Consumer acceptance of online pension investment advice

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INDUSTRY SERIES

NETSPAR

DESIGN PAPER 82

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Abstract

In their efforts to meet the demand for personalized pension solutions, pension fund managers seek to accurately measure individuals' risk preferences and to offer sound personalized investment advice – both tasks increasingly provided with the aid of online technologies. Relatively little is known, however, about what drives individuals' acceptance of online pension investment advice and, from a consumer point of view, which firms may be best placed to provide such advice. The aim of the current paper is to generate novel insights that shed light on these questions by conducting (1) a review of the current literature and (2) a 'real-world' empirical study using an innovative online pension investment advice tool (the 'Pension Builder') and applying this to a representative sample of the Dutch population. The goal of our literature review is to draw up a comprehensive framework of online pension investment advice acceptance that rests upon three main sets of drivers: characteristics of firms, of interactions, and of consumers. In the empirical analysis, we focus on one of these three components that has received relatively little attention in the literature to date, and we highlight the role that different firm characteristics – namely profit orientation (for-profit vs. not-for-profit) and independence (pension product provider vs. intermediary) – have on acceptance of online pension investment advice by the consumer. Based on the literature review and our empirical study, we find that besides the essential role of the quality of the consumer-firm interaction process, trust in the firm and perceived firm expertise are important drivers of online pension investment advice acceptance, and that these constructs themselves are strongly influenced by firm characteristics.

Dutch summary

In dit paper, combineren we twee complementaire onderdelen: (1) een breed over-
zicht van de huidige literatuur op het gebied van de acceptatie door consumenten
van online pensioenbeleggingsadvies, en (2) een empirische studie op basis van een
nieuwe online tool voor pensioenbeleggingsadvies (de 'Pension Builder') met een
representatieve steekproef van de Nederlandse bevolking. Het doel van het literatuur-
overzicht is om een breed kader te schetsen voor de analyse van de acceptatie van
online pensioenadvies. Het kader is gebaseerd op drie componenten: bedrijfs-,
interactie- en consumentkenmerken. De empirische studie richt zich vervolgens op
een van deze drie componenten, namelijk die van de bedrijfskenmerken, omdat
deze component tot op heden in het onderzoek relatief weinig aandacht heeft
gekregen. We richten ons op het effect van twee verschillende kenmerken, namelijk
winstoriëntatie (for-profit versus not-for-profit) en onafhankelijkheid (het bedrijf is
een leverancier van pensioenproducten versus een intermediair) op het accepteren
van online pensioenbeleggingsadvies door de consument. Op basis van het litera-
tuuroverzicht en onze empirische studie vinden we dat naast de essentiële rol van
de kwaliteit van het interactieproces tussen consument en bedrijf, vertrouwen in
het bedrijf en de perceptie van de expertise van het bedrijf belangrijke verklarende
latente constructen zijn die de adviesacceptatie door de consument beïnvloeden. Ook
vinden we dat het consumentoordeel op deze constructen op haar beurt zelf sterk
bepaald wordt door de kenmerken van het bedrijf.

Policy recommendations

Based on a review of the literature, conceptual model development and empirical analyses, we provide in this paper the following recommendations for pension providers that wish to increase the acceptance of online pension investment advice. We find that advice acceptance is influenced both by which specific firm provides the advice and how the advice is given. In other words, the same advice is more or less likely to be accepted depending on who gives the advice and how it is provided (Figure 2).

Perceived expertise of and trust in the advisor are important drivers of online pension investment advice acceptance (Table 1) that fully mediates the impact of different firm types providing the advice (Figure 4). We specifically compared pension funds, insurance firms, commercial comparison websites, and government websites as possible pension advisors, and found that pension funds, which are not-for-profit organizations that provide pension products, are seen as the most trustworthy and having the highest expertise (Figure 5).

Besides the firm supplying the advice, consumer satisfaction with the pension advice interaction also has a strong positive effect on online advice acceptance. This underscores the importance of designing attractive and easy-to-use online interfaces for consumer adoption of online advice.

Finally, when we control for the impact of individual characteristics on advisor and interaction evaluation, we find that online pension investment advice is also more likely to be accepted by consumers with a higher education.

Jointly, these findings demonstrate the importance of (1) building relationships that are based on trust and expertise that is clearly perceived by consumers, (2) carefully designing online advice processes to promote advice acceptance, and (3) targeting channels of online and offline advice to consumers who prefer to receive advice on each type of channel.

1. Introduction

Traditionally, most employer-based pension plans, both in the Netherlands and elsewhere, apply uniform investment portfolios for all participants within the same age cohort (Bodie and Treussard, 2007; Sundaresan and Zapatero, 1997). Lifecycle strategies, in particular, are used to shift investments from more to less risky as the participant's time to retirement approaches, but rarely is this variation based on the participant's risk preference or personal financial situation. Recently, however, pension plans are increasingly under pressure to more closely monitor the pension risk preferences of individuals and to assess whether their pension expectations can be met (e.g. Alserda et al. 2016).

In line with this, pension plan providers and pension plan participants are moving towards more individualized pension solutions, namely those that more accurately match pension investment portfolios to individual risk preferences for expected pension incomes (Alserda et al. 2016). Besides traditional survey techniques, recent advances in online technologies offer promising opportunities to deliver pension investment advice that can achieve such a match (Dellaert et al. 2016). For example, in the Netherlands, the financial services provider Centraal Beheer – Achmea recently launched the online tool *Beleggingsbalans* [*Investment Balance* in English] to support its newly introduced pension product.[1]

To date, however, relatively little is known about (a) what drives individuals' acceptance of online pension investment advice, and (b) which firms individuals believe are best suited to provide such advice. Ideally, individuals should be able to recognize the superior value of (unbiased) personalized pension investment advice, and to accept the advice if it indeed matches their preferences, especially in the case of individuals who participate in a collective pension plan with an insurance firm.[2] A prominent finding in the advice literature, however, suggests that individuals suffer from "egocentric advice discounting," i.e. the tendency to overweight one's own opinion relative to that of an advisor when deciding whether to accept an advice (Bonaccio and Dalal 2006; Harvey and Fischer 1997; Yaniv and Kleinberger 2000). Moreover, from a behavioral perspective, and given the challenging nature of assessing the quality of pension advice, we can expect variations in advice acceptance rates.

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1   See *https://www.centraalbeheerapf.nl/adviseur/blog/grote-stap-naar-meer-begrip-dc-pensi-oen/*. For an extensive analysis of the Dutch financial advice market see Fred de Jong's website and publications, at *http://www.freddejong.eu/publicaties/*.
2   We thank an anonymous Netspar reviewer for this suggestion.

In this paper, we take a behavioral approach to analyze variations in the degree to which online pension investment advice is accepted. The analysis is guided by our conceptualization of online advice acceptance as a function of three main domains of behavioral drivers: (i) *firm characteristics*; the nature of the organization providing the online advice to the individual (e.g., whether it is an investment firm or an independent intermediary), and how the consumer perceives this organization, are likely drivers of differences in online advice acceptance; (ii) *interaction design*; the way in which preferences of individuals are elicited online in the advice giving process, and how the advice is presented online to the individual, can influence the degree to which advice is accepted; and (iii) *consumer heterogeneity*; acceptance by individuals of online advice is likely to depend on personal characteristics (e.g., numeracy or financial and/or statistical literacy), demographics, and personality traits.

We first provide a selective review of the literature on (online) advice acceptance in each of these three domains. Second, since little research to date has addressed the role of firm characteristics on acceptance of online pension advice, we conducted a large-scale empirical study on this topic, collecting experimental survey data from a representative sample of the Dutch population. In our study, we measured acceptance of online pension advice by asking respondents to self-report how likely it was that they would follow the online advice provided to them on a 0 − 100% probability scale (Elrod at al. 1992). We investigated in particular which types of organizations, namely commercial vs. not-for-profit, and pension plan provider vs. independent intermediary, are best positioned, from the perspective of the consumer, to provide online pension advice. We conclude with a discussion of the relevance of the insights emerging from the literature review and of our survey findings for the Dutch pension industry.

2. Drivers of online pension advice acceptance

Most research pertaining to online advice has focused on the development of new methods to improve the quality of the interaction design or has analyzed how consumers make choices contingent on the form of the advice, e.g. online recommendations (Ricci and Werthner 2006; Senecal and Nantel 2004). This literature has mainly investigated online decision aids that support decision makers, namely consumers, who deal with complex decisions (e.g. Benbasat and Wang, 2005; Qiu and Benbasat, 2009; see Xiao and Benbasat, 2014 for a recent review). These software tools aim to improve consumer decision quality while simultaneously reducing the effort required to make a decision (Häubl and Trifts 2000). Research has shown that these tools can indeed be very effective when consumers decide to use them and when the tools can effectively learn about individual preferences (Diehl, Kornish, and Lynch, 2003; Häubl and Trifts, 2000; Senecal and Nantel, 2004; Urban and Hauser, 2004).

In line with Wendel et al. (2013), we focus in this paper more broadly on a more complete value chain analysis of the online advice process, in the sense that we consider the firm, the consumer, and the interactions between the consumer and the firm. We suggest that the unifying concept that binds these three components is that of an implicit psychological reciprocity contract, in which consumers contribute personal information and effort in exchange for more useful advice by the firm (Rousseau 1989; Zeithaml 1988).[3] More specifically, consumers evaluate how much they need to contribute for the advice to be generated and how valuable the advice is that

Figure 1: Main components of the online pension investment advice acceptance framework
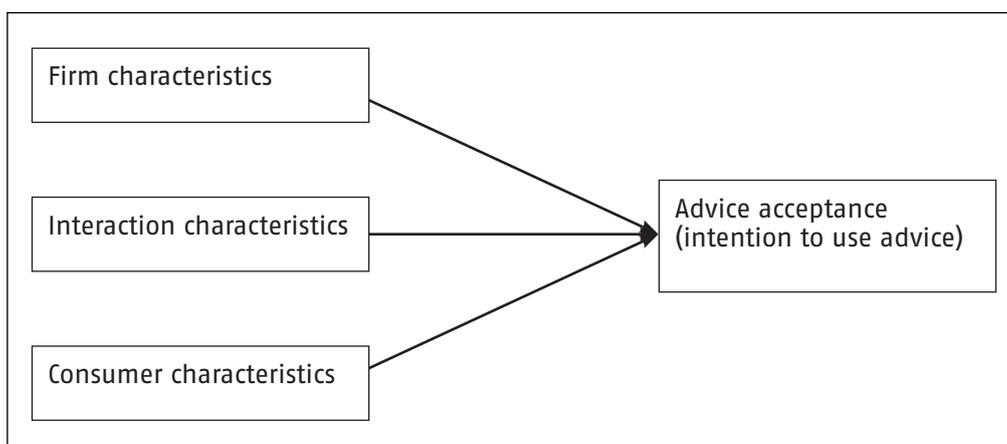
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3   We explore the idea of an implicit psychological reciprocity contract in more detail in subsection 2.2.2.

they obtain in return. This includes the actions that consumers need to take independently, such as collecting information on existing pension products, as well as the joint steps that they need to take in interaction with the firm, such as providing their risk preferences online and assessing the quality of the advice provided by the firm. These three basic components that affect online advice acceptance – firm, interaction and consumer characteristics – are depicted in Figure 1 and are next discussed in detail, together with our selected review of previous research relevant to our context.

2.1 Firm characteristics

Information asymmetry is likely to lead to problems between firms (the advisors) and consumers (the advisees) in the sense that the two parties have different information about product characteristics and consumer needs (Van Swol 2009). Individuals turn to firms for advice because firms have superior knowledge on the available products, their characteristics, and their fit to individual preferences. However, when an advisor also manages an advisee's product portfolio, such as when a pension plan provider advises a pension plan participant, there may be a so-called principal-agent problem, i.e. the incentives and preferences of the advisor (the 'agent') may not be perfectly aligned with those of the advisee (the 'principal'). Hence, to maximize the chances that the best product advice is given to an individual, firms need to be willing and able to properly elicit individual risk preferences – not a trivial exercise (see Donkers, Lourenço, and Dellaert 2012).

Fortunately, the advice from promotion or persuasive advertising differs, in the sense that advice is not necessarily considered manipulative or invasive but rather as a means to improve participants' decisions (Yaniv 2004). Furthermore, advice is prescriptive or evaluative in nature and therefore more easily associated with an independent third party (Schrah, Dalal, and Sniezek 2006). In addition, when consumers seek advice, following the advice implies a shared responsibility for the outcome that may result from following that advice (Harvey and Fischer 1997).

Jointly, these considerations suggest that consumer perception of the advisor's *expertise*, as well as the extent to which consumers *trust* the advisor to provide unbiased advice, are key drivers of their willingness to accept the advice that the advisor provides (Shapiro 1987, Singh and Sirdeshmukh 2000, Van Swol and Sniezek 2005, White 2005). In our context the advisor is a firm, and we expect perceived expertise and trust to be a function of firm type. In particular, we focus on the impact of whether the firm is commercial or not-for-profit, and whether it is a pension plan provider or an independent intermediary (see next paragraph and section 3 for more details). In other words, we expect the type of firm providing online advice to be an

Figure 2: Mediating constructs in the online pension investment advice acceptance full conceptual framework
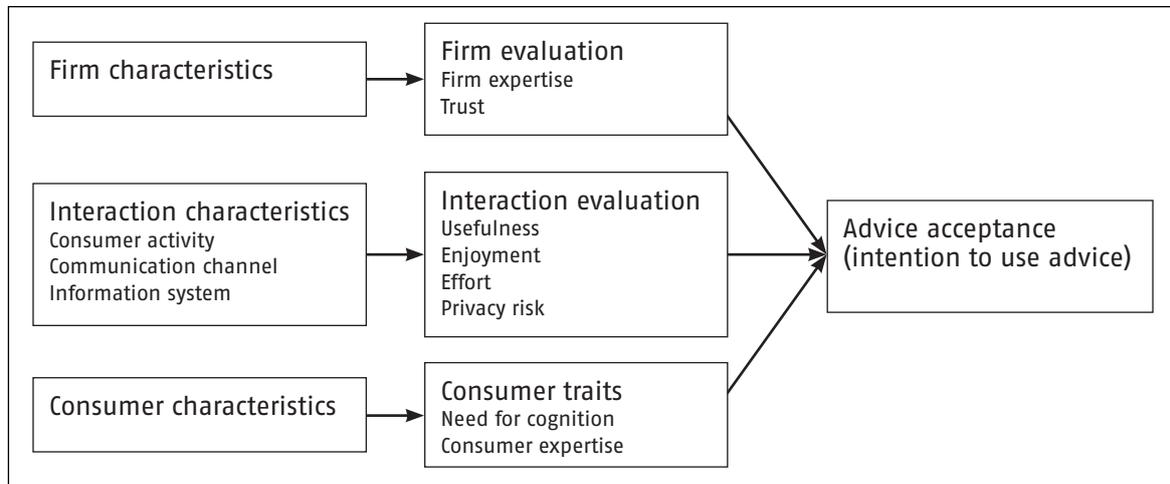
antecedent of and to influence the extent to which the firm is perceived to be an expert and can be trusted. That in turn drives the extent to which the advice will be accepted. In more technical terms, a firm's perceived expertise and trust are expected to be *mediators* of the effects of firm type on online advice acceptance, as summarized graphically in Figure 2.

Despite regulatory requirements, whether an advisor is a commercial firm or not-for-profit will signal consumers as to the main underlying incentives to provide advice, and the extent to which these are aligned (or unaligned) with the incentives of consumers. With all other factors equal, we propose that not-for-profit firms are likely to enjoy higher levels of trust, especially in light of the poor general perception of the financial industry in times of financial crisis (Mayer 2013). Likewise, we propose that advisors who provide only comparative information, instead of selling pension plans to pension plan participants, are likely to be seen as more trustworthy since their business model is based solely on the sharing rather than selling of information. In the case of selling, especially in the short run, sellers may enjoy high rewards from products with high profit margins, which may create strategic incentives for biased advice (e.g. Cadman, Carter, and Hillegeist 2010; Inderst and Ottaviani 2012). On the other hand, both commercial firms and pension plan providers are likely to be seen as having higher levels of expertise than not-for-profit firms and independent intermediaries, since without such high expertise these firms would not be able to survive in a highly sophisticated, regulated, and competitive market such as that for pension plans (see e.g. Coates and Hubbard 2007).

Advice acceptance may also vary, depending on aspects of the interaction on which the advice is based (Briggs, De Angeli, and Lynch 2002, Dabholkar and Bagozzi 2002, Dellaert and Dabholkar 2009, Kramer 2007). We see this interaction between consumers and advisors as an elaborate process that involves personalization in general and personalized advice in particular. We now discuss the main views of such elaborate interaction process in the literature and how we can adapt those views to our context.

2.2 Interaction characteristics

2.2.1 Theoretical background

Murthi and Sarkar (2003) conceptualized the interaction process between consumers and firms that enables personalization into three main stages: learning (the firm collects data from consumers), matching (using consumer data, the firm develops a personalized offering), and evaluation (the firm and consumers jointly assess the effectiveness of the matching and learning stages). Similarly, Adomavicious and Tuzhilin (2005) developed a three-stage structure: a first stage aimed at understanding the consumer, a second stage in which the firm delivers the personalized offering, and a third stage that involves measuring the impact of personalization in terms of increased consumer satisfaction, to facilitate future improvements in personalization. We adapt these proposed conceptual models to the context of consumer–advisor interactions when providing online personalized financial pension advice, and use in particular the structure recently proposed by Wendel et al. (2013) for personalized health recommendation interactions as a starting point.

On this basis, we distinguish three types of interaction domains in the advisory process between an advisor and a consumer: (1) the consumer activity domain, which includes the type of information that the consumer needs to provide as input for the advice, such as personal risk preferences; (2) the communication channel domain, which captures the processes and channels by which consumer and advisor communicate, such as the design of the online interface used to elicit risk preferences, and (3) the information system domain, which captures the technical system and processes used by the advisor to provide the advice, such as the underlying models that the firm uses to provide a pension recommendation that matches the consumer's risk preferences. Each of these three domains has important characteristics that we consider worth discussing briefly, not the least being that they help describe the online pension advice context.

The first domain (consumer activity) comprises actions that involve only, or mainly, the consumer. For example, consumers cognitively consider their personal risk preferences towards retirement and pension plans, which need to serve as input for the advice to be generated. After the advice is given, they must process and evaluate it. The more difficult the questions asked to generate an advice, and the more complex the advice, the more consumers will feel burdened in providing input for the advice and in understanding the advice once it is given.

The second domain (the communication channel) includes the processes by which consumer and advisor interact. In these processes, both consumer and advisor provide important inputs. For example, the online interface typically requires data input from both consumer (e.g. personal characteristics and risk preferences) and advisor (e.g. asset pricing and other financial models). In this context, the human-to-computer interaction (HCI) literature examining the ways human beings control computers (McMillan and Hwang 2002) becomes particularly relevant, especially studies that highlight not only the actual design of computerized systems but also human perceptions (Reeves and Nass 2000), namely the goals that individuals bring to the system (Xie 2000) and the level of agency and autonomy that individuals perceive they have when working with computers (Hoffman and Novak 1996). In other words, it matters whether a consumer is just looking for more information or seeking to simulate a future pension income. And, in turn, it matters whether an online advisor is able to meet those goals, by offering satisfactory information and providing an interactive simulation tool when the consumer needs this.

The third domain (the information system) refers to the advice generation process undertaken by the advisor on the basis of the personal information that the consumer gave provide (see the consumer activity domain above). In this stage the advisor's information system transforms the information of a particular consumer into a personalized advice on the basis of the financial decision model that the advisor has developed for that purpose. In this domain, aspects like database handling, consumer analytics, and access-to-market options are important.

2.2.2 Cost-benefit perceptions of the interaction process[4]

Consumers may prefer different products or services depending on the costs and benefits entailed (i.e., the benefits and drawbacks that they expect to experience

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4   In this paper, we discuss this set of drivers of advice acceptance separately only on a conceptual basis. In our empirical analysis, on the other hand, we use the consumer's satisfaction with the online interaction as a single-proxy for cost-benefit perceptions of the interaction process (see also subsection 3.2.3).

from using such a product or service; Gutman 1982; Myers 1976), and mentally they will perform cost-benefit trade-offs to determine which alternative provides them with the greatest value (Zeithaml 1988). This basic structure connects the features of the advice interaction process to the underlying costs and benefits that consumers perceive these interactions to have.

In the context of online advice, a similar structure of expectations between the consumer and the firm may exist, such that the consumer expects that the more input he or she provides the more the firm is obliged to return a higher quality advice, thereby subscribing to a psychological reciprocity contract. Psychological contract theory was developed mostly in the organization literature to describe individuals' beliefs in the reciprocal obligations between employees and organizations (Robinson 1996; Rousseau 1989). Hence, the underlying cost-benefit trade-offs that consumers make when evaluating the online advice interaction process can be conceptualized as a type of psychological contract, in which consumers contribute personal information and effort in exchange for a more useful, tailored advice by the firm (Wendel et al. 2013).

In line with this conceptualization, the *usefulness* of the online advice interaction process, or the degree to which a person believes that using an advice interaction process is will lead to a better advice, is an important cost-benefit component in consumer evaluations, similar to the acceptance of new technologies (Davis, Bagozzi, and Warshaw 1989; Rogers 2003). In exchange for greater usefulness, consumers need to provide more information to allow the firm to formulate personalized advice. Providing this information typically requires considerable *effort* on the part of the consumer. Therefore, the degree to which a person believes that an advice interaction process will be free of effort (ease of use) constitutes an important second cost-benefit component that consumers are likely to consider (Davis 1989). A third cost-benefit component, one that may lessen the anticipated effort by the consumer, is the anticipated *enjoyment* of using an advice interaction process. In research on technology-based self-service, Dabholkar and Bagozzi (2002) demonstrate that enjoyment significantly influences consumers' attitude toward a technology-based self-service. Findings by Van der Heijden (2003) provide further support for the impact of perceived enjoyment on consumers' attitude in the context of website evaluations. Therefore, we expect that enjoyment, or the degree to which a person believes that using an advice interaction process is an enjoyable experience, will also affect consumers' advice acceptance.

Finally, providing in-depth personal information is not only costly in terms of the effort it requires from the consumer; it also involves the risk of misuse of the

consumer's information by the firm. Therefore, the degree to which an advice interaction process is believed to be safe in terms of not exposing sensitive information (i.e. *privacy risk*) constitutes a fourth cost–benefit component that consumers may take into account in the context of the advice interaction process. Consumers tend to be concerned about their privacy and are generally reluctant to provide personal information (Phelps, Nowak, and Ferrell 2000; Rabino 2003). Recent trends in information technology that enable companies to collect more accurate and detailed personal information have only exacerbated consumers' privacy concerns (Koch and Möslein 2005).

2.3 Consumer characteristics

Several individual characteristics may help explain heterogeneity in advice acceptance. In particular, an individual's *gender* and *income* can be expected to affect advice taking, especially in the context of financial decisions (Bhattacharya et al. 2012). Women have been found to be less certain than men about their ability to handle financial matters (cf. Lundeberg, Fox, and Punccohar 1994, Prince 1993). Women may therefore be expected to be more inclined to accept advice than men. Low income individuals are also expected to accept advice more readily than wealthier individuals. In a financial decision context, lower income individuals are more vulnerable if they make the 'wrong' choice and therefore should discount the advice less (i.e. they should value the advice more) than individuals with higher income. *Age* too may affect individuals' interest in pension decisions and hence their willingness to consider and accept pension advice. As people age and face the prospect of reduced ability to remain active in the work force, they are likely to become more interested in retirement advice and what future income they can expect in the absence of labor returns. Finally, *education* may also influence advice acceptance, but the direction of the effect may be less clear. On the one hand, someone with a higher education may be able to more easily process pension information and therefore also pension advice, which may lead to higher advice transparency and thus acceptance. On the other hand, someone with a lower education level may more easily recognize the need for advice and thus accept it.

Besides socio–demographic characteristics, individual personality traits and individual financial expertise may influence advice acceptance.[5] We highlight *need for cognition* as a trait that is likely to impact the discounting or acceptance by

5   As with cost–benefit perceptions of the interaction process, we only discuss conceptually, but do not assess empirically, the effect of consumer characteristics on online pension advice acceptance.

individuals of advice, as this personality trait refers to the tendency to engage in and enjoy activities that are cognitively demanding (Cacioppo, Petty, and Kao 1984). In the context of complex financial advice by an online decision-support system, advice discounting may be expected to be lower among individuals who are high on need-for-cognition, i.e. individuals who tend to focus on objective or primary features such as the efficacy of the online advice. In contrast, discounting of the advice may be more pronounced among individuals with a lower need-for-cognition, as they tend to focus on peripheral or secondary cues such as the attractiveness (rather than the efficacy) of the online advice.

In addition, advice discounting may be expected to be stronger in case of larger expertise discrepancy, i.e. the gap between the expertise of an individual and that of an advisor (e.g. Harvey and Fischer 1997, Sniezek, Schrah, and Dalal 2004), which, in the context of financial decision making, may be assessed by an individual's *financial literacy* (see e.g. Lusardi and Mitchell 2011, Lusardi, Mitchell and Curto 2010). On the one hand, individuals with limited financial literacy are the ones who would potentially benefit most from expert advice so that they should accept the ensuing recommendations (Lee and Moray 1992). On the other hand, and paradoxically, they are also the ones who are least capable of assessing the value of financial advice and may refuse it. Which effect prevails is an interesting and important empirical question, especially if those who need advice (the financially illiterate) are those rejecting it.

3. Empirical analysis of the impact of firm characteristics

To obtain further insight into firm characteristics as drivers of online advice acceptance by consumers, we also conducted an empirical study. In particular, we investigated the mediating role of consumer perceptions of firm expertise and trust and how these perceptions depend on the type of firm that may provide online pension advice. We collected and studied these perceptions from respondents in a large representative sample, obtained online with a realistic innovative pension advice tool that has been developed in collaboration with our Netspar partners Robeco and Achmea.

3.1 Online advice tool: the Pension Builder

The study is built on recent advances in interactive online pension risk preference elicitation and advice. In particular, we implemented a prototype of the Pension Builder tool as recently proposed by Dellaert et al. (2016). The Pension Builder is an extension of the Distribution Builder tool introduced by Goldstein et al. (2008) and adapted to the Dutch consumer pension decision-making context (see also Donkers et al. 2013). Figure 3 shows the Pension Builder interface respondents used in the study.

The Pension Builder provides consumers with an intuitive device to express their preferences over risky investment outcomes and to make joint decisions on the risks and returns of financial outcomes, subject to budget constraints. Importantly, the tool draws on previous research on risk representations, demonstrating that individuals are best capable of understanding probabilities when these are presented graphically as frequencies of occurrence of a risky event (Fagerlin, Zikmund-Fisher, and Ubel,

Figure 3: Pension Builder tool presented to respondents
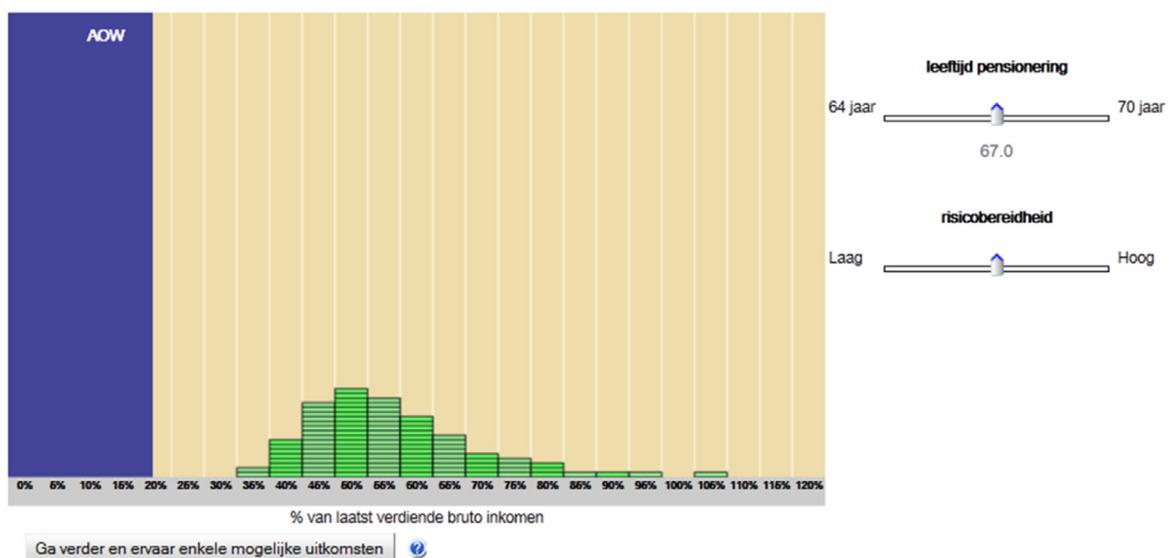
2011). In addition, the tool graphically represents the fact that (1) not all investment outcomes are equally valuable, (2) an individual's investments must come from a limited financial budget, (3) higher investment outcomes are more costly, and (4) higher risk can lead to a higher expected return. The Pension Builder furthermore assists consumers by automatically assigning the underlying probabilistic 'states–of–the–world' (such as the uncertainty of an economic recession) and the corresponding state prices across different outcomes, in such a way that the budget required to achieve a specific income distribution realization is minimized. Finally, another benefit of this type of interface is the embedded interactivity that aids consumers in discovering their own preferences.

To capture important aspects of the retirement savings and retirement timing decisions of consumers, the new interactive graphical Pension Builder tool expands earlier more generic tools in a number of ways. Two important innovations in particular are worth mentioning: (1) respondents are presented with a projected monthly retirement income including their base state pension, which allows them to think of risk–return trade–offs in terms of their actual projected retirement income; and (2) respondents are allowed to shift their desired retirement date. The desired retirement date is a fundamental driver of pension wealth and pension wealth needs. For example, retirement one year later calls for higher contributions to pension wealth while postponing withdrawals from it. The new tool was pretested and improved in several rounds with employees at Netspar partner organizations as well as novice users. This resulted in further refinements of the wording and graphical interface of the tool.

3.2 Data and experimental conditions

3.2.1 Structure of the survey task

The structure of the study was explained to respondents after they agreed to participate. They were first shown a short video explaining the basic features and workings of the Pension Builder tool. They then answered several short questions to make sure that they understood the working of the tool (and were requested to watch the video again if the questions were answered incorrectly). Next, respondents were asked to provide their risk–return preferences in the Pension Builder tool, and on the basis of their responses they were then presented with a personalized advice. Upon receiving their personalized advice, respondents were asked to indicate the likelihood that they would accept this advice. They also answered several questions regarding their personal characteristics and their evaluation of the firm providing the advice.

3.2.2 Experimental manipulation of firm characteristics

To test the impact of firm characteristics on consumer advice acceptance and the mediating role of perceived firm expertise and level of trust in the firm (see section 2.1 above), we presented respondents with four different types of firms. These firm types were selected on the basis of a review of different types of organizations that currently provide online pension advice in the Dutch pension market. The types of firms were selected to ensure variation in the perceived level of expertise and trust. More specifically, we classified pension advisors based on their profit orientation as either 'for profit' or 'not-for-profit' organizations (for profit (yes, no)) and as either providing pension products themselves or being an independent intermediary in the pension market (product provider (yes, no).

   We selected a representative firm type for each of the four combinations, resulting in the following four types of firms: (1) For profit & product provider: Insurance firm, (2) For profit & no product provider: Comparison website, (3) Not-for-profit & product provider: Pension fund, and (4) Not-for-profit & no product provider: Government-based comparison website. When introducing the Pension Builder task to respondents, we framed the Pension Builder service as if it was provided by one of these four firms.[6]

3.2.3 Perception measures, dependent variable and respondent characteristics

To measure consumer perceptions of firm expertise and level of trust in the firm, we adapted items from existing validated scales to our context. More specifically, we measured expertise using six items for which respondents indicated their agreement on a 7-point scale (1=totally disagree to 7=totally agree) with regard to a *firm of type X* (i.e. one of the four firm types as shown to the respondent). The items were defined as follows (translated from Dutch): (a) "A *firm of type X* has much experience in the pension domain," (b) "A *firm of type X* is skilled in the pension domain," (c) "A *firm of type X* has a lot of expertise in the pension domain," (d) "A *firm of type X* has a good understanding of the pension product market," (e) "A *firm of type X* has a lot of knowledge about many different products in the pension market," and (f) "A *firm of type X* is capable of finding the best product for me." For trust, we employed a three-item measurement scale. Respondents were again asked to answer on the same 7-point scale (1=totally disagree to 7=totally agree). The items were: (a) "When

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6   Respondents were also told that they either *received* advice from the firm or *generated* the advice themselves through the interface on the firm's website. The results showed that this manipulation had no effect on respondents' evaluations, and in our analyses we combined the data across these two conditions.

it comes to providing information about pensions and pension products, I trust a *firm of type X*," (b) "When it comes to providing information about pensions and pension products, a *firm of type X* is honest," (c) "When it comes to providing information about pensions and pension products, I believe what a *firm of type X* tells me."

As a measure of consumer acceptance of online advice, we asked respondents to indicate how likely it was that they would follow the online advice provided to them on a 0 – 100% probability scale (Elrod at al. 1992). This is our main dependent variable. We also asked respondents to evaluate the online interaction. In this study we use their overall satisfaction with the Pension Builder interface as a summary measure of their interaction evaluation (see footnote 2 in subsection 2.2.2). This was measured on a 7-point scale (1= very dissatisfied to 7 = very satisfied). Finally, we asked respondents to identify several personal characteristics, including age, gender, income, and education.

3.3 Results

3.3.1 *Data*

SSI, a professional panel data firm using large consumer panels in the Netherlands that ensure a representative sample of the Dutch population, collected the data for our study. Respondents were invited to participate in the survey if they belonged to the working population and worked at least 12 hours per week. Out of 6,473 respondents who started the study, we only analyze responses of 1,633 respondents who watched the explanatory video and for whom we obtained valid data.[7] In our sample, 38.1% are women, the average age was 45.2 years old (with a range from 21 to 65 and a standard deviation of 11.3 years old), and 17.5% had a bachelor degree or higher. The average gross yearly income is 41,947.20 euros per year (with a range from 15,500 to 280,000 euros and a standard deviation of 24,991.30 euros).

To check for scale validity, we conducted a confirmatory factor analysis on the firm expertise and trust scales. The results clearly reflect two different factors for the firms' perceived level of expertise and trust. Since one item of the expertise scale also partially loaded on the trust scale, this item was eliminated from further analysis. The

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7   This low continuation rate may be due to several factors, such as internet connection difficulties, lack of time to watch the full video and participate, and lack of fit of the survey with the respondent's interests, although we have no data to support any of these possibilities. Moreover, we note that lack of fit may suggest a self-selection issue in the sense that, to start with, some consumers may be a priori more inclined to seek online pension advice than others. That may itself affect the acceptance of advice. Quantifying the impact of self-selection is, however, outside the scope of the present paper.

Figure 4: Main variables of interest and controls and their relationships in the empirical *structural equation model of online pension investment advice acceptance**
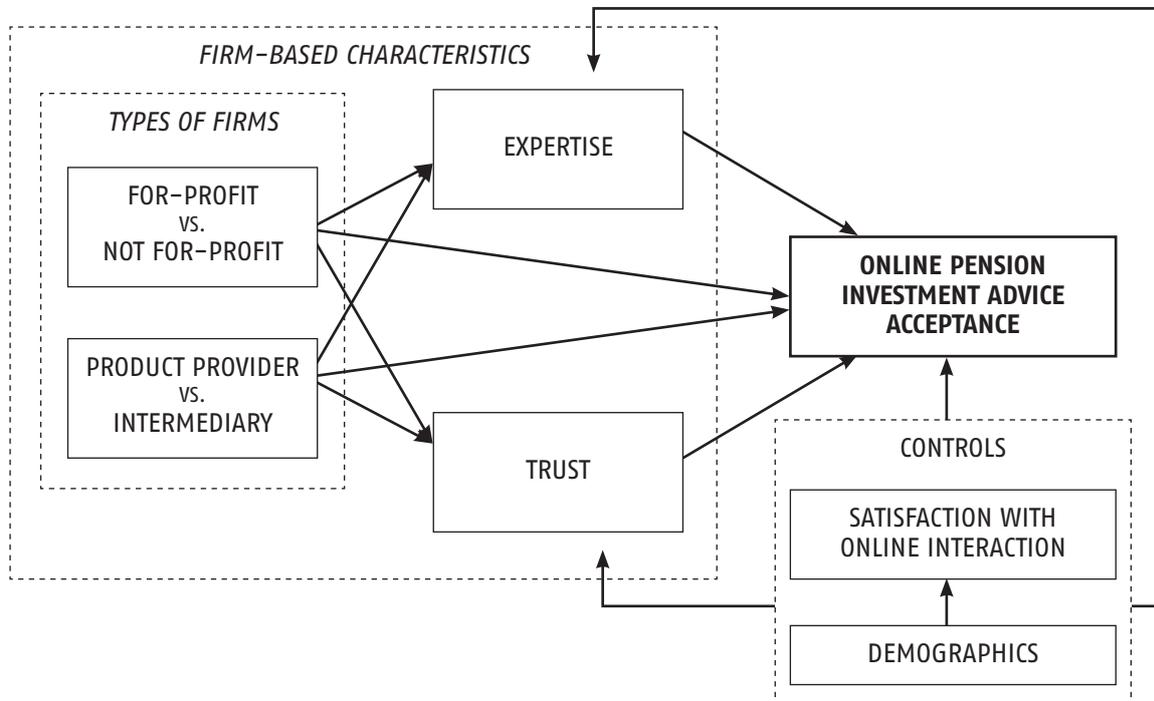
* *The four types of firms are hypothesized to have a direct effect on online advice acceptance (the two long arrows in the middle), as well as an indirect one through the mediators, expertise of and trust in the firm (the outer paths defined by the diagonal arrows). All outcome variables are controlled for consumer satisfaction with the online interaction and for demographics.*

resulting Cronbach's alphas were .97 for both scales. Jointly, these results support the validity of the scale measures.

3.3.2 A generalized structural equation model of online pension investment advice acceptance

We used an econometric structural equation model (SEM) approach to investigate our conceptualized relationships, in particular the expected mediation effect of the firm's perceived level of expertise and trust in the firm on the likelihood of acceptance of the advice. Instead of separately estimating (i) the effect of firm type on expertise and trust, (ii) the effect of firm type on advice acceptance, and (iii) the combined effect of firm type and expertise and trust on advice acceptance, an SEM model is able to estimate the various relationships while handling estimation uncertainty jointly and in an efficient manner (see Figure 4 for a schematic representation of our empirical model).

Table 1: Structural effects of firm type, firm expertise and trust on likelihood of acceptance of online pension investment advice§

	Estimated Coefficient	Standardized Coefficient	Standard Error	p-value
Online pension advice acceptance				
Perceived expertise of the firm	2.266	4.65	0.487	0.000
Trust in the firm	1.889	4.22	0.448	0.000
For profit	0.129	0.16	0.802	0.872
Product provider	0.152	0.19	0.799	0.849
Satisfaction with online interaction	9.088	28.05	0.324	0.000
Age	−0.004	−0.12	0.034	0.902
High education	3.057	2.96	1.032	0.003
Gender	−1.075	−1.32	0.815	0.187
Income (in thousands of euros)	−0.017	−1.06	0.016	0.288
Perceived expertise of the firm				
For profit	−0.261	−4.12	0.063	0.000
Product provider	0.579	9.14	0.063	0.000
Age	0.000	0.08	0.003	0.932
High education	−0.089	−1.04	0.086	0.301
Gender	−0.122	−1.82	0.067	0.069
Income (in thousands of euros)	0.002	1.84	0.001	0.066
Trust in the firm				
For profit	−0.733	−10.31	0.071	0.000
Product provider	0.118	1.65	0.071	0.099
Age	−0.013	−4.19	0.003	0.000
High education	−0.242	−2.49	0.097	0.013
Gender	−0.147	−1.94	0.076	0.052
Income (in thousands of euros)	0.002	1.13	0.002	0.259
Satisfaction with online interaction				
Age	−0.012	−3.66	0.003	0.000
High education	−0.201	−1.94	0.104	0.053
Gender	−0.239	−2.95	0.081	0.003
Income (in thousands of euros)	0.003	1.64	0.002	0.102

§ All error terms are assumed to follow a normal distribution. The number of observations in the advice acceptance equation is 1,508 and is 1,633 in the remaining equations. Intercept and error variance estimates are omitted for simplicity.

We conducted the model estimation in Stata. Despite having more parameters, a structural equation model with firm-related variables and controlling for '*satisfaction with online interaction*' (see the literature review and conceptualization in section 2.2, namely subsection 2.2.2 and footnote 2) and for demographics fits the data significantly better. We report in particular the results of a model estimated with Stata's gsem [Generalized Structural Equation Model] command, which makes use of more observations whenever possible, as is the case in the *Expertise*, *Trust*, and *Satisfaction*

equations.[8] Since the different variables that we use are measured in different units (e.g., income in thousands of euros, age in years), estimated standardized coefficients are used as an indication of their relative importance. All results are reported in Table 1.

3.3.3 The impact of firm type on perceived expertise of and trust in the firm

First, we determined whether the two different types of firms that we have classified (for profit vs. not-for-profit and product provider vs. no product provider) affect respondents' perceptions of expertise and trust. Interestingly, while we found that consumers perceive pension product providers as having significantly higher expertise than independent intermediaries (β=.579; p<.01), we also found that for-profit firms are perceived to have significantly lower expertise than not-for-profit firms (β=-.261; p<.01). Likewise, for-profit firms are trusted significantly less than not-for-profit (β=-.733; p<.01), while trust does not differ between pension product providers and independent intermediaries (β=.118; n.s.).

Importantly, although a commercial orientation can be seen as a double jeopardy for for-profit advisors because it negatively impacts consumer perceptions of their expertise and trustworthiness (the estimated effects are negative), in absolute terms a firm's general market orientation (for-profit vs. not-for-profit) is in relative terms far more important than independence in the formation of trust than it is in the formation of perceptions of expertise (the differences in absolute estimated standardized coefficients in the structural model are |-10.31| vs. 1.65 for trust and 9.14 vs. |-4.12| for expertise).

In other words, firms that have a for-profit structure clearly face a much greater challenge in convincing consumers to trust them than not-for-profit firms, so they will need to find other aspects in their strategy to compensate for this disadvantage. Figure 5 graphically illustrates the differences in perceived level of expertise and trust between the four separate firms representing the different firm types. (The graph is based directly on evaluation scores observed in our survey, not on parameter estimates from the model.)

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8 Unlike the sem command, model fit comparisons of models estimated with the gsem command are not straightforward due to the use of a different and typically larger number of observations whenever possible. However, a 'full' sem model with 33 parameters (29 'linear' parameters and 4 variance parameters) is significantly better than a 'null' one without a satisfaction equation and without consumer demographics in the expertise and trust equations and thus 19 parameters. (2*(LogLikelihoodFull − LogLikelihoodNull) = 2*(−41245 − (−41261)) = 31.1 > chi2(14) = 23.7; p<.05; N=1508 in both models).

Figure 5: Evaluation scores for perceived expertise and trust by firm type*

	Insurance firm	Pension fund	Comparison site	Government
■ Expertise	0.11	0.45	-0.38	-0.20
■ Trust	-0.32	0.42	-0.41	0.29
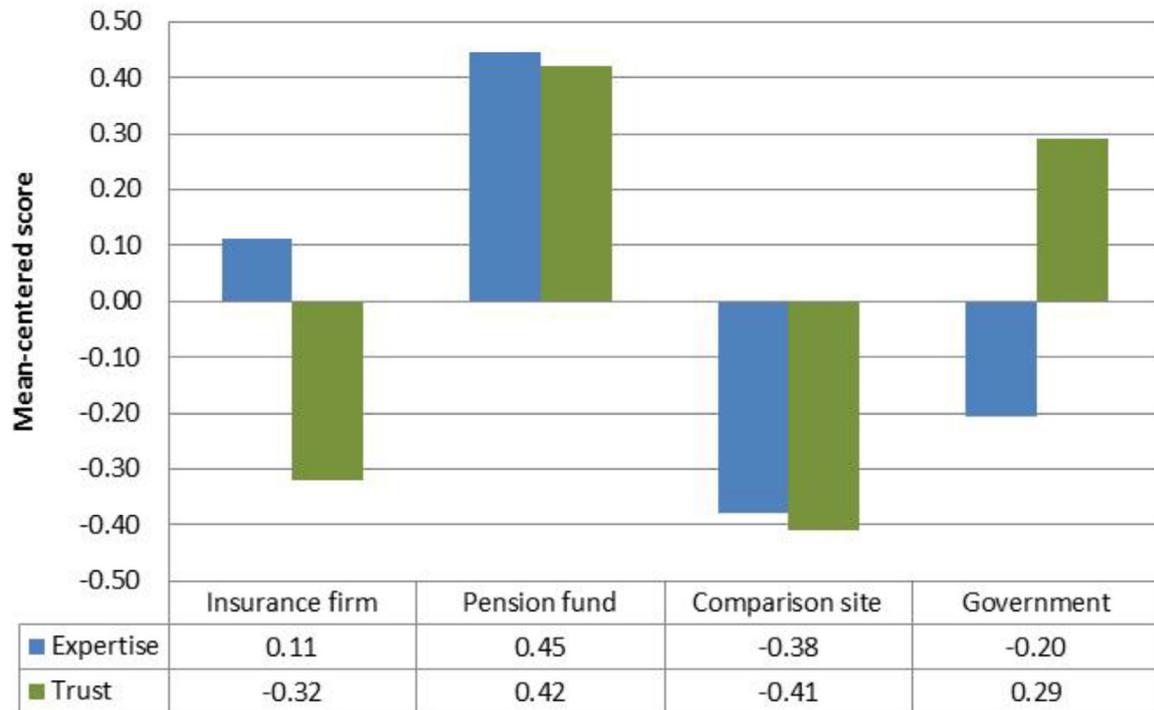
*   Within each firm type, the green bars refer to 'Trust' and the blue bars refer to 'Expertise'.

3.3.4 Expertise of and trust in the firm as mediators of the effect of firm type on advice acceptance

Turning to our focal dependent variable, our results clearly indicate that consumer perceptions of both expertise and trust are highly significant and positive predictors of acceptance of online pension advice, with higher levels of both perceptions being associated with a higher likelihood of acceptance of a firm's recommendation (β=2.266; p<.01 and β=1.889; p<.01 for expertise and trust, respectively). Since the likelihood of acceptance of online pension advice is not affected directly by the type of firm (β=0.129; p>.10 and β=0.152; p>.10 for commercial orientation and indepen-dence, respectively), both perceived expertise and trust *fully* mediate the effect of the type of firm, as a firm's commercial orientation and independence do affect both perceptions (as just discussed in subsection 3.3.3). Judging by their standardized coefficients, the importance of these two mediators in driving the acceptance of online pension advice is virtually the same (4.65 and 4.22 for expertise and trust, respectively) and almost seven times less important than consumer satisfaction with online interaction.

3.3.5 The additional impact of interaction evaluation and consumer characteristics

In line with the literature on decision support systems (e.g. Li and Gregor 2011; Liang, Lai, and Ku 2006), consumer satisfaction with online interaction significantly and positively predicts advice acceptance (β=9.088; p<.01), and its associated standardized coefficient is the largest of all by far and equal to 28.05. Assuming all other drivers to be constant, with every increase of one standard deviation in online interaction satisfaction, the likelihood of online pension advice acceptance rises by 28.05 standard deviations (recall that satisfaction is measured on a scale from 1 to 7, whereas advice acceptance likelihood ranges from 0% to 100%).

Not surprisingly, online pension advisors should ensure that consumers are satisfied with the online interaction process. But this is perhaps easier said than done, especially when faced with older consumers and females (estimated to negatively and significantly affect satisfaction: β=−0.012; p<.01 and β=−0.239; p<.01 for age and gender, respectively). As we have discussed in our literature review and conceptualization section, the online interaction process is a very elaborate one as it depends on several aspects within three different domains: the consumer, the communication, and the information system. Hence, successful online pension advisors probably need to perform well on all or at least most of these aspects to do well on satisfaction (which we implicitly assumed to be a proper summary measure of all three interaction domains).

In general, the impact of consumer characteristics (as measured by their standardized coefficients) is low compared to the effects of perceived firm expertise, trust in the firm, and interaction satisfaction. In fact, only for higher education did we find a significant positive effect on online advice acceptance (β=3.057; p<.01), with those with a bachelor degree or higher being more inclined to accept the online advice than consumers with lower education. At the same time, highly educated consumers trust an online pension advisor significantly less than the less educated (β=−0.242; p<.01), and so do older consumers compared to younger ones (β=−0.013; p<.01). All other effects of consumer characteristics are either insignificant or only marginally significant and therefore negligible.

4. Discussion

When looking at drivers of acceptance of online pension advice, we find that advice acceptance is influenced both by the type of firm that provides the advice and by how the advice is given (interaction). In other words, the same advice is more or less likely to be accepted depending on who gives the advice and how it is given (Figure 2). Both perceived expertise of the firm and trust in the firm are important drivers of online advice acceptance. These constructs largely mediate the impact of different firm types on online advice acceptance. We specifically compared pension funds, insurance firms, commercial comparison websites, and government websites as possible pension advisors, and found that pension funds are seen as the most trust-worthy and highest expertise advisors (Figure 5). This can be explained by the fact that they are not-for-profit organizations that provide pension products. Consumers evaluate these two firm characteristics positively.

As we proposed, not-for-profit firms are likely to enjoy higher levels of trust, especially in light of financial crises that may hurt the perception of the financial industry in general (Mayer 2013). Unlike what we predicted, however, advisors only provide comparative information but do not actually sell pension products to pension plan participants are not seen as more trustworthy. It may be that Dutch consumers regard the regulatory requirements in the Netherlands as a strong enough buffer against the biased advice that could result from selling products with high profit margins (e.g., Cadman, Carter, and Hillegeist 2010; Inderst and Ottaviani 2012).[9]

Moreover, computer-to-human interactions such as the one that consumers have with the Pension Builder may increase confidence that less discretionary criteria will be used when pension providers generate advice than is common in financial person-to-person interactions (see e.g. Cerqueiro, Degryse, and Ongena 2011), even if the advice is generated by for-profit firms. When it comes to perceptions of expertise, for-profit firms, much like pension plan providers, do appear to be seen as having higher levels of expertise than not-for-profit firms and independent intermediaries. This suggests, as we had discussed in our conceptualization, that without a high level of expertise these firms will have a hard time surviving in a highly sophisticated, regulated, and competitive market such as that for pension products (see e.g. Coates and Hubbard 2007).

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9   As an anonymous Netspar reviewer rightly pointed out, the use of the terms 'consumer' and 'firm' may not do full justice to the unique case of a pension fund and its plan members. Spe-cifically, it is worth noting that a fund plays a fiduciary role, i.e. it acts on behalf of its mem-bers, and thereby both parties have a common goal.

Besides the firm that supplies the advice, consumer satisfaction with the pension advice interaction also has a strong positive effect on online advice acceptance. This underscores the importance of designing attractive and easy-to-use online interfaces for consumer adoption of online advice.

Finally, when we control for the impact of individual characteristics on firm and interaction evaluation, we find that online advice is more likely to be accepted by consumers with a higher education.

5. Future research

Future research could benefit from testing consumer perceptions and acceptance of online advice in a real world setting, such as with actual pension funds or insurance firms that offer pension products. It would be particularly interesting if advice acceptance could be compared across different providers, to investigate if the firm does indeed play an important role in consumer online advice acceptance – even when a consumer is already coupled with a certain type of firm. In addition, it would be interesting to see if "real-world" consumers are given the freedom to choose between different online advisors the type of firm that they select. Although we designed a controlled setting to ensure that we could draw valid conclusions regarding the impact of the type of firm providing advice on advice acceptance, we only asked respondents to self-report how likely it was that they would follow the online advice provided to them on a 0 – 100% probability scale (Elrod at al. 1992).

This sequential process of advisor selection and advice acceptance would be worthwhile modeling econometrically, to establish the economic value of interaction design and firm type. Similarly, it would be worthwhile studying the sequential process that extends from online advice acceptance to the actual interventions that consumers decide to undertake in their pension strategies. For example, will consumers more or instead less easily adopt additional savings or investment strategies when given advice online than when they are advised in person?

Finally, in future applications of online advice, it is important to assess how consumers respond to advice that combines multiple components of their retirement portfolio. For example, depending on whether or not a consumer has private savings or investments, the retirement investment advice may shift. Thus, interactions may need to be more extensive and may need dynamic updating from time to time to capture possible changes in consumer circumstances. This may offer further opportunities for increasing perceived firm expertise and trust, but it may also lower consumer satisfaction with the interaction process, all depending on how 'all-in-one' the online interactions are designed.

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