such occupations. Respondents were first given an introduction into five fictive vignette persons with various occupations, emphasizing that these persons all had the same income and age and the same work experience – The only difference is their occupation. The five specific occupations are construction worker, teacher, nurse, person with a desk job, and fireman. All respondents answered questions about all these five occupations. Appendix 5.A shows the exact wording of the questions. The order of the questions and the gender of the vignette persons are randomized over the respondents, with the exception of construction worker and fireman. For these two occupations all respondents got male names.

First, the respondents were asked what they think is a reasonable retirement age for the various occupations. An example of such a question (desk job) is the following:

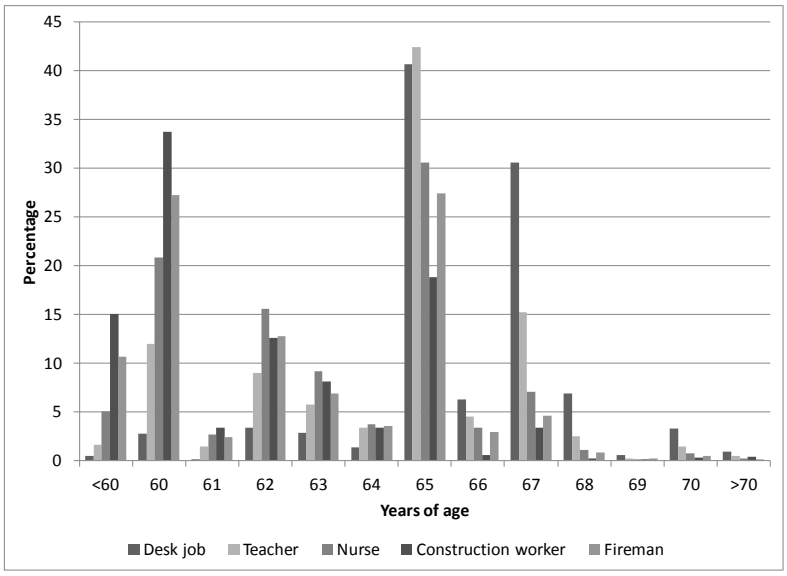
John has worked for 30 years at a desk job. What do you think is a reasonable retirement age for John?

Respondents could answer 'younger than 60', '60', '61', …, '70', or 'older than 70'.

Figure 5.1 presents the sample distribution of the answers. The large differences across occupations seem plausible and raise confidence that respondents understood the questions. The answers indicate that according to most respondents, early retirement is reasonable for construction workers, whereas people with desk jobs should retire later. The mean reasonable retirement age for the occupations ranges from almost 62 years of age for the construction worker to almost 66 years of age for the individual with a desk job.[62]

[62] For the occupation of teacher, nurse and fireman the mean reasonable retirement age amounts 64.3, 63 and 62.5 years of age, respectively.

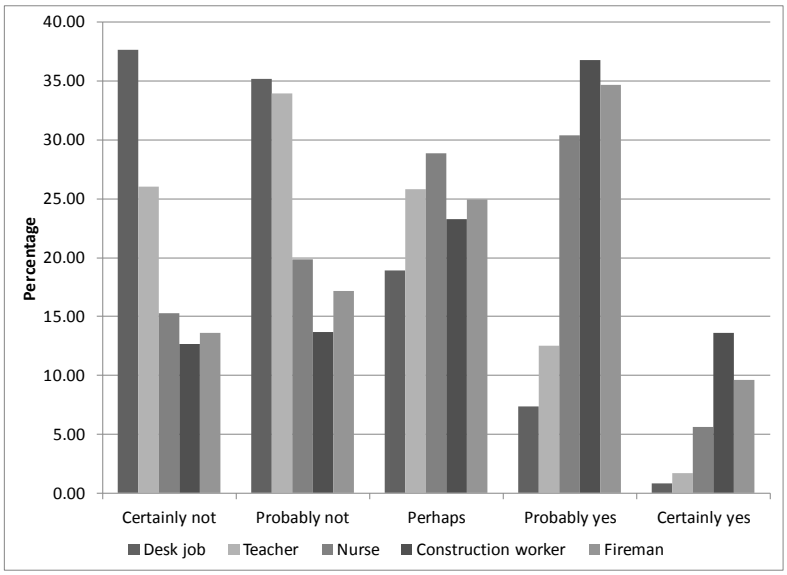
Figure 5.1 Reasonable retirement ages



Explanation: distribution of answers to the question: 'What do you think is a reasonable retirement age for … (fictive name with listed occupation)?' *N*=1,840. Source DO, own computations

After answering some other questions, the respondents indicated whether they were willing to contribute, through income tax payments, to an early retirement scheme for the five fictive persons. Respondents answered on a five point scale ranging from 'certainly not' to 'certainly yes'. Figure 5.2 shows the sample distribution of the answers. Construction workers are not only considered as reasonable early retirees but respondents are also often willing to contribute to their early retirement schemes. Approximately 50% of the respondents indicate they are certainly or probably willing to contribute to an early retirement scheme for construction workers, much more than for any of the other four occupations. It is possible that respondents show high willingness to pay, because they expect to be able to benefit of such schemes themselves. But the data also show that only 9% of the respondents identify themselves with the profession of 'construction worker', suggesting that many respondents are willing to contribute even if they do not expect to benefit directly from these schemes.

Figure 5.2 Willingness to contribute to early retirement schemes

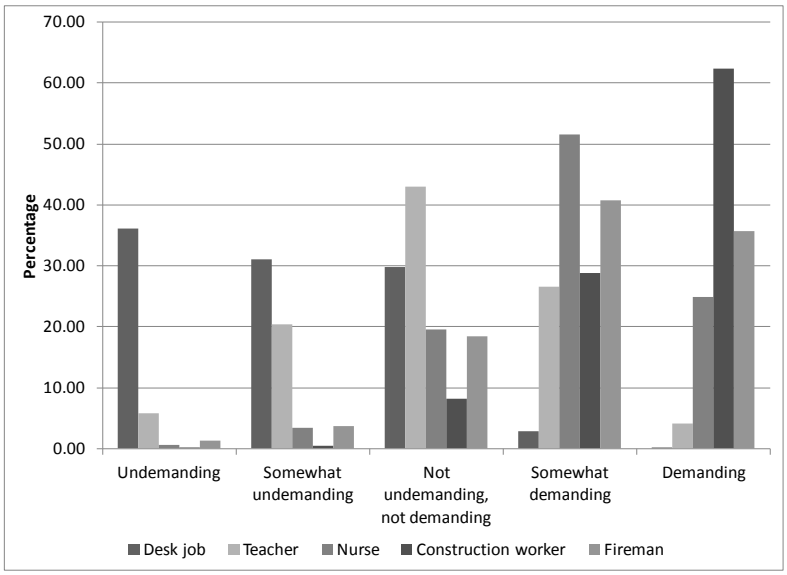


Explanation: Answers to the question: 'Are you willing to contribute as a tax payer to an early retirement scheme for … (fictive name with listed occupation)?' *N*=1,835. Source DO, own computations

The last vignette-related question asked the opinion of the respondents regarding how demanding they think the occupation of the fictive person is. For example:
'Do you think that the occupation of John (has a desk job) is demanding?'

This question was asked for each of the five professions. Respondents answered on a five-point scale ranging from 'undemanding' to 'demanding'. Figure 5.3 shows that respondents think that construction workers have the most demanding of the five occupations, followed by nurses and firemen. The occupations of teachers and especially individuals with desk jobs are considered less demanding.

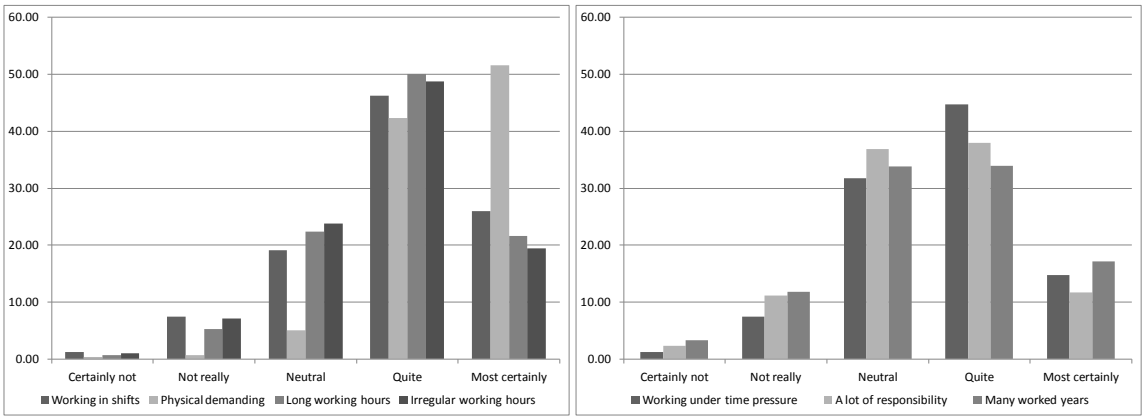
Figure 5.3 How demanding is each occupation?



Explanation: answer to the question: ”Do you think that the occupation of … (fictive name with listed occupation) is demanding?” *N*=1,835. Source: DO, own computations

The next questions asked to what extent certain job properties make an occupation demanding. The properties range from physically demanding work to working under time pressure. Figure 5.4 shows that occupations are primarily considered demanding due to the physical workload, followed by working in shifts and working long hours or in an irregular manner.

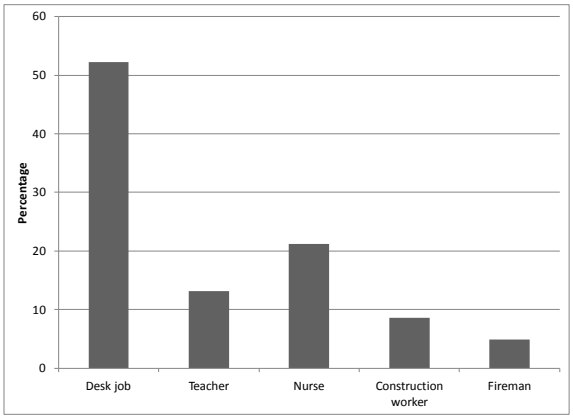
Figure 5.4 What makes an occupation demanding?



Explanation: answer to the question: ”What attribute makes an occupation demanding in your view?” *N*=1,834. Source: DO, own computations

Finally, the respondents are asked with which of the five occupations they identify themselves most. They were forced to choose one of the five occupations. Figure 5.5 shows that the majority of the respondents identify themselves with working in a desk job.[63]

Figure 5.5 With which of the five occupations do respondents identify themselves?



Explanation: answer to the question: "With which person does your occupation most closely compare?" *N*=1,787. Source: DO, own computations.

The descriptive statistics above suggest that most respondents find it reasonable that workers with demanding occupations retire earlier than others, and are also willing to contribute to this by paying taxes. Several competing explanations, however, could explain these findings. We have already mentioned the possibility of self-interest, stemming from those who expect to benefit themselves. Others may actually be biased by their own retirement scheme (as older workers for instance are typically allowed earlier retirement than younger workers, due to cohort-related shifts in pension rules) or because they identify with some attributes of the vignette (being a woman, or a young employee etc…). In the next section we introduce an econometric model that can account for these different explanations.

It should be noted that the survey questions are hypothetical and not incentivized. When, for example, respondents say they would be willing to contribute to an early retirement scheme of a certain occupation, we cannot guarantee that they would actually contribute to such a scheme if given the actual choice. The questions also do not provide information on how much they should contribute, so the answers do not reflect an actual trade off but more an attitude towards special arrangements for some occupations and not others. We therefore think more value should be attached to the qualitative differences across occupations than to the absolute levels of the willingness to contribute, etc.

[63] Descriptive statistics show that the age distribution of the respondents does not vary substantially over the various occupations.

5.5. Model and results

5.5.1 Demanding occupations and reasonable retirement age

The following model estimates the relationship between the extent to which certain occupations are perceived to be demanding and the associated reasonable retirement ages. Respondents evaluate how demanding the five occupations are according to equation (5.1):

$$y_{ij}^{*} = X_i^{'}\delta_j + Z_i\alpha_j + W_i{'}\lambda_j + \vartheta_i + u_{ij} \tag{5.1}$$

The latent dependent variable y_{ij}^{*} increases in the extent that respondent i *(i=1,…,N)* thinks occupation j *(j=1,…,5)* is demanding. This depends on respondent characteristics (X_i), on which job the respondent identifies with (Z_i), and on which characteristics make a job demanding in the view of the respondent (W_i). Unobserved heterogeneity across respondents is included via ϑ_i; for a given respondent, this term is the same for all occupations and represents the respondent's tendency to see any occupation as demanding. Finally, an idiosyncratic error term is included, assumed to be drawn from a standard normal distribution ($u_{ij}{\sim}N(0,1)$), independent of the other terms on the right hand side of equation (5.1) and independent across occupations.

The latent dependent variable is not observed. Instead, a respondent answers in five distinct categories, from 'undemanding' (1) to 'demanding' (5). This is captured using an ordered response equation:

$$Y_{ij} = k \; if \; c_{k-1} < \; y_{ij}^{*} \leq c_k \tag{5.2}$$
$$with \; 1 \leq k \leq \; 5, c_0 = -\infty \; and \; c_5 = \infty$$

The equation for the reasonable retirement ages for the five occupations is given by:

$$R_{ij} = \gamma_j y_{ij}^{*} + X_i^{'}\eta_j + Z_i\beta_j + \rho_i + \varepsilon_{ij} \tag{5.3}$$

The reasonable retirement age R_{ij} for respondent i and occupation j depends on the same variables as in equation (5.1), except that it does not include the variables W_i referring to the respondent's view on which job characteristics make an occupation demanding. These variables are assumed to affect the reasonable retirement age only through their effect on how demanding an occupation is considered (y_{ij}^{*}). Unobserved respondent specific heterogeneity is denoted by ρ_i. The idiosyncratic errors ε_{ij} are assumed to be drawn from $N(0, \sigma_\varepsilon^2)$, independent of each other and of the other terms on the right hand side of (5.1) and (5.3).

Combining equations (5.1) and (5.3) leads to:

$$R_{ij} = W_{ij}{'}\gamma_j\lambda_j + X_i^{'}\left(\gamma_j\delta_j + \eta_j\right) + Z_i(\beta_j + \alpha_j\gamma_j) + \rho_i + \gamma_j\vartheta_i + \varepsilon_{ij} + \gamma_j u_{ij} \tag{5.4}$$

Equation (5.4) shows that with the identifying assumption that job characteristics do not influence the reasonable retirement age directly, γ can be identified. The unobserved heterogeneity terms in equations (5.1) and (5.3) are assumed to be drawn from a bivariate normal distribution, independent of the error terms and all the explanatory variables in (5.4):

$$\begin{pmatrix}\vartheta_i\\ \rho_i\end{pmatrix} = N\left(\begin{pmatrix}0\\0\end{pmatrix},\begin{pmatrix}\sigma_\vartheta^2 & \tau\sigma_\rho\sigma_\vartheta\\ \tau\sigma_\rho\sigma_\vartheta & \sigma_\rho^2\end{pmatrix}\right).$$

This implies that the unobservable parts of equations (5.1) and (5.3) are correlated if τ is not equal to zero. The parameters of this model are estimated simultaneously using maximum simulated likelihood with 100 Halton draws.[64] Appendix 5.B presents details of the (simulated) likelihood. The independence assumptions on the error terms imply that the conditional likelihood given the unobserved heterogeneity terms can be written as the product of five contributions for the five occupations, each of which as the product of a density (for R_{ij}, using (5.4)) and a conditional probability (for Y_{ij} given R_{ij}, using (1)). The unconditional likelihood is the expected value of the conditional likelihood over the unobserved heterogeneity terms and it can be approximated using a simulated mean.[65]

Table 5.1 presents the estimates of equation (5.1).[66] The bottom part of this table shows that self-identification matters in the evaluation of which occupations are demanding, keeping perceived job characteristics constant. Especially respondents who identify their own job a desk job, teacher, or fireman consider this job as more demanding than other respondents. But all respondents, regardless of their own job, think that construction worker is a demanding occupation. Interestingly, teachers consider the job of a nurse as more demanding than nurses themselves do. Teachers, nurses, construction workers and firemen consider desk jobs as less demanding than those with a desk job themselves do. Gender differences also appear present: for the three occupations where male or female names were used for the fictive persons, the jobs of female fictive persons are evaluated as more demanding.

[64] For Halton draws the STATA program mdraws is used (also see Cappellari and Jenkins, 2006). A higher number of draws does not affect the results.

[65] An alternative would be to first estimate equation (5.1) and the reduced form of equation (5.4) separately, and then perform minimum distance to estimate the structural parameters in a second step by minimum distance. An advantage of the (simulated) ML approach is that it also gives the estimated covariance matrix of the unobservables. Another possibility is to estimate the model with the correlation coefficient between unobserved heterogeneity terms constrained to zero. These estimation results are qualitatively the same as presented in the following.

[66] Appendix D shows the descriptive statistics of the background variables of the estimation sample.

Table 5.1 Key estimation results for evaluation how demanding occupations are (equation (5.1))

	Evaluation how demanding occupations are				
	(1) Desk job	**(2) Teacher**	**(3) Nurse**	**(4) Construction Worker**	**(5) Fireman**
Shifts: Quite	0.167**	0.119	0.192**	0.025	0.235***
	(0.079)	(0.077)	(0.078)	(0.087)	(0.078)
Shifts: Certainly yes	0.051	0.164*	0.373***	0.042	0.326***
	(0.100)	(0.096)	(0.099)	(0.113)	(0.099)
Physical: Quite	-0.662***	-0.194	0.196	0.986***	0.602***
	(0.133)	(0.130)	(0.131)	(0.134)	(0.131)
Physical: Certainly yes	-0.927***	-0.189	0.504***	2.195***	1.067***
	(0.136)	(0.132)	(0.134)	(0.143)	(0.134)
Time Pressure: Quite	0.383***	0.268***	-0.001	-0.217***	-0.185**
	(0.075)	(0.072)	(0.074)	(0.084)	(0.074)
Time Pressure: Certainly yes	0.475***	0.486***	0.275**	-0.335**	-0.300**
	(0.117)	(0.113)	(0.118)	(0.135)	(0.117)
Responsibility: Quite	0.285***	0.277***	0.247***	0.027	0.106
	(0.074)	(0.071)	(0.073)	(0.083)	(0.073)
Responsibility: Certainly yes	0.571***	0.444***	0.415***	0.078	0.276**
	(0.127)	(0.124)	(0.130)	(0.148)	(0.129)
Irregular working hours: Quite	-0.007	0.160**	0.219***	0.084	0.158**
	(0.079)	(0.077)	(0.079)	(0.088)	(0.079)
Irregular working hours: Certainly yes	0.016	0.121	0.496***	0.074	0.415***
	(0.121)	(0.118)	(0.122)	(0.140)	(0.122)
Long working hours: Quite	0.113	0.086	0.097	0.037	0.122
	(0.077)	(0.074)	(0.076)	(0.084)	(0.076)
Long working hours: Certainly yes	-0.152	0.047	-0.070	0.308**	0.305***
	(0.111)	(0.107)	(0.110)	(0.129)	(0.111)
Many worked years: Quite	0.025	0.150**	0.248***	0.200**	0.139**
	(0.070)	(0.068)	(0.070)	(0.078)	(0.070)
Many worked years: Certainly yes	0.003	0.216**	0.545***	0.451***	0.109
	(0.095)	(0.091)	(0.096)	(0.115)	(0.095)
Gender of fictive person	0.127**	0.126**	0.214***	-	-
	(0.057)	(0.056)	(0.058)		
Teacher (self-identification)	-0.215**	0.426***	0.193**	0.111	0.005
	(0.089)	(0.087)	(0.090)	(0.104)	(0.090)
Nurse (self-identification)	-0.417***	-0.188**	0.010	-0.064	-0.064
	(0.082)	(0.079)	(0.082)	(0.095)	(0.082)
Construction worker (self-identification)	-0.267**	-0.283***	-0.345***	0.010	-0.191*
	(0.110)	(0.105)	(0.108)	(0.128)	(0.108)
Fireman (self-identification)	-0.244*	-0.140	-0.226	0.048	0.310**
	(0.143)	(0.138)	(0.142)	(0.166)	(0.145)
Constant	-	0.516	1.513***	2.098***	2.623***
		(0.451)	(0.463)	(0.504)	(0.463)
σ_ϑ			0.610***		
			(0.021)		
Log likelihood			-26494		
Number of observations			1771		

Standard errors in parentheses, *** Significant at 1% level, ** Significant at 5% level, * Significant at 10% level. Baseline respondent answers the questions with a male name for the fictive person, self-identifies with having a desk job and considers the extent to which various job attributes make a job demanding to be 'certainly not', 'not really' or neutral. Background controls (gender, education, age, age squared, employment status and household income) are included. For full set of results (including background controls), see Appendix 5.E.

The respondents tend to focus on physical demands: predictions on the basis of the estimates in Table 5.1 show that construction workers have the most demanding occupation,

followed by firemen, nurses, teachers, and individuals with a desk job.[67] Moreover, Table 1 shows that the physical burden makes construction work demanding. Other attributes also play a role, like working in shifts, many years worked, and irregular working hours in the case of nurses. A lot of responsibility makes desk jobs demanding.

The estimation results for the reasonable retirement age (equation 5.3) show a similar picture (Table 5.2). Keeping all other variables constant, including how demanding the job is perceived to be, construction workers are allowed to retire at the earliest age. But self-identification with the fictive persons seems to be a smaller issue here, as none of the coefficients are significant at the 5% level. Still, there is an indirect effect: Self-identification influences how demanding occupations are, and this affects the reasonable retirement age of an occupation - as indicated by the significant γ-coefficients. Female fictive persons are allowed to retire about three months earlier than male fictive persons who have the same job and whose job is evaluated as equally demanding.

[67] The calculation involves computation of the mean of the predicted values for the latent variable of equation (1). Fireman and nurse are close to each other for the second place in this ranking.

Table 5.2 **Key estimation results for evaluation of the reasonable retirement age**

	Evaluation of reasonable retirement age				
	(1)	(2)	(3)	(4)	(5)
	Desk job	**Teacher**	**Nurse**	**Construction Worker**	**Fireman**
γ_j	-0.552***	-0.815***	-0.836***	-0.738***	-0.960***
	(0.036)	(0.031)	(0.032)	(0.032)	(0.030)
Gender of fictive person (=1 if female)	-0.258***	-0.248***	-0.241***	-	-
	(0.080)	(0.081)	(0.082)		
Teacher (self-identification)	-0.091	-0.061	0.052	0.031	0.021
	(0.145)	(0.147)	(0.148)	(0.152)	(0.148)
Nurse (self-identification)	-0.129	-0.175	-0.211	-0.142	-0.100
	(0.132)	(0.133)	(0.134)	(0.138)	(0.135)
Construction Worker (self-identification)	-0.056	0.029	-0.110	0.228	-0.099
	(0.185)	(0.186)	(0.187)	(0.193)	(0.188)
Fireman (self-identification)	0.052	-0.283	-0.253	0.010	0.032
	(0.242)	(0.243)	(0.245)	(0.252)	(0.248)
Constant	66.697***	66.790***	66.328***	63.840***	66.024***
	(0.580)	(0.641)	(0.654)	(0.656)	(0.683)
σ_ε			1.365***		
			(0.010)		
σ_ρ			1.587***		
			(0.03)		
τ (correlation coefficient)			0.051		
			(0.033)		
Log likelihood			-26494		
Number of observations			1771		
standard deviation *(sd)* increase in demanding occupation $(= \gamma_j * sd)$	-0.751***	-1.042***	-1.118***	-1.066***	-1.254***
	(0.050)	(0.039)	(0.042)	(0.046)	(0.040)

Standard errors in parentheses, *** Significant at 1% level, ** Significant at 5% level, * Significant at 10% level. Baseline respondent has a desk job and answers the questions with a male name for the fictive person. Background controls (gender, education, age, age squared, employment status and household income) are included. For full set of results (including background controls), see Appendix 5.E. Bottom row is not estimated in the model and it shows the result of the calculation: $\gamma_j * sd$

If occupations are perceived as more demanding, this has a large effect on the reasonable retirement age. For instance, consider the occupation of construction worker and the perception that physical work makes a job demanding. The estimates imply that the reasonable retirement age for a construction worker decreases by 1.6 years if the respondent thinks physical work certainly makes an occupation demanding compared to when the respondent does not think physical work makes a job demanding.[68] An alternative way is to consider the impact of an increase of one standard deviation in how demanding occupations are on the reasonable retirement age. This increase would reduce the reasonable retirement with one year on average (also see table 5.2). The magnitude of the effect can also be computed for the baseline respondent, who thinks a particular occupation is demanding instead of undemanding. The baseline respondent is a higher educated male with a net

[68] This is the difference between answering the highest category ('most certainly') and the three lowest categories ('certainly not', 'not really' or 'neutral'). See figure 5.4. Table 5.1 shows that the corresponding coefficient (=2.195). Then this leads ceteris paribus to $\gamma_j * 2.195 = -0.738 * 2.195 = -1.62$ years.

household income larger than 2600 Euros (also see appendix 5.E). The resulting difference between the baseline respondent who thinks that the job is undemanding versus a baseline respondent who thinks that a job is demanding amounts to almost three years earlier retirement in the case of fireman and 1.6 years for people with desk jobs.[69] This is the same order of magnitude as the increase in the statutory retirement age in the Netherlands (see section 5.3).

Unobserved heterogeneity is present and sizeable. The order of magnitude can be compared to the standard deviation of the idiosyncratic error term. The standard deviation of the idiosyncratic error term amounts to 1 (by normalization), whereas the standard deviation of the unobserved heterogeneity amounts 0.61 in the evaluation of the demanding occupations (see table 5.1). In the evaluation of the reasonable retirement age the standard deviation of the idiosyncratic error term amounts 1.37 (see table 5.2), while the standard deviation of the unobserved heterogeneity term amounts 1.59. The unobserved heterogeneity terms are slightly positively correlated, but the correlation is not significant.

Except for teachers, self-identification has no significant effect on the assessment of the reasonable retirement age. The evaluation of teachers by teachers forms an exception. It might be that non-teachers have a different view on the demanding nature of these occupations than teachers have. Table 5.3 shows the marginal effects of self-identification on the reasonable retirement age. This consists of a direct and an indirect part. The indirect effect works through the effect of self-identification on how demanding occupations are. Except for the case of the construction worker, individuals who self-identify with their occupation, indicate a lower reasonable retirement age. The effect is 5 months at most, in the evaluation of and by teachers and this is the only significant effect.

[69] The model estimates the thresholds for the demanding occupation equation (see also Appendix D). The baseline respondent who thinks that an occupation is somewhat undemanding is defined at the average of the first two thresholds (=0.39). The baseline respondent who thinks that an occupation is somewhat demanding is defined at the average of the last two thresholds (=3.21). The difference (=2.824) is multiplied with the various γ's to get the estimated effect on the reasonable retirement age. For fireman the effect is largest: 2.7 years earlier retirement; for desk jobs it is the smallest: 1.6 years earlier retirement.

Table 5.3 **Marginal effects of self-identification on the reasonable retirement age**

	Self-identification with:			
Evaluation of	Teacher	Nurse	Construction worker	Fireman
Desk job	0.027	0.101	0.092	0.186
	(0.148)	(0.135)	(0.188)	(0.245)
Teacher	-0.409***	-0.021	0.259	-0.169
	(0.155)	(0.143)	(0.199)	(0.258)
Nurse	-0.110	-0.219	0.179	-0.064
	(0.156)	(0.142)	(0.199)	(0.258)
Construction	-0.050	-0.095	0.221	-0.026
	(0.153)	(0.140)	(0.195)	(0.253)
Fireman	0.017	-0.039	0.084	-0.266
	(0.161)	(0.147)	(0.204)	(0.266)

Standard errors in parentheses, *** Significant at 1% level, ** Significant at 5% level, * Significant at 10% level. The magnitude of the marginal effect is in years of age. The baseline respondent self-identifies with a desk job.

In a robustness check, we included the opinion of the respondents about the increase of the statutory retirement age in the Netherlands as an additional regressor, since the feelings about the increase of the statutory retirement age in the first pillar could matter for the reported reasonable retirement ages. For instance, respondents feeling negative about this reform may indicate that each fictive person should be allowed to retire early. In a previous questionnaire respondents were asked to choose amongst several measures to make the first pillar pension scheme sustainable. The measures included lower benefits, a higher pension premium, and an increase in the statutory retirement age. Appendix 5.G lists the exact question and the distribution of the answers, as well as the complete estimates of a full model in which the answer to this question is added on the right hand side of the equation for the reasonable retirement age. These results show that, as expected, respondents who think the statutory retirement age should be increased also give higher reasonable retirement ages than respondents who prefer other measures. Inclusion of this in the model, however, does not change any of the results on the variables of interest.

5.5.2 Demanding occupations and the willingness to contribute to an early retirement scheme

In this section we model the relationship between the extent to which an occupation is perceived to be demanding and whether respondents are willing to contribute to an early retirement scheme for that occupation through paying additional (income) taxes. This model closely resembles the model of the previous section. Respondents ($i=1,\ldots,N$) evaluate how demanding certain occupations ($j=1,\ldots,5$) are according to equations (5.1) and (5.2). The respondents also indicate whether they are willing to contribute to an early retirement scheme for certain professions. This is modeled using an ordered response equation:

$$C_{ij}^{*} = \kappa_j y_{ij}^{*} + X_i'\mu_j + Z_i\eta_j + \phi_i + \psi_{ij} \tag{5.5}$$

$$C_{ij} = l \; if \; d_{l-1} < C_{ij}^{*} \leq d_l \qquad (5.6)$$
$$with \; 1 \leq l \leq 5, d_0 = -\infty \; and \; d_5 = \infty$$

The willingness to contribute to an early retirement scheme C_{ij}^{*} for respondent i and occupation j depends on the same variables as in equation (5.3), including the perception how demanding occupation j is perceived to be. The respondent specific unobserved heterogeneity term in this equation is denoted by ϕ_i. The idiosyncratic error ψ_{ij} is assumed to be standard normally distributed. The respondents answer in five distinct answer categories to what extent they want to contribute to early retirement schemes of certain professions (equation (5.6)).

Since unobserved individual characteristics explaining the opinion about demanding occupations could be related to those determining the willingness to contribute to an early retirement scheme, we assume, the two unobserved heterogeneity terms are bivariate normal, independent of the covariates: $\binom{\vartheta_i}{\phi_i} \sim N\left(\binom{0}{0}, \begin{pmatrix} \sigma_\vartheta^2 & \tau\sigma_\phi\sigma_\vartheta \\ \tau\sigma_\phi\sigma_\vartheta & \sigma_\phi^2 \end{pmatrix}\right)$. This implies an additional correlation between the error terms of equations (5.1) and (5.5) if the parameter τ is not equal to zero. Equations (5.1), (5.2), (5.5) and (5.6) are estimated simultaneously using Simulated Maximum Likelihood with 100 Halton draws (see Cappelari and Jenkins, 2006).[70] Appendix 5.C provides details of the likelihood.

If respondents find an occupation more demanding, they are also willing to contribute more to an early retirement scheme for that occupation. Table 5.4 shows these positive effects (κ_j).[71] Table 5.5 shows the implied marginal effects. It shows that respondents are 30 to 40 percentage points more likely to contribute to the early retirement scheme when the extent to which an occupation is considered more demanding increases by one standard deviation. This is evaluated for the proportion of the sample that considers the occupation to be 'somewhat demanding' or 'demanding'. The difference in the willingness to contribute between a typical individual who evaluates an occupation as demanding and a typical individual who considers the same occupation undemanding, would amount to roughly 40 to 70 percentage points.[72]

[70] A higher number of draws does not affect the magnitude of the estimated parameters. Again, another possibility is to estimate the model with the correlation coefficient between the unobserved heterogeneity terms constrained to zero. These estimation results are also qualitatively the same as presented in the following.

[71] The estimates of the coefficients in equation (1) are similar to those in Table 1 (also see appendix F) and are therefore not presented here.

[72] The difference between two such individuals amounts roughly two standard deviations. This computation evaluates the willingness to contribute at two different points on the normal distribution: one standard deviation below and one standard deviation above the mean. With a difference of one standard deviation the results are close to a computation with marginal effects (table 5).

Table 5.4 Key estimation results for the willingness to contribute to (early) retirement schemes

	Evaluation of willingness to contribute				
	(1) **Desk job**	(2) **Teacher**	(3) **Nurse**	(4) **Construction Worker**	(5) **Fireman**
κ_i	1.492***	1.294***	0.766***	0.564***	0.654***
	(0.073)	(0.060)	(0.042)	(0.037)	(0.035)
Gender of fictive person (=1 if female)	-0.123	-0.014	0.126	-	-
	(0.093)	(0.086)	(0.078)		
Teacher (self-identification)	0.149	-0.061	-0.021	-0.059	-0.032
	(0.189)	(0.185)	(0.184)	(0.189)	(0.185)
Nurse (self-identification)	0.716***	0.333**	0.375**	0.421**	0.370**
	(0.175)	(0.168)	(0.168)	(0.173)	(0.170)
Construction Worker (self-identification)	0.381	0.364	0.545**	0.656***	0.590**
	(0.239)	(0.232)	(0.231)	(0.237)	(0.232)
Fireman (self-identification)	0.552*	0.235	0.463	0.198	0.468
	(0.302)	(0.293)	(0.290)	(0.297)	(0.293)
Constant	-	-0.749	-0.966	-0.304	-0.003
		(0.578)	(0.606)	(0.653)	(0.630)
σ_ϕ			2.731***		
			(0.077)		
τ $(correlation\ coefficient)$			0.516***		
			(0.021)		
number of observations			1771		
Log likelihood			-18096		

Standard errors in parentheses. *** Significant at 1% level, ** Significant at 5% level, * Significant at 10% level. Baseline respondent self-identifies their job with a desk job and has a male name for the fictive person in answering the questions. Background controls (gender, education, age, age squared, employment status and household income) are included. For complete results (including background controls), see Appendix 5.F.

Unobserved heterogeneity is significantly present. Table 5.4 shows that the standard deviation of the willingness to contribute amounts to 2.73, while the standard deviation of the idiosyncratic error term amounts to 1. Moreover, a sizeable and significant correlation between the two unobserved heterogeneity terms of 0.52 is found. This indicates that respondents with a higher willingness to contribute in general typically also tend to evaluate occupations as more demanding.

Table 5.5 Impact of one standard deviation increase in demanding occupation on willingness to contribute to early retirement scheme

Desk job	Teacher	Nurse	Construction worker	Fire man
28.38***	39.44***	38.12***	33.03***	33.70***
(1.38)	(1.83)	(2.09)	(2.18)	(1.78)

Standard errors in parentheses. *** Significant at 1% level, ** Significant at 5% level, * Significant at 10% level. Each marginal effect is evaluated for the proportion of the sample that considers the occupation in the column to be demanding or very demanding. Numbers are in percentage points. The baseline respondent is the same as in table 5.4.

Table 5.4 also shows that self-identification with a teacher or a fireman does not lead to a higher willingness to contribute for any other occupation compared to self-identification with having a desk job. Nurses are the other extreme case: if respondents identify themselves with a nurse, they are willing to contribute to an early retirement schemes of every occupation. Construction workers are willing to contribute to retirement schemes of nurses, construction workers and firemen. In combination with the indirect effects, respondents are always willing to contribute to retirement schemes of their own occupations (Table 5.6). They probably expect to benefit themselves from such arrangements.[73] But respondents also indicate that they are willing to contribute to retirement schemes of other occupations than their own occupation.

Table 5.6 Marginal effects of self-identification on the willingness to contribute to (early) retirement schemes

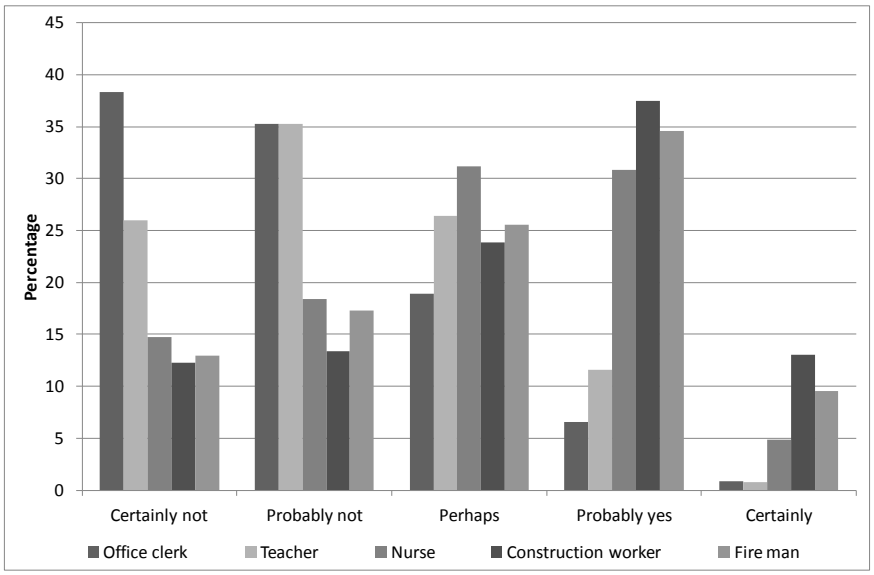
	Self-identifies with:			
Evaluation of the fictive	Teacher	Nurse	Construction worker	Fireman
Desk job	-2.03	2.43	-0.03	4.72
	(3.27)	(3.01)	(4.08)	(5.22)
Teacher	12.71**	3.30	1.05	3.94
	(5.00)	(4.70)	(6.33)	(8.02)
Nurse	5.51	15.72**	11.15	12.80
	(7.47)	(6.87)	(9.38)	(11.85)
Construction worker	0.35	16.19**	27.17***	9.85
	(7.84)	(7.20)	(9.77)	(12.36)
Fireman	-0.56	13.54*	19.05**	28.53**
	(7.76)	(7.14)	(9.72)	(12.31)

Standard errors in parentheses, *** Significant at 1% level, ** Significant at 5% level, * Significant at 10% level. The magnitude of the marginal effect is evaluated for the proportion of the sample that considers the occupation in the row to be demanding or very demanding. Numbers are in percentage points. Benchmark: respondents who self-identify with having a desk job.

Figure 5.6 shows whether people are willing to contribute to retirement schemes of occupations that they do not identify themselves with. It shows that almost half of the respondents *not identifying themselves with construction worker* indicate that they are probably or certainly willing to contribute to an early retirement scheme of construction workers. The willingness to contribute to such a scheme is somewhat smaller for firemen, and substantially smaller for the other three occupations. Only 6 percent of the respondents not in a desk job are probably or certainly willing to contribute to a retirement scheme of office clerks. Respondents are apparently willing to contribute to the retirement schemes of other occupations, but only if they perceive the occupations as demanding.

[73] Re-estimation of this model with the opinion of about the pension reform in the Netherlands shows that the results do not change. For details, see appendix 5.G.

Figure 5.6 Respondents willing to contribute to retirement schemes of occupations other than their own



For the evaluation of the willingness to contribute for the occupations, the respondents with the same occupation are omitted. For instance, in the evaluation of office clerk the respondents, who self-identify with office clerks, are left out. Source: descriptive statistics (DO), own computations

5.6. Conclusion

This paper relates the perception about how demanding occupations are to what people consider a reasonable retirement age and the willingness to contribute to an early retirement schemes for specific occupations. How demanding an occupation is, determines to a large extent the reasonable retirement age for that occupation. On average, the respondents of our survey think it is justified that a worker in a demanding occupation can retire approximately two years earlier. This difference is equal to the increase in the statutory retirement age in the Netherlands for the coming years. The respondents also indicate they are willing to contribute to an early retirement scheme for demanding occupations by paying higher taxes. This is notable as the Dutch government in the end did not distinguish between demanding and undemanding occupations when increasing the statutory retirement age.

The relationship between physical burden, demanding occupations and reasonable retirement ages is in line with other studies. Joulain and Mullet (2001) find that reasonable retirement ages are lower for occupations perceived as more physical demanding. They also find that cognitive or organizational attributes are not associated with the reasonable retirement age. Van Dalen et al. (2010) find that both employers and employees view older workers as less productive. A reason for this is the perception that hard skills (physical or cognitive abilities) matter more for the assessment of productivity.

Individuals rank the various occupations consistently in terms of how demanding occupations are and this relates to the reasonable retirement age and the willingness to contribute to early retirement schemes. We find that desk jobs are regarded as less demanding occupations. Accordingly, they are attributed a higher reasonable retirement age and the public is less willing to contribute to an early retirement scheme for people with desk jobs. For construction workers the opposite is the case. Firemen are close to construction workers, teachers are closer to desk jobs, and nurses are in between. This corresponds to the view that the Dutch population generally thinks that physical burden makes an occupation demanding.

Differences among reasonable retirement ages remain when correcting for self-identification. Individuals are often also willing to contribute to the retirement schemes of demanding occupations that are not similar to their own occupation. For instance, almost half of the respondents who do not identify themselves with construction worker indicate that they are probably or certainly willing to contribute to a retirement scheme for construction workers. This may also mean that they regard disability as less favorable than retirement. But we also find an effect of self-identification. For instance, respondents consider the job of teacher as more demanding if their own job is similar to that of a teacher. Accordingly, respondents are more supportive of contributing to the retirement schemes and assign a lower reasonable retirement age for the job they most identify with.

The finding that individuals are often willing to contribute to an early retirement scheme of demanding occupations that are dissimilar to their own could be grounded in reciprocation. Fong et al. (2005) argue that there is support for policies that rely on reciprocation. For instance, individuals are willing to financially support those who are struck by bad luck but not those who are poor because they are unwilling to work. An interpretation of our findings is that many respondents think that workers in demanding occupations contribute to society at the cost of their own health, and deserve to be compensated for this. Earlier retirement is an attractive form of compensation since their deteriorated health and the demanding nature of their jobs make it difficult to continue working. Future research could look further into this. Perugini et al. (2003) describe questions to measure reciprocity of individuals and have validated these questions in experiments. It would be interesting to see whether individuals who are reciprocal according to their index are indeed more willing to contribute to the early retirement schemes of demanding occupations.

What do our findings imply for public policy? The results show that the Dutch public supports special measures facilitating earlier retirement for physically demanding occupations, but do not provide insight in how this can be implemented. As discussed in

Section 5.1, differentiation of the eligibility age for the first pillar state pensions has been discussed but is considered infeasible as every occupation must be classified according to the attributes that make it demanding or not. Moreover, account has to be taken of the fact that individuals may engage in strategic behavior by switching occupations at a later age to qualify for earlier retirement (Ravesteijn et al., 2013) and it could add rigidity to the labor market. Repairing the gap in first pillar pensions through the second pillar is expensive, particularly for the many physically demanding jobs that are not well paid, so that the state pension is a large part of total pension income.

Alternatively, the first pillar eligibility age could be made dependent on the life time number of worked years instead of the occupation (possibly with adjustment for involuntary unemployment, disability, or career interruptions due to young children, for example). This is the system that has recently been adopted in Germany (OECD, 2013). Such a policy is easier to implement and induces less problems concerning strategic behavior. Individuals with physically demanding occupations would benefit from such an arrangement, since they often have low education level and start working at a relative early age. Similar policies could also use other proxies to drive the differentiation in the statutory retirement age, such as (life-time) income.

It is important to note, however, that such policies could also entail costs. For instance, a lower retirement age for demanding occupations may lead to a shift from disability at the end of working life to early retirement. This could diminish incentives for the employer to make occupations less demanding, for example by reducing heavy lifting or hazardous or stressful activities, as they might find it easier to redirect their employees into early retirement. It is up to policy makers to strike a balance in this trade-off.

Lastly, this study does not consider any alternative policy to the differential reduction in retirement age. Investing in the technological improvement of demanding occupations, increasing flexibility of the job market at later ages or pricing compensating differentials differently, are some of the candidates that respondents could prefer to early retirement. This is left for future research.

Appendix 5.A. Survey questions

This appendix lists the questions of the survey on demanding occupations. First the respondents were asked what they thought was a reasonable retirement age for the various fictive persons with different occupations:

We would like to ask you a number of hypothetical questions about the retirement age for various occupations. These questions are not about you, but about a fictive person with a number of characteristics. We would like to hear your opinion this person. John, Henry, Tim, Klaas and Stijn [in case of female names: Joan, Maria, Ann, Klaas and Stijn] *are all 55 years of age. They have worked full-time for the last 30 years. Before that they went to school. Their salaries are all equal.*

John [or Joan] *has worked for 30 years at a desk job. What do you think is a reasonable retirement age for John* [or Joan]*?*

Younger than 60 years of age
60 years of age
61 years of age
62 years of age
63 years of age
64 years of age
65 years of age
66 years of age
67 years of age
68 years of age
69 years of age
70 years of age
Older than 70 years of age

Henry [or Maria] *has taught for 30 years at an elementary school. What do you think is a reasonable retirement age for Henry* [or Maria]*?*
[Respondents see the same answer categories as the previous question]

Tim [or Ann] *has worked as a nurse for the last 30 years. What do you think is a reasonable retirement age for Tim* [or Ann]*?*
[Respondents see the same answer categories as the previous question]

Klaas has worked for 30 years in the construction sector. What do you think is an is a reasonable retirement age for Klaas?
[Respondents see the same answer categories as the previous question]

Stijn has worked for 30 years as a fireman. What do you think is an is a reasonable retirement age for Stijn?
[Respondents see the same answer categories as the previous question]

We would now like to ask you some questions about your willingness to contribute to early retirement schemes for certain occupations. This means that people with certain occupations will have the opportunity to retire earlier than people with other occupations.

Are you willing to contribute as a tax payer to an early retirement scheme for the persons we just described?
John [or Joan] *(has a desk job)*
Certainly not
Probably not
Perhaps
Probably yes
Certainly yes
Henry [or Maria] *(teacher at an elementary school)*
[Respondents see the same answer categories as the previous question]
Tim [or Ann] *(nurse)*
[Respondents see the same answer categories as the previous question]
Klaas (Construction worker)
[Respondents see the same answer categories as the previous question]
Stijn (Fireman)
[Respondents see the same answer categories as the previous question]

Do you think that the following persons have a demanding occupation?

John [or Joan] *(has a desk job)*

Undemanding

Somewhat undemanding

Not undemanding, not demanding

Somewhat demanding

Demanding

Henry [or Maria] *(teacher at an elementary school)*

[Respondents see the same answer categories as the previous question]

Tim [or Ann] *(nurse)*

[Respondents see the same answer categories as the previous question]

Klaas (Construction worker)

[Respondents see the same answer categories as the previous question]

Stijn (Fireman)

[Respondents see the same answer categories as the previous question]

What attributes makes an occupation demanding in your view?

- Working in shifts

certainly not

not really

neutral

quite

Most certainly

- Physically demanding

[Respondents see the same answer categories as the previous question]

- Working under time pressure (work has to be finished within a certain period)

[Respondents see the same answer categories as the previous question]

- A lot of responsibility

[Respondents see the same answer categories as the previous question]

- Irregular working hours

[Respondents see the same answer categories as the previous question]

- Long working days

[Respondents see the same answer categories as the previous question]

- Many worked years (in some occupations it is common to have started working at 16 or 18 years of age)

[Respondents see the same answer categories as the previous question]

To the persons, that indicated they have a job or had a job before, the following question was asked:

With which person does your occupation most closely compare?

John [or Joan] *(has a desk job)*

Henry [or Maria] *(teacher at an elementary school)*

Tim [or Ann] *(nurse)*

Klaas (Construction worker)

Stijn (Fireman)

Appendix 5.B. Likelihood function for model of demanding occupations and reasonable retirement age

This appendix derives the likelihood function of the model in section 5.4.1. The probability density corresponding to equation (5.4) is:

$$g\left(R_{ij}=r_{ij}|W_{ij},X_i,Z_i,\rho_i,\vartheta_i\right)=\frac{1}{\sqrt{\sigma_\varepsilon^2+\gamma_j{}^2}}\varphi\left(\frac{r_{ij}-W_{ij}^{'}\gamma_j\lambda_j-X_i^{'}(\gamma_j\delta_j+\eta_j)-Z_i(\beta_j+\alpha_j\gamma_j)-\rho_i-\gamma_j\vartheta_i}{\sqrt{\sigma_\varepsilon^2+\gamma_j{}^2}}\right) \quad 5.B.1)$$

Equations (5.1) and (5.2) combine into:

$$Y_{ij}=1\ if\ Y_{ij}^*\le c_1-X_i^{'}\delta_j-Z_i\alpha_j-W_{ij}^{'}\lambda_j-\vartheta_i$$

$$Y_{ij}=2\ if\ c_1-X_i^{'}\delta_j-Z_i\alpha_j-W_{ij}^{'}\lambda_j-\vartheta_i<Y_{ij}^*\le c_2-X_i^{'}\delta_j-Z_i\alpha_j-W_{ij}^{'}\lambda_j-\vartheta_i$$

$$Y_{ij}=3\ if\ c_2-X_i^{'}\delta_j-Z_i\alpha_j-W_{ij}^{'}\lambda_j-\vartheta_i<Y_{ij}^*\le c_3-X_i^{'}\delta_j-Z_i\alpha_j-W_{ij}^{'}\lambda_j-\vartheta_i$$

$$Y_{ij}=4\ if\ c_3-X_i^{'}\delta_j-Z_i\alpha_j-W_{ij}^{'}\lambda_j-\vartheta_i<Y_{ij}^*\le c_4-X_i^{'}\delta_j-Z_i\alpha_j-W_{ij}^{'}\lambda_j-\vartheta_i$$

$$Y_{ij}=5\ if\ Y_{ij}^*>c_4-X_i^{'}\delta_j-Z_i\alpha_j-W_{ij}^{'}\lambda_j-\vartheta_i$$

For the construction of the individual likelihood contribution the associated probability of equation (5.1) is conditioned on $\varepsilon_{ij}+\gamma_j u_{ij}$. This conditional distribution is normal:

$u_{ij}|(\varepsilon_{ij}+\gamma_j u_{ij})\sim N\left(\frac{1}{\sigma_\varepsilon}\frac{\gamma_j}{\sqrt{\sigma_\varepsilon^2+\gamma_j^2}}(\varepsilon_{ij}+\gamma_j u_{ij}),1-\frac{\gamma_j^2}{\sigma_\varepsilon^2+\gamma_j^2}\right)$ and leads to the following equation:

$$P\left(Y_{ij}=k|W_{ij},X_i,Z_i,\vartheta_i,\varepsilon_{ij}+\gamma_j u_{ij}\right)=\Phi\left(\frac{c_k-X_i^{'}\delta_j-Z_i\alpha_j-W_{ij}^{'}\lambda_j-\vartheta_i-\frac{1}{\sigma_\varepsilon}\frac{\gamma_j}{\sqrt{\sigma_\varepsilon^2+\gamma_j^2}}(\varepsilon_{ij}+\gamma_j u_{ij})}{\sqrt{1-\frac{\gamma_j^2}{\sigma_\varepsilon^2+\gamma_j^2}}}\right)-$$

$$\Phi\left(\frac{c_{k-1}-X_i^{'}\delta_j-Z_i\alpha_j-W_{ij}^{'}\lambda_j-\vartheta_i-\frac{1}{\sigma_\varepsilon}\frac{\gamma_j}{\sqrt{\sigma_\varepsilon^2+\gamma_j^2}}(\varepsilon_{ij}+\gamma_j u_{ij})}{\sqrt{1-\frac{\gamma_j^2}{\sigma_\varepsilon^2+\gamma_j^2}}}\right) \quad (5.B.2)$$

for k = 1, …, 5

As before, we define for notational purposes: $c_0=-\infty$ and $c_5=\infty$

Equation (5.4) can be rewritten to give an expression for the residuals and inserted in equation (5.B.2), leading to:

$$P\left(Y_{ij}=k|W_{ij},X_i,Z_i,\vartheta_i,\varepsilon_{ij}+\gamma_j u_{ij}\right)=$$

$$\Phi\left(\frac{c_k-X_i^{'}\delta_j-Z_i\alpha_j-W_{ij}^{'}\lambda_j-\vartheta_i-\frac{1}{\sigma_\varepsilon}\frac{\gamma_j}{\sqrt{\sigma_\varepsilon^2+\gamma_j^2}}(r_{ij}-W_{ij}^{'}\gamma_j\lambda_j-X_i^{'}(\gamma_j\delta_j+\eta_j)-Z_i(\beta_j+\alpha_j\gamma_j)-\rho_i-\gamma_j\vartheta_i)}{\sqrt{1-\frac{\gamma_j^2}{\sigma_\varepsilon^2+\gamma_j^2}}}\right)-$$

$$\Phi\left(\frac{c_{k-1}-X_i^{'}\delta_j-Z_i\alpha_j-W_{ij}^{'}\lambda_j-\vartheta_i-\frac{1}{\sigma_\varepsilon}\frac{\gamma_j}{\sqrt{\sigma_\varepsilon^2+\gamma_j^2}}(r_{ij}-W_{ij}^{'}\gamma_j\lambda_j-X_i^{'}(\gamma_j\delta_j+\eta_j)-Z_i(\beta_j+\alpha_j\gamma_j)-\rho_i-\gamma_j\vartheta_i)}{\sqrt{1-\frac{\gamma_j^2}{\sigma_\varepsilon^2+\gamma_j^2}}}\right)$$

The assumptions on the unobserved heterogeneity is that these terms are bivariate normally distributed: $\binom{\vartheta_i}{\rho_i}=N(\binom{0}{0},\begin{pmatrix}\sigma_\vartheta^2 & \tau\sigma_\rho\sigma_\vartheta\\ \tau\sigma_\rho\sigma_\vartheta & \sigma_\rho^2\end{pmatrix})$.

The individual contribution to the likelihood function is:

$$L_i=$$

$$\iint_{-\infty-\infty}^{\infty\ \infty}\prod_{j=1}^{5}P\left(Y_{ij}=k\middle|W_{ij},X_i,Z_i,\vartheta_i,\varepsilon_{ij}+\gamma_j u_{ij}\right)g\left(R_{ij}=r_{ij}\middle|W_{ij},X_i,Z_i,\rho_i,\vartheta_i\right)f(\rho_i,\vartheta_i)d\rho_i d\vartheta_i$$

where the function $f(\rho_i,\vartheta_i)$ is the density function of the bivariate normal distribution:

$$f(\rho_i,\vartheta_i)=\frac{1}{2\pi\sigma_\rho\sigma_\vartheta\sqrt{1-\tau^2}}\exp(-\frac{1}{2}\binom{\rho_i}{\vartheta_i}^{\mathrm{T}}\begin{pmatrix}\sigma_\rho^2 & \tau\sigma_\rho\sigma_\vartheta\\ \tau\sigma_\rho\sigma_\vartheta & \sigma_\vartheta^2\end{pmatrix}^{-1}\binom{\rho_i}{\vartheta_i})$$

Appendix 5.CDerivation likelihood function for demanding occupations and the willingness to contribute to (early) retirement scheme

This appendix derives the likelihood function of the model in section 5.4.2. Equation (5.C.1) shows the probability for a given respondent *i* answering the questions about demanding occupations and the willingness to contribute of occupation *j*:

$$\begin{aligned} P(Y_{ij} = k, C_{ij} = l) &= P(c_{k-1} < y_{ij}^* \leq c_k, d_{l-1} < C_{ij}^* \leq d_l) \\ &= P(y_{ij}^* \leq c_k, C_{ij}^* \leq d_l) - P(y_{ij}^* \leq c_k, C_{ij}^* \leq d_{l-1}) \\ &\quad -P(y_{ij}^* \leq c_{k-1}, C_{ij}^* \leq d_l) + P(y_{ij}^* \leq c_{k-1}, C_{ij}^* \leq d_{l-1}) \end{aligned} \tag{5.C.1}$$

The probabilities are from a bivariate normal distribution:

$$\begin{aligned} &P(y_{ij}^* \leq c_{k+x}, C_{ij}^* \leq d_{l+x}) \\ &= \Phi_2(\mathrm{c}_{k+x} - X_i'\delta_j - Z_i\alpha_j - W_{ij}'\lambda_j \\ &- \vartheta_i, \frac{\mathrm{d}_{l+x} - W_{ij}'\kappa_j\lambda_j - X_i'(\kappa_j\delta_j + \mu_j) - Z_i(\eta_j + \kappa_j\alpha_j) - \phi_i - \kappa_j\vartheta_i}{\sqrt{1+\kappa_j^2}}, \frac{\kappa_j}{\sqrt{1+\kappa_j^2}}) \end{aligned}$$

where x$\in \{0, -1\}$

The individual contribution to the likelihood is:

$$L_i = \int_{-\infty}^{\infty}\int_{-\infty}^{\infty}\prod_{j=1}^{5} P(Y_{ij} = k, C_{ij} = l|\phi_i, \vartheta_i, X_i, Z_i, W_{ij})\, f(\phi_i, \vartheta_i) d\phi_i d\vartheta_i$$

If the particular values of *k* and *l* are observed and zero otherwise. The function $f(\rho_i, \vartheta_i)$ is the density function of the bivariate normal distribution:

$$f(\phi_i, \vartheta_i) = \frac{1}{2\pi\sigma_\phi\sigma_\vartheta\sqrt{1-\tau^2}} \exp\left(-\frac{1}{2}\begin{pmatrix}\phi_i \\ \vartheta_i\end{pmatrix}^{\mathrm{T}} \begin{pmatrix}\sigma_\phi^2 & \tau\sigma_\phi\sigma_\vartheta \\ \tau\sigma_\phi\sigma_\vartheta & \sigma_\vartheta^2\end{pmatrix}^{-1} \begin{pmatrix}\phi_i \\ \vartheta_i\end{pmatrix} \right)$$

Appendix 5.D: Descriptive statistics of the background variables

Table 5.D.1 Descriptive statistics for the background variables in the estimated models

	Mean or Percentage
Gender	
Male	49.13
Female	50.87
Age (years)	48.30
Education	
Primary education	7.60
Lower secondary education (VMBO)	24.79
Upper secondary education (HAVO/VWO) and lower vocational(MBO)	38.50
Upper vocational (HBO) and University (WO)	29.11
Income (Nett monthly income household)	
1150 Euros or less	5.10
1151 - 1800 Euros	13.05
1801 - 2600 Euros	25.54
2601 Euros or more	56.30
Employment status	
Employed at the moment	65.60
Not working at the moment, but worked in the past	12.27
(Early) retired	22.12
Region of the Netherlands	
North	13.53
West	43.99
East	21.18
South	21.30

Weighted data. *N* = 1,771 (estimation sample). Region of the Netherlands: West = Noord- and Zuid-Holland, Utrecht and Zeeland; North = Groningen, Friesland and Drenthe; East = Overijssel, Flevoland and Gelderland; South = Noord-Brabant and Limburg.

Appendix 5.EAll estimation results for the model linking the extent of how demanding occupations are to the reasonable retirement age

This appendix shows all estimation results for the model of section 5.4.1.

Table 5.E.1 Estimation of model

	Desk job	Teacher	Nurse	Construction worker	Fire man
How demanding are said occupations?					
Shifts: Quite	0.167**	0.119	0.192**	0.025	0.235***
	(0.079)	(0.077)	(0.078)	(0.087)	(0.078)
Shifts: Certainly yes	0.051	0.164*	0.373***	0.042	0.326***
	(0.100)	(0.096)	(0.099)	(0.113)	(0.099)
Physical: Quite	-0.662***	-0.194	0.196	0.986***	0.602***
	(0.133)	(0.130)	(0.131)	(0.134)	(0.131)
Physical: Certainly yes	-0.927***	-0.189	0.504***	2.195***	1.067***
	(0.136)	(0.132)	(0.134)	(0.143)	(0.134)
Time Pressure: Quite	0.383***	0.268***	-0.001	-0.217***	-0.185**
	(0.075)	(0.072)	(0.074)	(0.084)	(0.074)
Time Pressure: Certainly yes	0.475***	0.486***	0.275**	-0.335**	-0.300**
	(0.117)	(0.113)	(0.118)	(0.135)	(0.117)
Responsibility: Quite	0.285***	0.277***	0.247***	0.027	0.106
	(0.074)	(0.071)	(0.073)	(0.083)	(0.073)
Responsibility: Certainly yes	0.571***	0.444***	0.415***	0.078	0.276**
	(0.127)	(0.124)	(0.130)	(0.148)	(0.129)
Irregular working hours: Quite	-0.007	0.160**	0.219***	0.084	0.158**
	(0.079)	(0.077)	(0.079)	(0.088)	(0.079)
Irregular working hours: Certainly yes	0.016	0.121	0.496***	0.074	0.415***
	(0.121)	(0.118)	(0.122)	(0.140)	(0.122)
Long working hours: Quite	0.113	0.086	0.097	0.037	0.122
	(0.077)	(0.074)	(0.076)	(0.084)	(0.076)
Long working hours: Certainly yes	-0.152	0.047	-0.070	0.308**	0.305***
	(0.111)	(0.107)	(0.110)	(0.129)	(0.111)
Many worked years: Quite	0.025	0.150**	0.248***	0.200**	0.139**
	(0.070)	(0.068)	(0.070)	(0.078)	(0.070)
Many worked years: Certainly yes	0.003	0.216**	0.545***	0.451***	0.109
	(0.095)	(0.091)	(0.096)	(0.115)	(0.095)
Female name of vignette person	0.127**	0.126**	0.214***	-	-
	(0.057)	(0.056)	(0.058)		
gender respondent	0.129*	0.098	0.131*	0.147*	0.303***
	(0.067)	(0.065)	(0.067)	(0.078)	(0.067)
Age	0.023*	0.024*	0.015	0.009	-0.031**
	(0.013)	(0.013)	(0.013)	(0.016)	(0.013)
age squared	-0.000	-0.000	-0.000	-0.000	0.000**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Family income less than 1150 Euro	-0.013	0.020	-0.040	0.109	0.117
	(0.130)	(0.125)	(0.129)	(0.154)	(0.130)
Family income between 1151 and 1800 Euro	-0.057	0.110	0.084	0.145	0.181*
	(0.092)	(0.089)	(0.093)	(0.109)	(0.093)
Family income between 1801 and 2600 Euro	-0.078	0.134*	0.050	0.134	0.160**
	(0.073)	(0.070)	(0.073)	(0.086)	(0.073)
basisonderwijs	-0.304**	-0.192	0.072	0.168	-0.040
	(0.154)	(0.149)	(0.154)	(0.180)	(0.153)
vmbo	-0.104	-0.111	0.196**	0.267***	0.070
	(0.081)	(0.078)	(0.082)	(0.096)	(0.082)
mbo+havo/vwo	-0.085	-0.079	0.182**	0.167*	0.162**
	(0.075)	(0.073)	(0.076)	(0.087)	(0.076)
Region North	-0.065	-0.284***	-0.256***	-0.091	0.040
	(0.095)	(0.092)	(0.095)	(0.109)	(0.096)
Region East	0.123	-0.148*	-0.075	0.019	-0.026
	(0.079)	(0.077)	(0.080)	(0.093)	(0.080)
Region South	0.041	-0.185**	-0.164**	-0.002	-0.057
	(0.077)	(0.074)	(0.077)	(0.089)	(0.077)

Table 5.E.1 Estimation of model (continued 1)

	Desk job	Teacher	Nurse	Construction worker	Fire man
Not in a job now, but worked before	-0.098	0.021	-0.024	0.136	0.084
	(0.098)	(0.095)	(0.099)	(0.118)	(0.099)
(Early) retirement	-0.160	0.023	0.026	0.131	0.144
	(0.105)	(0.102)	(0.106)	(0.124)	(0.105)
Teacher (self-identification)	-0.215**	0.426***	0.193**	0.111	0.005
	(0.089)	(0.087)	(0.090)	(0.104)	(0.090)
Nurse (self-identification)	-0.417***	-0.188**	0.010	-0.064	-0.064
	(0.082)	(0.079)	(0.082)	(0.095)	(0.082)
Construction Worker (self-identification)	-0.267**	-0.283***	-0.345***	0.010	-0.191*
	(0.110)	(0.105)	(0.108)	(0.128)	(0.108)
Fireman (self-identification)	-0.244*	-0.140	-0.226	0.048	0.310**
	(0.143)	(0.138)	(0.142)	(0.166)	(0.145)
Constant	-	0.516	1.513***	2.098***	2.623***
		(0.451)	(0.463)	(0.504)	(0.463)
What is a reasonable retirement age					
γ_j	-0.552***	-0.815***	-0.836***	-0.738***	-0.960***
	(0.036)	(0.031)	(0.032)	(0.032)	(0.030)
Female name of vignette person	-0.258***	-0.248***	-0.241***	-	-
	(0.080)	(0.081)	(0.082)		
gender respondent	-0.201*	-0.376***	-0.244**	-0.339***	0.021
	(0.109)	(0.110)	(0.111)	(0.114)	(0.112)
Age	-0.012	-0.016	-0.002	0.045**	-0.012
	(0.021)	(0.022)	(0.022)	(0.022)	(0.022)
age squared	0.000	0.000	0.000	-0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Family income less than 1150 Euro	-0.024	0.102	-0.235	-0.057	0.354
	(0.214)	(0.216)	(0.217)	(0.225)	(0.219)
Family income between 1151 and 1800 Euro	0.246	0.066	0.012	-0.134	0.139
	(0.153)	(0.155)	(0.156)	(0.161)	(0.157)
Family income between 1801 and 2600 Euro	-0.033	0.023	-0.041	-0.134	0.047
	(0.120)	(0.121)	(0.123)	(0.126)	(0.123)
basisonderwijs	-0.377	-0.780***	-0.269	0.057	-0.443*
	(0.242)	(0.244)	(0.247)	(0.254)	(0.247)
vmbo	-0.556***	-0.784***	-0.496***	-0.093	-0.216
	(0.134)	(0.135)	(0.137)	(0.141)	(0.137)
mbo+havo/vwo	-0.306**	-0.519***	-0.151	-0.103	-0.325**
	(0.126)	(0.127)	(0.129)	(0.132)	(0.129)
Region North	-0.206	-0.075	-0.082	0.063	0.025
	(0.160)	(0.162)	(0.163)	(0.167)	(0.164)
Region East	0.050	0.097	0.153	0.038	0.296**
	(0.132)	(0.133)	(0.134)	(0.138)	(0.135)
Region South	-0.283**	-0.141	-0.183	-0.209	-0.060
	(0.126)	(0.127)	(0.129)	(0.132)	(0.129)
Not in a job now, but worked before	-0.075	-0.271*	-0.372**	-0.288*	-0.250
	(0.161)	(0.163)	(0.164)	(0.170)	(0.165)
(Early) retirement	-0.047	-0.356**	-0.085	-0.352*	-0.156
	(0.173)	(0.175)	(0.176)	(0.181)	(0.177)
Teacher (self-identification)	-0.091	-0.061	0.052	0.031	0.021
	(0.145)	(0.147)	(0.148)	(0.152)	(0.148)
Nurse (self-identification)	-0.129	-0.175	-0.211	-0.142	-0.100
	(0.132)	(0.133)	(0.134)	(0.138)	(0.135)
Construction Worker (self-identification)	-0.056	0.029	-0.110	0.228	-0.099
	(0.185)	(0.186)	(0.187)	(0.193)	(0.188)
Fireman (self-identification)	0.052	-0.283	-0.253	0.010	0.032
	(0.242)	(0.243)	(0.245)	(0.252)	(0.248)
Constant	66.697***	66.790***	66.328***	63.840***	66.024***
	(0.580)	(0.641)	(0.654)	(0.656)	(0.683)

Table 5.E.1 Estimation of model (continued 2)

	Desk job	Teacher	Nurse	Construction worker	Fire man
c_1			-0.141		
			(0.369)		
c_2			0.921**		
			(0.369)		
c_3			2.408***		
			(0.370)		
c_4			4.019***		
			(0.371)		
σ_ε			1.365***		
			(0.010)		
σ_ϑ			0.610***		
			(0.021)		
σ_ρ			1.587***		
			(0.030)		
$\tau\ (correlation\ coefficient)$			0.051		
			(0.033)		
Number of observations			1771		
Log likelihood			-26494		

Standard errors in parentheses, *** Significant at 1% level, ** Significant at 5% level, * Significant at 10% level. Reference person has tertiary education degree ('HBO or WO'), a household income higher than 2600 Euros, is a male, lives in the West of the Netherlands, has a desk job. Furthermore, he answers the questions with a male name. Region of the Netherlands: West = Noord- and Zuid-Holland, Utrecht and Zeeland; North = Groningen, Friesland and Drenthe; East = Overijssel, Flevoland and Gelderland; South = Noord-Brabant and Limburg.

Appendix 5.F Estimation results for the model linking the extent of how demanding occupations are to the willingness to contribute to early retirement schemes for certain professions

This appendix shows the complete table with the estimation results for the model of section 5.4.2.

Table 5.F.1 Estimation of model

	Desk job	Teacher	Nurse	Construction worker	Fire man
How demanding are said occupations?					
Shifts: Quite	0.172**	0.139*	0.186**	0.000	0.283***
	(0.075)	(0.075)	(0.078)	(0.091)	(0.079)
Shifts: Certainly yes	0.025	0.163*	0.388***	0.073	0.352***
	(0.094)	(0.094)	(0.100)	(0.120)	(0.101)
Physical: Quite	-0.629***	-0.256**	0.153	0.957***	0.527***
	(0.129)	(0.128)	(0.132)	(0.136)	(0.133)
Physical: Certainly yes	-0.945***	-0.334**	0.394***	2.192***	0.971***
	(0.132)	(0.131)	(0.136)	(0.145)	(0.137)
Time Pressure: Quite	0.320***	0.244***	-0.026	-0.269***	-0.215***
	(0.071)	(0.070)	(0.074)	(0.088)	(0.075)
Time Pressure: Certainly yes	0.427***	0.454***	0.256**	-0.503***	-0.401***
	(0.110)	(0.110)	(0.119)	(0.143)	(0.119)
Responsibility: Quite	0.289***	0.279***	0.256***	-0.012	0.142*
	(0.070)	(0.069)	(0.073)	(0.087)	(0.074)
Responsibility: Certainly yes	0.511***	0.440***	0.493***	0.193	0.346***
	(0.121)	(0.121)	(0.131)	(0.158)	(0.132)
Irregular working hours: Quite	0.035	0.182**	0.245***	0.105	0.153*
	(0.075)	(0.075)	(0.078)	(0.091)	(0.079)
Irregular working hours: Certainly yes	-0.067	0.046	0.390***	-0.058	0.361***
	(0.115)	(0.115)	(0.123)	(0.148)	(0.124)
Long working hours: Quite	0.127*	0.109	0.108	0.080	0.160**
	(0.073)	(0.072)	(0.076)	(0.087)	(0.076)
Long working hours: Certainly yes	-0.053	0.099	0.016	0.483***	0.408***
	(0.105)	(0.103)	(0.110)	(0.138)	(0.112)
Many worked years: Quite	-0.050	0.064	0.162**	0.141*	0.056
	(0.066)	(0.066)	(0.070)	(0.082)	(0.071)
Many worked years: Certainly yes	-0.092	0.106	0.443***	0.513***	0.058
	(0.089)	(0.089)	(0.096)	(0.125)	(0.097)
Female name of vignette person	0.153***	0.143**	0.230***	-	-
	(0.058)	(0.057)	(0.059)		
gender respondent	0.128*	0.103	0.129*	0.128	0.302***
	(0.067)	(0.066)	(0.069)	(0.080)	(0.069)
age	0.022	0.023*	0.015	0.003	-0.037***
	(0.014)	(0.013)	(0.014)	(0.016)	(0.014)
age squared	-0.000	-0.000	-0.000	0.000	0.000**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Family income less than 1150 Euro	-0.039	-0.003	-0.046	0.123	0.114
	(0.130)	(0.128)	(0.131)	(0.158)	(0.134)
Family income between 1151 and 1800	-0.079	0.099	0.077	0.150	0.160*
	(0.093)	(0.091)	(0.095)	(0.111)	(0.095)
Family income between 1801 and 2600	-0.075	0.140*	0.068	0.176**	0.153**
	(0.073)	(0.072)	(0.075)	(0.089)	(0.075)

Table 5.F.1 Estimation of model (continued 1)

	Desk job	Teacher	Nurse	Construction worker	Fire man
basisonderwijs	-0.241	-0.152	0.114	0.114	0.014
	(0.157)	(0.153)	(0.158)	(0.184)	(0.159)
vmbo	-0.067	-0.091	0.217***	0.298***	0.101
	(0.082)	(0.080)	(0.084)	(0.099)	(0.084)
mbo+havo/vwo	-0.071	-0.085	0.169**	0.131	0.156**
	(0.076)	(0.075)	(0.078)	(0.089)	(0.078)
Region North	-0.083	-0.308***	-0.276***	-0.130	0.033
	(0.096)	(0.094)	(0.098)	(0.113)	(0.099)
Region East	0.090	-0.170**	-0.093	-0.003	-0.047
	(0.080)	(0.079)	(0.082)	(0.096)	(0.082)
Region South	0.022	-0.204***	-0.179**	-0.025	-0.076
	(0.077)	(0.076)	(0.079)	(0.092)	(0.079)
Not in a job now, but worked before	-0.104	0.030	-0.032	0.205*	0.088
	(0.099)	(0.098)	(0.102)	(0.122)	(0.102)
(Early) retirement	-0.144	0.028	0.017	0.141	0.133
	(0.106)	(0.105)	(0.109)	(0.128)	(0.108)
Teacher (self-identification)	-0.189**	0.454***	0.218**	0.121	0.028
	(0.089)	(0.088)	(0.092)	(0.106)	(0.092)
Nurse (self-identification)	-0.373***	-0.152*	0.053	-0.025	-0.041
	(0.082)	(0.080)	(0.084)	(0.098)	(0.084)
Construction Worker (self-identification)	-0.257**	-0.248**	-0.327***	0.048	-0.164
	(0.110)	(0.107)	(0.110)	(0.132)	(0.111)
Fireman (self-identification)	-0.163	-0.056	-0.163	0.089	0.390***
	(0.143)	(0.139)	(0.143)	(0.169)	(0.149)
Constant (self-identification)	-	0.579	1.496***	2.276***	2.768***
		(0.461)	(0.470)	(0.516)	(0.476)
Willingness to contribute					
κ_j	1.492***	1.294***	0.766***	0.564***	0.654***
	(0.073)	(0.060)	(0.042)	(0.037)	(0.035)
Female name of vignette person	-0.123	-0.014	0.126	-	-
	(0.093)	(0.086)	(0.078)		
gender respondent	-0.194	-0.152	0.098	0.108	0.022
	(0.141)	(0.137)	(0.138)	(0.142)	(0.139)
age	-0.071**	-0.061**	-0.016	-0.016	-0.026
	(0.030)	(0.029)	(0.030)	(0.030)	(0.030)
age squared	0.001**	0.001**	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Family income less than 1150 Euro	0.347	0.452*	0.244	0.250	0.179
	(0.263)	(0.253)	(0.251)	(0.258)	(0.253)
Family income between 1151 and 1800	0.246	0.156	0.118	0.000	0.205
	(0.198)	(0.192)	(0.192)	(0.197)	(0.193)
Family income between 1801 and 2600	0.195	-0.050	0.141	0.227	0.234
	(0.155)	(0.152)	(0.151)	(0.155)	(0.152)
basisonderwijs	0.537*	0.117	-0.178	-0.257	-0.293
	(0.320)	(0.310)	(0.312)	(0.322)	(0.317)
vmbo	0.314*	-0.157	-0.286	-0.378**	-0.176
	(0.178)	(0.174)	(0.176)	(0.181)	(0.176)
mbo+havo/vwo	0.130	-0.031	-0.210	-0.170	-0.108
	(0.163)	(0.158)	(0.159)	(0.163)	(0.160)
Region North	0.484**	0.298	0.337*	0.346*	0.151
	(0.205)	(0.200)	(0.203)	(0.208)	(0.204)
Region East	0.141	0.207	0.143	0.147	-0.017
	(0.178)	(0.174)	(0.174)	(0.179)	(0.175)
Region South	0.048	-0.065	-0.113	-0.058	-0.206
	(0.163)	(0.158)	(0.157)	(0.160)	(0.158)

Table 5.F.1 Estimation of model (continued 2)

	Desk job	**Teacher**	**Nurse**	**Construction worker**	**Fire man**
Not in a job now, but worked before	0.614***	0.300	0.326	0.147	0.256
	(0.209)	(0.203)	(0.203)	(0.209)	(0.204)
(Early) retirement	-0.076	-0.117	0.063	0.233	0.286
	(0.219)	(0.215)	(0.217)	(0.223)	(0.218)
Teacher (self-identification)	0.149	-0.061	-0.021	-0.059	-0.032
	(0.189)	(0.185)	(0.184)	(0.189)	(0.185)
Nurse (self-identification)	0.716***	0.333**	0.375**	0.421**	0.370**
	(0.175)	(0.168)	(0.168)	(0.173)	(0.170)
Construction Worker (self-	0.381	0.364	0.545**	0.656***	0.590**
	(0.239)	(0.232)	(0.231)	(0.237)	(0.232)
Fireman (self-identification)	0.552*	0.235	0.463	0.198	0.468
	(0.302)	(0.293)	(0.290)	(0.297)	(0.293)
Constant	-	-0.749	-0.966	-0.304	-0.003
		(0.578)	(0.606)	(0.653)	(0.630)
c_1			-0.137		
			(0.372)		
c_2			0.861**		
			(0.373)		
c_3			2.316***		
			(0.374)		
c_4			3.945***		
			(0.375)		
d_1			-1.441		
			(0.926)		
d_2			0.752		
			(0.924)		
d_3			2.635***		
			(0.923)		
d_4			5.378***		
			(0.925)		
σ_ϑ			0.606***		
			(0.018)		
σ_ϕ			2.731***		
			(0.077)		
$\tau\ (correlation\ coefficient)$			0.516***		
			(0.021)		
number of observations			1771		
Log likelihood			-18096		

Standard errors in parentheses; *** Significant at 1% level, ** Significant at 5% level, * Significant at 10% level. Reference person has tertiary education degree ('HBO or WO'), a household income higher than 2600 Euros, is a male, lives in the West of the Netherlands, has a desk job. Furthermore, he answers the questions with a male name. Region of the Netherlands: West = Noord- and Zuid-Holland, Utrecht and Zeeland; North = Groningen, Friesland and Drenthe; East = Overijssel, Flevoland and Gelderland; South = Noord-Brabant and Limburg

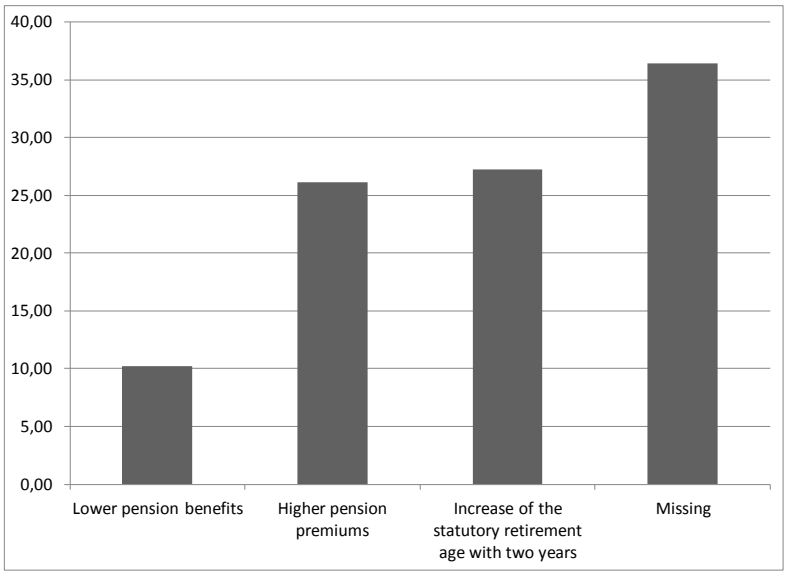
Appendix 5.G Estimation with stance towards statutory retirement age increase

This appendix shows the distribution of the stance towards the statutory retirement age over the respondents. It also shows re-estimation of the model with this answers to this question included as additional variables. For the stance on the statutory retirement age increase the distribution of the answers for the following question is examined:

To make sure that the general old-age pension remains affordable certain measures have to be taken.
Which of the following measures appeals to you most?
1 A lower general old-age pension.
2 An increase of the old-age pension premium for people working.
3 Increase the age by two years on which I will receive the general old-age pension.

Figure 5.G.1 shows the distribution of the answers over the respondents.

Figure 5.G.1 Distribution of answers over the respondents



Legend: answer to the question: " *To make sure that the general old-age pension remains affordable certain measures have to be taken. Which of the following measures appeals to you most?*" N=1,771. Source: DHS, own computations

Note that the question was asked only to respondents younger than 65 years of age. This implies that a large part (68%) of the 'missing' category consists of respondents at least this age.

Table 5.G.1 Estimation of model for reasonable retirement age with inclusion of opinion about AOW reform

	Desk job	Teacher	Nurse	Construction worker	Fire man
How demanding are said occupations?					
Shifts: Quite	0.163**	0.115	0.187**	0.187**	0.231***
	(0.079)	(0.077)	(0.078)	(0.078)	(0.078)
Shifts: Certainly yes	0.050	0.162*	0.370***	0.370***	0.324***
	(0.100)	(0.096)	(0.099)	(0.099)	(0.099)
Physical: Quite	-0.653***	-0.186	0.202	0.202	0.607***
	(0.133)	(0.130)	(0.132)	(0.132)	(0.131)
Physical: Certainly yes	-0.923***	-0.185	0.507***	0.507***	1.069***
	(0.136)	(0.132)	(0.134)	(0.134)	(0.134)
Time Pressure: Quite	0.379***	0.265***	-0.003	-0.003	-0.187**
	(0.075)	(0.072)	(0.074)	(0.074)	(0.074)
Time Pressure: Certainly yes	0.469***	0.480***	0.270**	0.270**	-0.305***
	(0.117)	(0.113)	(0.119)	(0.119)	(0.117)
Responsibility: Quite	0.285***	0.276***	0.246***	0.246***	0.105
	(0.074)	(0.071)	(0.073)	(0.073)	(0.073)
Responsibility: Certainly yes	0.576***	0.448***	0.418***	0.418***	0.279**
	(0.127)	(0.124)	(0.130)	(0.130)	(0.129)
Irregular working hours: Quite	-0.008	0.161**	0.219***	0.219***	0.158**
	(0.079)	(0.077)	(0.078)	(0.078)	(0.079)
Irregular working hours: Certainly yes	0.014	0.118	0.494***	0.494***	0.413***
	(0.121)	(0.118)	(0.122)	(0.122)	(0.122)
Long working hours: Quite	0.111	0.083	0.095	0.095	0.120
	(0.077)	(0.074)	(0.076)	(0.076)	(0.076)
Long working hours: Certainly yes	-0.148	0.052	-0.065	-0.065	0.310***
	(0.111)	(0.107)	(0.110)	(0.110)	(0.111)
Many worked years: Quite	0.027	0.152**	0.250***	0.250***	0.143**
	(0.070)	(0.068)	(0.069)	(0.069)	(0.070)
Many worked years: Certainly yes	0.006	0.220**	0.550***	0.550***	0.113
	(0.095)	(0.091)	(0.096)	(0.096)	(0.095)
Female name of vignette person	0.128**	0.127**	0.215***	-	-
	(0.057)	(0.056)	(0.058)		
gender respondent	0.125*	0.094	0.127*	0.127*	0.299***
	(0.067)	(0.065)	(0.067)	(0.067)	(0.067)
Age	0.023*	0.024*	0.015	0.015	-0.031**
	(0.013)	(0.013)	(0.013)	(0.013)	(0.013)
age squared	-0.000	-0.000	-0.000	-0.000	0.000**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Family income between 1151 and 1800 Euro	-0.004	0.031	-0.029	-0.029	0.128
	(0.130)	(0.126)	(0.129)	(0.129)	(0.131)
Family income between 1801 and 2600 Euro	-0.052	0.116	0.089	0.089	0.187**
	(0.092)	(0.089)	(0.093)	(0.093)	(0.093)
Family income more than 2600 Euro	-0.075	0.138*	0.054	0.054	0.164**
	(0.073)	(0.070)	(0.073)	(0.073)	(0.073)
Vmbo	-0.298*	-0.186	0.077	0.077	-0.033
	(0.154)	(0.148)	(0.153)	(0.153)	(0.153)
mbo+havo/vwo	-0.104	-0.110	0.196**	0.196**	0.070
	(0.081)	(0.078)	(0.082)	(0.082)	(0.082)
hbo+wo	-0.083	-0.077	0.184**	0.184**	0.164**
	(0.075)	(0.073)	(0.076)	(0.076)	(0.076)
Region North	-0.063	-0.282***	-0.253***	-0.253***	0.042
	(0.095)	(0.092)	(0.095)	(0.095)	(0.096)
Region East	0.126	-0.144*	-0.071	-0.071	-0.023
	(0.079)	(0.077)	(0.080)	(0.080)	(0.080)
Region South	0.043	-0.183**	-0.162**	-0.162**	-0.055
	(0.077)	(0.074)	(0.077)	(0.077)	(0.077)

Table 5.G.1 Estimation of model for reasonable retirement age with inclusion of opinion about AOW reform (continued 1)

	Desk job	Teacher	Nurse	Construction worker	Fire man
Not in a job now, but worked before	-0.101	0.017	-0.028	-0.028	0.080
	(0.098)	(0.096)	(0.099)	(0.099)	(0.099)
(Early) retirement	-0.156	0.027	0.029	0.029	0.147
	(0.105)	(0.102)	(0.105)	(0.105)	(0.105)
Teacher (self-identification)	-0.210**	0.431***	0.198**	0.198**	0.010
	(0.089)	(0.087)	(0.090)	(0.090)	(0.090)
Nurse (self-identification)	-0.411***	-0.183**	0.015	0.015	-0.059
	(0.082)	(0.079)	(0.082)	(0.082)	(0.082)
Construction Worker (self-identification)	-0.269**	-0.285***	-0.347***	-0.347***	-0.194*
	(0.110)	(0.105)	(0.108)	(0.108)	(0.108)
Fireman (self-identification)	-0.238*	-0.134	-0.219	-0.219	0.317**
	(0.143)	(0.138)	(0.142)	(0.142)	(0.145)
Constant	-	0.515	1.512***	1.512***	2.622***
		(0.451)	(0.463)	(0.463)	(0.463)
What is a reasonable retirement age					
γ_j	-0.545***	-0.813***	-0.832***	-0.738***	-0.961***
	(0.037)	(0.031)	(0.032)	(0.032)	(0.030)
Female name of vignette person	-0.247***	-0.241***	-0.240***	-	-
	(0.080)	(0.081)	(0.083)		
gender respondent	-0.203*	-0.377***	-0.245**	-0.339***	0.021
	(0.109)	(0.110)	(0.111)	(0.114)	(0.112)
Age	-0.009	-0.017	-0.008	0.039*	-0.015
	(0.022)	(0.023)	(0.023)	(0.023)	(0.023)
age squared	0.000	0.000	0.000	-0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Family income between 1151 and 1800 Euro	-0.055	0.077	-0.253	-0.074	0.335
	(0.215)	(0.217)	(0.218)	(0.226)	(0.220)
Family income between 1801 and 2600 Euro	0.216	0.037	-0.012	-0.156	0.118
	(0.152)	(0.153)	(0.155)	(0.160)	(0.156)
Family income more than 2600 Euro	-0.049	0.006	-0.058	-0.150	0.034
	(0.119)	(0.120)	(0.121)	(0.125)	(0.122)
Vmbo	-0.344	-0.751***	-0.244	0.077	-0.430*
	(0.238)	(0.241)	(0.243)	(0.251)	(0.244)
mbo+havo/vwo	-0.479***	-0.714***	-0.436***	-0.038	-0.168
	(0.134)	(0.136)	(0.137)	(0.141)	(0.137)
hbo+wo	-0.241*	-0.458***	-0.097	-0.053	-0.286**
	(0.126)	(0.128)	(0.129)	(0.132)	(0.129)
Region North	-0.184	-0.053	-0.059	0.086	0.044
	(0.158)	(0.160)	(0.161)	(0.165)	(0.162)
Region East	0.058	0.109	0.166	0.049	0.305**
	(0.132)	(0.133)	(0.134)	(0.138)	(0.135)
Region South	-0.255**	-0.113	-0.154	-0.182	-0.037
	(0.125)	(0.126)	(0.128)	(0.131)	(0.128)
Not in a job now, but worked before	-0.111	-0.296*	-0.385**	-0.299*	-0.266
	(0.160)	(0.162)	(0.163)	(0.169)	(0.164)
(Early) retirement	-0.071	-0.362**	-0.066	-0.330*	-0.146
	(0.174)	(0.176)	(0.178)	(0.183)	(0.178)

Table 5.G.1 Estimation of model for reasonable retirement age with inclusion of opinion about AOW reform (continued 2)

	Desk job	Teacher	Nurse	Construction worker	Fire man
Teacher (self-identification)	-0.028	-0.007	0.101	0.080	0.065
	(0.145)	(0.147)	(0.148)	(0.152)	(0.149)
Nurse (self-identification)	-0.064	-0.117	-0.158	-0.088	-0.052
	(0.132)	(0.133)	(0.134)	(0.138)	(0.135)
Construction Worker (self-identification)	-0.048	0.032	-0.109	0.228	-0.099
	(0.183)	(0.184)	(0.185)	(0.192)	(0.186)
Fireman (self-identification)	0.134	-0.216	-0.197	0.065	0.086
	(0.239)	(0.241)	(0.243)	(0.250)	(0.246)
Pension premium increase	0.350*	0.267	0.240	0.294	0.317
	(0.205)	(0.207)	(0.208)	(0.210)	(0.209)
Increase of two years in the statutory retirement age	1.073***	0.926***	0.836***	0.855***	0.795***
	(0.203)	(0.205)	(0.206)	(0.207)	(0.207)
Missing	0.752***	0.568***	0.418*	0.446**	0.489**
	(0.213)	(0.214)	(0.216)	(0.217)	(0.217)
Constant	65.971***	66.262***	65.976***	63.481***	65.612***
	(0.615)	(0.674)	(0.685)	(0.688)	(0.714)
c_1			-0.130		
			(0.369)		
c_2			0.932**		
			(0.369)		
c_3			2.418***		
			(0.370)		
c_4			4.029***		
			(0.371)		
σ_ε			1.365***		
			(0.010)		
σ_ϑ			0.605***		
			(0.021)		
σ_ρ			1.551***		
			(0.029)		
τ $(correlation\ coefficient)$			0.052		
			(0.035)		
Number of observations			1771		
Log likelihood			-26467		

Standard errors in parentheses, *** Significant at 1% level, ** Significant at 5% level, * Significant at 10% level. Reference person has tertiary education degree ('HBO or WO'), a household income higher than 2600 Euros, is a male, lives in the West of the Netherlands, has a desk job. Furthermore, he answers the questions with a male name. Region of the Netherlands: West = Noord- and Zuid-Holland, Utrecht and Zeeland; North = Groningen, Friesland and Drenthe; East = Overijssel, Flevoland and Gelderland; South = Noord-Brabant and Limburg.

Table 5.G.2 Estimation of model for willingness to contribute with inclusion of opinion about AOW reform

	Desk job	Teacher	Nurse	Construction worker	Fire man
How demanding are said occupations?					
Shifts: Quite	0.171**	0.139*	0.185**	0.000	0.283***
	(0.075)	(0.075)	(0.078)	(0.091)	(0.079)
Shifts: Certainly yes	0.025	0.165*	0.388***	0.076	0.353***
	(0.095)	(0.094)	(0.100)	(0.120)	(0.101)
Physical: Quite	-0.620***	-0.246*	0.161	0.964***	0.534***
	(0.129)	(0.128)	(0.133)	(0.136)	(0.133)
Physical: Certainly yes	-0.940***	-0.325**	0.401***	2.196***	0.977***
	(0.132)	(0.131)	(0.136)	(0.145)	(0.137)
Time Pressure: Quite	0.317***	0.241***	-0.029	-0.271***	-0.217***
	(0.071)	(0.070)	(0.074)	(0.088)	(0.075)
Time Pressure: Certainly yes	0.423***	0.452***	0.254**	-0.502***	-0.403***
	(0.111)	(0.110)	(0.119)	(0.143)	(0.120)
Responsibility: Quite	0.291***	0.280***	0.256***	-0.013	0.141*
	(0.070)	(0.069)	(0.073)	(0.087)	(0.074)
Responsibility: Certainly yes	0.513***	0.440***	0.494***	0.196	0.347***
	(0.121)	(0.121)	(0.131)	(0.158)	(0.132)
Irregular working hours: Quite	0.032	0.180**	0.243***	0.102	0.150*
	(0.075)	(0.075)	(0.079)	(0.091)	(0.079)
Irregular working hours: Certainly yes	-0.067	0.046	0.390***	-0.057	0.362***
	(0.115)	(0.115)	(0.123)	(0.148)	(0.124)
Long working hours: Quite	0.124*	0.105	0.106	0.078	0.158**
	(0.073)	(0.072)	(0.076)	(0.087)	(0.076)
Long working hours: Certainly yes	-0.057	0.093	0.012	0.478***	0.405***
	(0.105)	(0.104)	(0.111)	(0.138)	(0.112)
Many worked years: Quite	-0.054	0.061	0.159**	0.139*	0.054
	(0.066)	(0.066)	(0.070)	(0.082)	(0.071)
Many worked years: Certainly yes	-0.096	0.101	0.440***	0.511***	0.056
	(0.090)	(0.089)	(0.096)	(0.125)	(0.097)
Female name of vignette person	0.153***	0.143**	0.229***	-	-
	(0.058)	(0.057)	(0.059)		
gender respondent	0.129*	0.104	0.130*	0.128	0.303***
	(0.067)	(0.066)	(0.069)	(0.080)	(0.069)
age	0.022	0.023*	0.015	0.003	-0.037***
	(0.014)	(0.013)	(0.014)	(0.016)	(0.014)
age squared	-0.000	-0.000	-0.000	0.000	0.000**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Family income less than 1150 Euro	-0.040	-0.004	-0.048	0.121	0.112
	(0.130)	(0.128)	(0.132)	(0.158)	(0.134)
Family income between 1151 and 1800	-0.079	0.098	0.076	0.150	0.160*
	(0.093)	(0.091)	(0.095)	(0.111)	(0.095)
Family income between 1801 and 2600	-0.075	0.140*	0.067	0.177**	0.152**
	(0.073)	(0.072)	(0.075)	(0.089)	(0.075)
basisonderwijs	-0.240	-0.151	0.115	0.117	0.015
	(0.157)	(0.153)	(0.158)	(0.184)	(0.159)
vmbo	-0.068	-0.090	0.217***	0.299***	0.102
	(0.082)	(0.080)	(0.084)	(0.099)	(0.084)
mbo+havo/vwo	-0.070	-0.082	0.171**	0.132	0.157**
	(0.076)	(0.075)	(0.078)	(0.089)	(0.078)
Region North	-0.083	-0.308***	-0.276***	-0.130	0.032
	(0.096)	(0.094)	(0.098)	(0.113)	(0.099)
Region East	0.090	-0.171**	-0.094	-0.004	-0.048
	(0.080)	(0.079)	(0.082)	(0.096)	(0.082)
Region South	0.021	-0.204***	-0.180**	-0.026	-0.077
	(0.077)	(0.076)	(0.079)	(0.092)	(0.079)

Table 5.G.2 Estimation of model for willingness to contribute with inclusion of opinion about AOW reform (continued 1)

	Desk job	Teacher	Nurse	Construction worker	Fire man
Not in a job now, but worked before	-0.103	0.031	-0.031	0.205*	0.089
	(0.099)	(0.098)	(0.101)	(0.122)	(0.102)
(Early) retirement	-0.145	0.027	0.016	0.140	0.132
	(0.106)	(0.104)	(0.108)	(0.127)	(0.108)
Teacher (self-identification)	-0.186**	0.456***	0.221**	0.126	0.031
	(0.089)	(0.088)	(0.092)	(0.106)	(0.092)
Nurse (self-identification)	-0.372***	-0.151*	0.053	-0.025	-0.042
	(0.082)	(0.080)	(0.084)	(0.098)	(0.084)
Construction Worker (self-identification)	-0.258**	-0.247**	-0.327***	0.049	-0.164
	(0.110)	(0.107)	(0.110)	(0.132)	(0.111)
Fireman (self-identification)	-0.160	-0.054	-0.161	0.087	0.392***
	(0.143)	(0.139)	(0.143)	(0.169)	(0.149)
Constant	-	0.577	1.494***	2.275***	2.768***
		(0.461)	(0.470)	(0.516)	(0.476)
Willingness to contribute					
κ_j	1.480***	1.282***	0.764***	0.569***	0.659***
	(0.074)	(0.061)	(0.042)	(0.038)	(0.035)
Female name of vignette person	-0.129	-0.017	0.127	-	-
	(0.093)	(0.086)	(0.078)		
gender respondent	-0.204	-0.164	0.088	0.098	0.010
	(0.143)	(0.139)	(0.139)	(0.143)	(0.141)
age	-0.071**	-0.061**	-0.009	-0.013	-0.020
	(0.031)	(0.030)	(0.031)	(0.031)	(0.031)
age squared	0.001**	0.001*	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Family income less than 1150 Euro	0.340	0.433*	0.224	0.238	0.161
	(0.266)	(0.256)	(0.255)	(0.262)	(0.257)
Family income between 1151 and 1800	0.255	0.158	0.113	-0.006	0.196
	(0.197)	(0.192)	(0.192)	(0.198)	(0.194)
Family income between 1801 and 2600	0.203	-0.046	0.141	0.220	0.228
	(0.155)	(0.151)	(0.151)	(0.155)	(0.152)
basisonderwijs	0.539*	0.132	-0.150	-0.217	-0.250
	(0.319)	(0.309)	(0.311)	(0.321)	(0.316)
vmbo	0.292	-0.164	-0.271	-0.353*	-0.145
	(0.179)	(0.176)	(0.178)	(0.182)	(0.178)
mbo+havo/vwo	0.115	-0.028	-0.186	-0.133	-0.068
	(0.164)	(0.160)	(0.161)	(0.164)	(0.161)
Region North	0.477**	0.288	0.334*	0.352*	0.156
	(0.205)	(0.200)	(0.203)	(0.208)	(0.204)
Region East	0.141	0.208	0.145	0.153	-0.009
	(0.178)	(0.175)	(0.175)	(0.180)	(0.177)
Region South	0.039	-0.077	-0.115	-0.051	-0.198
	(0.163)	(0.158)	(0.157)	(0.160)	(0.158)
Not in a job now, but worked before	0.631***	0.320	0.324	0.145	0.251
	(0.209)	(0.203)	(0.203)	(0.209)	(0.204)
(Early) retirement	-0.062	-0.110	0.033	0.215	0.258
	(0.225)	(0.221)	(0.222)	(0.228)	(0.223)
Teacher	0.134	-0.069	-0.014	-0.043	-0.014
	(0.189)	(0.185)	(0.184)	(0.189)	(0.185)
Nurse	0.694***	0.310*	0.367**	0.423**	0.371**
	(0.175)	(0.168)	(0.168)	(0.173)	(0.170)
Construction Worker	0.369	0.350	0.541**	0.648***	0.587**
	(0.240)	(0.233)	(0.232)	(0.237)	(0.233)
Fireman	0.519*	0.204	0.461	0.207	0.474
	(0.302)	(0.293)	(0.290)	(0.297)	(0.293)

Table 5.G.2 Estimation of model for willingness to contribute with inclusion of opinion about AOW reform (continued 2)

	Desk job	Teacher	Nurse	Construction worker	Fire man
Pension premium increase	-0.057	-0.307	-0.174	-0.103	-0.171
	(0.245)	(0.240)	(0.234)	(0.238)	(0.235)
Increase of two years in the statutory retirement age	-0.330	-0.484**	-0.148	0.048	0.009
	(0.245)	(0.239)	(0.234)	(0.238)	(0.235)
Missing	-0.204	-0.388	-0.030	0.026	0.019
	(0.260)	(0.254)	(0.249)	(0.252)	(0.250)
Constant	-	-0.599	-1.211*	-0.592	-0.308
		(0.617)	(0.643)	(0.690)	(0.665)
c_1			-0.135		
			(0.372)		
c_2			0.863**		
			(0.373)		
c_3			2.320***		
			(0.374)		
c_4			3.948***		
			(0.375)		
d_1			-1.628*		
			(0.957)		
d_2			0.566		
			(0.955)		
d_3			2.449**		
			(0.955)		
d_4			5.190***		
			(0.956)		
σ_ϑ			0.604***		
			(0.018)		
σ_ϕ			2.724***		
			(0.077)		
$\tau\ (correlation\ coefficient)$			0.515***		
			(0.021)		
number of observations			1771		
Log likelihood			-18085		

Standard errors in parentheses, *** Significant at 1% level, ** Significant at 5% level, * Significant at 10% level. Reference person has tertiary education degree ('HBO or WO'), a household income higher than 2600 Euros, is a male, lives in the West of the Netherlands, has a desk job. Furthermore, he answers the questions with a male name. Region of the Netherlands: West = Noord- and Zuid-Holland, Utrecht and Zeeland; North = Groningen, Friesland and Drenthe; East = Overijssel, Flevoland and Gelderland; South = Noord-Brabant and Limburg.

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