



Network for Studies on Pensions, Aging and Retirement

The relationship between non-cognitive skills and retirement decisions

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Abstract

This paper summarizes the main findings of the literature on the relationship between non-cognitive skills and retirement decisions. It first provides a general introduction of the literature on non-cognitive skills. That is followed by a discussion of the extent to which non-cognitive skills relate to retirement decisions. We show evidence of the extent to which non-cognitive skills affect the way individuals adjust their retirement expectations when confronted with pension reforms. Finally, we discuss the importance of awareness of the non-cognitive skills of individuals in pension communication.

Samenvatting

In dit paper vatten we de belangrijkste bevindingen samen van de literatuur over de relatie tussen non-cognitieve vaardigheden en pensioenbeslissingen. De paper begint eerst met een algemene introductie over de literatuur met betrekking tot non-cognitieve vaardigheden. Daarna bespreken we in welke mate deze vaardigheden een effect hebben op pensioenbeslissingen. We tonen aan dat non-cognitieve vaardigheden een grote invloed hebben op hoe individuen hun pensioenverwachtingen aanpassen als zij geconfronteerd worden met pensioenhervormingen. Als laatste bespreken we de relevantie van het inventariseren van non-cognitieve vaardigheden voor de effectiviteit van de pensioencommunicatie.

Policy recommendations

Policymakers and pension funds can benefit from awareness of the non-cognitive skills of individual workers. The literature on pensions consistently shows that non-cognitive skills are highly important in explaining retirement behavior. Most studies find that neuroticism is positively correlated to early retirement, while extraversion is correlated to delayed retirement. Results from a stated preferences experiment furthermore show that people who differ in terms of non-cognitive skills are differently affected by pension reforms. Reforms are therefore likely to affect people who differ in terms of personality traits in different ways.

Although non-cognitive skills are malleable, changing these skills involves considerable costs. It is important that interventions aimed at personality change provide long-term consistent incentives for new patterns of thought, feeling, and behavior. One cannot change non-cognitive skills with only small incidental interventions since research shows that only major life events affect non-cognitive skills. It is therefore unadvisable for policymakers and pension funds to aim at introducing interventions to alter non-cognitive skills in order to optimize retirement decisions.

A more feasible option in the short run would be to adapt pension communication to individual personalities when seeking to counter the potentially negative effects of specific personality traits. In particular, neuroticism seems to be positively related to decisional procrastination. Results suggest that neurotic workers are less likely to engage on a timely basis in the complicated decision process regarding retirement and pension savings choices. Identifying personality traits, in particular emotional stability in combination with adjusted communication, may help pension funds to deal more adequately with procrastination behavior in the retirement decision-making process.

1. Introduction

As a result of population aging and declining fertility, many industrialized countries face a steady decrease in the ratio of workers who contribute to pension funds to inactive retirees who draw from these funds. Many of these countries have therefore started to implement major pension reforms in an effort to augment the labor supply of older workers. These reforms include decreases in pension benefits and increases in the eligibility age for early and statutory retirement (Gruber and Wise 1998; Duval 2005; Mastrobuoni 2009; Kangas et al. 2010; Börsch-Supan 2012; Staubli and Zweimüller 2013). This worldwide retrenchment of public pension rights means that individual workers must increasingly rely on their private pension savings if they want to retire early.

The literature on the substitution between public pension wealth and household savings argues, along the lines of the standard life cycle model, that publicly provided pension plans may crowd out private savings. The actual degree of substitutability between private and public savings has been the subject of several empirical research papers. This literature tells us that private and public pension assets are not perfect substitutes, but that the degree of substitution can indeed be substantial. See for instance the literature reviewed by Alessie et al. (2013) and the contributions by Feldstein (1974), Feldstein and Pellechio (1979), Gale (1998), and Bernheim (2002). The literature reviewed furthermore shows that there is substantial heterogeneity in the ways workers react to changing financial incentives in pension systems in their retirement decisions (e.g., De Grip et al. 2013; Elsayed 2015). The most dominant explanation for this heterogeneity and the imperfect substitution between public and private assets comes from the literature on cognitive skills and economic preferences. A considerable number of studies have looked at financial outcomes over the life cycle and examined the extent to which cognitive ability, numeracy, and financial literacy determine financial savings and asset accumulation. In particular, the concepts of numeracy and financial literacy get much attention in the policy debate around retirement and pension policy. However, by almost exclusively focusing on measures of numeracy and literacy, empirical economic research on retirement behavior has somewhat overlooked over the years that other abilities, such as non-cognitive skills which are only weakly related to cognition, are potentially as important as cognitive skills for economic choices and success.

Recent studies have tried to fill this gap in the literature and have indeed shown that non-cognitive skills (i.e., economic preferences and personality) are equally important in determining a broad range of economic decisions and outcomes, such

as educational choices (Coleman & DeLeire 2003), occupational choices (Bonin et al. 2007), financial investment decisions (Durand et al. 2008), as well as outcomes in other domains (Dohmen et al. 2011). This suggests that, to increase our knowledge of workers' capabilities in making retirement decisions and of how retirement preferences are formed exactly, it is worthwhile to consider in more detail the relationship between non-cognitive skills and retirement behavior.

In this paper we summarize the main findings in the literature on the relationship between non-cognitive skills and retirement decisions. We first provide a general introduction of the literature on non-cognitive skills. Subsequently, we discuss the extent to which non-cognitive skills relate to retirement decisions. Because of a lack of evidence for the Netherlands, this discussion focuses on evidence from international research. Using a stated preferences experiment, an approach with a rich tradition in the Netherlands, we then show evidence on the extent to which non-cognitive skills affect the way Dutch workers adapt their retirement expectations when confronted with pension reforms. Finally, we discuss the importance of considering people's non-cognitive skills in pension communication.

2. Non-cognitive skills in the economic literature

Defining non-cognitive skills

Cognitive skills often mentioned in economic literature are intelligence and the ability to solve abstract problems. Measures of these skills include IQ tests, standardized tests on reading, science and math, and financial literacy tests. Non-cognitive skills include economic preferences (for time and risk) and personality traits that are *weakly correlated with measures of cognitive skills*. The concept of non-cognitive skills was introduced by sociologists Bowles and Gintis (1976) in order to focus specifically on factors other than those measured by cognitive test scores. These non-cognitive factors may include concepts such as perseverance ("grit"), conscientiousness, self-control, trust, self-efficacy, resilience to adversity, and openness to experience. Non-cognitive skills are thus related to motivation, integrity, personality, and attitudes. They can involve personal intellect, but more indirectly and less deliberately than cognitive skills. Although these skills have various names in the literature, including soft skills, personality traits, non-cognitive abilities, character skills, and socio-emotional skills, the term non-cognitive skills is the preferred overarching name (Kautz et al. 2014). The term 'skills' suggests, after all, that these attributes can be learned.

This learning potential is important because widespread evidence suggests that both cognitive and non-cognitive skills can change and be changed over the life cycle. In this context, Kautz et al. (2014) make a strong plea to discard obsolete views about the origin and malleability of cognitive as well as non-cognitive skills, due to the overwhelming evidence that skills can be augmented through guidance and instruction. As an example they state that raw intelligence is not determined solely by parental genes but also enhanced by quality parenting and by caring environments, and that it becomes solidified around the time of puberty. This would suggest that improving financial literacy and financial education, which is often mentioned as a remedy to the increasingly more complicated financial environment in which individuals have to make retirement decisions (as advocated by, e.g., Hilgert et al. 2003; Greenspan 2002; Morton 2005, Lusardi et al. 2007), is most effective at early age. This limited malleability of cognitive skills may indeed partly explain the growing evidence that financial education aimed at older workers is ineffective in improving financial decision making (see, e.g., Fernandes et al. 2014; Ambuehl et al. 2014).

Most interestingly, non-cognitive skills can also be shaped and are in fact more malleable even at later age. Neuroscience actually shows that this malleability is associated with the slow development of the prefrontal cortex (Walsh 2005; Lenrooth et al. 2006). The consequence is that non-cognitive skills change throughout the

life span, in particular in early life and old age, and that this change can partly be attributed to social demands and experiences (Specht et al. 2011; 2014).

Operationalizing the concept of non-cognitive skills

Although non-cognitive skills are still largely ignored in policy discussions and in economic models of choice behavior, psychologists have analyzed in detail how these skills relate to various important economic outcomes and behaviors (e.g., Roberts et al. 2007; Moffit et al. 2011).

In addition, various studies in labor economics have assessed the importance of non-cognitive skills for several educational and labor market outcomes (Jencks 1979; Bowles and Gintis 2001; Farkas 2003; Heckman et al. 2006; Mueller and Plug 2006; Borghans et al. 2008; Heineck and Anger 2010; Caliendo et al. 2014).

The evidence highlights the importance of further integration of the different measures and concepts used by economists and personality psychologists within existing economic frameworks. Important in this respect is that Becker et al. (2012), who evaluated the relationship between economic preference measures, which are traditionally used in the economic literature, and psychological non-cognitive measures, show that the correlations between traditional economic and non-cognitive measures are small. The two types of measures are complements rather than substitutes in explaining important life outcomes, including educational attainment, earnings, unemployment, life satisfaction, and health outcomes.

There are still relatively few studies that have focused on the relationship between non-cognitive skills and retirement behavior (e.g., Löckenhoff et al. 2009; Sutin et al. 2009; Robinson et al. 2010; Sutin and Costa 2010; Feldman and Beehr 2011; Blekesaune and Skirbekk 2012). These studies, which we review in Section 3, have all used a very specific operationalization of non-cognitive skills, namely the so-called 'Big Five' taxonomy of personality. The use of this specific taxonomy is not without reason. Evidence on the relevance of this taxonomy has been growing for many years, beginning with the research of Fiske (1949) and later expanded upon by other researchers including Norman (1967), Smith (1967), Goldberg (1981), and McCrae & Costa (1987). The dominant view among personality psychologists is that someone's personality can be mapped along five general traits: openness to experience, conscientiousness, extraversion, agreeableness, and neuroticism. *Openness to experience* reflects a tendency to be imaginative, creative and unconventional. *Conscientiousness* captures the tendency to be well-organized, systematic, and self-disciplined (i.e., to show planned rather than spontaneous behavior). *Extraversion* measures the tendency to be active, forthcoming, dominant, and extravert (i.e., to seek stimulation

and the company of others). *Agreeableness* reflects a tendency to be friendly, warm, considerate, and non-cynical. And *neuroticism* stands for a tendency to be worried, touchy, nervous, and strenuous (also labeled emotional instability). These traits can be seen as overarching constructs which capture lots of underlying traits: there is a hierarchical organization of traits with sub-facets (that are highly but not perfectly correlated) and more narrowly defined traits at lower levels. While these Big Five measures are currently extensively used in psychology, there are nevertheless also several other taxonomies. These other taxonomies are, however, closely related to the Big Five (Kautz et al. 2014).¹

1 It is important to recognize that economic preference parameters do not relate closely to the Big Five taxonomy and apparently represent different attributes. A few studies provided empirical evidence of this difference (Almlund et al. 2011; and Becker et al. 2012).

3. Non-cognitive skills, savings, and the retirement decision

The relationship between non-cognitive skills and economic outcomes

Various studies show that non-cognitive skills are strongly related to job performance (Judge et al. 1999) and career choice (Page et al. 2008). This holds in particular for neuroticism (Tett et al. 1991; Gelissen and De Graaf 2006; Judge et al. 1999; Sutin et al. 2009). Moreover, it is found that agreeableness is related to work-related interpersonal skills (Barrick and Mount 2005; Hurtz and Donovan 2000; Salgado 1997). Sutin et al. (2009) furthermore show that neuroticism is negatively related to income and job satisfaction, while extraversion and conscientiousness are positively related to higher income and job satisfaction. Hence, we could expect that non-cognitive skills also impact retirement behavior. After all, it seems natural to expect that people who are successful in their job would retire later.

Moreover, recent studies that have analyzed the relationship between non-cognitive skills and savings indicate that these skills correlate with savings behavior. For example, Brandstätter (1996) and Cobb-Clark et al. (2013) find evidence that conscientiousness positively effects financial wealth in general. Furthermore, Duckworth and Weir (2010) find a positive effect of conscientiousness specifically for pension savings.

The relationship between non-cognitive skills and retirement behavior

What does the existing literature teach us about the direct relationship between non-cognitive skills and retirement behavior? When looking at this question, it is important to recognize that only a few empirical studies have explicitly focused on the direct relationship between non-cognitive skills and retirement and that much more research is necessary in this area. Nevertheless, there are some lessons to be drawn from these few studies.

Based on previous studies, we can expect neuroticism to be positively related to early retirement. Neuroticism is not only positively correlated to poor mental health and lower savings, but also to lower job performance (Blekesaune and Skirbekk 2012). Feldman and Beehr (2011) conjecture that neurotic individuals are more likely to have negative perceptions of both work and retirement. Using a large Norwegian survey, Blekesaune and Skirbekk (2012) indeed found evidence that neuroticism increases the risk of disability retirement for women. Robinson et al. (2011) furthermore investigated a small UK online survey of respondents who were either retired or close to retirement and found that neuroticism was positively related to early and regular retirement. Results from a large sample of employees in the government and education sectors,

which we present and discuss in Section 4, confirm the negative relationship between neuroticism and the retirement age.

Extraversion and agreeableness, however, are expected to be related to delayed retirement, as it has been shown that extraversion leads to better job performance, while agreeableness is positively related to having better interpersonal skills (Blekesaune and Skirbekk 2012). Extravert persons are found to save substantially less in general, implying that they have less funds to finance early retirement (Brandstätter 1996; and Nyhus and Webley 2001). Blekesaune and Skirbekk (2012) show evidence that is consistent with these hypotheses. They show that agreeableness and extraversion are negatively correlated with early disability retirement. However, they find no significant relationship between these personality traits and regular retirement. In the results presented in Section 4, we document a positive relationship between extraversion and the expected retirement age.

The relationship between openness to experience and early retirement is, however, less clear-cut. On the one hand, openness might be associated with later retirement, since some research indicates that it is associated with shorter unemployment spells (Kanfer et. al. 2001). On the other hand, people who are more open to new experiences might retire earlier in order to engage in new activities. Furthermore, openness to experience is positively related to the probability of holding stocks and shares (Brown and Taylor 2011). In a similar fashion, conscientiousness might delay retirement because of its positive association with job performance, but it might also speed up retirement because highly conscientious workers tend to save more (Brandstätter 1996; Cobb-Clark et al. 2013; Prevoe and Ter Weel 2015).

Overall, we can thus argue that most studies agree that neuroticism is positively related to early retirement, while extraversion and agreeableness delay retirement. There is less agreement on the relationship between openness to experience and conscientiousness with retirement behavior.

So far, no research has been done on the potential interaction effects of the various non-cognitive skills on retirement behavior. Numerous studies on education and labor market outcomes suggest that these interaction effects may be present. For example, Duckworth and Weir (2010) show that conscientiousness and emotional stability (the opposite of neuroticism) compensate each other. Another gap in this literature is that the few studies on the relationship between non-cognitive skills and retirement behavior without exception do not consider nonlinearities in the relationship between the two.

4. Non-cognitive skills and changes in pension systems

Persons with dissimilar non-cognitive skills may not only decide differently about their retirement in stable situations but also react in different ways to pension reforms. An experiment by Brandstätter and Güth (2000), which focused on the role of personality traits in explaining saving behavior in a computerized savings game, showed that introvert and neurotic persons react more strongly to information on their life expectancy in the game. In particular, neurotic introverts were most sensitive to 'punishment' in the game. In the context of the many pension reforms, we can assume that persons who are affected by these reforms may consider the cuts in pension rights as a punishment. Recent evidence by Montizaan et al. (2016) confirms this by showing that public sector workers affected by a major Dutch pension reform considered this pension reform as unfair and, hence, acted in negatively reciprocal ways towards their employer.

Stated preferences in pension research

A drawback of the few earlier studies that consider the role non-cognitive skills is that they do not explicitly account for the financial incentive structure in which individuals make their retirement decision. This is problematic since research has shown, for example, that individuals who are more conscientious have higher retirement savings, and that agreeableness is negatively related to retirement savings (Duckworth & Weir 2010). As such, it is not possible to conclude from the few existing studies whether non-cognitive skills directly affect the retirement decision or only indirectly through private pension savings. In other words, previous studies are likely to be affected by endogeneity bias. To test whether postponing retirement affects people who differ in their non-cognitive skills in different ways, we have conducted a stated preferences experiment, which we detail below.

Stated preferences experiments have three major advantages compared to revealed preferences research. Firstly, the stated preferences method makes it easier to control for conditions under which respondents make their choice. Secondly, the method allows controlling for differences in individual pension rights. Observational data typically have limited information, and they are based on individuals with different pension liabilities, who are liable to make different choices when it comes to their pension. Thirdly, the method makes it possible to gather information on how people are likely to make choices in the future, under changing circumstances. Younger generations might choose differently from older cohorts, which limits the usefulness of studies based on observational data. The drawback of experimental

studies is of course that it is never perfectly sure that people will actually behave as they report they would when confronted with having to choose. However, the usefulness and validity of the stated preferences have long been established since estimates from stated preferences and data on actual behavior are often quite close (Louvière et al. 2000). For example, Carson et al. (1996) demonstrate that the correlation between stated and revealed preferences is significant and high, ranging from 0.78 to 0.92.

The use of stated preferences in retirement research has a rich tradition in the Netherlands. Van Dalen and Henkens (2000) use questions on preferred retirement age when confronting respondents with a fictitious pre-pension scheme, where the replacement rate varies according to the retirement age. They forecast that pre-pension systems could increase the number of working years by one or two years. Nelissen (2001) also uses stated preferences methodology to investigate the effect of pre-pension and flexible pension schemes. He predicts that within ten years, pre-pension schemes could increase the labor market participation rate of older workers by five percentage points compared to early retirement schemes. For flexible pension schemes, the effect would even be larger, namely eight percentage points. Van Soest et al. (2006) analyze the individual preferences for full or partial retirement. They subsequently presented various fictitious pension options with a specific pension age and randomized associated replacement rates. Phased retirement – first some years with fewer working hours before full retirement – is included in some of the questions. They then ask people to value the suggested option by way of a school mark. They conclude that strong financial incentives are necessary to motivate people to work longer, and that there are no clear preferences for the part-time retirement option. Bruinshoofd and Grob (2006) submit a number of fictitious pension schemes with replacement rates associated to retirement age, and within each option they ask respondents to choose at which age they would prefer to retire. They conclude that increasing the retirement age by one year would induce people to work half a year longer. In their vignette study, Van Soest and Vonkova (2014) report large effects of financial incentives on the preferred retirement age, and they show these effects to be larger than those observed in studies that rely on actual retirement behavior. Vermeer et al. (2014) use a vignette setting to survey Dutch people's opinion on the extent to which occupations are demanding; they conclude that respondents believe that workers in demanding occupations should be able to retire at an earlier age. Using a vignette study, Elsayed et al. (2015) find that replacing full-time pension schemes with schemes that offer gradual retirement opportunities induce workers to retire later. Total lifetime labor supply, however, decreases because the positive effect on labor supply of delayed retirement is cancelled out by a reduction in working hours

in the years before full retirement. None of these studies address heterogeneities in non-cognitive skills.

Experimental design of the stated preferences approach

The stated preference experiment, in which Dutch public sector workers were confronted with different financial incentives to postpone their retirement, is part of the Dutch ROA Public Sector Survey 2012. The survey data also includes detailed information on individual and job characteristics, alternative sources of income after retirement, partner characteristics, and measures of the Big Five. The survey data were collected in two stages. In the first stage, a representative sample of 38,700 public sector employees born between 1946 and 1975 was approached by the pension fund by regular mail and requested to provide their e-mail address in order to participate into the web-based survey. In the second stage, in November 2012, we sent an e-mail containing the link to our web-based survey to the 8,100 employees who had provided their e-mail address. In total, 6,201 working individuals completed the survey. To avoid selectivity issues, we excluded workers who were already eligible to pension benefits (age 60 and older), leaving us with a sample of 4,063 workers.

The stated preference experiment used vignettes, in which individuals were confronted with various hypothetical, yet realistic pension schemes. The experiment was introduced by a short text explaining the topic, after which employees were assigned to three vignettes. These represented pension scheme scenarios with different financial incentives and contained a set of retirement ages and related income replacement rates (expressed as a percentage of current net income). The way we presented the pension schemes closely resembles the way the pension fund reports actual replacement rates at retirement age to its clients. For each scenario, respondents were asked which retirement age and associated replacement rate they preferred, making it possible to quantify how changes in financial incentives affect the employees' retirement age.

We designed a total of five different pension scheme scenarios with different retirement ages and replacement rate combinations. Each respondent had to respond to a baseline scenario which closely matched the real life pension scheme of an average public sector employee in the Netherlands at the time of the survey, with actuarially fair accruals of 7% and a 100% replacement rate upon retirement at age 67.² The other four scenarios differ from one another in terms of increased incentives

2 All replacement rates are expressed net of the current wage. In Elsayed et al. (2015) we show that the replacement rates that we use closely match those applied to an average public sector employee in the Netherlands at the time when the survey was conducted.

for continued employment provided by the retirement scheme. We implemented a price of leisure type of incentive (accruals of 9% or 11% for an additional year of employment) and a pension income type of incentive (decreasing pension income at all ages by 7% or 14%). Apart from the baseline scenario, which every respondent received, two retirement scenarios were randomly assigned to each respondent. The scenarios are summarized in Figures 1 and 2.

Measuring non-cognitive skills in the survey

The Big Five traits are derived from the abbreviated 15-item Big Five validated by Furnham et al. (2003) and McManus and Furnham (2006), which includes three items for each personality trait (Dutch translation is shown in the appendix). We constructed the Big Five personality traits by taking the average score of the items belonging to each personality trait. Job engagement measures the extent to which employees are fully involved in and enthusiastic about their job, and is based on the short form of the Utrecht Work Engagement Scale (UWES), which has been used and validated extensively (see, e.g., Schaufeli et al., 2002).

The order in which the scenarios were presented to the respondents was randomized. Some respondents were first confronted with the baseline scenario, while other

Figure 1. Baseline and pension schemes that shift the accrual rate

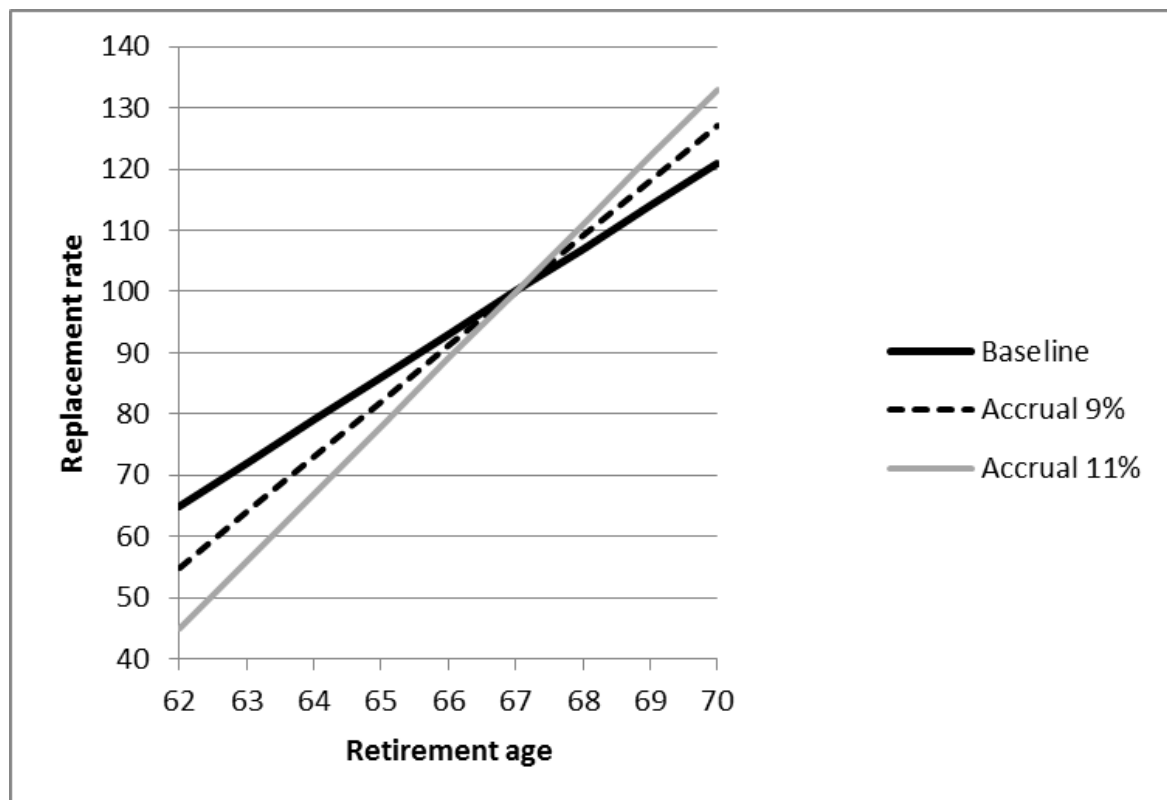
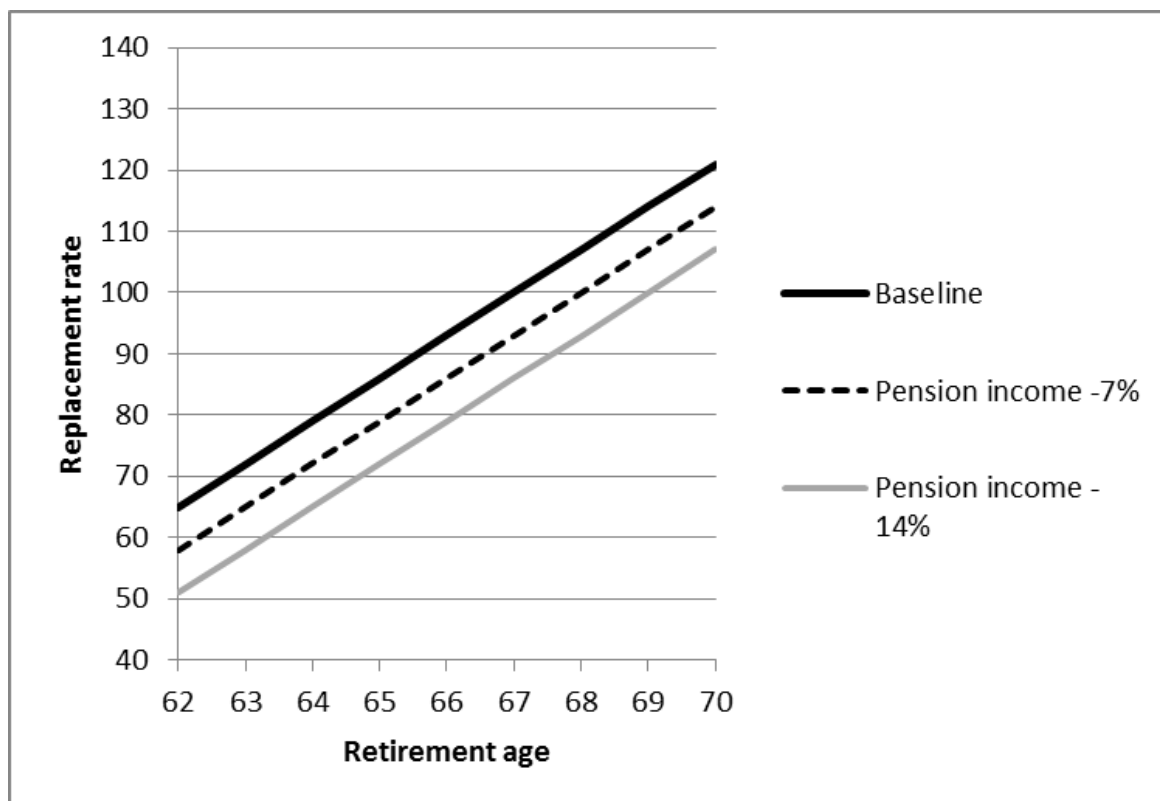


Figure 2. Baseline and pension schemes that shift the pension income



respondents were first confronted with the two scenarios with increased financial incentives to continue working. The results from such experiment can be interpreted to show how individuals would potentially react to changes in pension incentives as depicted in Figures 1 and 2.

Table 1 shows the relationship between non-cognitive skills and the preferred retirement age in the stated preference experiment. We find that neuroticism is significantly negatively related to the preferred retirement age (a one standard deviation increase leads to 1.8 months earlier retirement). This is consistent with the conjectures and results of Feldman and Beehr (2011), Blekesaune and Skirbekk (2012), and Robinson et al. (2010). We also find that extraversion is positively related to later retirement (a one standard deviation increase leads to 1.4 months later retirement). A potential explanation is that, as shown in previous research, extraversion leads to better job performance and is significantly negatively correlated with retirement savings (Brandstätter 1996; Nyhus and Webley 2001).³ We furthermore find a significant negative correlation between agreeableness and the expected retirement age (a one

³ We also conducted mediation analyses with health and job satisfaction. These show that the impacts of neuroticism and extraversion on the preferred retirement age are partially mediated by these two variables.

Table 1. Correlation between preferred age of retirement and non-cognitive skills (basic model without interactions)

| | Preferred retirement age |
|-------------------|--------------------------|
| Neuroticism | -0.148*** (0.028) |
| Extraversion | 0.121*** (0.028) |
| Openness | 0.008 (0.027) |
| Agreeableness | -0.089*** (0.027) |
| Conscientiousness | 0.009 (0.028) |
| Observations | 10,839 |
| R-squared | 0.112 |

OLS estimates on individuals aged 45–62 years. Robust standard errors in parentheses (clustered on the individual level). Control variables: education, gender, age (linear and squared), wage, tenure, marital status, sector dummies, and randomization dummies. All personality indicators are standardized. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

standard deviation increase leads to 1.1 months earlier retirement). This result is contrary to what could be expected from the literature on cognitive skills. As we will see in Table 2, the impacts of personality traits are substantial. A one standard deviation increase in neuroticism leads to similar effects, such as an increase in the accrual rate with 0.8%.

Table 2 shows the interaction effects between non-cognitive skills and the characteristics of the financial incentives in the stated preference experiment on the preferred retirement age. We measure the price of leisure incentive by a variable that takes the value 0 for the basic scenario, 1 for the scenario with the accrual rate of 9 percent, and 2 with the accrual rate of 11 percent. We measure the pension income incentive by taking the value 0 for the basic scenario, 1 for the scenario with a drop in pension income by 7 percentage points and 2 for the scenario with a drop by 14 percentage points.

The table shows that the average retirement age increases, as expected, with the price of leisure and loss of pension income. A 7 percentage point decrease in pension income increases the retirement age by approximately 7 months. An increase in the accrual rate by 3 percentage points increases the retirement age by approximately 4.5 months. Most important, however, is that the impact of pension reforms is heterogeneous with non-cognitive skills. The table shows that neurotic people tend to retire earlier than workers who are not neurotic, but also that this difference

Table 2. Basic model including interaction personality and financial shock

| VARIABLES | (1) Expected retirement age |
|--|--------------------------------|
| Pension income incentive | 0.568*** (0.012) |
| Price of leisure incentive | 0.374*** (0.010) |
| Neuroticism | -0.175*** (0.029) |
| Neuroticism * Pension wealth incentive | 0.014 (0.019) |
| Neuroticism * Price of leisure incentive | 0.038** (0.015) |
| Extraversion | 0.132*** (0.031) |
| Extraversion * Pension wealth incentive | -0.018 (0.019) |
| Extraversion * Price of leisure incentive | -0.004 (0.015) |
| Openness | 0.018 (0.030) |
| Openness * Pension wealth incentive | 0.005 (0.017) |
| Openness * Price of leisure incentive | -0.022 (0.014) |
| Agreeableness | -0.099*** (0.029) |
| Agreeableness * Pension wealth incentive | -0.007 (0.017) |
| Agreeableness * Price of leisure incentive | 0.026* (0.015) |
| Conscientiousness | 0.007 (0.030) |
| Conscientiousness * Pension wealth incentive | 0.011 (0.017) |
| Conscientiousness * Price of leisure incentive | -0.007 (0.015) |
| Observations | 10,839 |
| R-squared | 0.112 |

OLS estimates on individuals aged 45–62 years. Robust standard errors in parentheses (clustered at the individual level). Control variables: education, gender, age (linear and squared), wage, tenure, marital status, sector dummies, and randomization dummies. All personality indicators are standardized. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

becomes smaller the higher the accrual rate is. This follows logically from the fact that neurotic workers are among the groups which are hurt the most by this type of pension reform. After all, increases in the accrual rate will in particular disadvantage workers who wish to retire early. Consistent with Brandstätter and Güth (2000), we further conjecture that neurotic workers are likely to react more strongly due to their sensitivity to the 'punishment' for early retirement. This is probably because our result is not driven by the income or education level of the respondents in our experiment.⁴

4 We predominantly focus on people working in government and education. The question is therefore whether our results are representative for people in the private sector. We tested this by only looking at workers in the privatized sector (for example, transport and utility companies). We found similar results for this group and are therefore confident that our results are representative for people in the private sector.

5. Non-cognitive skill interventions and pension communication

In the previous sections we have seen that non-cognitive skills matter for retirement decisions and the way people react to pension reforms. Policymakers and pension funds can benefit from this information when trying to predict and better understand actual retirement patterns.

Non-cognitive skill interventions

We stated earlier that non-cognitive skills can be shaped and are in fact more malleable until higher age. The question which logically follows is whether policymakers and pension funds can influence a person's non-cognitive skills in order to optimize retirement and pension savings behavior. In other words, as phrased by Jackson et al. (2012): "Can an old dog learn (and want to experience) new tricks?" The answer to this question seems to be 'no', except at considerable cost. Several studies have found that cognitive, affective, and behavioral interventions – ranging from therapy to minor behavioral alterations, such as completing daily crossword and Sudoku puzzles – are associated with changes in a person's personality traits (De Fruyt et al. 2006; Jackson et al. 2012; Magidson et al. 2012; Tang et al. 2009; Hudson et al. 2015). Importantly, these interventions should provide long-term consistent incentives for new patterns of thoughts, feelings, and behaviors. One cannot change non-cognitive skills with only small incidental interventions. It therefore probably serves little purpose for policymakers and pension funds to aim at introducing non-cognitive skill interventions in order to optimize retirement decisions. A more feasible option in the short run would be that pension communication be customized to individual personalities to accommodate the potentially negative effects of specific personality traits.

Non-cognitive skills and pension communication

Decisional procrastination is at the heart of the discussion on retirement planning and pension communication. It is common knowledge that many workers do not save enough for their retirement due to the human tendency to procrastinate (Milgram and Tenne 2000). All too often, this delayed involvement in retirement planning translates into too little savings too late and the onset of psychological distress (Ferraro and Su 1999). It is therefore essential that the communication strategies of pension funds convince people to take timely action.

The importance of non-cognitive skills in this context is illustrated by Tenne (2000), who analyzed how decisional and task-avoidant procrastination relates to the Big Five traits. Two of the Big Five skills accounted for most of the explained variance in the two kinds of procrastination: neuroticism for decisional procrastination, and

conscientiousness for task avoidance procrastination. Another study, by Antonioni (1998), examined the relationship between the Big Five personality factors and different styles of handling interpersonal conflict. He looked at the behavior of students and managers and found that individuals who score high on neuroticism report anxiety in stressful situations, which in turn leads to avoidance behavior. In a similar fashion, Gerber et al. (2012) found that neurotic people tend to avoid political discussions more than emotionally stable people. All in all, these three studies thus suggest that people who score high on the neuroticism scale are less likely to engage on a timely basis in the complicated decision process involved with retirement and pension savings choices. Identification of the personalities of clients, in particular their emotional stability, may help pension funds to adequately deal with potential procrastination by enabling customized communication strategies.

A recent study by Ambuehl et al. (2014) illustrates that successful investment in communication and financial competence crucially depends on cognitive as well as non-cognitive skills. In their paper, these authors introduced a new method for measuring the quality of financial decision making, built around the concept of financial competence, and they analyzed the impact of a financial education intervention on consumer behavior. They found that financial education leads to significantly higher financial literacy, but not to greater financial competence. Further investigation revealed that behavior responds primarily to motivational rhetoric, even when people appear to understand and internalize the substantive elements of instruction. While the rhetorical components make the material engaging and memorable, they also concluded that the motivational rhetoric of the intervention impacted behavior, irrespective of whether or not the initial behavior was optimal. This indiscriminate response is therefore beneficial in some cases and harmful in others, implying that, on average, there is no benefit. The efficiency of training cognitive skills thus critically depends on the way communication about such an intervention interacts with people's soft skills.

More compelling evidence comes from Fernandes et al. (2014). They conducted a meta-analysis of 168 papers covering 201 prior studies, of the relationship between financial literacy and financial education to financial behavior. They found that financial education only explains a small part of financial behavior. Moreover, the partial effects of financial literacy on financial behavior diminish dramatically when one controls for psychological traits, which have been omitted in prior research, or when one uses an instrument for financial literacy to control for omitted variables. This illustrates that it is inefficient to develop cognitive interventions such as financial education, without prior knowledge about the non-cognitive skills of the people at which the intervention is targeted.

6. Conclusion

In this paper we have summarized results from the literature on non-cognitive skills, showing that non-cognitive skills are significantly related to savings and retirement decisions and the way workers react to pension reforms. Although there are still relatively few studies that have focused on the relationship between non-cognitive skills and retirement behavior, the studies conducted consistently show that non-cognitive skills are quite important for explaining retirement behavior. A consistent finding in this literature is that neuroticism negatively and extraversion positively relates to the age of retirement. Results from a stated preferences experiment show furthermore that people with different non-cognitive skills differ in the way they are affected by pension reforms. Neurotic people tend to retire earlier than workers who are more emotionally stable, but the difference becomes smaller the stronger the accrual rate is. This can partly be explained by the fact that neurotic workers are among the groups which are hurt the most by this type of pension reform. After all, an increase in the accrual rate will especially disadvantage workers who wish to retire early. However, neurotic workers are also likely to react more strongly to tighter financial incentives due to their high sensitivity to punishment.

It should, however, be noted that the results presented here are based on a largescale survey which may not be perfectly representative of the entire Dutch population. It is important to realize that we have no information on the non-cognitive skills of people outside our sample. As such, we cannot assess to what extent our findings would apply to workers in other industrial sectors. Nevertheless, it should be mentioned that the distribution of the non-cognitive skills in our sample does not differ substantially from other studies that used difference surveys (e.g., McManus and Furnham 2006).

For policymakers and pension funds it can be beneficial to collect information about the non-cognitive skills of individual workers. This can provide them with a better understanding of actual retirement patterns and of how financial education and communication can be optimized. We showed in this study that neurotic workers are less likely to engage on a timely basis in the complicated decision process involved with retirement and pension saving choices. Identifying the personality traits of clients, in particular their emotional stability, may help pension funds to adequately deal with potential procrastination behavior by adjusting their communication strategies.

Although the results presented in this study emphasize the crucial role that non-cognitive skills may play in the retirement process, it should be acknowledged

that this literature is very thin and that much more research is necessary. It is important to study this subject much further in order to get a good overview of the generalizability of results. Moreover, previous studies have not looked at possible interaction effects of the various non-cognitive skills on retirement behavior, even though there is evidence in the non-cognitive skills literature that suggests that these interaction effects may be present. Another unresolved gap in this literature is that, without exception, the few studies on the relationship between non-cognitive skills and retirement behavior included the Big Five scale linearly in their models. When customized interventions are introduced, it is essential to know where the different non-cognitive skills intersect in order to determine the efficiency of these interventions. Although the evidence discussed suggests that personalities are malleable, we have our doubts about the possibility that pension communication interventions can change someone's personality.

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Appendix

Example of vignette

46. Op welke leeftijd zou u stoppen met werken als u uit deze mogelijkheden mag kiezen?

| Uittradedeleeftijd | Pensioen (% van uw nettoloon) |
|--------------------|-------------------------------|
| 62 | 51 |
| 63 | 58 |
| 64 | 65 |
| 65 | 72 |
| 66 | 79 |
| 67 | 86 |
| 68 | 93 |
| 69 | 100 |
| 70 | 107 |

Maak hier uw keuze

- 62
- 63
- 64
- 65
- 66
- 67
- 68
- 69
- 70

Set of Big Five personality questions (in Dutch)

- Ik probeer gereserveerd te zijn ten opzichte van iedereen die ik ontmoet (A)
Ik ben er vrij goed in om mijzelf te disciplineren om dingen op tijd gedaan te krijgen (C)
Als ik veel stress ervaar, dan heb ik soms het gevoel dat ik emotioneel instort (N)
Ik ben geïntrigeerd door de patronen die ik vind in de kunst en natuur (O)
Ik geniet er echt van om met mensen te praten (E)
Ik voel me vaak gespannen en zenuwachtig (N)
Ik wil zijn waar de actie is (E)
Ik voel me vaak alsof ik barst van energie (E)
Ik word vaak boos vanwege de manier waarop mensen mij behandelen (N)
Sommige mensen vinden mij koud en gereserveerd (A)
Ik heb weinig interesse in het nadenken over de aard van het universum of om een mens te zijn (O)
Ik probeer over het algemeen doordacht en attent te zijn (A)
Ik heb altijd moeite om voor mijzelf orde op zaken te stellen (C)
Ik geniet er vaak van om te spelen met theorieën of abstracte ideeën (O)
Ik streef naar uitmuntendheid in alles wat ik doe (C)

Openness to experience (O)

Conscientiousness (C)

Extraversion (E)

Agreeableness (A)

Neuroticism (N)

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