



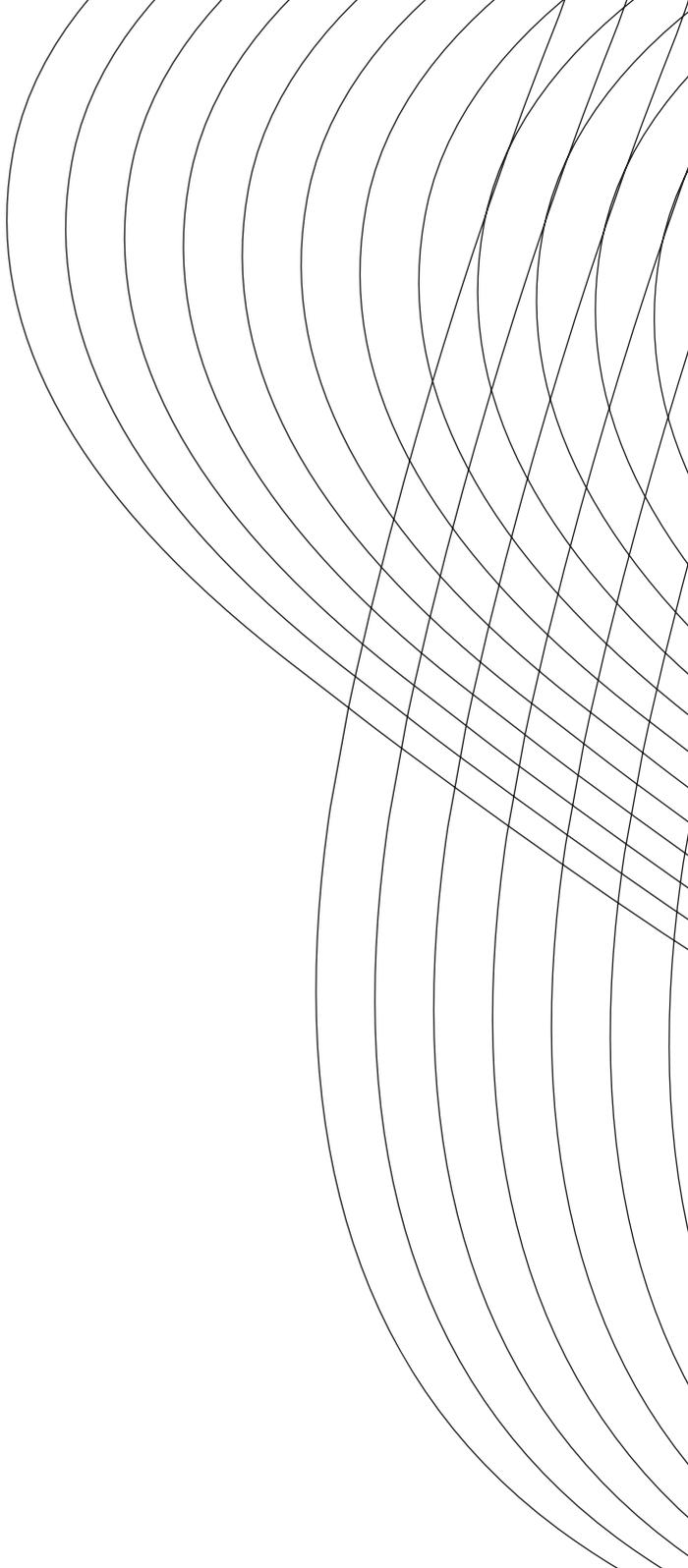
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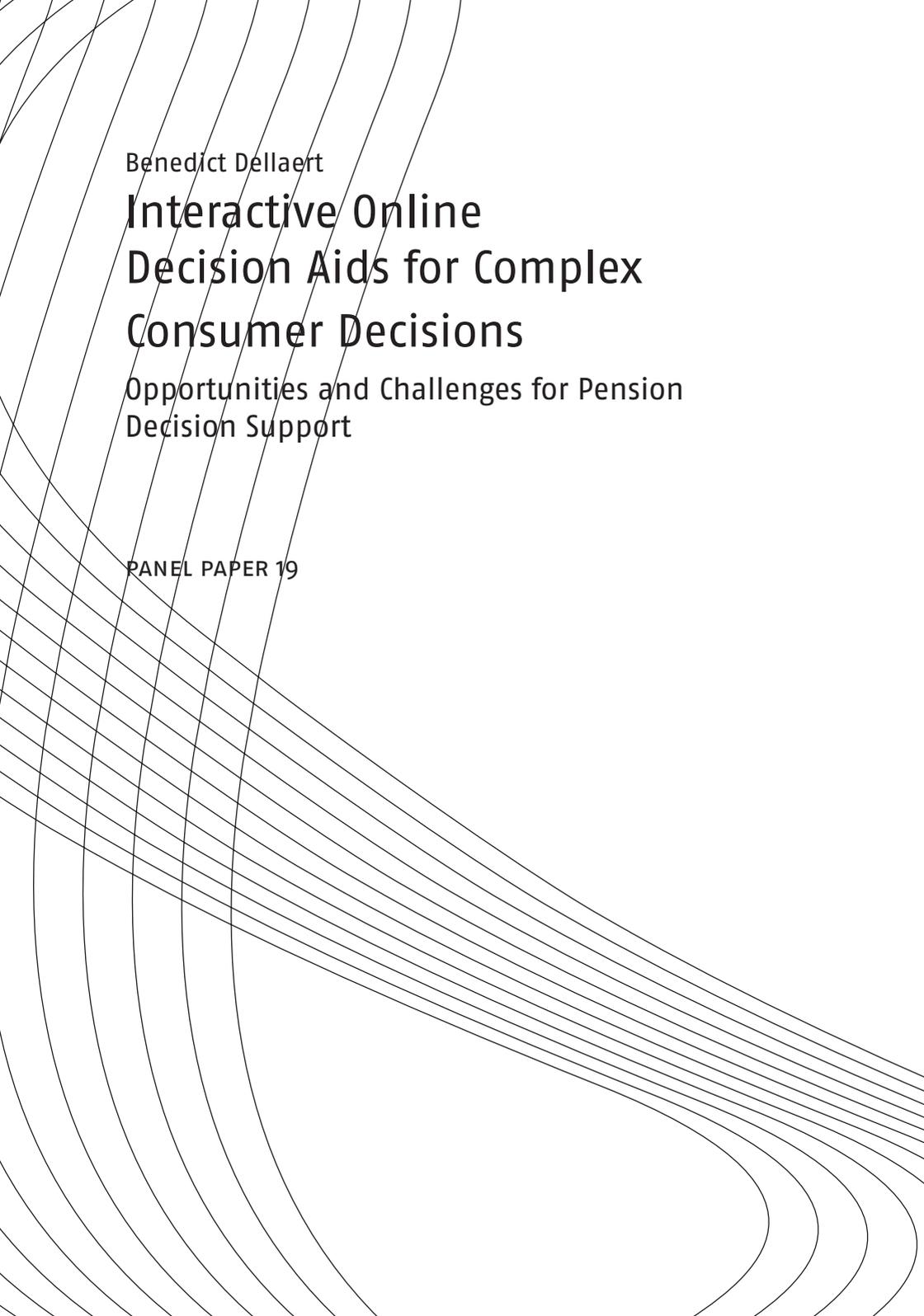
Netspar PANEL PAPERS

Benedict Dellaert

Interactive Online Decision Aids for Complex Consumer Decisions

Opportunities and Challenges for
Pension Decision Support





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Decision Support

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Editorial address

Netspar, Tilburg University
PO Box 90153, 5000 LE Tilburg
info@netspar.nl

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PREFACE

Netspar stimulates debate and fundamental research in the field of pensions, aging and retirement. The aging of the population is front-page news, as many baby boomers are now moving into retirement. More generally, people live longer and in better health while at the same time families choose to have fewer children. Although the aging of the population often gets negative attention, with bleak pictures painted of the doubling of the ratio of the number of people aged 65 and older to the number of the working population during the next decades, it must, at the same time, be a boon to society that so many people are living longer and healthier lives. Can the falling number of working young afford to pay the pensions for a growing number of pensioners? Do people have to work a longer working week and postpone retirement? Or should the pensions be cut or the premiums paid by the working population be raised to afford social security for a growing group of pensioners? Should people be encouraged to take more responsibility for their own pension? What is the changing role of employers associations and trade unions in the organization of pensions? Can and are people prepared to undertake investment for their own pension, or are they happy to leave this to the pension funds? Who takes responsibility for the pension funds? How can a transparent and level playing field for pension funds and insurance companies be ensured? How should an acceptable trade-off be struck between social goals such as solidarity between young and old, or rich and poor, and

individual freedom? But most important of all: how can the benefits of living longer and healthier be harnessed for a happier and more prosperous society?

The Netspar Panel Papers aim to meet the demand for understanding the ever-expanding academic literature on the consequences of aging populations. They also aim to help give a better scientific underpinning of policy advice. They attempt to provide a survey of the latest and most relevant research, try to explain this in a non-technical manner and outline the implications for policy questions faced by Netspar's partners. Let there be no mistake. In many ways, formulating such a position paper is a tougher task than writing an academic paper or an op-ed piece. The authors have benefitted from the comments of the Editorial Board on various drafts and also from the discussions during the presentation of their paper at a Netspar Panel Meeting.

I hope the result helps reaching Netspar's aim to stimulate social innovation in addressing the challenges and opportunities raised by aging in an efficient and equitable manner and in an international setting.

Henk Don

Chairman of the Netspar Editorial Board

Affiliations

Benedict Dellaert: Department of Business Economics, Marketing section, Erasmus School of Economics, Erasmus University Rotterdam and Netspar

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INTERACTIVE ONLINE DECISION AIDS FOR COMPLEX CONSUMER DECISIONS

Abstract

It is well recognized that individuals find the task of choosing a suitable pension product extremely complex. This complexity is driven by several important factors, including the complexity of the financial products (which often consist of many different components with different risks and expected returns), the challenge of understanding how different pension products can meet the (often more abstract) needs of the individual, and the difficulty that individuals face in projecting their own needs and preferences to the future. This paper reviews recent research on interactive decision aids in order to explore the extent to which these aids may be used to help consumers overcome the complexity of pension decisions. In particular, the paper addresses the following two important types of online technologies: 1. Preference formation tools, which may assist individuals in developing a better understanding of their own future needs and determining which product dimensions are most relevant to meet those needs, and 2. Product-selection tools, which help consumers in finding a suitable product once they have developed a fairly good understanding of their own preferences and needs.

Non-technical summary

This paper reviews recent research on interactive decisions aids to explore the extent to which these aids may be used to help consumers in overcoming the complexity of their pension decisions. In particular, two important types of online technologies are reviewed that are closely connected with the underlying stages in consumer decision-making: 1. Preference formation tools (that is, information acceleration, virtual user-toolkits and peer-to-peer communities), and 2. Product-selection tools (that is, personalized product recommendations and mass-customization). Based on a detailed description of the different technologies and an analysis of the specific challenges that consumers face in making pension-product decisions, we conclude that, while all of the technologies reviewed have the potential to support consumer pension decision-making, some technologies have greater potential than others for overcoming certain challenges.

Information acceleration is expected to be the most useful tool in overcoming low consumer involvement and expertise by generating interest among consumers about pension decision-making and assisting them in better understanding their own future situation. Virtual user-toolkits appear to be particularly well suited to helping consumers better understand the meaning of different pension-product features and how the selection of a certain pension product would affect their own personal retirement outcomes. Peer-to-peer communities may also serve this same goal of developing a better understanding of pension products and needs, and may assist consumers in making better pension-product selections. Personalized product recommendations and mass-customization, finally, may be of greatest help to consumers in overcoming the complexity of finding a suitable product in the highly diverse market of all the available pension products.

1. Introduction

In recent years, the range of available pension- and related income-provision products has expanded significantly. Increasingly, individuals are encouraged to enhance their regular pensions with additional, more personal financial arrangements. Consumers may indeed benefit from this increased flexibility and the availability of an array of financial products—as they have more opportunities to find a financial product that matches their individual-specific needs. At the same time, however, the question arises how challenging it is for consumers to act on this potential welfare gain, given the complexity of financial pension products.

In particular, it is well recognized that individuals find the task of choosing a suitable pension product extremely complex (Lusardi and Mitchell, 2007; Van Rooij, Kool and Prast, 2007). This complexity is driven by several factors – including the complexity of the financial products themselves (which often consist of many different components with different risks and expected returns), the difficulty for consumers to translate the different pension products in terms of how well they may meet their deeper underlying needs after retirement, and the difficulty for individuals to project their own needs and preferences for the future.

This paper reviews the recent research on interactive decision aids, exploring the extent to which these aids may be used to help consumers overcome the complexity of making pension decisions. In particular, it reviews the potential impact on consumer decision-making of two types of information technologies that are closely connected with the first two stages (preference development and the offer-evaluation stage) that

are distinguished by Simonson (2005) in the consumer decision-making process in the context of one-to-one marketing. The two types of technologies are as follows:

1. *Preference formation tools.* How can individuals best be assisted in formulating their future needs? Supporting individuals in this area may potentially reduce the perceived complexity of pension-product decisions, and increase the probability that individuals select a suitable pension product.
2. *Product-selection tools.* Once individuals have determined their future needs, how can the selection of the pension products be facilitated with interactive decision aids? It is expected that aids that closely follow the individuals' own terminology allow for more valuable as well as more user-friendly product recommendations and customization.

The paper focuses particularly on the role of online systems. Although many channels are relevant to support consumer pension decisions, the online channel is increasingly being used to support individual financial transactions and to facilitate consumer financial decision-making and learning (Barber and Odean, 2001). Growing numbers of individuals have access to the Internet, and many new initiatives are currently providing consumers with tailored pension information. A major benefit of such online systems is that they combine interface design flexibility with easy and flexible channel access for consumers. Thus, online decision aids can reduce decision complexity without a loss in terms of access to suitable financial products.

With some notable exceptions, research on consumer-oriented online decision-support technologies is rather limited in the domain of pensions and financial products (Barnatt, 1998; Gao et al., 2005, 2007; Looney and Hardin, 2009). However, in other

areas of consumer–firm interactions (such as new–product development), various types of online systems have commonly been researched and implemented to facilitate decision–making. Therefore, this paper reviews research findings in these broader areas (online preference formation assistance and online product–selection assistance), and reviews the factors that may influence consumer adoption of the proposed online decision technologies. Finally, the paper discusses the specific challenges of consumer pension decision–making – and the policy implications thereof – in terms of suitable approaches to support consumer pension decision–making online.

2. Supporting Consumer Preference Formation Online

In many areas of consumption, consumers must use considerable expertise to make high-quality decisions. One key challenge is for consumers to find the product in the market that best matches their preferences. This requires extensive market screening and product comparisons (see section 3). Before consumers can face this challenge, however, they first have to develop an adequate understanding of their own needs and objectives with respect to the products they are going to buy. This is the *decision stage* that is addressed in the current section. For instance, consumers may need to consider how they will use a certain product (a car, perhaps) before they select it, so that they can decide on the properties of the product (the size of the car, mileage, performance) that they require. Likewise, in the domain of pensions, consumers must consider the goals they will have after retirement (and over the course of their working life) in order to decide on requirements they have with respect to their financial pension arrangements.

Thus, to overcome the uncertainty that individuals may have about their future retirement needs and preferences, firms may wish to aid them in developing a better understanding of these needs. Online systems offer a variety of ways to do so, and this paper draws on three particular streams of research to discuss these opportunities. First, rich online virtual environments have been developed to assist consumers in understanding new and unfamiliar consumption situations. This approach is often referred to as *Information Acceleration* (Urban, Weinberg and Hauser, 1996; Urban, et al., 1997), since its aim is to propel consumers into the future. Traditionally, it has been implemented to evaluate the likely success of (radically) new technologies. The second stream

of research involves the development of highly interactive *virtual user-toolkits* to allow consumers to experiment with and learn about their preferences for different product variants (Von Hippel and Katz, 2002). These toolkits communicate with consumers at their own level and support direct (virtual) feedback on the impact of product changes they may wish to evaluate. Third, online peer-to-peer user communities have been implemented to support consumer learning and exploration of new consumption areas. Experienced users can typically share valuable insights about products and consumption situations with novice users (Mathwick, Wiertz and De Ruyter, 2008), and may also assist inexperienced consumers in further refining their understanding of their own preferences and needs.

Information Acceleration

In a typical information acceleration process, consumers are invited to explore a virtual (online) environment that consists of many different types of information and information formats. The virtual environment is designed to simulate the information that is available to the consumer at the future time that he or she makes a purchase decision (Urban et al., 1997). In the case of postponed consumption (such as retirement), this could also involve providing information about the future consumer situation. Information formats may include (enacted) video statements by product users and experts explaining important consumption considerations and product features. Consumers may also access written product reviews by independent experts or peers, technical product specifications, and peer testimonials (Huang, Lurie and Mitra, 2009). Furthermore, consumers may be allowed to virtually explore a product using 3D or some other type of visualization (Lurie and Mason, 2007; Schlosser, 2003).

Finally and importantly, context information is provided about the consumers' future economic, social, and technological environment. For example, a consumer may learn that other consumers will (or will not) commonly use similar new products, or that housing and working environments are different from those experienced today.

A particular strength of the information acceleration approach is the very rich, often visual, environment that is used to support consumers. Rich media environments tend to attract consumers (Dellaert and Dabholkar, 2009; Mathwick, Malhotra and Rigdon, 2001), and have been found to lead to better consumer decision-making in some instances (Kahai and Cooper, 2003), and to identical quality but faster decision-making in others (Dennis and Kinney, 1998). Also, a greater variety in information content and format makes it easier for different consumers to find the information that matches their own mental representation of the decision problem (Hauser et al., 2009), which in turn is likely to increase their evaluation of the information and its impact on their decision (Lee and Labroo, 2004; Lee, Keller and Sternthal, 2010). The richer media environment can also facilitate the transition from more general or needs-based representations of a decision problem to more concrete and actionable representations – for example, by clarifying connections between consumer needs and specific product features (Randall, Terwiesch and Ulrich, 2005).

A number of empirical applications have used information acceleration to support and expedite product-innovation processes and to make forecasts for future market demand (Urban et al., 1996, 1997). It was found that the simulated environments provide a viable way of replacing real-world human and other information sources. In a test case with cameras, the external

validity of the product–adoption decision made by consumers in an information acceleration environment was sufficient to warrant the use of this approach as a replacement for actual test markets. The information–acceleration–based results also provided insights that traditional marketing research methods cannot easily provide (Urban et al., 1997). Thus, information acceleration across several applications has been shown to improve consumer understanding of very new consumption situations, which suggests that it may be a promising approach to assist consumers in better understanding their future pension needs and preferences.

Virtual User–toolkits

In new product–development trajectories, eliciting and integrating consumer product needs is often a vital part of the process. The objective is to align new products with consumer demand as closely as possible. One of the major challenges in doing so is to find a shared language that both consumers and new–product development teams can use to communicate about a product. Virtual user–toolkits were developed with this purpose in mind. They allow end–users to become involved in new–product development without necessarily becoming experts in the underlying production technologies (Dahl and Moreau, 2007; Füller and Matzler, 2007; Von Hippel and Katz, 2002).

The design of virtual user–toolkits includes a very user–friendly interface that allows consumers to explore the effect of changes in product design and product specifications on product performance and consumption experiences (Von Hippel and Katz, 2002; Franke and Piller, 2004). Thus, by experimenting within the toolkit environment, consumers can learn about the relationships between their needs and preferences and product–specification changes (Carlson and Bond, 2006; Von Hippel and Katz, 2002).

For example, at a relatively basic level, virtual user-toolkits might allow consumers to observe how different color patterns match together when designing clothing or shoes, while at a more sophisticated level, these toolkits allow consumers to experiment with different spatial layouts of kitchen or house designs.

Another important feature of virtual user-toolkits is that even though they are highly user-friendly in terms of their interface design, the underlying flexible set of product configurations is designed in such a way that it can be directly linked – through a formalized set of technical specifications – to the production technology of the firm (Von Hippel and Katz, 2002). This structure implies that any product specification that is explored by the consumer can also be produced by the firm. This feature greatly strengthens the impact and effectiveness of the user interface. Virtual user-toolkits have been successfully applied in various industries to integrate consumers into the design process (Von Hippel and Katz, 2002; Franke and Piller, 2004). These toolkits have also provided an environment in which consumers could sharpen and better understand their preferences for very new product specifications with which they might have had little experience. This suggests that virtual user-toolkits also may have considerable potential to assist consumers in exploring their preferences for different (new) product options.

Peer-to-peer User Communities

Personal interaction is often a very effective way to communicate about relatively fuzzy knowledge—and consumers have been found to have a strong appreciation of person-to-person interaction, even in online decision-support environments (Dellaert and Dabholkar, 2009; Franke, Keinz and Schreier, 2008; Nambisan, 2002). One traditional way of providing consumers with

support is through (online) salesperson interaction (Crosby, Evans and Cowles, 1990). Recently, however, the emphasis has shifted to include the role of online peer-to-peer user communities in providing consumers with decision assistance and offering them the opportunity to share product experiences (Algesheimer, Dholakia and Herrmann, 2005; Mathwick et al., 2008).

From the perspective of preference formation assistance, peer-to-peer communities can assist consumers in several ways. Perhaps most importantly, these communities provide a platform for consumer knowledge exchange with respect to preferences and needs and the way that these preferences and needs connect to different product specifications and applications (Nambisan, 2002; Mathwick et al., 2008). For example, in disease-related patient communities, patients may share experiences about different treatments and medication, and other disease-related experiences.

Secondly, peer-to-peer communities allow consumers to share ideas and provide feedback to each other's solutions to resolve product needs. Franke et al. (2008) show that consumers who share feedback about the products they have designed become more confident about having chosen the most fitting option for themselves. Thereby, peer-to-peer communities can serve as a catalyst in the consumer preference-formation process.

3. Supporting Consumer-product Selection

Once consumers have determined their own needs and preferences, they still face the daunting task of screening the market to find the best-fitting product that is available. Recent trends towards greater product diversification and online access to very wide product assortments further complicate selection of a suitable product in the market.

Online environments may also support consumers in this decision stage. Two approaches stand out in the literature (Arora et al., 2008). First, consumers are often supported through provision of personalized product recommendations. These recommendations are typically generated in a firm-driven process by which consumers are provided with a subset or ranking of products in order of projected relevance to the consumers (Häubl and Trifts, 2000). A second approach, mass-customization, is also used to support consumer-product selection. This is typically a consumer-driven process in which firms provide consumers with an online interface that supports them in selecting efficiently the product composition that best fits their needs (Dellaert and Stremersch, 2005).

Personalized Product Recommendations

Personalized product recommendations can be generated with either largely passive or more active consumer participation (Ariely, Lynch and Aparicio, 2004). In case of passive personalization, firms rely on observations of consumer behavior (such as online browsing, downloading or buying) to discover patterns in consumer preferences and to segment consumers that behave in a similar way. This approach allows firms to provide individual-level recommendations to each consumer based on the

degree to which their situation matches with patterns observed in the data of the overall population (Ansari, Essegai and Kohli, 2000). For example, personalized recommendations about books or music may be made on the basis of the observed match of the books or music that a certain individual inspected with those inspected by others in the firm's database.

In the case of personalized recommendations with customer input, a more interactive approach is followed (Häubli and Trifts, 2000; Murray and Häubl, 2009; Xiao and Benbasat, 2007), and the consumer is asked to report explicitly on his or her preferences to generate the personalized recommendations. This can be done through an online survey, for example. In order to recommend the most suitable product(s) to the consumer, the consumer's input in such a survey is combined with either a rule-based knowledge system or a population-level model that looks for matching preference patterns based on the input and behavior of other consumers. The type of recommendations can range from relatively straightforward (for example, a simple price-screening process such as airline ticket recommendations), to quite sophisticated (for example, a social dating service with online interviews and recommendations).

Research shows that personalized recommendations can effectively assist consumers in terms of both reducing their overall product search time and improving the outcome of the choices that they make (Häubli and Trifts, 2000; Xiao and Benbasat, 2007). Thus, when many products are available in the market, personalized recommendations can provide valuable support in reducing the complexity of consumer product-selection decisions in product categories ranging from books and music to travel and financial services.

Mass-customization

Mass-customization interfaces provide consumers with the opportunity to select their most preferred option from each of a set of modules (Dellaert and Stremersch, 2005; Liechty, Ramaswamy and Cohen, 2001). The product space is predefined by the firm, and the mass-customization interface allows consumers to make their choice effectively within this space.

One key design principle that typically underlies mass-customization is that of modularization (Sanchez and Mahoney, 1996), which involves the design of goods and services in such a manner that within the boundaries of a predefined underlying frame, separate components can be selected and easily interchanged. For example, a common platform may be used to produce many different models of cars with different designs and different technical capacities (Robertson and Ulrich, 1998). This design approach configures the decision space from which the consumer can freely choose. It also facilitates network-based production, where different components can be outsourced to various suppliers in the firm's network (Stremersch et al., 2003).

Typically, the option-selection menu in mass-customization is supported in several ways. Default options, which facilitate the consumer selection process, often provide a starting point for the selection process (Goldstein et al., 2008). Help options are typically available to provide explanations about the different product options, and these may be further supported by a call- or chat function that allows consumers to contact a firm's employees with any questions they might have. Visualization has also proven to be helpful to consumers in categories such as apparel (Dellaert and Dabholkar, 2009; Lurie and Mason, 2007).

An aspect that has also received particular attention in the literature is how best to communicate with consumers about

products in the mass-customization process. Research shows that the mass-customization interface, in order to be most effective in terms of aiding decisions, needs to closely match the mental representations that individuals make of the product decision (Randall, Terwiesch and Ulrich, 2005, 2007; Franke, Keinz and Steger, 2009). In particular, consumers who know more about a given product category ('expert users') are found to be more able to cognitively connect concrete mass-customizable product features to their own underlying more abstract product needs, while 'novices' are better served with more abstract product-option descriptions to guide their choices. This finding is in line with other research in the domain of marketing communications, where it has been shown that the fluency with which consumers can process information in a message significantly influences their evaluation of the content of the message—such that greater fluency leads to more positive evaluations (Lee and Labroo, 2004; Lee, Keller and Sternthal, 2010).

Mass-customization leads to higher consumer evaluations of the products they select, both because the product better fits their underlying preferences (Dellaert and Stremersch, 2005), and because the active involvement in the product-selection process provides consumers with a sense of "owning" the product solution that they select (Fuchs, Prandelli and Schreier, 2009). Furthermore, despite some early concerns (Huffman and Kahn, 1998), the complexity of the mass-customization process is generally evaluated as relatively low by consumers (Dellaert and Stremersch, 2005; Franke and Schreier, 2010; Valenzuela, Dhar and Zettelmeyer, 2009).

4. Adoption of New Online Technologies to Support Decision-making

Consumers face a number of underlying cost-benefit trade-offs when considering whether they should adopt the various online technologies that are available to support their product decision-making. These trade-offs are similar in nature to those that consumers encounter in other technology-related decisions (such as the decision to adopt self-service technology (Dabholkar and Bagozzi, 2002), or to adopt information systems in general (Davis, Bagozzi and Warshaw, 1989)).

In research that addresses these cost-benefit trade-offs in the context of online consumer decision aids, four factors tend to dominate (Dabholkar and Bagozzi, 2002; Dellaert and Dabholkar, 2009; Franke and Schreier, 2010): 1. The *perceived usefulness* of the process, which represents consumer perception of the improved decision outcome that can be achieved by using the system; 2. The *perceived complexity* of using the process, which refers to consumer perception of how complicated it actually is to use the system; 3. The *perceived enjoyment* involved in using the process, which reflects consumer perception of the pleasure associated with using the system; and 4. The *perceived level of control* that the consumer has over the process, which refers to how strongly consumers believe they are able to personally determine the outcome they can achieve when using the system.

Thus, while some of the proposed online technologies require relatively little effort on the part of the consumer (for example, passive personalized recommendations), others require quite a bit of effort (for example, online virtual toolkits). Likewise, consumers may view certain technologies as more or less useful, or enjoyable than others in which to participate (depending, for example, on

the level of visualization in the interface). In particular, in the domain of personalized product recommendations and mass-customization, many studies have addressed such consumer trade-offs (Dellaert and Stremersch, 2005; Dellaert and Dabholkar, 2009; Franke, Keinz and Steger, 2009; Franke and Schreier, 2010; Kramer, 2007; Murray and Häubl, 2009; Simonson, 2005; Valenzuela, Dhar and Zettelmeyer, 2009). However, less research has addressed consumer trade-offs in the decision whether or not to use information technologies to support preference formation processes (Dahl and Moreau, 2007; Mathwick et al., 2008; Schlosser, 2003, 2005).

Moreover, in the specific area of personalized product recommendations (where the firm plays an important role in defining the product that is recommended), the perceived *transparency* of the process leading to the recommendation has also been found to have a significant effect on consumer decisions to use the process (Kramer, 2007). The notion of transparency is conceptually closely related to the level of trust that consumers have in a recommendation system – in that consumers are more likely to trust recommendations for which they have a clear understanding of how they were generated. Indeed, several studies have shown that consumer trust in a recommendation system is an important determinant of whether or not they will adopt such a system (Gefen, Benbasat and Pavlou, 2008; Komiak and Izak Benbasat, 2006; Wang and Benbasat, 2005, 2007). The issue of trust is less prominent in research on the adoption of other online decision-support technologies although it is also often addressed as an important aspect of the impact of recommendations in peer-to-peer communities (Shneiderman, 2000).

More generally, the underlying trends in the research findings are threefold. First, while several cost-benefit factors tend to affect the adoption decisions of consumers, the direct role of perceived complexity is minor, compared to the role played by the other factors. The impact of perceived complexity appears to be mainly indirect, by lowering the perceived usefulness of the process (Dellaert and Stremersch, 2005; Franke and Schreier, 2010). Therefore, if a firm has decided to implement a consumer decision-support technology, it should strive to communicate clearly to consumers the usefulness of the tool, and to make the process of using it as enjoyable, controllable and transparent for consumers as possible.

The second major trend in research findings has to do with concerns that market adoption of the technologies may be lagging, despite the positive net effect on consumer decision-making of the various technologies (Murray and Häubl, 2009; Simonson, 2005). The underlying reasons why firms may or may not implement customer decision-support technologies are not well understood at the moment, and suggestions vary across specific technologies. In particular, it has been argued that strategic disadvantages exist for firms to offer technologies such as complete mass-customization, and that firms benefit most from providing only limited or restricted support (Syam, Ruan and Hess, 2005). Also, the complexity may be high for firms to successfully implement the proposed technologies and the required underlying changes in production processes (Salvador, Martin de Holan and Piller, 2009). Additional consumer costs factors have also been proposed as reasons for limited implementation. They include the required up-front consumer time investment (Murray and Häubl, 2009), consumers' anticipated regret (Syam,

Krishnamurthy and Hess, 2008), and a relatively low stability in consumer preferences (Simonson, 2005).

Third, several studies have shown strong heterogeneity in consumers' intentions to adopt online consumer decision aids, depending on specific consumer traits and situational differences. Product expertise and involvement have been identified as important differentiators of consumer response to product decision-support technologies (Dellaert and Stremersch, 2005; Franke, Keinz and Steger, 2009; Kramer, 2007; Randall, Terwiesch and Ulrich, 2007). Important conclusions in this area are that consumer 'experts' are less concerned about dealing with complex decisions and can more easily cognitively connect the interpretation of different types of product information (comparing feature-based vs. needs-based recommendations, for example). Consumers also differ in terms of their general inclination to interact about products with adaptive online environments (Mathwick, Wagner and Unni, 2010). Furthermore, the goals that consumers have also influence how they respond to different information formats (Schlosser, 2003). Finally, an important situational factor that might affect consumer response to decision-support technologies is the social environment in which consumers use the technology, which may affect the impact of different costs and benefits on their adoption decision (Dabholkar and Bagozzi, 2002; Franke, Keinz and Schreier, 2008; Schlosser, 2005). Jointly, these findings suggest that online consumer-support technologies should be designed in such a way that they can flexibly be adapted to the diverse needs and expectations of different consumers, and across different usage situations (Hauser et al., 2007; Wendel and Dellaert, 2009).

5. Specific Challenges in Supporting Consumer Pension Decision-making

Although pension decision-making shares several characteristics with other complex product decisions the process also poses specific challenges to consumers that have some unique decision-making aspects. Table 1 summarizes the different challenges that are discussed in this section, and the potential of different consumer decision-support technologies that can be of help in overcoming them.

Perhaps most noteworthy is the fact that for most pension-product decisions there is an extreme *temporal separation* between the time of payment for the product and the time of consumption (after retirement). Consumers have to decide to pay for a product now (pension savings and investments), but will experience the benefits of the product only in the distant future (after retirement). In combination with this temporal separation, consumers have to deal with several sources of uncertainty when making their product decision. First, there is uncertainty related to the performance of the product that they purchase. There is an inherent risk in the performance of most pension products over time that affects consumer income after retirement – and consumers have to consider what risks they find acceptable and at what price. Second, consumers are also uncertain in the projection of their own future needs and preferences. For example, consumers need to project their future health, their future family situation, housing location, and activity preferences. Related to this second aspect is uncertainty with regard to the economic, physical and social environment that consumers will face after retirement. Trends such as population growth (or decline), economic cycles and advances in technology can affect

consumer well being after retirement – and may affect their optimal pension allocation.

Like products in other markets, pension products are often also *complex*. The characteristics of the product require a certain expertise in order to fully understand their implications for consumers. For example, some investment products may be difficult to understand, or tax implications may require additional knowledge. Pension products may also be complex, due to the multitude of features that need to be taken into account. Decisions may need to take account of multiple different funding allocations, or the dynamic allocation of funds over time. Furthermore, the complexity of the consumer pension decision is typically increased by the availability of a vast array of products from which to choose. Many products are already on the market, and firms provide further new product suggestions on a regular basis.

Finally, despite the potentially strong impact of pension decisions on consumer income after retirement, most consumers have only very *low involvement* in pension-product decisions, and also a low level of product expertise (Van Rooij, Kool and Prast, 2007). This further complicates the decision-making task for consumers, and may lead to a low level of consumer attention and activity in the area of pension decision-making.

6. Policy Implications: Selecting Suitable Pension Decision-support Technologies

Consumer decision-support technologies have the potential to help consumers overcome the challenges of temporal separation of costs and benefits in a number of ways. Firms and not-for-profit organizations that wish to aid consumers in making better pension decisions could implement such technologies on their websites. Information acceleration was introduced specifically with the aim of projecting consumers into the future (Urban et al., 1996, 1997). This is particularly relevant for long-term pension investment decisions. While information acceleration has thus far mainly been used as a tool to support new product development and marketing testing, it seems well suited to also support consumers directly in better understanding their own future needs and risk preferences. To achieve this latter goal, virtual user-toolkits may be more effective. Such toolkits allow consumers to experiment with different decisions and evaluate their likely outcomes (Von Hippel and Katz, 2002). This type of experimentation is less well supported by information acceleration. In the context of pension decisions, online interactive tools that allow consumers to build and test different probability distributions of pension outcomes are particularly helpful (Goldstein, Schwarz and Johnson, 2008). Such interactive environments can also help consumers in terms of being able to express more easily their risk-preference profile to firms. Peer-to-peer communities have the potential to assist consumers in both aspects, since peers may be able to both explain the consequences of risky decisions to others, and to allow them to better understand their likely future situation – for example, by sharing their own experiences after retirement.

Personalized product recommendations and mass-customization are mainly aimed at assisting consumers once they have formulated their own future needs and preferences, and therefore can do relatively little in terms of improving consumer understanding of product risks, and lowering their uncertainty about the future. The help options and personalized online support available in these interfaces can achieve these goals to some extent, but typically are not specifically designed with this purpose in mind.

In terms of overcoming the complexity of consumer pension decisions, the different consumer decision-support technologies also vary in their strengths and weaknesses. All five of the proposed technologies have the capacity to better explain the more difficult features of pension products. Information acceleration and peer-to-peer communities can achieve this goal by communicating with consumers in their own language about the implications of choosing different features. Such personalization of communication can also be implemented in virtual user-toolkits, which have the added advantage that they allow consumers to experiment with product-feature changes and see how these affect their own pension outcome.

With regard to personalized product recommendations and mass-customization, it is relevant to note that recent research shows that individuals cognitively represent future outcomes in more abstract terms than they do current circumstances (Trope and Liberman, 2003; Zhao, Hoeffler and Zauberman, 2007). This suggests that personalized recommendations and mass-customization interfaces are most effective if they communicate with consumers at the more abstract level of product benefits (that is, possible lifestyle choices after retirement), rather than at a concrete product-feature level (that is, risks, income) (Randall,

Table 1. The potential of different online decision-support technologies to overcome challenges related to consumer pension-product decisions

	Temporal separation of costs and benefits		Complexity of decision		Low pension involvement and expertise
Decision-support technology	Improving understanding of inherent product risks	Lowering uncertainty about the consumer's own future situation	Explaining difficult pension-product features	Sorting through the many available products	Increasing interest in pension-product decisions
Information acceleration	–	+	+	–	+
Virtual user-toolkits	+	+	+	–	–
Peer-to-peer communities	+	+	+	+	–
Personalized product recommendations	–	–	+/-	+	–
Mass-customization	–	–	+/-	+	–

“+” indicates that the expected potential to overcome challenge is relatively high
 “–” indicates that the expected potential to overcome the challenge is relatively low
 “+/-” indicates that, depending on the specific design of the interface, the potential to overcome the challenge may be high or low

Terwiesch and Ulrich, 2005, 2007). At the same time, however, these online aids need to translate abstract benefits in terms of specific recommendations of pension products that firms can provide. How this balance between abstract recommendations and concrete product specifications can best be designed remains an area for future research.

Overcoming the second aspect of complexity – the large number of products available in the market – is the objective for which personalized product recommendations and mass-

customization are specifically designed. Both technologies can offer excellent support to consumers in terms of more easily finding the best-fitting product in the market based on their own unique preference structure (Ansari et al., 2000, Häubl and Trifts; 2000; Dellaert and Stremersch, 2005). Peer-to-peer communities may also provide consumers with recommendations that can considerably reduce the workload in searching through the marketplace – but to a lesser extent than strictly personalized recommendations. Information acceleration and virtual user-toolkits seem less well suited to help consumers search through a vast array of product offerings.

The final aspect in which most pension-product decision-makers may face a challenge is in terms of the fact they are not very involved in the pension-product decision, and only have limited expertise. The consumer decision-support technology that seems best suited to overcome this particular challenge is information acceleration, which is most likely to create a greater sense of urgency as well as increased enjoyment in going through the pension decision process. The rich media environment that is available in information acceleration may be enjoyable in its own right, and may best resonate with consumers who have relatively little expertise and inclination to consider pension decisions. The other decision-support environments, in contrast, all require a greater level of consumer interest in becoming involved in making a careful pension decision – and therefore are less likely to arouse consumer interest before entering into the decision-making process.

7. Conclusion

This paper reviewed recent research on interactive decision aids, with the aim of exploring the extent to which these aids could be used to help overcome complexity in consumer pension decisions.

Two important types of online technologies were reviewed:

1. Preference formation tools (information acceleration, virtual user-toolkits, and peer-to-peer communities), and
2. Product-selection tools (personalized product recommendations and mass-customization).

Based on a detailed description of the different technologies, and an analysis of the specific challenges that consumers face in making pension-product decisions, we conclude that all of the technologies reviewed have the potential to support consumer pension decision-making, but that different technologies have greater potential for overcoming certain challenges than others do. *Information acceleration* is expected to be most useful in overcoming low consumer involvement and expertise by generating consumer interest about pension decision-making and by helping consumers better understand their own future situation. *Virtual user-toolkits* appear particularly well suited to help consumers better understand the meaning of different pension-product features, and the impact of selecting a certain pension product on their personal retirement outcomes. *Peer-to-peer communities* may also serve this same goal of developing a better understanding of pension products and needs, as well as assisting consumers in making better pension-product selections. *Personalized product recommendations* and *mass-customization*, finally, are likely to offer the greatest help to consumers in overcoming the complexity of finding a suitable product among the highly diverse market of all available different pension products. Thus, this paper hopes to

offer a basis for further exploration and implementation of online consumer-support technologies in the area of consumer pension decision-making.

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SUMMARY OF DISCUSSION

By Patrick Hullegie

Interactive Online Decision Aids for Consumer Pension Decisions

By Benedict Dellaert (Erasmus School of Economics)

Chair: Henk Don

Discussants: Arvid Hoffmann (Maastricht University and Netspar)

Gerben Wijnja (AFM)

Netspar Panel: April 8, 2010

Over the past three decades, individuals have become increasingly responsible for their own retirement and pensions. At the same time, it is well known that choosing a suitable pension product is a complex task for individuals. Not only is their financial knowledge often quite limited, but also they are susceptible to behavioral biases, such as myopic loss aversion.

Arvid Hoffmann started with a discussion of these two factors. He recognized the potential importance of Decision Support Systems (DSSs) to overcome the complexity of pension decisions. However, Hoffmann continued his discussion by stating that it does not become clear from the paper *how* exactly DSSs can help to overcome the complexity of pension decisions as well as the behavioral biases of investors. Hoffmann also pointed to some of the limitations of DSSs. For example, the way in which information is provided guides the individual's decision. Recent research shows that when consumers are confronted with their

own limitations, this can lead to undesirable side effects, such as resistance to DSS advice.

In the paper of Dellaert, peer-to-peer communities are suggested as a promising method of improving pension decision-making. In response, Hoffmann pointed to some of the limitations of peer-to-peer communities. First of all, given the limited financial knowledge of individuals, it is likely that peers will not have the best advice. Secondly, individuals typically look for confirmation of their own views in peer-to-peer networks—a practice that does not necessarily improve decision-making.

Hoffmann finished his discussion with several suggestions for future research. As a first route to pursue, future research should aim to find out on which parts of their pension decisions individuals want to get advice, and on which parts they need advice. How to present information to consumers in DSSs is another interesting and important area of future research suggested by Hoffmann.

The second discussant, **Gerben Wijnja**, started by saying that online decision aids for complex financial and/or pension decisions are interesting options for his employer, the Netherlands Authority for the Financial Markets (AFM). Decisions about pensions are long-term decisions that involve great uncertainty, something that is poorly understood by consumers. Wijnja sees an opportunity for DSSs to provide advice that is low cost, high quality and easily accessible. However, Wijnja wondered whether there might not be a potential conflict with the duty of care as specified in Dutch law. He questioned whether a company could make money with it—or should a government, instead, be charged with delivering such aids?

Wijnja also mentioned that consumers typically consider pensions to be boring. Consumers have too high expectations and tend to undervalue financial advice. Should DSSs, which Wijnja considers to be part of a solution, be targeted at specific groups of consumers? Or does one size fit all?

In response to the discussants, Benedict Dellaert agreed that there are potentially undesirable side effects associated with DSSs. He stressed that consumers should not be pushed in directions where they do not want to go. DSSs have to find a balance here, which will be a matter of trial and error.

In the general discussion, **Wouter Frerichs** (Zwitserleven) mentioned that in the Netherlands it often is the employer who makes the pension decisions. If consumers get more choices they might become more excited. In that way, a market for DSSs could be created for third-pillar pensions. He also mentioned that there is already a DSS available in the Netherlands for pension decision-making, at *www.pensioenkiijker.nl*.

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19. *Interactive Online Decision Aids for Complex Consumer Decisions: Opportunities and Challenges for Pension Decision Support* (2010)
Benedict Dellaert

Interactive Online Decision Aids for Complex Consumer Decisions Opportunities and Challenges for Pension Decision Support

It is well recognized that choosing a suitable pension product is an extremely complex task for individuals. Benedict Dellaert (EUR and Netspar) reviews in this Panel Paper recent research on online interactive decisions aids, aiming to explore if these aids may be used to help consumers in overcoming the complexity of pension decisions. In particular he addresses two important types of online technologies: preference formation tools and product selection tools. His conclusions are based on a detailed description of the different technologies, and an analysis of the specific challenges that consumers face in making pension product decisions.