MEREL VAN DIEPEN

Dynamics and Competition in Charitable Giving

Dynamics and Competition in Charitable Giving

Dynamics and Competition in Charitable Giving

Dynamiek en concurrentie in geefgedrag aan goede doelen

Proefschrift

ter verkrijging van de graad van doctor
aan de Erasmus Universiteit Rotterdam
op gezag van de rector magnificus
Prof.dr. S.W.J. Lamberts
en volgens besluit van het College voor Promoties.

De openbare verdediging zal plaatsvinden op
donderdag 22 januari 2009 om 13.30 uur

door
Merel van Diepen
geboren te Leiderdorp

Promotiecommissie

Promotor:
Prof.dr. Ph.H.B.F. Franses

Overige leden:
Prof.dr.ir. B.J. Bronnenberg
Prof.dr. M.P. Keane
Prof.dr. S. Stremersch

Copromotor:
Dr. B. Donkers

Erasmus Research Institute of Management - ERIM
Rotterdam School of Management (RSM)
Erasmus School of Economics (ESE)
Erasmus University Rotterdam
Internet: http://www.erim.eur.nl

ERIM Electronic Series Portal: http://hdl.handle.net/1765/1

ERIM PhD Series in Research in Management, 159
Reference number ERIM: EPS-2009-159-MKT
ISBN 978-90-5892-188-8

Design: B&T Ontwerp en advies www.b-en-t.nl
Print: Haveka www.haveka.nl

Preface

Nine years of Erasmus University. The end of an era. It is with great joy but also great sadness that I write these words. Joy because I'm finished! Sadness because it is really over. In a way doing a PhD was the easy way out for me: after my studies I was not quite ready to step into the real world. It turned out to be a path of self-discovery, during which I was confronted with my strengths and weaknesses. Working with so many smart people who I could learn so much from gave me the confidence I lacked before.

During my PhD I was supported by lots of people who have all helped me become who I am today. First of all, I want to thank my promoter Philip Hans Franses and my co-promoter Bas Donkers. Philip Hans inspired me to do the PhD and kept me enthusiastic throughout the years. Being extremely busy never stopped him from making time for me. Bas was my daily supervisor. Although technically sort of my boss, over the years I've come to think of him as a friend. We had a lot of heated discussions – perhaps not always work-related – and even more pleasant talks – definitely not always work-related. Although he is not generous with complements, the ones he gives are heartfelt and therefore all the more valuable. I want to thank him that his door was always open and he always had time for me. I would also like to thank the members of the small committee, Bart Bronnenberg, Michael Keane, and Stefan Stremersch, who evaluated this thesis. Their comments and suggestions are highly appreciated.

I thank Wessel, who had to endure all my stress, naturally got blamed for everything that went wrong, and still loved me anyway. He was always willing to listen, even to all the technical details, and often gave me a different point of view, which solved many a problem. Thanks mom and dad, for trusting that I would do fine and never ask the wrong questions. Also for all the fun we had on our countless lunches and trips. Gijs and Bram, for being the best brothers in the world. And of course for all of your help putting questionnaires in envelopes and transporting them to the university. I love you all! Thanks Kim and Aafke, for always being there for me when I needed to let off some steam. Aaf, for helping me through some tough decisions and clearing my head.

Thanks to my in-laws Hans, Hannah, Gerlant and Klaas, and Joris and Floor, for their support, concern and interest.

Of course, my fellow PhD candidates played an important role during the past years. We had such good times! To name a few: the international eves with lots of good cooking and music, Joost's Valentine bash, the desert lunch and the swimming pool in Singapore, a whole day to the cinema, ' sateejes' and of course the never-ending coffee breaks. I started this adventure with Rene, and I was very happy to have him by my side. Judie, who was my roommate for the largest part of my PhD, made me feel like a girl in a world full of boys. I also thank Amy, Björn, Bram, Carlos, Daniel, Diana, Eelco, Francesca, Hendrik, Isabel, Jeroen, Joost, Jos, José, Lenny, Ludo, Maarten, Marielle, Martijn, Michiel, Milan, Nalan, Nees, Niki, Nuno, Patricia, Remco, Rianne, Robin, Ward, Wilco and Yuri.

Besides my fellow PhD candidates I had lots of other pleasant colleagues. Thanks to Dennis and Richard, for their technical assistance, but mostly for the fun. I also want to thank Elli, Carien, Tülay, Tineke Kurtz, Tineke van der Vhee, Marjon and Anneke for all their help. And of course to everyone else from the Econometric Institute and the Marketing Department for the good times.

This thesis would not have been written if it weren't for the charity organizations that provided the data. I was happy to be able to work on such a humane topic, which was not just numbers but had a psychological and social aspect, as well as practical relevance; I could actually explain to people what I was working on. So my thanks go to the charity organizations and the foundation SOFN for making this project possible. Special thanks to the charities that worked with me on the experiment.

Finally, a number of other people helped me complete this thesis. I want to mention my student assistants Peter Exterkate and Jacoline Brouwer and the people from Acxiom for their help with data preparation, my co-author Michael Keane, Kim, Dave and Leon for reading and correcting my chapters, Hannah, Joris, uncle Jan and Bas' parents for their help during the experiment, and Ferry, Arjan and Monique for creating the first draft of the survey.

I had a blast. I think I'm ready now.

Merel van Diepen
Leiden, October 2008

Table of Contents

Chapter 1
Introduction

1.1 Motivation

Charities are big business. In the Netherlands alone, charities raised a combined 4.4 billion Euros in 2005. Although foundations and corporations contribute substantially to this amount, the largest part of the funds comes from individual donations. A quick Euro for a door-to-door collection while you're having dinner, a direct debit authorization you get guilted into while shopping, a membership at the Postal Code Lottery; it all adds up.

To keep donors contributing, charities make use of all sorts of fundraising tools and activities, most popular being direct mail. Nowadays, potential donors are deluged by huge amounts of mailings from many different charities, all soliciting their donations. As charities depend for a large part on their revenues from direct mail it is important to uncover the precise effects of charitable direct mailings on donating behavior.

The motivation for this thesis is twofold, scientific and societal. From a scientific viewpoint two aspects are of particular interest, that is, dynamics and competitive interactions. Existing models for donating behavior focus on a single decision context, a single donation to a single charitable cause. In reality, however, people receive lots of donation requests, which intuitively are not independent. For example, one can imagine that if an individual recently donated to a certain cause, he will not donate to this cause again today. And if he receives requests from multiple different charities at the same time, he may decide to choose one or donate smaller amounts to all.

This thesis studies individual donating behavior towards multiple charities over time, providing new insights into charitable giving and the fundraising process. Through

cooperation with a number of large charity organizations in the Netherlands, we have access to individual level data of direct mailings received and donations made for multiple charities. This gives us the unique opportunity to study dynamic and competitive effects not only theoretically, but also empirically.

Besides the two main themes that constitute the common thread throughout this thesis, there is an additional issue of scientific interest. When modeling response to direct mailings, we have to take into account that charities do not send these mailings randomly. Instead, they apply target selection techniques, using past behavior variables to predict future behavior and targeting those individuals that are most likely to respond. The result of these behavior-driven decision rules is that charitable direct mailings are endogenous. When modeling the relationship between charitable direct mailings and donating behavior based on the responses to these endogenously selected mailings, the parameter estimates will be biased if endogeneity is ignored. In the chapters of this thesis, we take various approaches to avoid this endogeneity bias.

The second part of the motivation for this thesis is of a societal nature. As charities send more and more mailings, people may feel overwhelmed or even get irritated. Indeed, the term "junk mail" is often associated with charitable direct mail these days. The many contributions in newspapers and magazines devoted to charitable requests and the annoyance these bring about bespeak the significance of the subject. For example, a survey by TNS NIPO (2003) revealed that 66% of the Dutch public is annoyed by the amount of soliciting direct mailings they receive. According to a survey in the magazine of the Dutch consumers' association (2005), 43% of the respondents receive more than one direct mailing a year of the same organization. Of these individuals, 83% find this annoying or even unacceptable. Another survey in the magazine "Onze Wereld" (2008) states that 76% of the Dutch public gets irritated sometimes about charities' fundraising methods.

For one of the chapters of this thesis, we conducted a survey of our own, in which respondents were given the possibility to give some extra comments. Many made use of this opportunity to vent their frustrations. In Table 1.1 we present an overview of the sources of annoyance that were mentioned over ten times. Of all the complaints, two of the top three concern the number of direct mailings charities send, with multiple mailings from the same charity as the ultimate number one.

Table 1.1: Overview of annoyances concerning charities

Annoyance	Frequency
Too many mailings from the same charity	121
Including small presents in the mailings	106
Too many mailings in general	87
Contact by telephone	85
Request for automatic transfer	76
High salaries of management	52
Too many / too fancy brochures	43
Another request shortly after donation	42
Once you have donated, requests keep on coming	38
Too much overhead costs	38
Trust issues (is the money well spent?)	25
Aggressive / sentimental approach	24
No hallmark / shady charities	22
Too many charities	21
Too many charities with the same purpose	17
Extra requests on top of an automatic transfer	17
Exchanging of address data	15
A prescribed amount in a mailing	15

All in all, charities' fundraising methods and direct mailings in particular are subjects that occupy society. The public opinion appears to become more and more dominated by negative aspects. From the charities' point of view, the question is then whether their direct mailing frequencies perhaps negatively affect donating behavior in the long run. According to the Dutch consumers' association survey (2005), half of the respondents state that they stopped donating to a certain organization out of irritation, and another 20% state that they considered doing so. As for the survey in the magazine "Onze Wereld" (2008), 76% of the irritated donators state that this irritation affects their donating behavior. Hence, people state they will adjust their donating behavior, but one may wonder if they will truly put their money where their mouth is, that is, keep it to themselves. After all, in marketing there are myriads of situations where what people say they will do bears little resemblance to what they actually do. This thesis therefore studies the effects of charitable direct mailings on donations, based on actual behavioral data as opposed to self-stated data.

To summarize, the aim of this thesis is to study donating behavior in response to direct mailings from multiple organizations over time, in order to contribute to the charitable giving and direct mailing literature on two important yet under researched dimensions, and at the same time provide socially relevant insights to charities to guide their mailing strategies and help increase their revenues. For this we have access to a unique dataset consisting of the databases of multiple charity organizations, providing information on direct mailings and donations at the individual level. We also make use of the data from a direct mailing field experiment we conducted in cooperation with a number of charities.

1.2 Outline of the thesis

This thesis consists of two parts, which both contain two chapters. The four chapters are written in such a way that they can be read independently. The first part focuses on econometric models that describe the effects of charitable direct mailings on donating behavior. To estimate these models we make use of the databases of a number of charities, that contain information on all direct mailings sent and donations made at the individual level. The first chapter in Part I is based on Van Diepen, Donkers and Franses (2008a). The second part of the thesis focuses on the analysis of a field experiment, in which we varied the number of charitable direct mailings experimental subjects received in a single week. The second chapter in Part II is based on Van Diepen, Donkers and Franses (2008b).

The first chapter of Part I, Chapter 2, proposes a dynamic direct mailing response model with competitive effects. The model incorporates past direct mailings and past purchase behavior to map the dynamic competitive interactions amongst the organizations sending those mailings. We investigate the impact of direct mailings on the revenues of each organization and its competitors over time. The model accounts for endogeneity of the mailing decision and for unobserved heterogeneity across households. Although the model is applicable to any type of organization sending direct mailings, we consider it in the charitable giving setting. We estimate the model using data from three large charities on direct mailings and donations at the individual level. The results show that a charity's own mailings are short-run substitutes, that is, an extra mailing cannibalizes the revenues of subsequent mailings. Furthermore, competitive charitable direct mailings tend to be short-run complements and thus increase the total pie that is divided among the charities. In the long run these effects die out. The results

are also interpreted from a behavioral perspective. As charitable mailings differ from regular mailings in various respects, we describe the implications of a number of theoretical drivers of donating behavior for the model parameters. We then use the parameter estimates to examine the practical relevance of these drivers.

The second chapter of Part I, Chapter 3, presents another dynamic model of individual donating behavior in response to direct mailings of multiple charities. Many people feel a moral or social obligation to support charitable causes and non-compliance with this standard can result in feelings of guilt. In this chapter we investigate how such guilt feelings affect donating behavior over time. We consider the *stock of guilt*, representing accumulated feelings of guilt, which grows over time as a result of moral obligation and also due to for example receiving direct mailings. Making a donation reduces the stock of guilt, but comes at certain costs. This stock of guilt is known to the donator when he makes the donating decision, but is unobserved by us. Empirically, we deal with this by deriving the stationary distribution of guilt, representing the overall distribution of guilt levels across all individuals and time. We assume that individuals plan their donations optimally, based on expectations of the mailing behavior of charities. To be more precise, when individuals decide to respond to a direct mailing, they are aware that their current decision affects the amount of mailings they will receive in the future, as a result of target selection. We incorporate this awareness in our model by allowing individuals to anticipate the consequences of (not) donating on both their future level of guilt and their future mailing frequency.

The solution of the resulting stochastic dynamic programming model suggests that when the stock of guilt reaches a certain high level, this drives the individual to make a donation, thereby reducing their stock of guilt. We estimate this model using a dataset with records of all direct mailings of and donations to five charities and present a number of fit statistics, which show that the model fits the data quite well. The structural model also allows policy experiments, which reveal that there is room for improvement in the charities' mailing strategies, where two cases are particularly relevant. The optimal mailing strategy from the donators' point of view makes donators feel better but reduces revenues for the charities. The optimal mailing strategy from the beneficiaries' point of view acquires more funds for the charities, but decreases donators' welfare. The results of the current mailing strategies of the charities are somewhere between the results of the optimal strategies from both viewpoints, indicating that the charities seem to be taking both types of stakeholders into account.

In Part II we describe the analysis of a field experiment we conducted. Instead of using naturally occurring data where mailings, and hence observations, are not randomly selected, and solving this issue using intricate econometric modeling techniques as we do in Part I, another option is to create new data that does not suffer from endogeneity. Hence, we induce exogenous variation in the number of mailings that individuals receive, so that we can draw reliable and unbiased conclusions about the relations between direct mailings and donating behavior through relatively simple analyses.

In the first chapter of Part II, Chapter 4, we motivate our field experiment and describe our experimental design, which we realized with the help of five charities. We send our experimental subjects different numbers of experimental direct mailings and we collect information on the actual donations made in response to the experimental mailings and the responses to subsequent mailings sent out by the charities. This allows us to study the competitive effects of charitable direct mailings simultaneously, in the short run and in the long run. An analysis of this unique database reveals that competitive mailings sent contemporaneously have a negative effect on the response to a charity's own mailing, but that this effect does not persist over time. Furthermore, strong cannibalization effects exist on the donations made to future mailings of the same charity.

In the second chapter of Part II, Chapter 5, we study the underlying process of individuals' response behavior to charitable direct mailings. Individuals may feel irritated by these mailings, in particular when they receive many. Therefore, we study the consequences of perceived irritation on stated behavior and on actual behavior. Target selection by charities likely results in good donators receiving many mailings and hence they might be most irritated. Thus, besides the direct mailings themselves, irritation resulting from these direct mailings could also be endogenously determined. To avoid endogeneity bias, we use the data from our field experiment, which we combine with a survey to measure irritation. Our analysis reveals that direct mailings do result in irritation, but surprisingly this affects neither stated nor actual donating behavior.

In Chapter 6, the final chapter of this thesis, we conclude with an overview of the individual chapters and our main conclusions, implications, and recommendations for further research.

Part I

Direct Mailing Response Models

Chapter 2

Dynamic and Competitive Effects of Direct Mailings: A Charitable Giving Application

2.1 Introduction

The use of direct marketing (DM) has increased steadily over the past decades, with companies in the US spending more than 166 billion dollars on DM activities in 2006. From all direct marketing activities, direct mailings are the most important one, accounting for about a third of total expenditures in DM (Direct Marketing Association 2007).

Research on response behavior to direct mailing activities would preferably include both dynamics and competitive interactions. After all, when multiple companies send multiple communications to individuals, there is likely to be interference and the response to a given message will be affected by messages received previously (Greyser 1973).

In practice, however, direct mailing studies have typically focused on a static single-firm context, neglecting potential competitive and long-term effects (e.g. Bult and Wansbeek 1995). Recently, some attention has been paid to the dynamics of response behavior at the individual level (e.g. Ansari, Mela and Neslin 2008; Simester et al. 2007) and corresponding improved mailing strategies (e.g. Elsner, Krafft and Huchzermeier 2004; Gönül and Shi 1998; Gönül and Ter Hofstede 2006; Simester, Sun and Tsitsiklis 2006). However, these studies focus on a single company, and hence ignore competitive activity. Thus, so far, the direct marketing literature has focused on messages sent by the

focal firm, and neglected the individual-specific consequences of messages received from competing firms. The main reason for this appears to be a lack of the necessary data.

Our present study addresses the above two issues by analyzing the dynamic competitive interactions among direct mailings at the household level. We focus on the interaction effects between competitors' mailings on donor behavior, as opposed to strategic competitive behavior of competing companies. We develop a direct mailing response model that is applicable to all kinds of direct mailings that elicit a direct response, such as catalogs, promotional offers, and solicitation letters from charities. The model explains responses to direct mailings using past direct mailings and past purchase behavior, implemented through the usual RFM variables. As an individual will be more aware of recent events than of events in the distant past, we adopt a Koyck lag structure where past events receive less weight (see Ansari, Mela and Neslin (2008) for a recent application).

To illustrate the use of the model we present an empirical application to charitable direct mailings. We construct a unique dataset by merging the databases of three large charity organizations in the Netherlands. This results in household level data on the direct mailings received and the donations made by each household to each charity. Hence, and this is an important novelty, we are able to empirically study competitive effects of direct mailings over time.

Charitable mailings differ from regular mailings in various respects. Therefore, we build on research in marketing and psychology and the charitable giving literature to form expectations about the dynamic competitive effects of direct mailings, and in particular charitable direct mailings. Based on our estimation results we will discuss the practical relevance of various phenomena for competitive charitable direct mailings.

Our main goals can thus be summarized as follows.

1) Establish that competitive interactions exist among direct marketing communications.
2) Illustrate the dynamic behavior of these competitive interactions.
3) Develop a parsimonious model that still captures the potential richness of these competitive dynamics.
4) Describe the implications for the model parameters of a number of theoretical drivers of donating behavior and use the model to examine the practical relevance of these drivers.

The remainder of this chapter is organized as follows. After the introduction, we motivate why dynamic and competitive effects of direct mailings are important and discuss the relevant literature. Next, we present the model. After this, we introduce the application of the model to charitable organizations and discuss the theoretical framework, followed by a description of the data and our estimation results. We conclude with potential limitations and future research topics.

2.2 Dynamic and competitive effects

In this section we discuss the challenges marketers face when modeling direct mailing response behavior. We distinguish two important dimensions: (1) the dynamics of customer behavior and (2) the interference of competitor activity.

2.2.1 Dynamic effects

Many marketing science studies have paid attention to dynamics. Think, for example, of the short / long term distinction in Fok et al. (2006), Jedidi, Mela and Gupta (1999) and Pauwels, Hanssens and Siddarth (2002). Also, the carry-over effect of advertising on sales has been acknowledged and modeled much earlier, as described, for example, in the meta-analytic study by Clarke (1976). However, the issue has not received much attention in the direct marketing literature. Traditionally, both academics and practitioners have focused on a static context, sidestepping potential long-term effects. A typical example can be found in the target selection literature and practice where often a selection is made for a one-event mail-shot without recognizing the overall effect on individuals (Kestnbaum, Kestnbaum and Ames 1998). But of course, people tend to (at least partially) remember past events. These memories are then integrated into an overall attitude, affecting current and future decisions. Hence, omitting dynamics will generally lead to unreliable results and suboptimal marketing activities. Direct mailing organizations have to bear in mind that the decision to mail an individual today does influence the response to future mailings (Campbell et al. 2001; Piersma and Jonker 2004). Campbell et al. (2001) note that cannibalization can occur between successive mailings and that timing is an important factor in this saturation effect. The more time between two mailings, the smaller is the saturative impact.

A recent stream of research has acknowledged the importance of the appropriate number and timing of mailings for individuals over a long-term horizon (e.g. Elsner, Krafft and Huchzermeier 2004; Gönül and Shi 1998; Gönül and Ter

Hofstede 2006; Piersma and Jonker 2004), but the exact long-term effect of a company's direct mailings on revenues is not immediately clear. On the positive side, repeated advertising exposures can lead to familiarity and liking of a company and can prevent forgetting over time (Zajonc 1968; Zielske 1959). Direct mailings can thus serve as a reinforcement of the message. Furthermore, sending many mailings increases the probability that an individual reads the message. The more mailings, the higher is the probability that at least one mailing will not be overlooked in the large amounts of mail or simply discarded out of lack of interest at the time of receipt. Finally, each direct mail has the potential to trigger a purchase that would otherwise not have been made, thereby enlarging total revenues. However, direct mailings may also have negative long-run effects.

In a recent survey amongst practitioners in direct marketing, long-term effects of direct mailings and direct mail induced irritation were suggested as two important research avenues (Verhoef et al. 2003). Elliott and Speck (1998) show that excessive direct mailing clutter can lead to a negative attitude, such as irritation, reducing the effectiveness of the mailings (see also Naik and Piersma (2002)). Also, Campbell et al. (2001) present an example of a company that recognized the cannibalization that occurred between essentially redundant mailings. The consequences of this are even more serious, due to the fact that target selection results in the best customers receiving the largest number of mailings. If this results in irritation, the company is harming the relationship with its best customers. Thus, although decreasing marginal returns, or saturation, to marketing activities are commonplace, even supersaturation could occur (Leeflang et al. 2000, p. 68). That is, the marginal returns to excessive direct mailings might in fact be negative. Indeed, a recent study by Simester et al. (2007) has shown that a higher mailing frequency can result in a loss in total revenues, and that this only occurred for the company's best customers who already received many mailings.

Of course, besides the influence of past mailings on today's behavior, past purchase behavior is also highly relevant to explain response to direct mailings. Indeed, it is well known that past behavior is a very good predictor of future behavior (Bult and Wansbeek 1995; Rossi, McCulloch and Allenby 1996). This is supported by the frequent application of the Recency, Frequency and Monetary Value (RFM) framework in marketing response models. In sum, to better understand and exploit consumer response behavior to direct mailings, dynamics should be taken into consideration.

2.2.2 Competitive effects

There are studies that incorporate dynamics by acknowledging the importance of the total number and timing of mailings over a long-term horizon, but none of these account for competitive activity. Thus, so far, the direct marketing literature has focused on messages sent by the focal firm, while interference is equally likely to result from messages received from competing firms (Unnava and Sirdeshmukh 1994; Yoo and Mandhachitara 2003).

Most researchers would agree that competitive effects are highly relevant to include in models, but often the lack of data has prevented extensive research in this area. A company has easy access to information on its own sales, but it is much harder to gain insight into competitor activity or into individuals' choice and consideration sets. This problem has frequently been acknowledged and brought up as a limitation or further research suggestion (Gönül and Shi 1998; Naik, Mantrala and Sawyer 1998).

Although much research has been devoted to the study of competitive interference on memory and brand evaluations (D'Souza and Rao 1995; Keller 1991), little is known about its effects on consumer behavior in general, and on responses to direct mailings in particular. Some studies present little pieces of information, which at the least emphasize the importance of thorough research on competitive interactions in the direct mailing field. For example, Dwyer (1997) concludes that people typically divide their purchases across a number of competing organizations. For a comprehensive picture of direct mail competition this is highly relevant, as many people likely receive mailings from multiple organizations. Furthermore, it is generally believed that own and cross effects, that is, the effects of a company's own actions versus its competitors', differ and are thus both of importance.

Several studies have shown that competitive interference can severely undermine the effectiveness of marketing actions (Unnava and Sirdeshmukh 1994). Therefore, one would generally expect negative competitive effects. An explanation can be found in the advertising clutter theory, where high advertising frequencies may lead to irritation and market shrinkage. The potentially negative impact of additional mailings, established by Simester et al. (2007) for a single firm, could be intensified by competitive interference. On the other hand, there may be situations where positive competitive externalities exist. Examples are new products, where competitive advertising may increase awareness thereby enhancing total sales (Prins and Verhoef

2007) and new attribute promotion, where competitive advertising may help remember old attributes thereby better distinguishing the new ones (Jewell and Unnava 2003).

In sum, to understand one's own effectiveness in direct mailing, one needs to know what competitors do and have done.

2.3 The model

In this section we present our dynamic model of individual response behavior to direct mailings of competing companies. We model response behavior as a function of both promotion history and purchase history, implemented using Recency, Frequency and Monetary variables. Purchase history refers to what the individual has done in the past and promotion history refers to what the direct mailing organizations have done in the past (Elsner, Krafft and Huchzermeier 2004).

The key elements of our model originate from the following assumptions. Each time an individual receives a direct mail, he decides whether he will respond or not and, if so, with what amount. We consider the prototypical individual who, upon receiving a direct mailing, instantly makes the response decision (see also Colombo and Jiang (1999)). The decision made is thus a response/non-response decision to a particular mailing, and not a choice between companies. In addition, our model does not explicitly model forward looking behavior or a budget restriction. Note that we assume that two mailings do not arrive at exactly the same time. As always, individuals are likely to vary in their response behavior. We accommodate for this by incorporating heterogeneity, that is, individual-specific parameters, thereby better capturing the true but unknown underlying decision processes.

Each individual receives a different number of mailings over time. We model individual *i*'s response decision at mailing event $\tau = 1,...,T_i$ using a Tobit-2 specification (Amemiya 1985, p. 385). Thus, we assume that the individual jointly decides whether to respond or not and, if so, with what amount. Although modeling both response and amount may seem like a logical step, in the direct mailing literature the focus is mostly on modeling response incidence only (recent exceptions can be found in Gönül and Ter Hofstede (2006) and Simester et al. (2007)).

We expect that the response decision today is influenced by all mailing events in the past, although it is likely that the effect is larger the more recent is the event, as people tend to forget past events over time (Zielske 1959). In other words, the effect of an event is diminishing over time. We distinguish between own effects and cross effects,

as, for example, past mailings from the company that has sent today's mailing may affect today's decision differently than mailings from other companies.

Let $R_{i\tau}$ be a binary variable to indicate whether individual *i* responds at mailing event τ or not. Furthermore, $A_{i\tau}$ indicates the natural logarithm of the amount individual *i* spends at mailing event τ conditional on the decision to respond. Let $R^*_{i\tau}$ be the latent variable related to $R_{i\tau}$ and $A^*_{i\tau}$ the censored variable related to $A_{i\tau}$, where ' censored' means partially observed and partially latent. Note that we take the natural logarithm of the amount to ensure positive amount predictions. In our model we include as explanatory variables representing the purchase history the RFM variables response rate ($\text{resprate}^{own}_{i\tau}$ and $\text{resprate}^{other}_{i\tau}$), average natural logarithm of donation ($\text{amav}^{own}_{i\tau}$ and $\text{amav}^{other}_{i\tau}$), and exponentially weighted responses and amounts to measure their recency ($\text{resprec}^{own}_{i\tau}$, $\text{resprec}^{other}_{i\tau}$, $\text{amrec}^{own}_{i\tau}$ and $\text{amrec}^{other}_{i\tau}$). To represent the promotion history we include the variables mailing frequency ($\text{mailings}^{own}_{i\tau}$ and $\text{mailings}^{other}_{i\tau}$), also based on the RFM structure. In addition, we include some quadratic terms to account for nonlinearities. Our Tobit-2 model then reads as:

$$R_{i\tau} = \begin{cases} 1 & \text{if } R^*_{i\tau} > 0 \\ 0 & \text{otherwise} \end{cases} \tag{2.1}$$

$$A_{i\tau} = \begin{cases} A^*_{i\tau} & \text{if } R^*_{i\tau} > 0 \\ 0 & \text{otherwise} \end{cases} \tag{2.2}$$

with

$$\begin{aligned} R^*_{i\tau} = {} & \beta_{R0i} + \sum_{c\in C}\beta^c_{R1i}\text{mailings}^{\,c}_{i\tau} + \sum_{c\in C}\beta^c_{R2i}\text{mailings}^{\,c\,2}_{i\tau} + \\ & \sum_{c\in C}\beta^c_{R3i}\text{resprate}^{\,c}_{i\tau} + \\ & \sum_{c\in C}\beta^c_{R4i}\text{resprec}^{\,c}_{i\tau} + \sum_{c\in C}\beta^c_{R5i}\text{resprec}^{\,c\,2}_{i\tau} + \\ & \sum_{c\in C}\beta^c_{R6i}\text{amav}^{\,c}_{i\tau} + \sum_{c\in C}\beta^c_{R7i}\text{amrec}^{\,c}_{i\tau} + \varepsilon_{Ri\tau} \end{aligned} \tag{2.3}$$

$$\begin{aligned} A^*_{i\tau} = {} & \beta_{A0i} + \sum_{c\in C}\beta^c_{A1i}\text{mailings}^{\,c}_{i\tau} + \sum_{c\in C}\beta^c_{A2i}\text{mailings}^{\,c\,2}_{i\tau} + \\ & \sum_{c\in C}\beta^c_{A3i}\text{resprate}^{\,c}_{i\tau} + \\ & \sum_{c\in C}\beta^c_{A4i}\text{resprec}^{\,c}_{i\tau} + \sum_{c\in C}\beta^c_{A5i}\text{resprec}^{\,c\,2}_{i\tau} + \\ & \sum_{c\in C}\beta^c_{A6i}\text{amav}^{\,c}_{i\tau} + \sum_{c\in C}\beta^c_{A7i}\text{amrec}^{\,c}_{i\tau} + \varepsilon_{Ai\tau} \end{aligned} \tag{2.4}$$

with C = {*own*, *other*} and where $\varepsilon_{Ri\tau}$ and $\varepsilon_{Ai\tau}$ represent unobserved factors that influence the response decision and amount, respectively. Furthermore, $(\varepsilon_{Ri\tau}, \varepsilon_{Ai\tau}) \sim N(0, \Sigma_{\varepsilon})$ with the usual restriction that $\Sigma_{\varepsilon,11} = 1$ for identification of the response equation. The subscripts R and A indicate that the parameters are equation-specific. Previous studies suggest that decisions on whether or not to donate may be influenced differently by the same variables than decisions on how much to donate. For example, it has been found that past amounts have little explanatory power in the response equation, but are highly relevant in the amount equation (Donkers et al. 2006; Piersma and Jonker 2004).

To define our explanatory variables we introduce some additional notation. Let $t_{i\tau}$ denote the calendar time of mailing event τ for individual *i*. Then $\Delta t_{is\tau} \equiv t_{i\tau} - t_{is}$ is the number of time periods elapsed between event *s* and τ. Hence, for $\tau > s$, $\Delta t_{is\tau}$ is a measure of the recency of event *s* at the time mailing τ is received. Also, we introduce the dummy $\text{mail}^{c}_{is\tau}$, $c \in$ {*own*, *other*}, to indicate that the mailing individual *i* received at mailing event *s* was sent by the same vs. a competing company as the mailing at event τ.

To account for the effects of forgetting we apply a multivariate finite duration adjustment of the geometric lag, or Koyck, model with unequally spaced observations, similar to Ansari, Mela and Neslin (2008). Thus, we discount each mailing event *s* by its recency $\Delta t_{is\tau}$, placing higher weights on more recent events. We estimate the decay parameters λ in the explanatory variables, allowing them to be different for mailings, responses and amounts, indicated by the lower case subscripts *m*, *r* and *a*. They are not equation-specific and are the same for own and competitive variables, as these represent forgetting behavior. In Table 2.1 we present how our explanatory variables are constructed.

As an example, to construct the variable $\text{resprec}^{c}_{i\tau}$, $c \in$ {*own*, *other*}, we sum over all events before event τ to which individual *i* actually responded ($R_{is} = 1$) to obtain the discounted number of past responses for either the mailing company itself ($\text{mail}^{own}_{is\tau} = 1$) or the competition ($\text{mail}^{other}_{is\tau} = 1$). We consider this a recency measure because, conditional on the individual's general response tendency, this term is small if the last response was long ago, as the variable diminishes over time through the decay parameter when no new response is added. Furthermore, if the last response was very recent, this term is large.

Table 2.1: Explanatory variables

Variable	Equation
$\text{mailings}_{i\tau}^{c}$	$\sum_{s=1}^{\tau-1}\lambda_m^{\Delta t_{is\tau}}\text{mail}_{is\tau}^{c}$
$\text{resprate}_{i\tau}^{c}$	$\frac{\sum_{s=1}^{\tau-1}\lambda_r^{\Delta t_{is\tau}}R_{is}\text{mail}_{is\tau}^{c}}{\sum_{s=1}^{\tau-1}\lambda_r^{\Delta t_{is\tau}}\text{mail}_{is\tau}^{c}}$
$\text{resprec}_{i\tau}^{c}$	$\sum_{s=1}^{\tau-1}\lambda_r^{\Delta t_{is\tau}}R_{is}\text{mail}_{is\tau}^{c}$
$\text{amav}_{i\tau}^{c}$	$\frac{\sum_{s=1}^{\tau-1}\lambda_a^{\Delta t_{is\tau}}A_{is}\text{mail}_{is\tau}^{c}}{\sum_{s=1}^{\tau-1}\lambda_a^{\Delta t_{is\tau}}R_{is}\text{mail}_{is\tau}^{c}}$
$\text{amrec}_{i\tau}^{c}$	$\sum_{s=1}^{\tau-1}\lambda_a^{\Delta t_{is\tau}}A_{is}\text{mail}_{is\tau}^{c}$

Note: λ_m, λ_r and λ_a will be estimated alongside all other parameters

2.3.1 Unobserved heterogeneity

We specify individual-specific random effects for model intercepts, mailing and past behavior variables, so that individual-specific inference can be made. All random effects may be correlated both within and across equations. We use Bayesian estimation methods, where we model unobserved heterogeneity with a multivariate normal distribution. We apply Markov Chain Monte Carlo (MCMC) techniques to estimate the model. To obtain draws from the posterior distributions for the model parameters, we use the Gibbs sampling technique of Geman and Geman (1984). Furthermore, we make use of data augmentation (Tanner and Wong 1987) for the latent variables in the model. We specify weakly informative priors for the model parameters. Finally, when a full conditional posterior distribution is of unknown form, we use the Metropolis-Hastings algorithm (Chib and Greenberg 1995). For further sampling details, such as prior and full conditional distributions, see Appendix 2.A.

2.3.2 Endogeneity of mailings

Direct marketers often use target selection techniques to decide to which subjects they will send a direct mailing. They do not just send mailings randomly or to everyone, but they estimate the likelihood that each prospect will respond, and select prospects with high response probabilities. The idea behind target selection techniques is that past behavior predicts future behavior, so that people who have frequently responded in the past will have a high probability to be selected again in the future. Or, the good customers receive more mailings. Thus, the mailing decision of a company depends on the responsiveness of a customer, making the direct mailings he receives endogenous. As Donkers et al. (2006) show, ignoring the endogeneity of mailings results in biased parameter estimates. We apply the methodology developed by Manchanda, Rossi and Chintagunta (2004) to overcome this issue. This involves simultaneously estimating both our Tobit-2 model for the response decision and the mailing strategy models for all companies. We implement a probit model for a company's weekly mailing decision as a function of the individual-specific parameters. Furthermore, we include week dummies in the mail decision model to control for common events (for example a Christmas mailing). See Appendix 2.A for more estimation details.

2.4 Dynamic and competitive effects for charities

We apply our model to donating behavior to charities, as direct mailing forms an important part of charitable fundraising activity. Indeed, one of the main sectors sending direct mail to consumers is the charity sector (Francis and Holland 1999). Furthermore, as people often receive many mailings of various charities in a short period of time, this is also a setting where competition is highly relevant. Finally, in a recent review on charitable literature, Andreoni (2006) explicitly indicates that both the dynamic and the competitive aspects of fundraising and charitable giving are important unexplored areas.

Although charitable direct mail and consumer marketing are similar in many aspects (Diamond and Gooding-Williams 2002), there are also differences in the decision process associated with the different types of mailings (Bendapudi, Singh and Bendapudi 1996). In this section we form expectations about the dynamic competitive effects among charitable direct mailings based on the literature on charitable giving and on research in marketing and psychology. We introduce a number of different

theoretical drivers of charitable giving and describe their potential implications for our model parameters.

We start with a discussion of the effects of past mailings on the donating decision. Charitable direct mail has much in common with other types of direct mail and we can draw on the general direct mailing literature for many issues. Certain aspects of charitable giving are however rather specific to this context. The main difference between charitable direct mail and ' for profit' direct mail (the kind that tries to sell something) is that with charitable mailings there are no obvious immediate personal benefits of responding for the recipient (Rothschild 1979). Instead, their sense of obligation is called upon. As individuals do not like being confronted with an appeal (Diamond and Noble 2001), their tendency to get irritated by high charitable mail frequencies may be much stronger than with regular direct mail. While with regular mail they simply lose interest and stop reading, resulting in the diminishing marginal returns that are typical for the boredom effect, excessive charitable direct mail could cause so much irritation that response and donations in fact decrease. People might develop defensive strategies against charitable direct mailings (Diamond and Noble 2001). Indeed, Francis and Holland (1999) show that consumers have much stronger feelings about charitable direct mail than other types of direct mail and that charitable direct mail results in more irritation.

The negative effect of a charity's direct mailings will be intensified even further by the competition. Potential donators feel overwhelmed by so many solicitations from so many charities (Abdy and Barclay 2001; Sargeant and Kähler 1999). Advertising clutter theory then suggests that a negative attitude is formed against an entire medium or sector (Elliott and Speck 1998), in our case charitable direct mail. Andreoni (2006) refers to this as "donor fatigue". Besides the general effectiveness-reducing effect of competitive mailings, they will thus increase irritation by adding to the total mailing volume. Therefore, the effects of irritation suggest that both own and competitive mailings will have a negative effect on the donating decision.

At the same time, each charitable direct mail could trigger a donation that otherwise would not have been made, thereby enlarging revenues. So, at least the charity's own mailings have a positive effect on response (which of course is what charitable organizations hope and generally assume, judging by their high mailing frequencies).

Bearing in mind that there are no obvious benefits to making a donation, one may wonder how the persuasion process of a charitable direct mail works. Because charitable direct mailings appeal to the sense of obligation and moral standards, individuals may feel guilty if they do not make a donation. In fact, guilt has been well established as an important driver of charitable donating (see Andreoni (1990) and Sargeant (1999) for example). Assuming that people remember past (mailing) events, one could imagine that each letter creates some feeling of guilt of not donating, building up total feelings of guilt. Furthermore, the larger the guilt feeling, the higher is the inclination to donate. This notion of guilt as a driver of charitable giving implies that charitable mailings have a positive effect on response. This holds both for own and competitive mailings. A mailing of one charity might increase guilt enough for the household to donate to a subsequent solicitation of another charity. Hence, positive externalities could exist.

Summarizing, it is unclear a priori which effect past charitable direct mailings have on the response to today's solicitation. Both the effect of the charity's own mailings and of the competition can go both ways.

Next, we discuss the effects of past donating behavior on the donating decision. Above we described how charitable direct mailings may cause feelings of guilt. Indeed it has been frequently noted that *not* donating can make someone feel guilty (Bendapudi, Singh and Bendapudi 1996; Bennett 2003). Furthermore, guilt can act as a behavioral motivation, in the sense that individuals who feel guilty will try to alleviate their guilt by engaging in compliant and altruistic behavior (Bendapudi, Singh and Bendapudi 1996; Burnett and Lunsford 1994; Huhmann and Brotherton 1997). We propose that, as people remember past events, total feelings of guilt build up over time, only to be relieved when a donation is made. The act of giving reduces guilt. As an indication that there is indeed a dynamic component to guilt, Dahl, Honea and Manchanda (2003) remark that individuals with guilt feelings concerning charity try to compensate by promising to make a donation in the future. Bendapudi, Singh and Bendapudi (1996) state that the donation decision depends on a cost-benefit analysis. Applied to this context, benefits consist of guilt relief and costs include financial costs (money donated), physical costs (effort of donating) and opportunity costs (the fact that contributions to charity cannot be spent on something else). This implies that an individual will only donate if guilt exceeds a certain threshold. Thus, if an individual donated recently, his guilt and thus his inclination to donate again today will be low (see also Diamond and

Noble (2001)). Recency of the last donation therefore has a negative effect on the likelihood of responding.

The idea of the guilt relief is closely related to image management and the concept of licensing (Khan and Dhar 2006; Monin and Miller 2001). In this context, licensing means that a prior decision that activates a positive self-image, subsequently licenses a more selfish decision. Thus, an individual that has recently donated feels justified not to donate for a while, based on moral credentials. This notion of licensing /guilt relief applies to both own and competitive mailings, as we assume that people develop feelings of guilt towards charity in general, as opposed to specific organizations.

On the other hand, if an individual has not donated to a charity for a very long time, there is a good chance he has defected in the sense that he stopped being a donator to the charity. This would imply that the recency of response to a charity's own mailings in fact has a positive effect on the likelihood of responding. Overall, there could be an inverse-U shaped effect of recency on current donating behavior, with very recent and distant last donations having a negative effect relative to intermediate values of recency.

Next, we discuss the effects of attitudes on the donating decision, as it is generally agreed that consumer attitudes influence consumer behavior (Fishbein and Ajzen 1975). We distinguish two dimensions: (1) the attitude towards charitable organizations and donating in general and (2) charity-specific attitudes, measuring the attitude towards one charity relative to the others.

In the charitable giving literature it is well established that certain people have a more favorable attitude towards charities than others and generally donate more than others. They are more generous. Generosity is a character trait that tends to be stable over time, implying that past response rates and average amounts positively affect the donating decision today. This holds for a charity's own past donations, but also for donations to the competition. Frequent and large past donations to both own and competitive mailings indicate a generous individual who will also donate generously today.

Next, attitude towards a specific charity is an important driver of the donations to that charity (Diamond and Gooding-Williams 2002) so that past response rate and donations again have a positive effect on the donation to the same charity today. The difference with the generosity driver lies in the competitive effects. We propose that an individual with a relatively positive attitude towards a certain charity will have a relatively negative attitude towards competitive charities. Thus, competition among

charities implies that high response rates and amounts at the competition have a negative effect on the donating decision.

Finally we argue that there are important behavioral patterns underlying donating behavior. Whereas attitudes drive the total amount of money donated, behavioral patterns determine how that money is donated. If an individual has a certain amount to spend on charity in a given time period, say a year, he can make for example one large donation, a few moderate ones or many even smaller ones. Define a *giving pattern* as a way in which people can donate a fixed total amount in response to a given number of mailings. A giving pattern can then be characterized by either the frequency of donation or the average donation. A low frequency implies a high average amount per donation and vice versa. We expect each individual to have his own giving pattern that is stable across charities and time. Some people like to give a little bit very often, while others prefer to make a large donation occasionally, resulting in a continuum of possible giving patterns. The existence of giving patterns then suggests that the past response rate has a positive effect on today's response decision but a negative effect on today's amount, and vice versa for past average amount. As giving patterns are not charity-specific, these relationships are also expected to hold for response rates and average amount donated to other charities.

The implications that giving patterns, guilt buildup, and the other drivers of donating behavior have on the signs of the effects of our model variables are summarized in Table 2.2. For some variables we have multiple drivers affecting their influence, making it hard to identify the precise role of each driver. For most variables, however, we are able to determine the most important driver underlying their influence, based on the sign of their influence. The final column in Table 2.2 already preludes our empirical findings, indicating which drivers appear to dominate.

2.5 Data

For this research we have a unique dataset at our disposal. It consists of the databases of three large charity organizations in the Netherlands that are active in the health sector and that are keen on gaining insight into their competitive interactions. These charities are three of the largest charities in the health sector, representing almost 50% of the total revenues from direct mail. In their databases, the charities track their donators by recording who gave what and when.

Table 2.2: Drivers of donating behavior

									Giving patterns		Empirical findings	
			Irritation	Guilt buildup	Licensing /Guilt relief	Defection	Generosity	Competition	Response equation	Amount equation	Response equation	Amount equation
Own	Mailings	β_1, β_2	–	+							–	–
	Response recency	β_4, β_5			–	+					+	–
	Response	β_3					+	+	+	–	+	n.s.
	Amount	β_6					+	+	–	+	+	+
Other	Mailings	β_1, β_2	–	+							+	n.s.
	Response recency	β_4, β_5			–						+	–
	Response	β_3					+	–	+	–	n.s.	n.s.
	Amount	β_6					+	–	–	+	+	+

Table 2.3: Descriptive statistics of the individuals per year

	Charity 1		Charity 2		Charity 3	
	mean	std. error	mean	std. error	mean	std. error
# mailings	3.83	1.41	3.87	2.69	3.25	1.67
# responses	0.73	0.86	0.46	0.80	0.54	0.73
total donation (€)	8.48	15.08	5.36	15.03	5.75	10.18

This means we have revealed preference data, that is, we have individual records of actual response behavior to competing organizations, which enable investigation of donating to multiple charities and hence competitive interactions between different charities. The relevant information that is generally available for each individual in the database of a particular charity organization includes the following:

- name of the respondent
- complete address of the respondent
- for each soliciting mailing that has been sent:
  - date of the mailing
  - amount donated (if the individual responded)

Using the name and address data, we connect the three databases so that we can track for each individual when he received a mailing from one of the three charities and his exact response behavior towards these competing organizations.

We have five years of data at our disposal on donations to the three health charities. As they requested to remain anonymous we call them charity 1, 2 and 3. The observation period is January 2002 - December 2006. From the millions of individuals in the database we randomly select 5000 individuals. In this sample, 3985 individuals receive mailings from one charity during our observation period, 978 of two charities, and 37 of three charities. Furthermore, 1466 individuals receive mailings from charity 1, 3881 from charity 2 and 705 from charity 3.

For each individual in our sample we use an individual start-up period. This is one year after the first date each charity (that mails him during the data period) has sent a mailing. This enables us to compute reasonable initial values of the explanatory variables. The remainder of the data is used as the estimation sample. See Table 2.3 for some descriptives of the full sample. The overall response rate is 0.142, so people on average respond to about one out of seven mailings, although this varies somewhat across charities. This may seem high for direct mailings but personal communication

with the relevant fund managers confirmed this is actually a reasonable response rate for mailings to donators on the house list. Excluding start-up, people receive around five mailings a year from these three charities (which is much less than the sum of the means across charities in Table 2.3, as not all individuals receive mailings from all charities).

2.6 Empirical results

To investigate the effects of mailing actions and the competitive interactions between charity 1, 2 and 3, we estimate the model parameters. We apply MCMC techniques to obtain draws from the posterior distributions of the parameters.

2.6.1 Estimation results

Using the Gibbs sampling technique of Geman and Geman (1984) we estimate our model, where we use 40000 iterations as burn-in. After the chain has converged, we retain every tenth iteration of the next 40000 iterations to obtain an approximately random sample from the posterior distribution. Our posterior results are based on the resulting 4000 draws. In Table 2.4 we present the posterior means of the effects of our variables in both the response and the amount equation, where posterior standard deviations are in parentheses. Below we will discuss the results and the implications for the drivers of charitable giving.

Drivers of charitable giving

The effect of mailings on response to a mailing of the same charity is significantly negative (-0.211). Thus, each extra mailing a charity sends to an individual negatively affects the probability that this individual will respond to future mailings, suggesting irritation. Also, the effect of the square of mailings is significantly negative (-0.132), implying that high mailing frequencies irritate more. Hence, we find evidence that irritation plays a role for own mailings.

For competitive mailings, the main effect is significantly positive (0.100), confirming that guilt buildup drives response. However, the squared effect is significantly negative (-0.073) so that small numbers of competitive mailings have a positive effect by inducing guilt but larger numbers have a negative effect, suggesting irritation caused by too many mailings. Thus, it seems that a little competition among charities can be reinforcing, but too much may be detrimental.

Table 2.4: Posterior means and standard deviations of variable effects

Explanatory variables		Response equation		Amount equation		Decay		
Constant	β_0	-1.359**	(0.020)	1.177**	(0.024)			
Mailings	β_1^{own}	-0.211**	(0.038)	-0.113**	(0.041)	λ_m	0.001[a]	(2.62e-4)
	β_1^{other}	0.100**	(0.058)	0.050	(0.040)			
Mailings^2	β_2^{own}	-0.132**	(0.026)	-0.016	(0.026)			
	β_2^{other}	-0.073*	(0.041)	-0.028	(0.033)			
Response rate	β_3^{own}	0.484**	(0.050)	0.043	(0.071)	λ_r	0.247[a]	(0.013)
	β_3^{other}	0.047	(0.074)	-0.031	(0.048)			
Response recency	β_4^{own}	0.352**	(0.061)	-0.491**	(0.067)			
	β_4^{other}	0.118**	(0.048)	-0.290**	(0.051)			
Response recency^2	β_5^{own}	-0.004	(0.025)	0.031	(0.019)			
	β_5^{other}	0.033	(0.022)	0.011	(0.019)			
Average amount	β_6^{own}	0.133**	(0.021)	0.433**	(0.025)	λ_a	0.262[a]	(0.011)
	β_6^{other}	0.039*	(0.019)	0.034*	(0.016)			
Amount recency	β_7^{own}	-0.138**	(0.024)	0.197**	(0.024)			
	β_7^{other}	-0.019	(0.024)	0.136**	(0.025)			

*, **: Zero not contained in 95%, 99% Highest Posterior Density region, respectively.
[a]: Testing for significance is not relevant as implementation of the logit transformation automatically leads to exclusion of 0.

Regarding the amount donated, we find that own mailings have a negative effect (-0.113), implying irritation, but mailings mainly affect the response decision. This seems plausible, as for example irritation would cause people to ignore charitable mailings entirely (cf. Diamond and Noble (2001)), instead of making a smaller donation.

For recency of response, we find a significantly positive main effect on response incidence (0.352), implying defection. If an individual last donated long ago, he has a low response probability, suggesting he has stopped being a donator to the charity. We also find a significantly positive main effect of recency of other responses (0.118), which

we did not anticipate. If an individual's last donation to other charities was long ago, he has a low response probability, indicating he has stopped being a donator altogether, for example because he has died. Surprisingly, we find that the licensing/guilt relief effect mainly manifests itself through the effect of recency on amount, both from own (-0.491) and other responses (-0.290). An individual that has donated recently appears to feel licensed to donate a smaller amount to the current mailing, instead of not donating at all.

Next, we describe the effects of response rate and average amount, which concern multiple drivers. Separately, the giving patterns imply positive effects of response on response (β_{R3} , say *RR*) and amount on amount (β_{A6} , say *AA*) and negative effects of response on amount (β_{A3} , say *RA*) and amount on response (β_{R6} , say *AR*). However, since generosity and competition are also affecting these relationships, establishing the existence of giving patterns is not that straightforward. To determine whether giving patterns indeed exist, we note that, after allowing for generosity and competition effects, it must still hold that $RR>RA$ and $AR<AA$. Still, we cannot directly compare these effects since they concern different equations with different scales. A trivial comparison is obtained when *RR* and *AA* are both positive and *RA* and *AR* are both negative. In case all effects are positive, the two conditions can be integrated into $(RA \cdot AR)/(AA \cdot RR)<1$, which is insensitive to scaling effects, so it can be used for testing. For other cases, we cannot derive a condition to test exactly, due to sign changes in the equations. Now, for own effects, 71.6% of the draws satisfy one of the two conditions where the effect of giving patterns can be verified. All these draws display the hypothesized pattern, demonstrating the presence of giving patterns with fairly high confidence. For other effects, we can only verify the implied patterns for 25.9% of the draws, resulting in unreliable inference. However, the fact that 82.3% of these draws display the hypothesized pattern suggests that giving patterns are stable across charities and thus also hold for competitive donations.

Now, besides giving patterns, attitude effects can play a role. As we find a significantly positive effect of both own and other amount on response (0.133 and 0.039), which would be negative if giving patterns were the only driving force, some attitude effects are present. Based on this alone, we cannot distinguish whether the positive effect is charity-specific or caused by general generosity. However, general generosity would imply equal own and other effects. Since own effects are clearly larger than other effects, we conclude that results are caused (at least partly) by charity-specific

attitudes, or, we find evidence for the competition driver. Finally, note that particularly the own effect of amount on amount (0.433) is quite substantial, which is plausible as donation sizes tend to be rather stable over time.

Decay parameters

Next, we consider the decay parameters for mailings, responses and amounts (see right-hand side panel of Table 2.4). Through the decay parameter the effect of, for example, a mailing decreases over time. Although the decay parameter for mailings λ_m may seem very small at first sight (0.001), we have to keep in mind that these estimates are per year. Thus, if we consider for example the weekly and monthly decay rates for mailings we find that they are still 0.87 and 0.54, respectively. Hence, a mailing is half forgotten after a month. An alternative interpretation is that ten mailings only feel like five mailings a month later. Nonetheless, after a year a direct mailing is almost completely forgotten and its effect is negligible. Past response behavior is much more persistent than past mailings however, as after a year both a past response and a past amount are still in people's memory for around a fourth, according to the model parameters (0.247 and 0.262). Or, after a year, the effect of a response or amount has decreased to about one fourth of the instantaneous effect.

Heterogeneity

Up till now we have discussed the effects at the posterior means of the parameter values. However, there is heterogeneity across individuals. In Table 2.5 we present the posterior mean of the variance in the random effects for the various model variables, indicating the variation in effects across individuals. As the random effects may be highly dispersed, the story may be quite different for some individuals than for others. For example, the competitive effect of response on response is not significant at the population level at a posterior mean of 0.047, but the 95% credible interval for the random effects that excludes 2.5% of the lowest and 2.5% of the highest individual parameter estimates, ranges from -0.21 to 0.39. Thus, on the one hand, the competitive response rate has a substantial negative effect on response probability, suggesting loyalty towards the competition for some individuals. On the other hand, the competitive response rate increases the response probability to future mailings for other individuals, for example reflecting that general generosity dominates for these individuals.

Table 2.5: Variance across individuals

		Response	Amount
Constant		0.155	0.171
Mailings	own	0.061	0.072
	other	0.017	0.015
Mailings^2	own	0.024	0.018
	other	0.008	0.006
Response	own	0.729	1.112
	other	0.237	0.403
Response recency	own	0.353	0.553
	other	0.044	0.067
Response recency^2	own	0.054	0.016
	other	0.011	0.003
Amount	own	0.146	0.475
	other	0.013	0.016
Amount recency	own	0.059	0.065
	other	0.011	0.014

Endogeneity

As explained above, we have corrected for potential endogeneity bias by estimating a model for each charity's mailing strategy alongside our Tobit-2 model for the donating decision (cf. Manchanda, Rossi and Chintagunta (2004)). We modeled a charity's weekly mailing decision as a function of the individual-specific parameters and week dummies. The parameter estimates can be found in Appendix 2.B. The results show that the charities target individuals with high response propensities, as is also frequently described in the direct marketing literature. Furthermore, charities do not take donated amounts into account in their mailing decisions, which is confirmed by our discussions with several fund managers. As for the week dummies, we find that charity 3 sends its mailings in very specific weeks, while the other two spread out their campaigns over multiple weeks. All charities send relatively large mailing volumes towards the end of the year, which is the only distinctive common mailing moment in our data.

To investigate the impact of the endogeneity bias correction on the estimation results, we have estimated the model without this correction as well. The estimation results can be found in Appendix 2.C. We find substantial differences: without the correction fewer variables are significant and at the same time other effects are highly overestimated. For example, the impact of recent responses is much stronger without

the endogeneity correction. As we find clear evidence for target selection by the charities, the results of the model with the correction should be favored.

2.6.2 Revenue implications of an extra mailing

Even though the separate posterior mean effects are quite clear-cut and straightforward to interpret, the explanatory variables are all interrelated and non-linear in the decay parameters and therefore their overall effect on response to a mailing is not immediately apparent. For example, a higher number of mailings in the past tends to lower today's response probability to the same charity. At the same time a higher number of past mailings implies a higher number of past responses (Elsner, Krafft and Huchzermeier 2004), which in turn increases the probability of response to a mailing today. In short, each mailing triggers a process, which affects subsequent mailing events. Furthermore, as we allow for heterogeneity in the parameters in our model, there may be certain patterns in response behavior that cannot be identified based on these population-averaged estimates alone. Thus, to get a clear view of all dynamic effects, we compute impulse response functions (IRF's), which track the consequences of one extra mailing, the impulse, for response and amount on subsequent mailing events.

Averaging the responses to impulses on different moments in time would result in an approximation of the effect of an extra mailing. However, choosing the impulse dates randomly would not be realistic, as not every point in time is a plausible candidate for sending an extra mailing. For example, charities would never (intentionally) send two direct mailings on one day, nor on consecutive days. Thus, to stay as close to the actual mailing strategies as possible, we opt for the following solution. Instead of adding an extra mailing on various days and averaging results, we remove an existing mailing and simulate the difference in response propensity and donated amount on subsequent events. This way, it is as if the mailing sequence minus the removed mailing forms the baseline, and the removed mailing the impulse. We follow this procedure for all existing mailings within a certain period, resulting in estimates for the effect of an extra mailing, with the mailing strategy corresponding to the actual strategies used by the charities.

We divide our five year time span in two parts for each individual, an individual start-up period, as described above, and an impulse period that varies over individuals in line with the varying start-up period. The impulse period ends two years before the end of our observation period, to ensure a two year simulation period for each impulse.

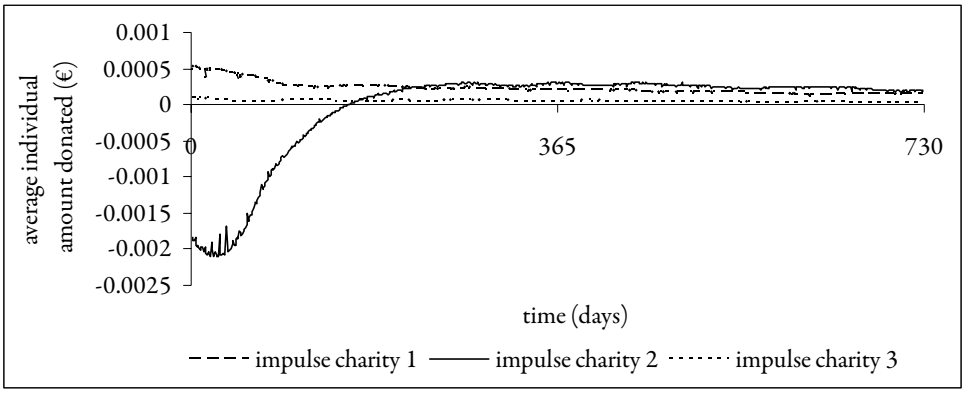

Figure 2.1: IRF for amount donated to charity 2

Now, we compute donator-specific IRF's by simulating response behavior for each draw of the individual parameter estimates[1]. This simulated behavior is then averaged over 1000 draws of the individual parameter estimates and over 25 draws from the error distribution to obtain average response probabilities and amounts donated. Now, an extra direct mailing has an immediate effect, which is the response to the mailing itself, but it also sets a process in motion that indirectly affects all subsequent mailing events.

Figure 2.1 presents the (kernel-smoothed) average IRF for the donated amount per individual to charity 2, as an example. We do not show the immediate effect, that is, the response to the impulse mailing itself. Due to the relative magnitude of this effect compared to subsequent effects, this would make the graph rather uninformative. The solid line represents the effect of an impulse of a mailing of charity 2 according to its mailing strategy on the average individual amount donated to charity 2 over time. In addition, the effects of extra mailings of the competing charities on the average individual donation to charity 2 are represented by the two dashed lines.

We find that the own effect is larger than competitive effects, but competitive interactions do exist. An extra mailing of a competing charity positively affects the amount donated to charity 2, possibly due to guilt creation. The effect of an impulse of charity 1 is much larger than that of charity 3, and both effects diminish over time.

[1] As some parameter values led to explosive behavior of the responses over time, we restricted the amount donated per mailing to twice the maximum amount donated by the individual during our data period.

Table 2.6: Immediate, indirect and net effects of an extra mailing on revenues in Euros

	Immediate effect	Indirect effects			Net effect
		Charity 1	Charity 2	Charity 3	
Charity 1	2365.35**	-586.42*	793.92*	43.80	1778.93**
	(63.46)	(306.80)	(411.71)	(88.69)	(342.51)
		-24.79%	33.56%	1.85%	75.21%
Charity 2	2931.14**	135.57	-155.58	33.30	2775.56**
	(73.63)	(272.07)	(566.04)	(63.59)	(603.73)
		4.63%	-5.31%	1.14%	94.69%
Charity 3	711.26**	15.71	171.32	-163.05	548.21**
	(41.00)	(58.60)	(219.28)	(118.39)	(132.23)
		2.21%	24.09%	-22.92%	77.08%

*, **: Zero not contained in 95%, 99% Highest Posterior Density region, respectively.

We define the indirect effects as the sum of effects across all individuals over two years after, and not including, the impulse, where we apply an annual discount rate of 10%. Thus, an extra mailing has an indirect own effect, which is the total effect on subsequent mailing events of the same charity, and indirect cross effects, representing the total effect on subsequent mailing events of the other charities. Although we did not depict it for reasons of clarity, an extra mailing also clearly has an immediate effect, which we defined as the response to the impulse mailing itself. By definition, there are no immediate cross effects.

In Table 2.6 we present the immediate and indirect effects of an extra mailing by each of the three charities on the revenues in Euros. That is, the numbers represent the extra donated amount across all individuals over two years, generated by an extra mailing in accordance with actual mailing strategies, compared to the situation without the extra mailing. Furthermore, we present the net effect of an extra mailing, computed as the sum of the immediate effect and the indirect own effects for all charities. Standard errors based on variation in expected effects in our sample of draws of individual parameter estimates are in parentheses. The indirect and net effects are also presented as percentages of the immediate effect.

Table 2.6 should be read as follows. The rows represent the charity sending the "impulse" mailing, and the columns the charities for which we compute the effects.

Thus, if charity 1 sends an extra mailing to the donators in our sample according to its mailing strategy, this results in an immediate gain of €2365.35, for example. As a benchmark, we note that the average total yearly revenues in our sample of 5000 individuals is €12280.47 for charity 1, €19646.34 for charity 2 and €3224.47 for charity 3. Thus, an extra mailing will result in around 15-22% of the total yearly revenues. Although this may seem high for US standards, charities in the Netherlands have a much lower mailing frequency. As people receive on average three to four mailings a year from these charities (see Table 2.3), revenue increases of this size could be expected and are in line with decreasing marginal returns.

For all charities we find significant positive immediate effects, the donations to the extra mailing. However, a direct mailing also has a cannibalization effect, the indirect own effect. People donate less to subsequent mailings of the same charity, since they have already donated to the extra mailing. Indeed, all charities have a negative indirect own effect with up to a quarter of the revenues cancelled out within two years, although standard errors are quite high. The cross effects reflect competitive interactions. We find that these competitive effects vary in size, possibly due to differences in database compositions and mailing strategies, but that they are consistently positive. Finally, note that the effect sizes across charities correspond roughly to the size of each of the charities.

As shown by Figure 2.1, the effects of a mailing on charities' future revenues vary over time, with most of the indirect effects not differing significantly from zero. We investigate these effects in more detail by breaking down the indirect revenues into four periods of six months in Table 2.7. Some clear patterns arise from these results. First, for all three charities we find that their mailings result in a strong initial decline in response behavior in the first six months after the extra mailing followed by an improvement; the negative effect dies out or even becomes positive in the long run. However, only the negative effects in the first six months are significant. The cannibalization effect is thus strong in the short run and decreases over time. Next, concerning the competitive effects, we find that competitive mailings have a positive effect in the short run, that is quite substantial in some cases and for charity 1 on charity 2 also significant. All cross-effects die out in the long run. Thus, charities tend to be short-run complements, in that they positively affect and support one another, and this effect diminishes over time. This is supported by the fact that the sum of all cross effects in the first half year is significantly different from zero.

Table 2.7: Indirect effects of an extra mailing on revenues in Euros over time

	Charity 1				Charity 2				Charity 3			
	1st half year	2nd half year	3rd half year	4th half year	1st half year	2nd half year	3rd half year	4th half year	1st half year	2nd half year	3rd half year	4th half year
Charity 1	-673.93**	-15.62	59.25	43.88	307.05**	193.93*	159.46	133.47	19.66	10.34	9.42	4.39
	(100.10)	(83.66)	(80.11)	(63.34)	(127.14)	(107.91)	(105.92)	(91.13)	(32.27)	(27.96)	(20.78)	(18.66)
Charity 2	78.23	25.18	28.10	4.06	-803.90**	220.06	242.09	186.18	11.81	9.03	8.38	4.08
	(91.65)	(75.63)	(66.19)	(55.22)	(167.28)	(156.91)	(155.10)	(126.85)	(19.43)	(19.25)	(16.78)	(12.33)
Charity 3	2.95	5.32	5.27	2.16	52.83	51.55	41.95	24.99	-163.87**	-7.93	-1.40	10.14
	(17.39)	(15.19)	(17.24)	(11.67)	(59.75)	(71.82)	(56.00)	(36.40)	(42.54)	(39.36)	(28.35)	(26.13)

*, **: Zero not contained in 95%, 99% Highest Posterior Density region, respectively.

Table 2.8: Net effect of an extra mailing on revenues in Euros

	Two competitors[a]	One competitor	No competition
	1778.93	1809.47	2353.45
Charity 1	(342.51)	(350.18)	(771.97)
		1.72%	32.30%
	2775.56	2731.23	1743.50
Charity 2	(603.73)	(565.66)	(656.65)
		-1.60%	-37.18%
	548.21	475.42	536.01
Charity 3	(132.23)	(122.87)	(248.16)
		-13.28%	-2.23%

[a]: Effects with two competitors taken from Table 2.6

Since not all charities are included, the data do not cover all competition. To shed some light on the potential bias this may cause, we estimate the model without competitive effects and also a model for each combination of two charities, instead of all three. The parameter estimates can be found in Appendices 2.D and 2.E. To design a mailing strategy the charities should consider the net effect of a mailing, which is the sum of the immediate effect and the own indirect effect. In this way long-term effects are taken into account. In Table 2.8 we summarize the net effect of a mailing for all three charities for 1) the full model, 2) the model with only the largest competitor (defined as the competitor with the highest yearly revenues) and 3) the model with no competition. We also report standard errors and the percentage changes of these models' results relative to the full model results.

The predictions of the model with one competitor are relatively close to the model with all competitors. As long as competition is accounted for, the results appear fairly robust with respect to the number of competitors included in the model. However, we find that ignoring competitive effects generally results in large deviations from the full model results. The bias varies from an underestimation of 37% to an overestimation 32%, likely resulting in faulty decisions. Although these differences are not statistically significant, economically they are. For charity 3 the effects are much smaller, which can be explained by the fact that this charity does not have as much interaction with the competition as the other two. However, when competition is strong, ignoring it changes results drastically. Thus, accounting for competitive effects

improves the quality of the marketing activities undertaken and could well be worth the trouble of data collection.

Charities interact regularly (more than in other industries) and discuss when the various mailing campaigns will take place, so that they know each other's strategy at an aggregate level. Also, the charities in the application cooperated in a joint research project to gain more insights in the effects of their mailings, which resulted in this research. Commercial organizations could collect data on how many mailings individuals receive and from which companies and on donating / purchasing behavior through a survey. Another option is to purchase data from marketing research companies. Examples are GfK, which collects data on direct marketing activities from multiple companies via the DirectMail panel, and TNS, which maintains a diary-based panel on all sorts of mail, the Royal Mail Consumer Panel (see also Francis and Holland (1999)).

2.7 Discussion and conclusion

We have proposed a model to establish the existence of, and to describe, dynamic and competitive effects of direct mailings, and we applied the model to a unique dataset concerning three charities in the health sector. By combining the databases of these charities, we could retrieve which mailings were received by which households on which day. This way we were able to empirically study dynamic competitive interactions between multiple direct mailing organizations, and this has not yet been done before.

The estimated model parameters in our charitable giving application indicate that substantial dynamic and competitive effects exist. This result is quite interesting, as the relevant literature on direct mailings has largely overlooked these effects. Not only have long-run effects been ignored for a long time, but also only a single firm has been considered in general, neglecting potential competitive interaction effects.

Our parameter estimates indicate that past events (mailings, responses, amounts spent) are indeed still relevant at present. Although the exact numbers probably depend on the context, it seems plausible that these effects also exist for other types of mailings, such as catalogs and all kinds of promotional offers. Thus, for accurately describing direct mailing response behavior, the static context cannot be justified. Furthermore, for strategic purposes, a firm has to take into consideration that each mailing decision will affect response behavior well into the future. Even though the mailing itself is fairly quickly forgotten, the response that the mailing is aimed to trigger

is not. In our context of charitable giving, direct mailings are short-run substitutes, in that an extra mailing cannibalizes the revenues of subsequent mailings. Over time, this effect dies out.

We also find that competitive interactions indeed exist. Particularly in the short run, competitive charitable direct mailings are complements, so that competition is reinforcing. Possibly due to lack of necessary data, these competitive effects have not been shown before. As the effects can be quite substantial, however, it may be worth putting substantial effort into data collection.

Since charitable mailings differ in various respects from regular direct mailings, we used our model to shed light on the practical relevance of a number of theoretical drivers of donating behavior. Our main findings substantiate the idea of direct mailing irritation. Sending too many requests can be detrimental for a charity's revenues. However, small numbers of competitive mailings seem to be reinforcing, suggesting that these increase guilt and consequently the inclination to donate. The effects of recency imply that some licensing takes place. People who recently donated feel licensed to donate smaller amounts. And finally, people give according to certain giving patterns, that is, some people give a substantial donation occasionally, while others frequently give small amounts. These giving patterns appear to be stable across time and charities.

As a limitation of this study, we note that our data have not been collected with the purpose of theory testing. Our results are clearly indicative of the relevance of the various drivers, but more detailed experiments would have to be carried out to disentangle their influences.

In addition, we mention that the model is not particularly suited to develop optimal mailing strategies, as this requires extensive numerical simulation procedures. With the insights on the relevant competitive interactions, one might consider using more stylized models of individual response behavior to develop optimal mailing strategies (Naik, Raman and Winer 2005; Simester, Sun and Tsitsiklis 2006).

A final limitation is that our data still does not cover all competition. This restriction is somewhat alleviated by our robustness checks, where we find that focusing only on the largest competitor does not substantially alter results. However, we focus on the health sector and leave out other categories. Across categories, results may indeed be quite different.

The model can be refined in various ways. The first seeks to relieve the lack of full competitive activity. In principle, an extension to more than three competitors is

easy, although this would put a heavy burden on data collection. Hence, an interesting issue for further research would be to include an ' other competitor' category, without having to be very specific.

Finally, our model can be used to simulate the effects of too many or too little mailings on own and on competitor's revenues. It would be challenging to see if a natural experiment would lead to comparable outcomes. In Part II of this thesis, we present the results of a field experiment, where we vary the number of charitable direct mailings that individuals receive.

2.A Bayesian estimation of direct mailing response model parameters

We have N individuals with T_i mailing event observations in W_i weeks for individual i, $i = 1,..,N$. Define for mailing event τ $y_{i\tau}^* = (R_{i\tau}^*, A_{i\tau}^*)^T$ and $\varepsilon_{i\tau} = (\varepsilon_{Ri\tau}, \varepsilon_{Ai\tau})^T$ and let $\lambda = (\lambda_m, \lambda_r, \lambda_a)^T$ contain all decay parameters. Let $X_{i\tau}(\lambda)$ denote the $(1 \times k)$-matrix of k mean-centered explanatory variables, where λ in parentheses indicates the dependence on the decay parameters. Then $X_i(\lambda)$ is the $(T_i \times k)$ matrix that stacks $X_{i\tau}(\lambda)$ for the T_i mailing events of individual i. For y_i^* and ε_i similar definitions hold.

In our non-linear random-coefficients Tobit-2 model specification in (2.1)-(2.4), we have $\varepsilon_{i\tau} \sim N(0, \Sigma_\varepsilon)$ with $\Sigma_\varepsilon = \begin{bmatrix} 1 & \sigma_{RA} \\ \sigma_{AR} & \sigma_A^2 \end{bmatrix} = \begin{bmatrix} 1 & \rho\sigma_A \\ \rho\sigma_A & \sigma_A^2 \end{bmatrix}$, $\beta_i \sim N(\beta, \Sigma_\beta)$ and $\beta_i = (\beta_{Ri}^T, \beta_{Ai}^T)^T$ of size $(2k \times 1)$. The vector β_{Ri} contains all parameters in the response equation, excluding the decay parameters, that is, $\beta_{Ri} = (\beta_{R0i}, \beta_{R1i}^{own}, \beta_{R1i}^{other}, \beta_{R2i}^{own}, \beta_{R2i}^{other}, ..., \beta_{R7i}^{own}, \beta_{R7i}^{other})^T$.

To correct for target selection and the resulting endogeneity of the mailings received, we simultaneously estimate our Tobit-2 model for the response decision and the mailing strategy models for all three firms. We assume that a firm makes a mailing decision every week w for each individual i. Let m_{ijw} be a dummy variable indicating whether firm j sends a mailing to individual i in week w, $w = 1,..., W_i$. Then m_i denotes the $(W_i \times 3)$ matrix of mail dummies for all firms for all weeks of individual i. The mailing strategy model is a probit model for a firm's weekly mailing decision as a function of the individual response parameters and week-dummies. Let Z_{1i} be the $(W_i \times 2k)$ matrix that stacks W_i times the vector β_i^T. Furthermore, let Z_{2i} be a $(W_i \times 52)$ matrix containing an intercept and 51 week-dummies. Then we add the following to our model in (2.1)-(2.4):

$$P[m_{ijw} = 1 \mid Z_{1i}, Z_{2i}] = P[m_{ijw}^* > 0 \mid Z_{1i}, Z_{2i}] \tag{2.5}$$

$$m_i^* = Z_{1i}\delta_1 + Z_{2i}\delta_2 + \xi_i \text{ with } \xi_i \sim N(0, I) \tag{2.6}$$

Here, δ_1 is a $(2k \times 3)$ matrix containing for all three funds the parameters for the individual response parameters and δ_2 a (52×3) matrix containing the constant and the parameters for the week-dummies.

To obtain draws from the posterior distributions for the model parameters, we use the Gibbs sampling technique of Geman and Geman (1984). Furthermore, we make use of data augmentation (Tanner and Wong 1987) for the latent variables in the model. The latent variables y_i^*, β_i and m_i^* $\forall i$ are sampled alongside the model

parameters β, Σ_β, λ, Σ_ε, δ_1 and δ_2. We specify a flat prior for β and independent weakly informative priors for the other model parameters, details of which will be discussed below. Finally, when a full conditional posterior distribution is of unknown form we use the Metropolis-Hastings algorithm (Chib and Greenberg 1995). In the remainder of this appendix we describe for each parameter and each latent variable the full conditional distribution we use to obtain posterior results.

Sampling of y_i^*

To sample the elements of y_i^*, we use a data augmentation step and simulate the latent variables for each mailing event as follows. When a purchase is made, we set $A_{i\tau}^*$ equal to $A_{i\tau}$ and draw $R_{i\tau}^*$ from the conditional normal distribution $N(X_{i\tau}(\lambda)\beta_{Ri} + \rho\frac{A_{i\tau} - X_{i\tau}(\lambda)\beta_{Ai}}{\sigma_A}, 1-\rho^2)$, truncated from below at zero. When no purchase is made, we start with drawing $R_{i\tau}^*$ from the conditional normal distribution $N(X_{i\tau}(\lambda)\beta_{Ri}, 1)$, truncated from above at zero. We then draw $A_{i\tau}^*$ from its conditional normal distribution $N(X_{i\tau}(\lambda)\beta_{Ai} + \sigma_A\rho(R_{i\tau}^* - X_{i\tau}(\lambda)\beta_{Ri}), (1-\rho^2)\sigma_A^2)$.

Sampling of m_i^*

To sample m_i^*, we use a data augmentation step by simulating the latent variables as follows. We draw m_i^* from the normal distribution $N(Z_{1i}\delta_1 + Z_{2i}\delta_2, I)$, with each element truncated from below at zero when a mailing is sent, or truncated from above at zero when no mailing is sent.

Sampling of β_i

As β_{Ri} and β_{Ai} are correlated, it is convenient to sample them simultaneously. For this purpose we define $Z_{i\tau}(\lambda) = I_2 \otimes X_{i\tau}(\lambda)$ with I_2 the 2-dimensional identity matrix and $\otimes$ the Kronecker product. Let $Z_i(\lambda)$ be the $(2T_i \times 2k)$ matrix that stacks the $Z_{i\tau}(\lambda)$ matrices for the T_i mailing events of individual i. Then $y_i^* = Z_i(\lambda)\beta_i + \varepsilon_i$ with $\varepsilon_i \sim N(0, I_{T_i} \otimes \Sigma_\varepsilon)$. In addition we have $\beta_i = \beta + \eta_i$ with $\eta_i \sim N(0, \Sigma_\beta)$. Finally, we have $m_i^* = Z_{1i}\delta_1 + Z_{2i}\delta_2 + \xi_i$ with $\xi_i \sim N(0, I)$ and $Z_{1i} = \iota \otimes \beta_i^T$.

Combining the three sources of information on β_i we obtain, $\beta_i \mid y_i^*, m_i^*, Z_i(\lambda), \beta, \Sigma_\varepsilon, \Sigma_\beta, Z_{2i}, \delta_1, \delta_2 \sim N(VU, V)$ with $V^{-1} = Z_i^T(\lambda)(I_{T_i} \otimes \Sigma_\varepsilon)^{-1} Z_i(\lambda) + \Sigma_\beta^{-1} + \delta_1\delta_1^T W_i$ and $U = Z_i^T(\lambda)(I_{T_i} \otimes \Sigma_\varepsilon)^{-1} y_i^* + \Sigma_\beta^{-1}\beta + \sum_{t=1}^{T_i} \delta_1(m_{it}^* - Z_{2it}\delta_2)$ and a draw is made from this distribution.

Sampling of Σ_ε

Since $\Sigma_{\varepsilon,11}$ is restricted to 1 for identification purposes, sampling of Σ_ε is not straightforward. We follow the approach of McCulloch, Polson and Rossi (2000) and use the reparametrization $\Sigma_\varepsilon = \begin{bmatrix} 1 & \gamma \\ \gamma & S+\gamma^2 \end{bmatrix}$ where S and γ are both scalars in our two-dimensional case. This implies $\varepsilon_{Ri\tau} \sim N(0,1)$ and $\varepsilon_{Ai\tau} \mid \varepsilon_{Ri\tau}$, γ, $S \sim N(\varepsilon_{Ri\tau}\gamma,\ S)$. Now, consider $\varepsilon_{Ai\tau} = \varepsilon_{Ri\tau}\gamma + \omega_i$ and note that S is the variance of the error term in this model. Given conjugate priors $S \sim IG2(\kappa, C)$ and $\gamma \sim N(\bar{\gamma}, B^{-1})$, the full conditional posteriors are:

$$S \sim IG2\left(\kappa + \sum_{i=1}^{N} T_i, C + \sum_{i=1}^{N}\sum_{\tau=1}^{T_i}(\varepsilon_{Ai\tau} - \varepsilon_{Ri\tau}\gamma)^2\right) \text{ and } \gamma \sim N\left(A_\gamma\left(\frac{\sum_{i=1}^{N}\sum_{\tau=1}^{T_i}\varepsilon_{Ri\tau}\varepsilon_{Ai\tau}}{S} + B\bar{\gamma}\right), A_\gamma\right)$$

with $A_\gamma = \left(\frac{\sum_{i=1}^{N}\sum_{\tau=1}^{T_i}\varepsilon_{Ri\tau}^{\ 2}}{S} + .B\right)^{-1}$

We take $\bar{\gamma} = 0$, $B^{-1} = 1/10$, $\kappa = 3$ and $C = (1 - B^{-1})(\kappa - 1)$, in line with McCulloch, Polson and Rossi (2000) and draw S and γ from the full conditional posterior distributions.

Sampling of λ

To ensure that the effect of an event is diminishing over time the decay parameters must be in the interval (0, 1). To achieve this, we specify the decay parameter vector as $\lambda = \frac{\exp(\varphi)}{1+\exp(\varphi)}$. Thus, we apply the logit transformation to the vector λ to obtain a vector φ and generate draws for φ to ensure that the elements of λ are in the interval (0, 1). We use the Metropolis-Hastings algorithm (Chib and Greenberg 1995) to make independent draws for the separate elements in φ and specify a univariate $N(0, 1)$ prior distribution for each element φ_j, $j = 1,...,J$ with J the number of elements of φ (see also Ansari, Mela and Neslin (2008)). The full conditional posterior distribution for φ_j, $j = 1,...,J$ is then proportional to the likelihood times the prior and thus to

$$\prod_{i=1}^{N}\prod_{\tau=1}^{T_i}\exp\left(-\tfrac{1}{2}\left(y_{i\tau}^{*} - Z_{i\tau}\left(\frac{\exp(\varphi_j)}{1+\exp(\varphi_j)}\right)\beta_i\right)^{T}\Sigma_\varepsilon^{-1}\left(y_{i\tau}^{*} - Z_{i\tau}\left(\frac{\exp(\varphi_j)}{1+\exp(\varphi_j)}\right)\beta_i\right)\right)\cdot\exp\left(\frac{-\varphi_j^{\ 2}}{2}\right).$$

We draw each element in φ sequentially using a random walk Metropolis-Hastings algorithm with a normal candidate-generating density centered on the previous draw. To obtain reasonable acceptance rates, the variance is adjusted depending on the acceptance rate (Train 2003, p. 306).

Sampling of β

To sample β we consider the part of the model that depends on β which we can write as $\beta_i = \beta + \eta_i$ with $\eta_i \sim N(0, \Sigma_\beta)$. Given a conjugate prior $\beta \sim N(\overline{\beta}, B_\beta^{-1})$, β is drawn from $N(A_\beta(\Sigma_\beta^{-1}\Sigma_\beta\beta_i + B_\beta\overline{\beta}), A_\beta)$ with $A_\beta = (N\Sigma_\beta^{-1} + B_\beta)^{-1}$. We take $\overline{\beta}$ = 0, B_β = 1/100, and draw β from the full conditional posterior distribution.

Sampling of Σ_β

To sample Σ_β we again consider the regression model $\beta_i = \beta + \eta_i$ with $\eta_i \sim N(0, \Sigma_\beta)$. It follows that the full conditional posterior distribution of Σ_β is an inverted Wishart with scale parameter $\sum_{i=1}^{N}(\beta_i - \beta)(\beta_i - \beta)^T + \kappa_1 I_{2k}$ and $N + \kappa_2$ degrees of freedom, where the κ terms stem from the conjugate prior we impose to improve convergence of the Gibbs sampler, as recommended by Hobert and Casella (1996). We set κ_1 = 1/10 and κ_2 = 32 to induce only a marginal influence of the prior on the posterior distribution and draw Σ_β from its full conditional posterior distribution.

Sampling of δ_1 and δ_2

To sample δ_1 and δ_2 we consider the regression model $m_i^* = Z_{1i}\delta_1 + Z_{2i}\delta_2 + \xi_i$ with $\xi_i \sim N(0, I)$. Let $Z_i = (Z_{1i}, Z_{2i})$ of size $(W_i \times (2k + 52))$ and $\delta = (\delta_1^T, \delta_2^T)^T$ of size $((2k + 52) \times 3)$. Given a conjugate prior $\delta \sim N(\overline{\delta}, B_\delta^{-1})$, δ is distributed as $N\left(A_\delta\left(Z_i^T m_i^* + B_\delta\overline{\delta}\right), A_\delta\right)$ with $A_\delta = \left(Z_i^T Z_i + B_\delta\right)^{-1}$. We take $\overline{\delta}$ = 0, B_δ = 1/10, and draw δ from the full conditional posterior distribution.

2.B Estimation results of mailing strategy models

The tables below present the parameter estimates for the mailing strategy models. Table 2.9 presents the estimates of the parameters belonging to the parameters from the response equation of the Tobit-2 model, and Table 2.10 presents the estimates of the parameters belonging to the parameters from the amount equation of the Tobit-2 model. Table 2.11 presents the estimates for the constants and the week dummies in the mailing strategy models.

Table 2.9: Parameter estimates mailing strategy models - response equation variables

	Charity 1		Charity 2		Charity 3	
β_0	0.608**	(0.197)	0.561**	(0.170)	0.698**	(0.240)
β_1^{own}	0.389	(0.288)	0.021	(0.223)	-0.068	(0.313)
β_1^{other}	-0.039	(0.305)	-0.038	(0.254)	-0.075	(0.366)
β_2^{own}	0.101	(0.303)	0.004	(0.283)	-0.081	(0.365)
β_2^{other}	0.265	(0.301)	0.040	(0.256)	0.077	(0.338)
β_3^{own}	0.035	(0.261)	-0.129	(0.214)	0.276	(0.302)
β_3^{other}	-0.210	(0.276)	0.231	(0.252)	-0.459	(0.330)
β_4^{own}	0.098	(0.254)	-0.105	(0.223)	0.128	(0.256)
β_4^{other}	-0.126	(0.318)	0.094	(0.253)	-0.455	(0.298)
β_5^{own}	0.135	(0.280)	0.055	(0.278)	-0.007	(0.307)
β_5^{other}	-0.022	(0.294)	-0.095	(0.285)	0.179	(0.329)
β_6^{own}	-0.127	(0.256)	-0.549**	(0.200)	-0.025	(0.287)
β_6^{other}	-0.099	(0.284)	0.082	(0.236)	-0.068	(0.336)
β_7^{own}	0.065	(0.292)	0.068	(0.255)	-0.071	(0.309)
β_7^{other}	-0.267	(0.281)	0.198	(0.267)	-0.167	(0.331)

**: Zero not contained in 95%, 99% Highest Posterior Density region, respectively.

Table 2.10: Parameter estimates mailing strategy models - amount equation variables

	Charity 1		Charity 2		Charity 3	
β_0	-0.230	(0.197)	-0.145	(0.172)	-0.203	(0.220)
β_1^{own}	0.155	(0.291)	-0.032	(0.283)	-0.023	(0.333)
β_1^{other}	0.160	(0.301)	-0.048	(0.268)	0.149	(0.342)
β_2^{own}	-0.072	(0.309)	-0.020	(0.272)	-0.055	(0.333)
β_2^{other}	0.176	(0.310)	-0.034	(0.267)	-0.019	(0.322)
β_3^{own}	-0.156	(0.292)	-0.141	(0.255)	0.047	(0.356)
β_3^{other}	0.056	(0.350)	0.002	(0.291)	-0.045	(0.384)
β_4^{own}	0.061	(0.222)	0.046	(0.185)	-0.123	(0.247)
β_4^{other}	-0.008	(0.295)	0.040	(0.260)	0.050	(0.343)
β_5^{own}	0.011	(0.300)	0.058	(0.284)	-0.074	(0.317)
β_5^{other}	0.058	(0.315)	0.023	(0.282)	0.019	(0.324)
β_6^{own}	-0.207	(0.257)	0.202	(0.185)	-0.024	(0.274)
β_6^{other}	-0.199	(0.290)	-0.094	(0.251)	-0.268	(0.327)
β_7^{own}	-0.267	(0.266)	-0.233	(0.255)	0.235	(0.324)
β_7^{other}	-0.209	(0.303)	-0.114	(0.268)	-0.031	(0.334)

Table 2.11: Parameter estimates mailing strategy models - constant and week dummies

	Charity 1		Charity 2		Charity 3	
constant	-0.544*	(0.254)	-0.633**	(0.233)	-0.244	(0.263)
week 1	-0.815**	(0.101)	-1.209**	(0.070)	-1.607**	(0.141)
week 2	-1.029**	(0.124)	0.178**	(0.030)	-1.620**	(0.146)
week 3	0.173**	(0.049)	0.471**	(0.027)	-1.610**	(0.145)
week 4	1.876**	(0.038)	-0.359**	(0.036)	-1.624**	(0.144)
week 5	1.149**	(0.040)	-0.855**	(0.050)	-1.620**	(0.148)
week 6	-0.194**	(0.058)	1.083**	(0.026)	-1.627**	(0.148)
week 7	0.396**	(0.043)	0.297**	(0.027)	-1.630**	(0.144)
week 8	1.041**	(0.039)	0.029	(0.030)	-1.614**	(0.141)
week 9	0.737**	(0.041)	-0.309**	(0.034)	-1.612**	(0.144)
week 10	-0.675**	(0.083)	0.021	(0.030)	-1.626**	(0.142)
week 11	-0.984**	(0.109)	0.181**	(0.028)	-0.328**	(0.058)
week 12	-0.118*	(0.054)	0.330**	(0.028)	1.113**	(0.044)
week 13	-0.349**	(0.063)	0.309**	(0.028)	-0.613**	(0.065)
week 14	-0.465**	(0.069)	0.234**	(0.028)	-1.669**	(0.136)

week 15	1.100**	(0.039)	0.501**	(0.026)	-1.667**	(0.139)
week 16	1.170**	(0.039)	-0.295**	(0.033)	-1.567**	(0.131)
week 17	0.950**	(0.039)	0.935**	(0.025)	-1.468**	(0.113)
week 18	-0.108	(0.054)	0.597**	(0.026)	-0.433**	(0.057)
week 19	-1.188**	(0.146)	-0.147**	(0.032)	0.277**	(0.048)
week 20	0.628**	(0.042)	-1.010**	(0.054)	-1.157**	(0.091)
week 21	0.407**	(0.044)	-0.494**	(0.037)	-1.677**	(0.137)
week 22	-0.187**	(0.056)	0.100**	(0.029)	-1.617**	(0.136)
week 23	0.205**	(0.046)	0.697**	(0.026)	-0.238**	(0.054)
week 24	-0.556**	(0.075)	0.323**	(0.027)	-0.158**	(0.052)
week 25	-1.041**	(0.121)	0.369**	(0.027)	-0.960**	(0.076)
week 26	-0.253**	(0.059)	-0.034	(0.030)	0.925**	(0.044)
week 27	-0.518**	(0.069)	0.324**	(0.027)	-0.796**	(0.072)
week 28	0.430**	(0.043)	-0.278**	(0.033)	-1.687**	(0.143)
week 29	-0.240**	(0.058)	0.690**	(0.026)	-1.188**	(0.092)
week 30	-0.660**	(0.079)	-0.611**	(0.039)	-1.106**	(0.088)
week 31	-0.421**	(0.064)	0.193**	(0.028)	-0.624**	(0.064)
week 32	-0.709**	(0.082)	0.376**	(0.027)	0.100*	(0.050)
week 33	0.210**	(0.046)	-0.443**	(0.037)	0.034	(0.051)
week 34	0.776**	(0.040)	-0.520**	(0.037)	-0.732**	(0.072)
week 35	0.853**	(0.039)	-0.014	(0.030)	-0.496**	(0.062)
week 36	0.231**	(0.046)	-0.361**	(0.034)	0.008	(0.053)
week 37	0.097*	(0.049)	-0.314**	(0.034)	-1.429**	(0.119)
week 38	1.149**	(0.039)	0.150**	(0.028)	-0.394**	(0.060)
week 39	0.475**	(0.044)	0.771**	(0.025)	-1.551**	(0.137)
week 40	-0.643**	(0.080)	-0.099**	(0.031)	-1.014**	(0.090)
week 41	-0.537**	(0.077)	0.523**	(0.027)	-0.947**	(0.083)
week 42	1.077**	(0.039)	-0.213**	(0.032)	-1.135**	(0.097)
week 43	-0.161**	(0.056)	-0.492**	(0.038)	1.305**	(0.045)
week 44	0.032	(0.051)	0.344**	(0.028)	0.164**	(0.051)
week 45	0.961**	(0.040)	0.338**	(0.028)	-1.597**	(0.145)
week 46	0.526**	(0.042)	0.783**	(0.026)	-1.603**	(0.139)
week 47	1.757**	(0.037)	0.150**	(0.029)	-1.588**	(0.144)
week 48	0.705**	(0.041)	0.952**	(0.026)	-1.403**	(0.123)
week 49	0.745**	(0.041)	0.485**	(0.027)	-1.503**	(0.135)
week 50	0.116*	(0.052)	-0.130**	(0.032)	-0.035	(0.053)
week 51	-1.068**	(0.132)	-1.667**	(0.127)	0.464**	(0.049)

*, **: Zero not contained in 95%, 99% Highest Posterior Density region, respectively.

2.C Estimation results without correction for endogeneity

Table 2.12 presents the parameter estimates for the model without the correction for potential endogeneity bias.

Table 2.12: Parameter estimates without endogeneity correction

Explanatory variables		Response equation		Amount equation		Decay		
Constant	β_0	-1.257**	(0.014)	1.229**	(0.020)			
Mailings	β_1^{own}	-0.266**	(0.048)	-0.142**	(0.033)	λ_m	(3.56e-4)[a]	(1.65e-4)
	β_1^{other}	0.065	(0.052)	-0.010	(0.029)			
Mailings^2	β_2^{own}	-0.050	(0.034)	-0.002	(0.021)			
	β_2^{other}	-0.032	(0.028)	0.003	(0.016)			
Response	β_3^{own}	0.443**	(0.042)	-0.053	(0.049)	λ_r	0.276[a]	(0.015)
	β_3^{other}	0.122	(0.082)	-0.188**	(0.048)			
Response recency	β_4^{own}	0.554**	(0.055)	-0.388**	(0.048)			
	β_4^{other}	0.252**	(0.037)	-0.221**	(0.032)			
Response recency^2	β_5^{own}	-0.005	(0.016)	0.025*	(0.010)			
	β_5^{other}	-0.008	(0.015)	-0.001	(0.011)			
Amount	β_6^{own}	0.228**	(0.018)	0.494**	(0.022)	λ_a	0.274[a]	(0.014)
	β_6^{other}	0.008	(0.016)	0.030**	(0.012)			
Amount recency	β_7^{own}	-0.248**	(0.027)	0.164**	(0.021)			
	β_7^{other}	-0.024	(0.023)	0.147**	(0.016)			

*, **: Zero not contained in 95%, 99% Highest Posterior Density region, respectively.
[a]: Testing for significance is not relevant as implementation of the logit transformation automatically leads to exclusion of 0.

2.D Estimation results with two charities

Table 2.13 presents the parameter estimates for the models with respectively charity 1 and 2, charity 1 and 3, and charity 2 and 3.

Table 2.13: Parameter estimates with two charities

Explanatory variables		Response equation		Amount equation		Decay		
Constant	β_0	-1.392**	(0.024)	1.163**	(0.023)			
		-1.036**	(0.025)	1.346**	(0.029)			
		-1.517**	(0.025)	1.042**	(0.031)			
Mailings	β_1^{own}	-0.231**	(0.050)	-0.093*	(0.048)	λ_m	0.001[a]	(2.46e-4)
		-0.193**	(0.065)	-0.062	(0.054)		0.002[a]	(0.001)
		-0.240**	(0.033)	-0.121**	(0.053)		0.001[a]	(1.69e-4)
	β_1^{other}	0.153**	(0.040)	-0.067	(0.042)			
		-0.021	(0.087)	0.025	(0.095)			
		0.053	(0.077)	-0.006	(0.051)			
Mailings^2	β_2^{own}	-0.141**	(0.037)	-0.047	(0.031)			
		-0.150**	(0.050)	-0.059	(0.039)			
		-0.151**	(0.026)	-0.028	(0.031)			
	β_2^{other}	-0.084**	(0.032)	0.050*	(0.024)			
		0.017	(0.098)	-0.037	(0.068)			
		0.081**	(0.040)	0.012	(0.033)			
Response	β_3^{own}	0.300**	(0.042)	-0.064	(0.041)		0.225[a]	(0.010)
		0.080	(0.064)	-0.088	(0.058)	λ_r	0.373[a]	(0.014)
		0.455**	(0.048)	0.026	(0.044)		0.247[a]	(0.010)
	β_3^{other}	0.107**	(0.050)	-0.067	(0.059)			
		-0.051	(0.151)	0.017	(0.089)			
		-0.059	(0.070)	-0.017	(0.099)			
Response recency	β_4^{own}	0.369**	(0.064)	-0.509**	(0.055)			
		0.313**	(0.077)	-0.528**	(0.056)			
		0.298**	(0.072)	-0.348**	(0.060)			

		0.197**	(0.048)	-0.331**	(0.076)			
	β_4^{other}	0.033	(0.076)	-0.043	(0.078)			
		-0.132**	(0.041)	0.165**	(0.055)			
		0.002	(0.030)	0.027	(0.020)			
Response recency^2	β_5^{own}	-0.045	(0.031)	-0.004	(0.019)			
		0.025	(0.026)	0.003	(0.025)			
		0.045*	(0.022)	0.014	(0.026)			
	β_5^{other}	-0.004	(0.069)	-0.126	(0.094)			
		-0.019	(0.041)	-0.036	(0.034)			
		0.095**	(0.021)	0.354**	(0.021)		0.241[a]	(0.009)
Amount	β_6^{own}	0.129**	(0.031)	0.483**	(0.027)	λ_a	0.412[a]	(0.019)
		0.099**	(0.024)	0.541**	(0.030)		0.258[a]	(0.011)
		0.048*	(0.022)	0.044**	(0.019)			
	β_6^{other}	0.046	(0.060)	-0.019	(0.053)			
		-0.005	(0.036)	0.060	(0.048)			
		-0.135**	(0.038)	0.225**	(0.025)			
Amount recency	β_7^{own}	-0.014	(0.040)	0.277**	(0.024)			
		-0.070	(0.043)	0.191**	(0.040)			
		-0.064	(0.043)	0.174**	(0.028)			
	β_7^{other}	-0.107	(0.081)	-0.079	(0.088)			
		-0.038	(0.086)	0.025	(0.037)			

*, **: Zero not contained in 95%, 99% Highest Posterior Density region, respectively.

[a]: Testing for significance is not relevant as implementation of the logit transformation automatically leads to exclusion of 0.

2.E Estimation results with one charity (no competitive effects)

Table 2.14 presents the parameter estimates for the models with respectively charity 1, charity 2, and charity 3.

Table 2.14: Parameter estimates without competitive effects

Explanatory variables		Response equation		Amount equation		Decay	
Constant	β_0	-1.000**	(0.032)	1.364**	(0.032)		
		-1.605**	(0.032)	0.928**	(0.039)		
		-0.970**	(0.046)	1.125**	(0.043)		
Mailings	β_1^{own}	-0.177**	(0.064)	-0.035	(0.051)	0.007[a]	(0.003)
		-0.175**	(0.048)	-0.119*	(0.055)	λ_m 0.005[a]	(0.002)
		-0.220**	(0.079)	-0.118*	(0.074)	0.022[a]	(0.009)
Mailings^2	β_2^{own}	-0.149**	(0.042)	-0.050	(0.036)		
		-0.138**	(0.032)	-0.050	(0.033)		
		0.013	(0.044)	-0.040	(0.054)		
Response	β_3^{own}	0.059	(0.068)	-0.047	(0.061)	0.564[a]	(0.026)
		0.393**	(0.064)	0.032	(0.084)	λ_r 0.344[a]	(0.017)
		0.141	(0.107)	-0.066	(0.096)	0.484[a]	(0.037)
Response recency	β_4^{own}	0.354**	(0.049)	-0.450**	(0.052)		
		0.249**	(0.078)	-0.419**	(0.070)		
		0.242**	(0.060)	-0.081	(0.076)		
Response recency^2	β_5^{own}	-0.044**	(0.017)	-0.026*	(0.012)		
		0.022	(0.022)	-0.004	(0.019)		
		0.060	(0.037)	-0.026	(0.036)		
Amount	β_6^{own}	0.072**	(0.026)	0.406**	(0.031)	0.596[a]	(0.028)
		0.024	(0.028)	0.400**	(0.036)	λ_a 0.336[a]	(0.022)
		-0.022	(0.039)	0.511**	(0.063)	0.489[a]	(0.051)
Amount recency	β_7^{own}	-0.001	(0.020)	0.265**	(0.022)		
		-0.012	(0.041)	0.270**	(0.031)		
		0.126*	(0.046)	0.185**	(0.043)		

*, **: Zero not contained in 95%, 99% Highest Posterior Density region, respectively.
[a]: Testing for significance is not relevant as implementation of the logit transformation automatically leads to exclusion of 0.

Chapter 3

A Dynamic Model of Guilt as a Driver for Charity Donations

3.1 Introduction

Many studies have investigated motivations to comply with a charitable donation request. Extant literature on charitable giving has focused primarily on why people give to charity in a static context, that is, why people respond to a single donation request. In reality, many people make multiple donations each year, but at the same time most of them do not respond to all the requests they receive. In fact, in many situations consumers make multiple consecutive decisions that can affect each other, instead of one isolated decision (Khan and Dhar 2006). As people tend to (partially) remember past events and anticipate future events, dynamics play an important role in the donating process (see Chapter 2 of this thesis).

In this chapter we investigate donating behavior over time across multiple charities, where our prime focus is on guilt. Examples of other pervasive motivations that have been identified in studies on altruism and charitable donating are empathy and sympathy, a warm glow feeling, prestige, social pressure and reciprocity (Andreoni 1990; Bennett 2003; Falk 2007; Guy and Patton 1989; Haggberg 1992; Sargeant 1999). However, none of these drivers have been studied in a dynamic context. One of the reasons for the lack of research on donation dynamics may be that most of the identified motivations do not readily fit into a dynamic framework. We believe though that guilt can be viewed as a longitudinal concept, and hence this is the focus of this chapter.

A well-known classification of guilt types is that of reactive, anticipatory and existential guilt, see Huhmann and Brotherton (1997). Reactive guilt occurs as a

response to a transgression. Anticipatory guilt results when an individual foresees a potential transgression. Existential guilt arises as a result of a discrepancy between an individual's own well-being and that of others. Current feelings of guilt can thus be experienced as a reaction to past behavior and also future guilt can be anticipated. Moreover, guilt can be a consequence and a driver of behavior.

Until now, charitable giving studies, as we will discuss below, only consider the guilt invoked by a single appeal and also only at the time of the appeal. Furthermore, guilt appeals are generally considered as either anticipatory or existential. Studies thus ignore the consequences of currently not donating, a violation of norms that incurs guilt feelings, for an individual's potential response to future appeals, thereby ignoring the reactive guilt dimension. In the present chapter we explicitly address the dynamic aspects of feelings of guilt.

We propose to consider an individual's *stock of guilt* that represents the total accumulated feelings of guilt at a certain point in time. We assume people have a *single* stock of guilt and we propose that the stock of guilt grows over time as a result of moral obligation and also due to for example receiving direct mailings. Making a donation reduces the stock of guilt, but comes at certain costs. In contrast to studies on one-shot donation decisions, our dynamic framework of guilt buildup and relief thus accounts for all three dimensions of guilt resulting from charitable direct mailings, including reactive guilt. We put forward a structural model to describe how guilt affects individual charity donations.

When fitting our structural model to our unique dataset, which covers many individuals who receive direct mailings from and donate to five of the largest Netherlands-based charities, we need to account for the fact that charities use target selection rules. To be more precise, charities send out more mailings to their better donators, and this is known to the individuals. Hence, when individuals decide to respond to a direct mailing, they are aware that their current decision affects the amount of mailings they will receive in the future. We incorporate this awareness in our model by allowing individuals to anticipate the consequences of (not) donating on both their future level of guilt and the charities' mailing frequency.

This chapter is organized as follows. First, we provide an overview of the relevant theory. Next, we introduce our model of guilt accumulation and relief over time, in part driven by direct mailings and by donations in response to these mailings. We also account for other but unobserved changes in guilt feelings. We infer individual

donating behavior by solving the corresponding stochastic dynamic programming model. Then, we discuss the unique dataset and we present our estimation results and some fit statistics, which show that our model fits the data quite well. Our structural model permits an analysis of mailing strategies that maximize charity revenues or donator welfare, which will be presented next. These policy experiments show that charities' mailing strategies can be improved to the benefit of either the beneficiaries or the donators of the charities. We conclude with a discussion of our main results and some limitations.

3.2 Theoretical considerations

Many of the commonly studied drivers for charitable giving have always been studied in the context of a single donation decision. When expanding towards a dynamic view on charitable giving, only few drivers will generate strong predictions. One of the most interesting candidates for a theory of dynamic giving to charitable organizations is guilt, as the literature provides some clear indications that there is a dynamic component to guilt[2]. Obviously, the general agreement that individuals can anticipate the guilt they would feel after a contemplated transgression already alludes to the dynamics of guilt. Moreover, Dahl, Honea and Manchanda (2003) remark that individuals with feelings of guilt try to compensate by promising to make a donation in the future. Finally, O'Keefe and Figgé (1997) establish that people feel guilty after rejecting an initial request, which affects their decision on a subsequent request.

3.2.1 Guilt

Guilt is a fairly broad concept that has been defined in many ways. For example, Baumeister, Stillwell and Heatherton (1994) define it as "an individual's unpleasant emotional state associated with possible objections against his or her actions, inaction, circumstances or intentions". Particularly relevant for this study is the concept of consumer guilt, defined as "a negative emotion which results from a consumer decision that violates one's values and norms" by Burnett and Lunsford (1994).

[2] Another motivation that would also fit a dynamic context is prestige. People may strive to maintain a certain level of prestige over time. However, since our dataset concerns Dutch charities and prestige is not very relevant as a motivation in the Netherlands, we do not go into this motivation.

Although guilt is considered a negative emotion (Richins 1997), it generally serves a positive social function (Ausubel 1955; Baumeister, Stillwell and Heatherton 1994). A considerable stream of literature has shown that guilt can act as a behavioral motivation, in the sense that individuals who feel guilty will try to alleviate their guilt by engaging in compliant and altruistic behavior (Baumeister, Stillwell and Heatherton 1994; Burnett and Lunsford 1994; Regan 1971; Tangney, Stuewig and Mashek 2007). People are motivated to relieve the aversive guilt feelings by taking some compensatory action, such as donating to charity, which is generally recognized as a form of altruistic or prosocial behavior (Basil, Ridgway and Basil 2008). Indeed, guilt has been well established as an important driver of charitable donating (Andreoni 1990; Sargeant 1999).

As people are imperfect, they do not live up to their moral standards all the time (Tangney, Stuewig and Mashek 2007). In everyday life, people will thus typically build up guilt until they perform an action that alleviates their feelings of guilt. So, the longer an individual violates his moral standards, the more guilt he will experience.

A frequently applied classification of guilt types is that of reactive, anticipatory and existential guilt (see, for example, Huhmann and Brotherton (1997)). Reactive guilt (e.g. Rawlings 1970) is guilt that occurs as a response to a transgression, so after a violation of norms. Anticipatory guilt (e.g. Rawlings 1970; Lindsey 2005) results when an individual contemplates a potential violation of norms. And finally, existential guilt (Izard 1977) arises as a result of a discrepancy between an individual's own well-being and that of others. In the dynamic context of this chapter, we consider an individual's *stock of guilt* that represents the total feelings of guilt at a certain point in time, comprising all three types of guilt. In addition, all three types of guilt are relevant when studying the consequences of charitable direct mailings and the responses they elicit.

Several studies have found that the beneficiary of the altruistic behavior motivated by feelings of guilt need not be the original victim of the transgression (Darlington and Macker 1966; Regan 1971). That is, in order to relieve guilt substitutes are acceptable. This suggests that for example feelings of guilt from buying a nice watch or ignoring a request for help from a friend could be alleviated by making a donation to charity. Therefore, we assume people have a single *stock of guilt* representing total guilt feelings. As people remember their past activities – both actions and inactions – total feelings of guilt will accumulate over time.

We propose that this total accumulated stock of guilt drives the decision to make a donation. Obviously, guilt motivates charitable donations as people believe altruistic behavior will reduce their guilt (Bendapudi, Singh and Bendapudi 1996; Dahl, Honea and Manchanda 2003; Rawlings 1970). Indeed, Lindsey (2005) has empirically established that altruistic behavior actually does reduce guilt. In this study, individuals who took steps into the bone marrow donation process felt significantly less guilty afterwards than individuals who took no action.

3.2.2 Guilt and charitable giving

Although feelings of guilt may occur primarily in close relationships, they can also extend to distant or even non-existent relationships (Baumeister, Stillwell and Heatherton 1994; Dahl, Honea and Manchanda 2003; 2005). Hence, people can and do in fact feel guilty towards charitable causes, and charities frequently use guilt appeals in their attempt to motivate people to donate (Huhmann and Brotherton 1997).

Extant literature on charitable guilt appeals has generally considered them as either anticipatory or existential in nature (for example, by Basil, Ridgway and Basil (2008) and Huhmann and Brotherton (1997)), as opposed to reactive. A donation solicitation will tactfully point out how much better off the reader is than the beneficiary of the charity (existential), or make him imagine how guilty he would feel if he decided not to donate (anticipatory). This classification as anticipatory or existential stems from the static focus of the studies involved: they only consider the guilt invoked by a single guilt appeal at the time of the appeal and ignore the consequences of not donating to that appeal on the response to future appeals. However, the full effect of guilt on donating behavior cannot be uncovered through studying a single-shot, stand-alone guilt appeal (Hibbert et al. 2007).

In contrast to studies on one-shot donation decisions, our dynamic framework of guilt buildup and relief accounts for all three dimensions of guilt resulting from charitable direct mailings. That reactive guilt indeed plays a role in responding to requests is shown by O'Keefe and Figgé (1997), who establish that rejecting a request increases feelings of guilt. In line with this, it has been frequently noted that *not* donating can make someone feel guilty (Bendapudi, Singh and Bendapudi 1996; Bennett 2003; Burnett and Lunsford 1994; Dahl, Honea and Manchanda 2003). Hence, a dynamic model of guilt should also account for reactive guilt.

Now, assuming that people remember past events, both good and bad, one could imagine that each charitable direct mailing an individual receives creates some feeling of guilt, increasing the stock of guilt. Instead of focusing on the guilt induced by the specific content of a guilt appeal, which tends to be the standard approach in the static context, we take the view that each direct mailing induces a fixed amount of guilt, although this may differ across charities. For example, people may experience more guilt towards international aid charities than towards health charities.

The notion that each direct mailing increases guilt is substantiated by the concept of norm salience. Charitable requests can serve to activate the social responsibility norm, which is a generally accepted social norm (Krebs 1970). This norm entails that charitable behavior is acknowledged as a universal human value (Bendapudi, Singh and Bendapudi 1996). Charitable requests increase awareness of the suffering of others (Regan 1971). This awareness heightens the salience of the social responsibility norm and moral obligation to do good (Rawlings 1970), thereby increasing feelings of guilt.

All in all, an individual's stock of guilt builds up over time, increasing even more when explicit donation solicitations are received. Then, when a certain threshold is reached beyond which guilt can no longer be tolerated (Hibbert et al. 2007; Izard 1977; Lascu 1991), the individual will make a donation to attenuate his guilt. The size of this donation will depend on the total amount of guilt, that is, the higher guilt, the higher is the donation. Indeed, in an experiment on the relationship between guilt and altruism, Regan (1971) found that higher guilt resulted in higher donations. This is also supported by the notion that people want to help proportional to their guilt (Baumeister, Stillwell and Heatherton 1994). Hence, we assume that the reduction in guilt increases with the size of the donation.

Obviously, making a donation comes at certain costs. According to Bendapudi, Singh and Bendapudi (1996) these costs include financial costs (money donated) and physical costs (effort of donating). We will distinguish between fixed costs of donating, for example the energy of making a transfer, and variable costs, that is, the amount of money donated itself (see also Shapiro (1973)). The donation decision then depends on a cost-benefit analysis (Bendapudi, Singh and Bendapudi 1996), trading off the benefits of guilt relief against the costs of donating.

The buildup and relief of guilt through receiving direct mailings and responding to them is in line with the idea of self-concept maintenance. Failing to

adhere to moral standards will result in feelings of guilt, and severe transgressions will ultimately result in a negative self-concept (Mazar, Amir and Ariely 2007). People are willing to suffer some guilt if the benefits of transgressing are large enough. Thus, if there is something to gain, they will engage in behavior that goes against the moral standard to the extent that their positive self-concept is still maintained. This suggests that people will go against the social responsibility norm by not donating, as long as they do not feel too guilty. At higher levels of guilt they are willing to make a donation in order to avoid degradation of their self-concept.

In addition, it has been shown that a prior decision that activates a positive self-concept, subsequently licenses a more selfish decision (Khan and Dhar 2006; Monin and Miller 2001). Thus, an individual who has recently donated feels justified not to donate for a while, based on moral credentials.

Summarizing, we consider an individual's stock of guilt that can be reduced by making a donation. As long as no donation is made the stock of guilt will typically grow as a result of a general sense of moral obligation. Receiving charitable direct mailings will make the guilt grow even more. Making a donation reduces the stock of guilt, but comes at certain costs. In total, our theoretical considerations imply that the higher the stock of guilt, the higher will be the propensity to respond. When the stock of guilt reaches a certain high level, this drives the individual to make a donation, thereby reducing the stock of guilt.

3.3 The model

In this section we describe our stochastic dynamic programming model of individual response behavior towards charitable direct mailings. The model enables us to study how guilt affects charitable donating and to predict individual donating behavior over time.

3.3.1 Utility specification

We assume that the stock of guilt forms the motivation to make a donation in response to a direct mailing. Individuals have a preference for low levels of guilt, which thus translate into high utility values. The individual's objective is to maximize his lifetime utility, which equals the utility today plus the discounted future utility. Thus, individuals are motivated to donate as it results in a reduction in guilt and a corresponding increase in utility. As our model (and data) concerns responses to direct

mailings only, no donation can be made unless an actual mailing has been received. This is in line with Andreoni (2006), who notes that individuals generally only donate when they are asked.

An individual *i* enters a time period *t* with a certain stock of guilt G_{it}, which during this period evolves into his end-of-period stock of guilt $G_{i,t+1}$. Now, in each time period *t* it holds that the higher an individual *i*'s end-of-period stock of guilt $G_{i,t+1}$, the lower is his instantaneous utility U_{it} in that period. If one or more mailings are received in this time period, the individual has the opportunity to attenuate his guilt. Making a donation will reduce the end-of-period stock of guilt, thus increasing the individual utility, which will be discussed below. Making a donation, however, also comes at certain costs, thereby reducing the individual's utility.

The fixed cost of donating, represented by *fc*, explains why individuals do not donate one Euro every day, for example. We assume that each donation incurs the same fixed cost. The variable costs of donating refer to the amount of money donated. We fix its impact on total costs and hence on utility to one, so that utility will be measured in Euro equivalents. Hence, large donations are more costly than small donations. Of course, when an individual makes donations to multiple funds in one period, these all come with their associated fixed and variable costs and hence they all reduce utility.

In sum, the donation decision depends on a cost-benefit analysis, where the benefits consist of guilt relief. The individual's instantaneous utility in time period *t* is therefore given by:

$$U_{it} = -G_{i,t+1} - C_{it} \tag{3.1}$$

with

$$C_{it} = \sum_{j=1}^{J} D_{ijt} - fc \sum_{j=1}^{J} I[D_{ijt} > 0] \tag{3.2}$$

Here:

G_{it} represents the guilt that has been built up until period *t* and is restricted to be nonnegative.

C_{it} summarizes the variable and fixed costs of donating.

D_{ijt} represents the donation made by individual *i* to fund *j* in period *t*. It can only be positive if a mailing is received and will therefore be 0 by

definition if an individual *i* does not receive a mailing of fund *j* in time period *t* (cf. Andreoni (2006)). The vector $D_{it} = (D_{i1t},...,D_{iJt})$.

$I[D_{ijt} > 0]$ indicates whether individual *i* made a donation to fund *j* in period *t*.

J is the number of funds in the model.

3.3.2 Guilt dynamics

During a period *t*, the stock of guilt changes due to a number of sources. First, as a result of everyday life events, there will be shocks in guilt that are unrelated to the direct mailings and donations we observe. For example, helping an old lady cross the street may decrease the stock of guilt, while buying an expensive watch may increase it. Thus, a (to the econometrician unobserved) shock in guilt φ_{it} is experienced by the individual. We opt for an additive i.i.d. logistic error term with positive mean φ, reflecting that on average guilt increases over time, and variance σ^2. Thus, we assume that each period there are certain individual shocks in guilt that the econometrician does not observe but the individual does. The individual will react optimally to the total feelings of guilt, which are stochastic to the econometrician.

Next, the individual potentially receives a number of direct mailings, represented by the vector $m_{it} = (m_{i1t},...,m_{iJt})$, with m_{ijt} a dummy indicating whether individual *i* received a mailing from charity *j* in period *t*. These mailings increase guilt even further, as the individual is then confronted with a direct appeal which makes his obligation more salient and makes him more aware of his own relative well-being. This increase in guilt δ_j is fund-specific, indicating that some funds might have a higher propensity to make someone feel guilty than others. For example, one would expect that ignoring a mailing of an international aid fund acting for children in need would on average increase the stock of guilt more than ignoring a mailing of a fund for research for some disease.

If the individual received one or more mailings during this time period *t*, he will decide whether to donate or not at the end of the period. If he makes a donation, this will reduce his stock of guilt, where we assume this reduction to be concave in the donation size. Higher donations reduce guilt more, but there are decreasing returns to scale, so that higher donations are less efficient. This implies that a certain optimal donation exists for each level of guilt and hence explains why individuals donate a certain amount and not more or less. Furthermore, Kahneman and Knetsch (1992) state that different charities may provide different amounts of moral satisfaction. Hence,

charities may differ in their effectiveness in reducing guilt and the same donation can thus result in different guilt reductions across different charities. Therefore, if an individual makes donations to multiple funds in one time period, these donations are combined in one weighted total donation $Dtot_{it} = \sum_{j=1}^{J} \gamma_j D_{ijt}$. The fund-specific weights γ_j represent the propensity to reduce guilt of the different funds.

Thus, based on the total guilt feelings during the period, which are exactly known to the individual but unobserved to the econometrician, he decides on the optimal donation D_{it} to reduce his guilt, resulting in an end of period stock of guilt $G_{i,t+1}$. In sum, the dynamics in the stock of guilt are given by[3]:

$$G_{i,t+1} = G_{it} + \varphi_{it} + \sum_{j=1}^{J} \delta_j m_{ijt} - \left(\beta_1 Dtot_{it} - \beta_2 Dtot_{it}^2\right) \text{ with } \varphi_{it} \sim LOG(\varphi, \sigma^2) \quad (3.3)$$

Here:

m_{ijt} indicates whether individual *i* received a mailing from fund *j* in period *t*.

$Dtot_{it}$ is the overall donation to charity, where each fund has its own effectiveness γ_j for transforming a monetary donation into a guilt reduction.

Summarizing, the utility maximizing individual faces a trade-off when deciding whether and how much to donate. Making a donation reduces his guilt, but comes at certain costs. If no donation is made, he saves himself the monetary value and fixed cost of the donation but his stock of guilt stays high. The model assumptions imply that a donation is made when the stock of guilt reaches a sufficiently high level and the donation will be higher, the higher the level of guilt.

3.3.3 Endogeneity of mail probabilities

Charities generally apply some form of target selection to select the individuals from their list of addresses to send a mailing. This means that the probability that an individual receives a mailing from a charity depends on his past donating behavior. For example, a charity assigns a high mail probability to an individual that has had a high

[3] Note that, as the stock of guilt cannot be negative, this equation only holds if the result is nonnegative. Otherwise, $G_{i,t+1}$ is set to zero.

response rate in the past. The result is that individuals with high response rates receive more mailings and the mail probabilities are endogenous.

We assume that the probability that individual *i* will receive a mailing from charity *j* in period *t+1*, $p_{ij,t+1}$, depends on whether or not he has responded to the last mail he received. Mailing probabilities do not change between mailing moments but are only updated after the (non-)response to a mailing is observed by the charity. Thus, for each charity *j* we distinguish two possibilities: a non-response mail probability p_j^{NR}, which is the probability charity *j* mails an individual that did not respond to their last mail in a certain period, and a response mail probability p_j^R, the probability charity *j* mails an individual that did respond to their last mail in a certain period. Since charities usually strive to target their best donators, we expect that $p_j^R > p_j^{NR}$.

Thus, the individual mailing probabilities change over time as a result of their dependence on the donating decisions over time. The dynamics of the individual mailing probability of charity *j* are given by:

$$p_{ij,t+1} = \begin{cases} p_j^{NR} & \text{if } m_{ijt} = 1 \text{ and } D_{ijt} = 0 \\ p_j^R & \text{if } m_{ijt} = 1 \text{ and } D_{ijt} > 0 \\ p_{ijt} & \text{if } m_{ijt} = 0 \end{cases} \tag{3.4}$$

Assuming rational expectations, an individual will be able to anticipate the impact of his donating decision on the future probability of receiving a mailing. Thus, an individual knows how his donation today affects his future mailing probability and takes this into account when deciding on his donation. For example, he may decide not to donate to avoid receiving a large amount of mailings in the future that will increase his guilt. On the other hand, if he expects he has to wait a while for the next donation opportunity he may be more prone to donate today so that his guilt doesn't get out of hand. Hence, he plans his donations optimally.

3.3.4 A dynamic programming approach

The individual's objective is to maximize his current discounted lifetime utility, which equals the utility in the current period plus the discounted expected future utility over an infinite time horizon. Thus, the objective function is:

$$V_{it} = E\left(\sum_{s=0}^{\infty} \lambda^s U_{i,t+s}\right) \tag{3.5}$$

where λ is the discount factor. The individual maximizes his lifetime utility by deciding whether and how much to donate in each period. Thus, the decision variable is D_{it}, the vector with donations made by individual *i* in period *t*. As can be inferred from equations (3.1)-(3.3), this decision depends on his current guilt G_{it} and the mailings he receives this period m_{it}, which also contribute to his guilt. Furthermore, as his decision today affects his future stock of guilt and thus his future utility through the mailing probabilities p_{it} (see equation (3.4)), his decision also depends on p_{it}. Together these variables contain the information that characterizes the state of the individual, on which he bases his decision. Hence, the stochastic dynamic optimization model contains one decision variable and three state variables, which are:

m_{it}	the vector that indicates from which funds individual *i* actually received a mailing in period *t*.
p_{it}	the vector of mailing probabilities for individual *i* in period *t*, that is $p_{it} = (p_{i1t},..., p_{iJt})$. For all *j*, p_{ijt} can take on two values, p_j^{NR} and p_j^R.
G_{it}	the guilt of individual *i* at the start of period *t*, which is stochastic and unobserved by us (so this is a latent state variable).

Each period, the individual decides on the optimal donations, based on the state he finds himself in. Although theoretically any donated amount is possible, it seems plausible to assume that people only donate certain focal amounts. After all, in practice people generally choose a round number and would not make a donation of, for example, €13.84. Many theoretically possible donations would never be observed in practice. Therefore, we assume the donating decision amounts to choosing from a discrete set of donations, represented by $\mathbf{D}$. We introduce the Cartesian product

$$\begin{aligned} &\mathbf{D}^{m_{it}} = \mathbf{D}^{m_{i1t}} \times \mathbf{D}^{m_{i2t}} \times ... \times \mathbf{D}^{m_{iJt}} = \\ &\left\{(d_1, d_2,..., d_J) \,|\, d_1 \in \mathbf{D}^{m_{i1t}} \wedge d_2 \in \mathbf{D}^{m_{i2t}} \wedge ... d_J \in \mathbf{D}^{m_{iJt}}\right\} \end{aligned} \tag{3.6}$$

where we define

$$\mathbf{D}^{m_{ijt}} = \begin{cases} \mathbf{D} & \text{if } m_{ijt} = 1 \\ 0 & \text{if } m_{ijt} = 0 \end{cases}. \tag{3.7}$$

Now, in each period *t* individual *i* will choose $D_{it} \in \mathbf{D}^{m_{it}}$, implying that donations can only be made to charities that send a direct mailing in this period.

Now, to solve the dynamic optimization problem through dynamic programming we consider the Bellman equation for optimality (3.8), where we omit the subscript *i* for notational convenience.

$$V_t^*(G_t, m_t, p_t) = \max_{D_t \in \mathbf{D}^{m_t}} \left\{ \begin{matrix} U_t\left(D_t, G_{t+1}(D_t, G_t, m_t)\right) \\ + \lambda \cdot E_t\left(V_{t+1}^*\left(G_{t+1}(D_t, G_t, m_t), m_{t+1}, p_{t+1}(D_t, m_t, p_t)\right)\right) \end{matrix} \right\} \tag{3.8}$$

This equation says that at each point in time the value function today must equal the utility of the optimal decision today plus the expected future utility of this decision. We solve the recursion through a value function iteration process to obtain the steady state point. This results in the value function and the policy function, that is, the optimized value of the problem and the optimal donations for each point in the state space.

Given that each donation incurs fixed costs, which we expect to be quite high, it will generally be optimal to make at most one donation[4]. To simplify solving the problem and reduce the computational burden, we therefore assume that, if an individual receives mailings of multiple charities in one period, he will specialize and donate to the optimal charity, that is, the charity that results in the highest value (cf. Andreoni and Payne (2003)). We will elaborate on this assumption in the data section. Finally, we discretize guilt through a uniform grid, so that all model variables are discrete.

3.3.5 Model estimation

We start by estimating the mailing probabilities given that an individual did or did not respond to the last mailing for each charity *j*, p_j^{NR} and p_j^R. For this, we implement a probit model for the mailing strategy of each charity, as follows:

[4] As making a donation to a charity affects the future mailing probability of that charity, theoretically there could be cases where an individual is willing to invest extra in fixed costs to influence multiple future mailing probabilities.

$$mail^{*}_{ijt} = \theta_{1j} + \theta_{2j} \cdot I[D_{ij\tau_{ijt}} > 0] + \eta_{ijt} \text{ with } \eta_{ijt} \sim N(0,1) \tag{3.9}$$

$$mail_{ijt} = \begin{cases} 1 & \text{if } mail^{*}_{ijt} > 0 \\ 0 & \text{otherwise} \end{cases} \tag{3.10}$$

where τ_{ijt} indicates the last period before t that individual i received a mailing from charity j. Then, p_j^{NR} and p_j^{R} are computed as

$$p_j^{NR} = \Phi(\theta_{1j}) \text{ and } p_j^{R} = \Phi(\theta_{1j} + \theta_{2j}) \tag{3.11}$$

with Φ the standard normal cumulative distribution function. We consider these probabilities as given and assume donors know these probabilities and thus anticipate how their behavior affects the charities' mailing probabilities over time.

Now, the sequence of states over time forms a Markov Decision Process. Given a policy function and the distribution of φ_{it}, we can compute the transition matrix to go from one point in the state space to another. In solving the DP problem, we assumed people behave optimally, in that they make the optimal donation decision. In reality, however, people may accidentally make a suboptimal decision. As people are imperfect, there may not be a one-to-one relationship between the stock of guilt and donations (Tangney, Stuewig and Mashek 2007). To accommodate for this possibility we allow for deviations from optimal behavior.

Let D denote any possible donating decision of individual i in period t. Then,

$$V_{it}(D, G_{it}, m_{it}, p_{it}) = \left\{ \begin{matrix} U_{it}\left(D, G_{i,t+1}(D, G_{it}, m_{it})\right) \\ + \lambda \cdot E_{it}\left(V^{*}_{i,t+1}\left(G_{i,t+1}(D, G_{it}, m_{it}), m_{i,t+1}, p_{i,t+1}(D, m_{it}, p_{it})\right)\right) \end{matrix} \right\} \tag{3.12}$$

denotes the value of making this decision, given optimal behavior in the future. So, for the optimal donating decision D^{*}_{it} it holds that:

$$D^{*}_{it} = \underset{D \in \mathbf{D}^{m_{it}}}{\arg\max} \{V_{it}(D, G_{it}, m_{it}, p_{it})\} \tag{3.13}$$

Also, note that:

$$V_{it}(D_{it}^{*}, G_{it}, m_{it}, p_{it}) = V_{it}^{*}(G_{it}, m_{it}, p_{it}) \tag{3.14}$$

as can be inferred from equation (3.8). Now, we allow for deviations from optimal behavior by introducing an error term and assume that for the actual donating decision D_{it} it holds that:

$$D_{it} = \underset{D \in \mathbf{D}^{m_{it}}}{\arg\max} \left\{ V_{it}(D, G_{it}, m_{it}, p_{it}) + \varepsilon_{it}^{D} \right\} \text{ with } \varepsilon_{it}^{D} \sim EV\left(0, \frac{1}{\omega^2}\right) \tag{3.15}$$

Note that this error term is not accounted for in solving the DP problem, that is, people will not anticipate they will make such errors when they solve their problem. The error term purely represents and accidental mistake when deciding on the donated amount, and not a shock in utility that people can anticipate. The probability that individual *i* makes donating decision $\overline{D}$ in period *t* now equals:

$$P[D_{it} = \overline{D}] = \frac{e^{V_{it}(\overline{D}, G_{it}, m_{it}, p_{it}) \cdot \omega}}{\sum_{D \in \mathbf{D}^{m_{it}}} e^{V_{it}(D, G_{it}, m_{it}, p_{it}) \cdot \omega}} \tag{3.16}$$

We compute the likelihood of the data given a parameter vector as follows. We start by solving the DP problem and computing the transition matrices from one state to another given all feasible decisions. From the logit probabilities in (3.16), the probability distribution of mail states and the transition matrices, we compute the stationary distribution over guilt and mail probability states, $\{G_{it}, p_{it}\}$. Then, for each individual we compute the likelihood of observing the T_i mail and donation observations over time, say y_i, given the parameters. To solve for the initial conditions problem (see Heckman (1981)), we use a start-up period to fix the first period mail probabilities p_{i1}. For the distribution of guilt we use the stationary distribution of guilt, properly conditioned on p_{i1}.

As various studies suggest there may be individual differences in proneness to guilt (e.g. Basil, Ridgway and Basil 2008) and responsiveness to guilt (e.g. Lascu 1991), we allow for heterogeneity in the model parameters. We introduce this heterogeneity by imposing a latent class structure with two segments. Let $L_i^c(y_i; \xi_c)$ be the likelihood of observing y_i, the mail and donation observations over T_i periods for individual *i*, for

latent class c given the model parameters for this class, summarized in ξ_c. Furthermore, let p be the probability of segment 1, which we compute as the average over all individuals i of

$$\frac{L_i^1(y_i;\xi_1)}{L_i^1(y_i;\xi_1)+L_i^2(y_i;\xi_2)}. \tag{3.17}$$

Then, we compute the total likelihood of the data across all n individuals given the parameters as:

$$\prod_{i=1}^{n}\left(pL_i^1(y_i;\xi_1)+(1-p)L_i^2(y_i;\xi_2)\right). \tag{3.18}$$

We estimate the dynamic programming model through a (numerical) Maximum Likelihood routine. In the next section, we describe the unique data we use to estimate the model.

3.4 Data

To estimate the model we have access to the databases of five large charity organizations in the Netherlands, allowing us to create a unique dataset of direct mailings and donations at the individual level. The charities are active in three different sectors, that is, two charities in the health sector, two charities in the international aid sector and one charity in the social welfare sector.

Obviously, not every individual in our dataset is a donator to all five charities. Privacy regulations in the Netherlands allow charities to store only addresses of individuals that have donated at least once to their organization in the past[5]. Hence, they can only send mailings to individuals that are their own donators. The charities that an individual donates to, and that are thus, so to say, active, are represented by the vector F_i. As F_i hardly varies over time, we can consider it the type of an individual. It represents from which funds an individual could receive mailings each period. Thus, the

[5] In fact, charities can also buy new addresses to send acquisition mailings, but are obliged to delete these addresses if the individuals do not respond. If they do respond they are added to the mailing list. Thus, in our data we only have individuals from the mailing lists.

state variable m_{it} is restricted by F_i. For example, if $F_i = \{1\ 0\ 0\ 0\ 0\}$, meaning that only fund 1 is active with this individual, he can only receive mailings from fund 1. The feasible mail states are then ' no mailing' and ' a mailing from fund 1', that is {0 0 0 0 0, 1 0 0 0 0}. These restrictions greatly reduce the state space. For each possible *F* type, we solve the dynamic programming problem separately (see Appendix 3.A for details on how we solve the dynamic programming problem).

Our dataset covers mailings and donations during three years, from January 2004 until December 2006. Our model applies only to active donators. For example, an individual that never donates and always throws out all charitable direct mailings immediately will not experience guilt as we have conceptualized it. Also, an individual that has informed a charity that he no longer wishes to receive direct mailings will not anticipate receiving such mailings in the future, the latter being what our model would predict. Finally, an individual that receives an acquisition mailing at the very end of the three year data period would, unrealistically, anticipate mailings from the start, according to our model. Therefore, we restrict our attention to all individuals that receive at least one mailing a year from all charities they donate to, that is, all charities in F_i. Furthermore, an individual has to make at least one donation each year. These restrictions ensure that we only consider active individuals, leaving out individuals that have stopped donating entirely, for example because they have died, or that no longer receive mailings from a charity, for example because they requested this.

Because each donation incurs fixed costs we assumed that, if an individual receives mailings of multiple charities in one period, he will specialize and donate to the optimal charity, that is, the charity that results in the highest value. In order for this model assumption to be realistic, we choose our time period such that it is plausible that people only make one donation in that time period. As multiple donations only occur in 0.1% of all individual-week combinations in the data of these five charities, we decided to aggregate the data to the week level. Individuals that do donate multiple times a week over the period of 2004 to 2006 are left out of consideration, as our model does not apply to them.

From the resulting dataset, that contains 18670 individuals, we randomly select 5000 individuals for estimating the dynamic programming model. We use the full sample for estimating the mailing strategy models. For each individual we can track exactly when they received direct mailings from any of the charities, and, if they responded to a mailing, how much they donated.

Table 3.1: Data available per charity

	# individuals	# observations	weekly mailing rate
Charity 1	1330	138320	0.110
Charity 2	13701	1424904	0.100
Charity 3	2795	290680	0.078
Charity 4	8593	893672	0.110
Charity 5	1831	190424	0.073

To ensure that the state space is properly initialized and that all individuals are equally represented we use the first year of data for initialization. This leaves 104 week observations per individual for estimation. Since not all individuals receive mailings from all charities the numbers of observations available for estimating the mailing strategy models differ across charities, see Table 3.1. Table 3.1 also presents the average weekly mailing rate per charity.

For estimating the dynamic programming model, weeks in which individuals do not receive a mailing are not informative about their behavior, as they can not take action. Only the weeks in which an individual receives at least one direct mailing make a relevant contribution to the likelihood; the likelihood of his donating actions. Thus, for the dynamic programming model, the randomly selected 5000 individuals constitute an unbalanced panel with T_i observations each. On average, we have 15 observations per individual, resulting in 76040 observations in total. In 0.6% of the individual week observations multiple charities send a mailing[6]. In fact, the maximum number of mailings received in one week is 3. During our two year estimation period, individuals receive 16 mailings on average, with a maximum of 61. Individuals make an average of 6 donations, which implies a response rate of 38.2%. Given that we are considering active donators this is quite reasonable for the Dutch situation.

Table 3.2 presents some descriptive statistics per year, averaged over the full sample of 5000 individuals. Charity 2 is the largest charity with the most donators, and it has by far the highest response rate. We see that the largest charities receive somewhat smaller donations. As individuals can receive mailings of multiple charities, the numbers of donators across charities add to more than 5000.

[6] In a small number of instances multiple mailings of the same charities were received. As personal communication with the charities' fund managers convinced us that this is not their intention we considered these mailings as one and the same.

Table 3.2: Descriptive statistics across charities per individual per year

	# donators	# mailings per year	# donations per year	response rate	average donation
Charity 1	336	0.77	0.19	0.25	€17.32
Charity 2	3690	7.84	4.33	0.55	€10.32
Charity 3	744	1.21	0.31	0.25	€15.84
Charity 4	2275	5.24	0.99	0.19	€12.60
Charity 5	488	0.74	0.22	0.30	€18.27
Total	5000	7.90	3.02	0.38	€11.48

Table 3.3: Descriptive statistics for individuals with different numbers of active charities

# active charities	# individuals	# mailings per year	# donations per year
1 charity	3121	5.96	3.06
2 charities	1352	9.66	2.79
3 charities	413	13.91	3.25
4 charities	101	17.82	3.74
5 charities	13	22.08	5.12

As explained before, charities can only send mailings to individuals on their mailing lists due to privacy regulations. In Table 3.3 we present the distribution of the number of charities in F_i. Furthermore, we present the average number of mailings and donations per year for individuals with different numbers of active charities. We find that 62% are only on one mailing list and thus only receive mailings from this charity. Furthermore, 8% of the individuals receive mailings from three funds, and only 0.3% receive mailings from all five funds. Regarding the number of mailings these individuals receive, we see that the more charities are active, the more mailings they receive, which is what we would expect. However, we also see that the number of donations does not grow proportionally. Hence, the response rate tends to decrease as the number of active charities increases.

3.4.1 Discrete state and decision variables

To be able to solve the dynamic programming problem and compute the likelihood through a Markov Chain procedure we need our state and decision variables to be discrete. Two of our state variables, mailing probabilities p_{it} and received mailings m_{it},

are already discrete. Our state variable guilt G_{it} and our decision variable donated amount D_{it} will have to be discretized. For guilt G_{it}, we choose a uniform grid with 101 grid points that ranges from 0 to 100 and from 0 to 150 for latent class 1 and 2, respectively. With these grids the stationary distribution was reasonable[7] at the final parameter estimates.

As explained in the model section, we assume the donating decision amounts to choosing from a discrete set of donations, represented by $\mathbf{D}$, as individuals generally donate certain focal amounts. To construct the set $\mathbf{D}$ we analyze the amounts that are donated in the data. In total the individuals in our sample donate 141 different amounts. We consider the eight amounts that are donated most frequently, and that we believe the model will still be able to distinguish between. For example, although €3.00, €2.00 and €2.50 are all donated frequently, we only include €2.50[8] in our grid. The amounts in $\mathbf{D}$ cover 65.2% of the donations exactly. All other donations are transformed into the amount in $\mathbf{D}$ that is closest.

The distribution of the (transformed) donations in the data over the focal amounts in $\mathbf{D}$ is in Table 3.4. We also present the average of the donations in the original data that have been transformed to each amount in $\mathbf{D}$. For example, the average of all donations that have been transformed to €5.00 (that is, all original donations between €3.75 and €6.25) is €4.87, which is very close. No severe skewness problems arise. The only exception is the focal amount of €100.00, which contains all donations higher than €75.00 and is thus not bounded from above. However, the high average of the original data (€157.08) is caused by a small number of outliers, with a maximum donation of €1000.00. In fact, both the mode and the median are equal to €100.00.

3.5 Empirical results

In this section we present the results of our empirical application. We discuss the estimation results for both the mailing strategy models and the dynamic programming model.

[7] That is, the overall stationary distribution contained a probability mass smaller than 1.e-04 for the highest gridpoint.

[8] This may seem a strange amount to donate, but is actually very common in the Netherlands, since the Dutch guilder, that was used until the introduction of the Euro in 2002, had a denomination of fl. 2.50.

Table 3.4: Distribution of donations

amount	average in original data	frequency	relative frequency
€2.50	€2.45	3284	10.88%
€5.00	€4.87	7521	24.94%
€7.50	€7.46	5944	19.69%
€10.00	€10.30	5512	18.26%
€15.00	€14.96	4437	14.70%
€25.00	€25.62	2599	8.61%
€50.00	€50.10	709	2.35%
€100.00	€157.08	178	0.59%
total		30184	100.00%

Table 3.5: Estimation results for the mailing strategy models

	Constant		Last response	
Charity 1	-1.237***	(0.005)	0.049***	(0.010)
Charity 2	-1.296***	(0.002)	0.030***	(0.003)
Charity 3	-1.431***	(0.004)	0.044***	(0.008)
Charity 4	-1.225***	(0.002)	0.006*	(0.005)
Charity 5	-1.461***	(0.005)	0.020**	(0.009)

*,**,***: significantly different from zero at respectively 10%, 5%, 1%.

3.5.1 Parameter estimates of the mailing strategy models

We estimate a probit model for the mailing strategy of each charity, with the response to the last mailing as explanatory variable, see equations (3.9) and (3.10). To ensure proper initialization of this variable and equal representation of all individuals we use the first year of data as the initialization period and start estimation on January 1st 2005. For an overview of the number of individuals and observations for each charity, see Table 3.1. The estimation results for all five charities are in Table 3.5.

We find that the response to the last mailing has a significant effect on the current mailing probability for all charities, although for charity 4 this is only marginally significant. Thus, charity 4 seems to target the least, which is confirmed by personal communication with the fund managers. Recently, this charity has started to regularly send direct mailings to the greater part of their database.

Using these parameter estimates we can compute the weekly mailing probabilities for each charity, given the response to the last mailing, see equation (3.11).

Table 3.6: Weekly mailing probabilities

	Mailing probability last non-response	Mailing probability last response
Charity 1	10.81%	11.75%
Charity 2	9.75%	10.29%
Charity 3	7.62%	8.26%
Charity 4	11.02%	11.14%
Charity 5	7.21%	7.48%

The results are in Table 3.6. We consider these mailing probabilities as given. Assuming rational expectations, donators will then know these probabilities and thus will realize how their behavior affects the charities' mailing probabilities. Next, we solve and estimate the dynamic programming model, where the mailing probabilities change over time as a result of their dependence on the donating decisions over time. Furthermore, in their expectation of future utility, individuals take into account how their decision today affects their future mailing probabilities.

3.5.2 Parameter estimates of the dynamic programming model

In order to identify the parameters in the dynamic programming model we set one of the guilt reduction effectiveness parameters γ_2[9] equal to 1. This is necessary since all guilt reduction effectiveness parameters are multiplied by the linear guilt reduction parameter β_1 (as can be inferred from equation (3)). Besides this normalization, we fix the discount factor λ at 0.975 to reduce computational burden. Estimating the dynamic programming model through Maximum Likelihood estimation results in the parameter estimates in Table 3.7.

We find a large segment of 76.6% and a smaller segment of 23.4%. Compared to segment 2, the large segment 1 has higher fixed costs and a lower linear guilt reduction parameter. Also, the charity-specific guilt reduction effectiveness parameters are much lower (except of course for the base charity 2, which we fixed at 1). This implies that the majority of the individuals donate not very often, but when they do donate their donations tend to be relatively high. After all, as their guilt reduction per donated Euro is lower, they have to make larger donations to achieve the same guilt reduction as individuals in segment 2.

[9] We chose charity 2 as the base charity because it is the largest.

Table 3.7: Estimation results for the dynamic programming model

	Segment 1		Segment 2	
	0.766		0.234	
Fixed cost fc	140.508***	(1.759)	43.576***	(0.107)
Guilt reduction linear β_1	3.815***	(0.075)	6.066***	(0.051)
Guilt reduction quadratic β_2	0.000	(0.000)	0.056***	(0.004)
Weekly guilt φ	0.000	(0.000)	0.000	(0.000)
Standard deviation σ	2.873***	(0.051)	3.123***	(0.012)
Direct mailing guilt				
Charity 1 δ_1	2.222***	(0.129)	1.466***	(0.069)
Charity 2 δ_2	7.613***	(0.121)	8.337***	(0.017)
Charity 3 δ_3	0.323***	(0.154)	0.000	(0.000)
Charity 4 δ_4	0.000	(0.000)	0.000	(0.000)
Charity 5 δ_5	3.207***	(0.202)	0.513***	(0.032)
Guilt reduction effectiveness				
Charity 1 γ_1	0.609***	(0.011)	0.850***	(0.008)
Charity 2 γ_2	1.000	(---)	1.000	(---)
Charity 3 γ_3	0.679***	(0.012)	0.856***	(0.007)
Charity 4 γ_4	0.681***	(0.007)	0.854***	(0.007)
Charity 5 γ_5	0.643***	(0.015)	0.848***	(0.214)
(1/standard deviation logit) ω	0.056***	(0.000)	9.799***	(0.878)

*,**,***: significantly different from zero at respectively 10%, 5%, 1%.

Furthermore, since they donate less often than individuals in segment 2 because of their higher fixed costs, their guilt will be higher when they do donate, resulting in even higher donations. Individuals in segment 2 donate more regularly, but they donate lower amounts.

Since both costs and utility are in a Euro metric, guilt is as well, implying that donating one Euro to charity 2 relieves 3.82 Euros worth of guilt for individuals in segment 1 and 6.07 Euros worth of guilt for individuals in segment 2. This seems low compared to the fixed costs of €140.51 and €43.58, respectively. However, as a guilt reduction persists in the future, it should be evaluated in terms of the net present value of these guilt reduction amounts. Disregarding, for simplicity, future opportunities to decrease guilt, the discount rate of 0.025 implies that the smallest possible donation of

€2.50 could potentially reduce the stock of guilt with 381.50 Euros worth of guilt in segment 1 and 606.60 Euros worth of guilt in segment 2. In solving the dynamic programming model, individuals will account for these large future benefits of donating today, but they also realize that there will be future opportunities to reduce guilt.

The quadratic guilt reduction parameter is not significant for segment 1. However, because guilt cannot be negative and is thus bounded from below at zero, the reduction of guilt is still concave in the size of the donation. The estimated location parameter φ is not significantly different from zero in either segment. Nonetheless, the random increase φ_{it}, which follows a *censored* logistic distribution with mean φ and standard deviation σ, is positive on average. Again, this is caused by the fact that guilt cannot become negative, so that the effective realizations of φ_{it} are censored from below.

Guilt induced by direct mailings varies over charities. A direct mailing of charity 2 causes most guilt, in both segment 1 and 2. In segment 1, charity 1 and 5 also cause quite some guilt. Mailings of these charities affect guilt in segment 2 as well, but not as much as in segment 1, especially compared to mailings of charity 2. Charity 3 only causes a little guilt in segment 1, and charity 4 fails to induce guilt in either segment. As charity 3 is the only social welfare charity, its lack of guilt induction may be caused by guilt attribution. Potential donators may feel that the beneficiaries of this charity brought their fate upon themselves and therefore feel less guilty. Regarding charity 4, a similar story may apply, as it concerns a type of disease that most people feel is a consequence of an individual's behavior and lifestyle.

The guilt reduction effectiveness parameters also differ somewhat over charities. The effectiveness parameter for charity 2 γ_2, which we fixed at 1, is by far the largest in both segments. Combined with the high direct mailing guilt induction of this charity, this agrees with the fact that charity 2 has the highest response rate of the five charities (see Table 3.2). Finally, we find that ω, representing the inverse of the standard deviation of the error term ε_{it}^{D} in equation (3.15), differs substantially across segments. To aid interpretation, we compute the R^2 implied by these parameter estimates. That is, we assess the portion of the variance in the value function explained by the model without the error ε_{it}^{D}. Note that the variance in the value function also includes unobserved variation through the other stochastic component in the model, the random guilt increase φ_{it}. This stochastic component, however, only concerns the distribution of donated amounts, assuming the optimal charity is chosen. We find an R^2 of 0.65 and 1.00 in segment 1 and 2, respectively. Thus, in segment 2 the behavior

predicted by the solution of the DP problem and the predicted behavior allowing deviations from optimality are equal. That is, in segment 2 φ_{it} is sufficient to fit the distribution of donated amounts and an individual in segment 2 is predicted to always choose the charity that results in the highest value. With an R^2 is 0.65, the behavior predicted by the solution of the DP problem and the behavior subject to deviations from optimality are also quite similar. Thus, although we do include an error term in the model to allow for deviations of optimal behavior, it is of little consequence in practice.

3.5.3 Model fit

To assess the fit of the model we compare the distribution of donated amounts conditional on receiving a mailing predicted by the model with the actual distribution in the data. To compute the actual distribution per segment, we use the posterior means of the classification probabilities for each segment as weights. From the donation distributions, we also compute the expected donated amount in a random week, conditional on receiving a charitable direct mailing. Table 3.8 presents the results for both latent segments separately and for the total sample. Overall, the model fit is quite good. The model predicts a slightly higher response to mailings than the actual response rate and the expected donated amounts conditional on receiving a mailing are somewhat overestimated. On the other hand, the model predicts a relatively low frequency of the highest possible donation of €100.00.

Next, we assess how well the model fits differences between charities. Table 3.9 presents the actual and fitted distribution of weekly donated amounts per charity, conditional on receipt of a mailing from that charity. We find that the model picks up differences between charities remarkably well. For example, the non-response rate of charity 2, which is much lower than that of the other four charities, is indeed predicted to be much lower. Also, the dip in the data for €7.50 donations, which is present for all charities except charity 2, manifests itself in the fitted distributions for these charities. The big jumps between amounts in the data are smoothed out somewhat by the model, as becomes clear from Figure 3.1, which presents the actual and fitted distribution for charity 1.

Table 3.8: Actual and fitted distribution of donated amounts conditional on receipt of a mailing

	Segment 1		Segment 2		Total	
	actual	model	actual	model	actual	model
€0.00	65.40	62.56	46.41	44.86	60.31	58.41
€2.50	0.06	0.46	15.92	16.17	4.32	4.15
€5.00	1.45	3.32	32.90	27.93	9.89	9.09
€7.50	9.48	7.04	3.28	7.34	7.82	7.11
€10.00	9.45	9.03	1.26	2.46	7.25	7.49
€15.00	7.91	9.44	0.17	1.06	5.84	7.47
€25.00	4.65	6.37	0.06	0.18	3.42	4.92
€50.00	1.27	1.67	0.01	0.01	0.93	1.28
€100.00	0.32	0.10	0.00	0.00	0.23	0.08
Expected amount given a mailing	5.03	5.56	2.46	2.80	4.34	4.91

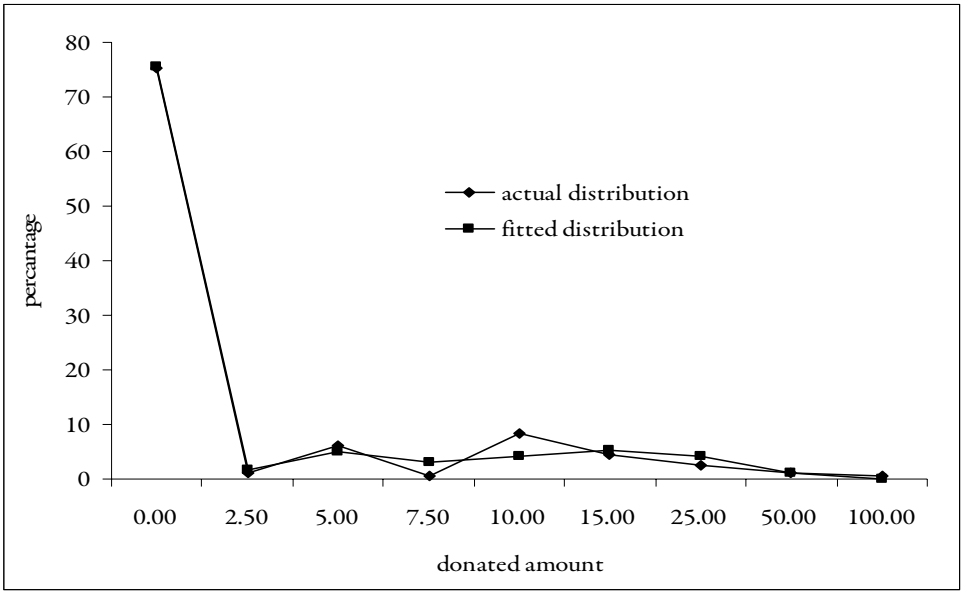

Figure 3.1: Actual and fitted distribution of donated amounts to charity 1 conditional on receipt of a mailing from charity 1

Table 3.9: Actual and fitted distribution of donated amounts per charity conditional on receipt of a mailing of that charity

	Charity 1		Charity 2		Charity 3		Charity 4		Charity 5	
	actual	model	actual	model	actual	model	actual	model	actual	model
€ 0.00	75.17	75.55	44.77	50.34	74.75	77.26	81.11	77.74	70.43	71.63
€ 2.50	1.20	1.53	7.06	5.22	1.71	1.98	1.22	1.72	1.27	1.82
€ 5.00	6.23	5.04	13.98	11.53	6.54	4.74	4.77	4.85	4.20	4.91
€ 7.50	0.65	3.06	14.34	9.08	0.79	3.27	0.66	3.25	1.99	3.84
€ 10.00	8.27	4.12	6.80	9.07	8.14	3.98	6.73	3.96	7.33	5.00
€ 15.00	4.43	5.41	7.19	8.31	3.97	4.55	3.21	4.48	9.87	6.40
€ 25.00	2.43	4.11	4.66	5.10	2.52	3.26	1.69	3.13	2.21	4.92
€ 50.00	1.07	1.12	1.03	1.28	0.94	0.89	0.54	0.82	1.83	1.40
€ 100.00	0.55	0.07	0.17	0.08	0.63	0.06	0.07	0.05	0.86	0.09
Expected amount given a mailing	3.57	3.40	5.56	5.53	3.57	2.93	2.24	2.84	4.94	4.05

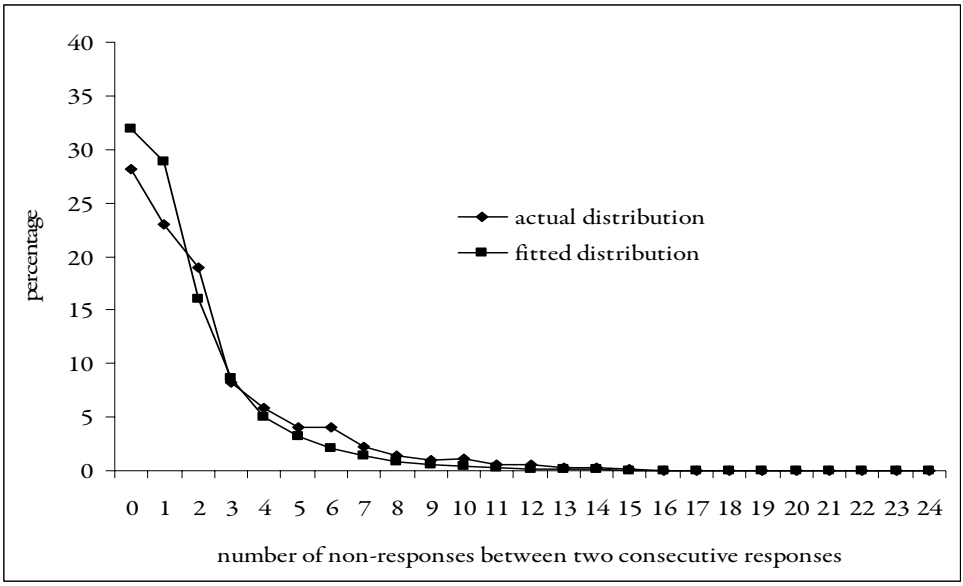

Figure 3.2: Actual and fitted distribution of number of non-responses between two consecutive responses

In Figure 3.2, we provide some evidence on how well the model fits choice dynamics. We compare the simulated and actual distributions of the number of non-responses to direct mailings between two consecutive responses. We compute the actual distribution by taking the number of non-responses for each individual between their first and second response. As we excluded donators with less than one donation per year, every individual in the sample makes at least two donations during our data period.

We see that the model somewhat overestimates the frequency of very small inter-response numbers of non-responses. For example, the model predicts that 32.0% of the responses are followed by another response vs. 28.1% in the data. For one non-response between two responses the model predicts 28.8% vs. 23.0% in the data. Apart from that, the actual and fitted distributions correspond quite well. Furthermore, both the modal and median number of non-responses between two consecutive responses of respectively zero and one in the data are correctly predicted by the model.

3.6 Policy experiments

Our structural model can be used to conduct a multitude of possible policy experiments. In this section, we study the impact of variations in the charities' mailing strategies.

A charitable organization has two types of stakeholders, that is, the donators and the beneficiaries. The organization acts as an intermediary to transfer funds from the donators to the beneficiaries. In our structural model we model the behavior of the donators, and consider the mailing strategy of the charity from the donator's point of view as given. We can now analyze the impact of a change in the mailing strategies on both charity revenues and donator welfare. Hence, our model permits an analysis of optimal mailing strategies from the beneficiaries' point of view, by maximizing revenues, and from the donators' point of view, by maximizing utility. In Tables 3.10 and 3.11, we present the results of a number of different mailing strategies.

In Table 3.10, we present the expected weekly revenues for various mailing strategies. We compute the expected weekly revenues using the stationary distribution and take into account the costs of a mailing (both printing and postal costs) and the costs of collecting a donation made through a transfer form. We set these costs at €0.50 and €0.17 respectively, after consulting the fund managers of the involved charities. Thus, we find that the total expected weekly revenues per donator for our five charities at their current mailing strategies are €0.552[10], the largest part of which goes to charity 2.

Next, we analyzed how these revenues change for a number of other strategies. For example, instead of a low and high mailing probability for individuals that did not and individuals that did respond to the last mailing, charities could choose not to target and simply mail every individual in their database with a certain probability, regardless of their past behavior. We chose to use the average weekly mailing rate in the total sample for each charity, see Table 3.1. It appears that this strategy would result in slightly higher total weekly revenues of €0.553, although revenues do not increase for all charities, and the difference is only marginal.

Another option is to switch the high and low mailing probabilities. We study what would be the effect of targeting those that did not respond to the last mail. This results in even higher total weekly revenues of €0.555.

[10] The actual weekly revenues per donator after subtracting mailing and collecting costs are €0.549. As we established before, the model fits donating behavior quite accurately.

Table 3.10: Expected weekly revenues for various mailing strategies

	Charity 1		Charity 2		Charity 3		Charity 4		Charity 5		Expected weekly revenues					
	p^{NR}	p^{R}	p^{NR}	p^{R}	p^{NR}	p^{R}	p^{NR}	p^{R}	p^{NR}	p^{R}	1	2	3	4	5	Total
current	0.108	0.117	0.098	0.103	0.076	0.083	0.110	0.111	0.072	0.075	0.021	0.363	0.028	0.116	0.025	0.552
flat	0.110	0.110	0.100	0.100	0.078	0.078	0.110	0.110	0.073	0.073	0.021	0.367	0.027	0.114	0.025	0.553
switched	0.117	0.108	0.103	0.098	0.083	0.076	0.111	0.110	0.075	0.072	0.022	0.370	0.027	0.112	0.025	0.555
always	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.048	1.705	0.062	0.254	0.085	2.154
optimized*	1.000	0.408	1.000	1.000	0.086	1.000	0.063	0.121	1.000	1.000	0.106	1.993	0.020	0.062	0.125	2.306

*: Optimization criterion = total revenues

An explanation for this result could be that people that did not donate the last time now have higher guilt and are therefore more eager to donate. Again, the difference in revenues with the current strategy is very small, but it does indicate that there could be something to gain from a different strategy.

Another simple strategy would be to mail everyone all the time. This improves the weekly revenues tremendously. The total revenues almost quadruple, and revenues are between two and almost five times as high for individual charities. Although this may seem appealing at first sight, we should note that our model does not account for irritation. When individuals would receive a mailing from each charity each week our guilt buildup concept may not be the only driver anymore. Instead of inducing guilt, the extra mailing could induce irritation and cause people to stop donating all together.

The final line in Table 3.10 presents the mailing strategy that maximizes total weekly revenues, and is thus optimal from the beneficiaries' point of view. We find that indeed the total revenues are even higher than for all charities to send a mailing to every individual every week. However, to achieve this result, charity 3 and 4 have to sacrifice some revenues compared to the current strategy. Hence, although the total revenues are maximized, not all individual charities gain from this strategy. For all charities except charity 4 it appears optimal to mail at least part of the sample every week. As mailings of charity 4 induce no guilt whatsoever (see Table 3.7 for the parameter estimates of the dynamic programming model), it seems plausible that mailing all individuals all the time may cost more than it yields for charity 4. Charity 2 and 5, that induce much guilt relatively, should mail all individuals every week, regardless of whether they responded to the last mail or not. Charity 1, that also induces quite some guilt – even more than charity 5 – but has a lower overall guilt reduction effectiveness, should only mail individuals that did not respond to the last mail every week. The explanation might be that individuals that just responded have a relatively low level of guilt, so that their inclination to respond again is already quite low. As charity 1 has the lowest guilt reduction effectiveness, individuals that do respond will not pick this charity if multiple mailings are received, and it therefore does not make much sense for charity 1 to mail all these individuals every week. For charity 3, we observe the opposite – and rather counterintuitive – pattern. Each week, they should mail all individuals that responded to the last mail, and only part of the individuals that did not respond. Obviously, because of the complicated interrelations between all parameters it is hardly possible to uncover the precise underlying reasoning behind the optimal strategy.

Table 3.11: Expected weekly utility for various mailing strategies

	Charity 1		Charity 2		Charity 3		Charity 4		Charity 5		Expected weekly utility
	p^{NR}	p^{R}	p^{NR}	p^{R}	p^{NR}	p^{R}	p^{NR}	p^{R}	p^{NR}	p^{R}	
current	0.108	0.117	0.098	0.103	0.076	0.083	0.110	0.111	0.072	0.075	-634.596
flat	0.110	0.110	0.100	0.100	0.078	0.078	0.110	0.110	0.073	0.073	-634.514
switched	0.117	0.108	0.103	0.098	0.083	0.076	0.111	0.110	0.075	0.072	-633.826
always	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	-1369.464
optimized*	0.094	0.997	0.056	0.083	0.296	0.374	0.999	1.000	0.065	0.106	-584.487

*: Optimization criterion = total revenues

Next, we discuss Table 3.11, which presents the expected weekly utility for various mailing strategies. We find that the expected weekly utility, which we compute via the stationary distribution, is -634.596 for the current mailing strategy. Just as above, the flat mailing strategy and the switched mailing strategy result in a slight improvement (-634.511 and -633.824, respectively). Thus, charities would benefit both beneficiaries and donators with either of these strategies. However, the strategy to mail all individuals every week decreases utility substantially, as lots of direct mailings induce lots of guilt. Thus, although this strategy yields a high return and may be desirable from the beneficiaries' point of view, from the donators' point of view it is not. The difference between the current strategy and this strategy indicates that charities seem to account for the donators' utility, at least to a certain extent.

The final line in Table 3.11 presents the mailing strategy that maximizes the expected weekly utility, and is thus optimal from the donators' point of view. We find that mainly charities that do not induce much guilt should increase their mailing frequencies compared to the current strategy. In that way, individuals have many opportunities to attenuate their guilt, while their guilt is hardly increased by all these requests. Note that this optimal strategy from the donators' point of view does not correspond at all to the optimal strategy from the beneficiaries' point of view. In fact, the total weekly revenues of the strategy that maximizes utility are €0.366 and the weekly utility of the strategy that maximizes revenues is -1392.553. Both are much worse than the results of the current strategy, indicating that the charities seem to take account of both stakeholders.

Table 3.12: Signs of marginal derivates of expected weekly utility and revenues

	Utility	Total revenues	Charity 1 revenues	Charity 2 revenues	Charity 3 revenues	Charity 4 revenues	Charity 5 revenues
$\partial / \partial p_1^{NR}$	−	+	+	−	−	−	−
$\partial / \partial p_1^{R}$	+	+	+	+	+	+	+
$\partial / \partial p_2^{NR}$	−	+	−	+	−	−	−
$\partial / \partial p_2^{R}$	−	+	+	+	+	+	+
$\partial / \partial p_3^{NR}$	+	+	−	−	+	−	−
$\partial / \partial p_3^{R}$	+	+	−	−	+	−	−
$\partial / \partial p_4^{NR}$	+	+	−	−	−	+	−
$\partial / \partial p_4^{R}$	+	+	−	−	−	+	−
$\partial / \partial p_5^{NR}$	+	+	−	−	−	−	+
$\partial / \partial p_5^{R}$	+	+	−	−	−	−	+

Next, we study the impact of the individual charities on the expected utility and revenues, by computing the marginal derivatives of these criteria with respect to the charities' mailing probabilities in the current mailing strategy. In Table 3.12 we present the signs of the marginal derivatives. A number of clear patterns can be observed. To increase the expected weekly utility, we find that most charities can increase both their mailing probability for individuals that did not respond to their last mailing and the mailing probability for individuals that did respond to their last mailing, p^{NR} and p^{R}. An increase in mailing frequencies of charity 2, which induces the most guilt by far, has a negative effect on utility, while for charity 1 results are mixed. Although these results concern marginal derivatives of the separate charities, the directions mostly agree with the simultaneously optimal strategy.

Regarding the expected total revenues, we find that all charities have positive marginal derivatives. Thus, for all charities separately, sending more direct mailings results in higher total revenues. However, although an increase in mailing frequency leads to an increase in total revenues, most competitive interactions are negative. That is, when a charity increases its mailing frequencies it increases its own revenues, but it decreases revenues for the other charities. Exceptions are the mailing probabilities to

those that did respond to the last mail of charity 1 and 2, the two charities with the highest guilt induction. Increasing these probabilities increases revenues for all charities.

3.7 Discussion and conclusion

In this chapter we studied how guilt affects charitable donating to multiple charities over time. We put forward a stochastic dynamic programming model, which we estimated using a unique dataset containing all direct mailings from and donations to five of the largest Netherlands-based charities during three years. We introduced heterogeneity in the parameters by imposing a latent class structure with two segments. As charities apply target selection techniques, the probability that an individual receives a mailing from a charity depends on his past donating behavior. To capture this endogeneity, we assumed that the individual mailing probability depends on the last response decision. To obtain each charity's mailing probability given response or non-response to the last mailing, we therefore first estimated a probit model for the mailing strategy of each of the charities.

As expected, we found that charities do indeed target the better donators, evidenced by significant and positive effects of response to the last mailing on future mailing probabilities for all charities. Taking the estimated mailing probabilities as given and assuming rational expectations, the subsequently obtained parameter estimates for the dynamic programming model indicate that there is a large segment of individuals who donate not very often but with large amounts, and that there is a smaller segment of individuals who donate more frequently with smaller amounts. Furthermore, some charities seem to induce more guilt than others, and also some charities are more effective in reducing guilt than others. We show that our model of guilt build-up and relief fits actual behavior quite accurately. The predicted distributions of donated amounts and of the number of non-responses between two consecutive responses closely follow the patterns in the data. Differences between charities are also picked up remarkably well.

Although our data set is unique because it combines individual-level data from multiple organizations, it of course does not cover all charities. We therefore ran a robustness check by re-estimating the model with only four of the five charities, and no substantial differences were noted. We are thus fairly confident with the main findings.

Our structural model enabled us to do some policy experiments. We showed that the mailing strategies can be improved to the benefit of either the beneficiaries or

the donators of the charities. To increase total revenues, charities which induce guilt should increase their mailing frequencies, because individuals will then donate more often to reduce their high guilt levels. To increase donators' welfare, the charities that do not induce guilt should increase their mailing frequencies, as this would result in more opportunities to attenuate guilt without increasing it. As the results of the current mailing strategies of the charities are somewhere between the results of the optimal strategies from both viewpoints, they seem to be taking both types of stakeholders into account.

Since the stock of guilt is unobserved and thus a latent variable, one may wonder whether it is actually guilt that is captured by the model and whether guilt is the only motivating factor for donating to charity. We argued that most pervasive motivations of charitable giving do not fit readily into a dynamic framework. The motivations that only affect individual responses statically, so without a dynamic component, will be captured by the logistic error term in our model (see equation (3.3)). An alternative and more dynamic driver could be the management of one's self-image, where people feel better about themselves when they donate and their self-image thus increases when they make a donation. It might, however, well be that this feeling of feeling good about yourself is not only instantaneous, but that it slowly decreases over time, similar to the increases in guilt in our model. Thus, a model of self-image management would come down to a mirror image of the guilt model, where a high level of guilt corresponds to a low self-image. The implications of a self-image management theory for donating behavior would therefore be very similar to those of guilt. In fact, our model could be easily reinterpreted in this context. The same holds for the warm glow concept that has prevailed in the economics literature on donating. So far it has only been conceptualized in a static context, but the extension of a warm glow feeling to a dynamic context would intuitively follow the self-image management theory outlined above, as warm glow is the feeling one gets of doing good. Whether donating behavior is driven by guilt, warm glow or self-image management is a question that cannot be answered based on objective data of donating behavior itself. Future research could go deeper into the underlying motivational process, for example through survey research. Most importantly, a dynamic model of donating behavior would result in predictions and implications similar, if not equal, to our model of guilt build-up and relief.

Our study is not without limitations. We want to note, however, that our main limitations are all caused by restricted computing power and time, and are not

insurmountable weaknesses of the model. If computing time was unlimited, all limitations below could be easily addressed.

One limitation is that we let the charities' mailing strategies depend only on the response to the last mailing, which we did for mere convenience as the state space thus became reasonably feasible. In reality, charities may use other variables to describe past behavior, such as response rates or average past amount donated. However, our personal consultation with the charities' managers confirmed that recency variables, such as our response to the last mailing, are the most important target variables.

A second limitation is that we only allowed for two latent segments. We did not test whether this is the optimal number of segments. Perhaps estimating the model with more than two segments would result in an even better model fit. However, as estimating the current model was already extremely time-consuming, we decided to leave this extension for further research.

A third limitation is our assumption that people make at most one donation a week. If they receive mailings of multiple charities, they focus on the charity which yields the highest value. Because of the large fixed costs of making a donation, in general it would be optimal to select one charity. However, because of the effect of donating on future mailing probabilities, theoretically an individual could be willing to have more fixed costs. As allowing for this possibility would increase computation time, and also because multiple donations in one week were virtually nonexistent in our data set, we chose to keep it as simple as possible.

A final limitation is that our model does not account for irritation caused by direct mailings. At very high mailing frequencies, the guilt build-up concept as we described it might not apply anymore and other drivers may interact. Instead of inducing guilt, extra mailings could induce irritation and perhaps cause people to reduce donations or even stop donating entirely. To account for irritation we would have to include a disutility of mailings, for example by including the number of direct mailings received in the past year. This would mean that an extra state variable would have to be added to the state space, increasing computation time tremendously. Further research should examine the role of irritation, and whether the optimal policies would change due to irritation. We want to note, however, that Chapter 5 of this thesis shows that although direct mailings do cause irritation, this irritation is not translated into a change in donating behavior.

3.A The solution of the dynamic programming problem

In this appendix we describe the details of how we solve the dynamic programming (DP) problem faced by individuals in our model, where we omit the subscript *i* for notational convenience. In order to construct the value function, which is a function of the state space, we need to compute the value for each possible point in the state space. First, to aid computation, we split the random shock φ_t into a deterministic part φ and a stochastic part $\varepsilon_t \sim LOG(0,\sigma^2)$ and we define the new state variable $\widetilde{G}_t = G_t + \varepsilon_t$, so that we have from (3.1) and (3.3):

$$G_{t+1} = \widetilde{G}_t + \varphi + \sum_{j=1}^{J} \delta_j m_{jt} - \left(\beta_1 Dtot_t - \beta_2 Dtot_t^2\right) \tag{3.19}$$

$$\widetilde{G}_{t+1} = \widetilde{G}_t + \varepsilon_{t+1} + \varphi + \sum_{j=1}^{J} \delta_j m_{jt} - \left(\beta_1 Dtot_t - \beta_2 Dtot_t^2\right) \tag{3.20}$$

$$U_t = -\left(\widetilde{G}_t + \varphi + \sum_{j=1}^{J} \delta_j m_{jt} - \left(\beta_1 Dtot_t - \beta_2 Dtot_t^2\right)\right) - C_t \tag{3.21}$$

where $Dtot_t$ and C_t are as defined before. Then, we redefine the state space as $\left\{\widetilde{G}_t, m_t, p_t\right\}$ and construct the Bellman equation:

$$V_t^*(\widetilde{G}_t, m_t, p_t) = \max_{D_t \in \mathbf{D}^{m_t}} \left\{ \begin{array}{l} U_t\left(D_t, \widetilde{G}_t, m_t\right) \\ + \lambda \cdot E_t\left(V_{t+1}^*\left(\widetilde{G}_{t+1}(D_t, \widetilde{G}_t, m_t), m_{t+1}, p_{t+1}(D_t, m_t, p_t)\right)\right) \end{array} \right\} \tag{3.22}$$

We discretize the state variable guilt $\widetilde{G}_t$ through a uniform grid, and assume that people only donate certain focal amounts, so that all model variables are discrete. Furthermore, people can only donate to charities that send a mailing and we assume that, if an individual receives mailings of multiple charities in one period, he will specialize and donate to the optimal charity, that is, the charity that results in the highest value. We solve the recursion in the Bellman equation (3.22) through a value function iteration process to obtain a steady state point, by proceeding as follows.

Since both the mailing probability state variable p_t and the mailing state variable m_t are restricted by the active charities vector *F* and these restrictions greatly reduce the state space, we solve the dynamic programming model separately for each possible *F* type. For example, if *F* = {1 0 0 0 0}, meaning that only charity 1 is active with

this individual, he can only receive mailings from charity 1. The feasible mail states are then ' no mailing' and ' a mailing from charity 1', that is {0 0 0 0 0, 1 0 0 0 0}. Then, although the number of grid points for the guilt state variable is unchanged, the number of state points for both p_t and m_t is greatly reduced, and we only have to compute the value function for the feasible state points. Thus, for each possible *F* type, we do the following.

We initiate the value at time *t*+1, $V^*_{t+1}(\tilde{G}_t, m_t, p_t)$ at a certain value for all points in the state space[11]. Next, we compute $V^*_t(\tilde{G}_t, m_t, p_t)$ given this $V^*_{t+1}(\tilde{G}_t, m_t, p_t)$ through the following steps:

- For all possible mailing probability states p_t:
  - For all possible mailing states m_t: we compute the value $V^*_t(\tilde{G}_t, m_t, p_t)$ and the optimal donation for all possible guilt states $\tilde{G}_t$. For this, we distinguish three cases:
    1) No mail is received in period *t*, so m_t ={0 0 0 0 0}.
       In this case no donation can be made and the optimal donation is automatically zero. Furthermore, as no mail is received, the mailing probability state does not change (see equation (3.4)), so that the state for the next period p_{t+1} equals that of the current period p_t. We compute the mail combination probability distribution for the next period, that is, the probabilities of receiving every possible combination of mailings m_{t+1}. For example, if *F* = {1 1 0 0 0} and $p_{t+1} = \{p_{1,t+1}, p_{2,t+1}\} = \{0.1, 0.2\}$, then the probability of receiving no mailing, only a mailing of charity 1, only a mailing of charity 2, or mailings of both charities in period *t+1* are respectively 0.72, 0.08, 0.18 and 0.02. For each possible guilt state $\tilde{G}_t$ we compute the utility in period *t* U_t according to equation (3.21). Subsequently, we compute the expectation in the Bellman equation (3.22) $E_t\left(V^*_{t+1}\left(\tilde{G}_{t+1}(D_t, G_t, m_t), m_{t+1}, p_{t+1}(D_t, m_t, p_t)\right)\right)$ by integrating out ε_{t+1} to obtain $\tilde{G}_{t+1}$ through equation (3.20) and integrating out the future mail states m_{t+1} through the computed mail probability distribution. Note that we do not have to integrate out the future mail probability states p_{t+1}, since these are completely determined by the state and decision in period *t* and are

[11] During likelihood computation we use the previously obtained value function as the initialization for a new set of parameters, in order to save computation time.

thus not stochastic. Next, we compute $V_t^*(\tilde{G}_t, m_t, p_t)$ according to this equation, where we interpolate the expectation.

2) Only a single mailing is received in period *t*, so m_t ={1 0 0 0 0}, for example. In this case a donation can be made to the charity sending the mailing. Hence, for all possible donations *D* (including no donation, so €0.00) we compute the new mailing probability state p_{t+1} through equation (3.4). Next, we compute the new mail combination probability distribution, so the probability distribution of m_{t+1}. For each possible guilt state $\tilde{G}_t$ we compute the expectation in the Bellman equation as in 1) given the donation *D* and compute the value for this decision, say $V_t(D, \tilde{G}_t, m_t, p_t)$. Now, for each guilt level we choose the optimal donation as

$$D_t^* = \arg\max_D \left\{ V_t(D, \tilde{G}_t, m_t, p_t) \right\} \tag{3.23}$$

and the value function as

$$V_t^*(\tilde{G}_t, m_t, p_t) = V_t(D_t^*, \tilde{G}_t, m_t, p_t) \tag{3.24}$$

3) Multiple mailings are received in period *t*, so m_t ={1 1 1 0 0}, for example. In this case we assume that people donate only to the charity that results in the highest value. We observe that the only difference between receiving one mailing and receiving multiple mailings comes from the extra guilt from the mailings. Thus, instead of computing all values for all donations to all charities we derive the value function with multiple mailings from the value function with single mailings from 2) by shifting the value functions with a single mailing by the difference in guilt, which reduces computation time tremendously.

Thus, for each charity that sends a mailing we compute the new mailing probability state p_{t+1} for all possible donations *D* (including no donation), should this charity be chosen. Then we derive the value from the value for this p_{t+1} and m_t =only a mailing from this charity, which has been computed in 2). We compute the difference in guilt through the δ parameters to determine at which guilt levels we need to read the value function and interpolate the value function. We also take the optimal

donations that go with these values. Should we interpolate the value function and the two grid points deliver two different donations, we compute the value and the optimal donation for these separate guilt levels and choose the highest value and the accompanying donation.

After deriving the value from every single charity, we choose for each guilt level the highest value and accompanying donation, including the charity that it is donated to, resulting in the value function and optimal donation for mail states with multiple mailings.

Together, these computations result in the value function for the entire state space $V_t^*(\widetilde{G}_t, m_t, p_t)$. We compute the stopping criterion for the recursion as the sum of the absolute values of the difference between $V_t^*(\widetilde{G}_t, m_t, p_t)$ and $V_{t+1}^*(\widetilde{G}_t, m_t, p_t)$ in all points in the state space. We replace $V_{t+1}^*(\widetilde{G}_t, m_t, p_t)$ by $V_t^*(\widetilde{G}_t, m_t, p_t)$ and iterate until convergence.

Part II

Experimental Evidence

Chapter 4

Donating to Charity: Insights from a Natural Field Experiment

4.1 Introduction

The non-profit sector continues to grow. In 2006, charities in the US raised a combined $295 billion, an increase of 4.2% compared to 2005 (Giving USA 2007). To keep donors contributing, charities make use of all sorts of fundraising tools and activities, the most popular being direct mail (Sargeant and Kähler 1999). As charities depend for a large part on their revenues from direct mail it is important to know the precise effects of charitable direct mailings.

The number of direct mailings charities send is unabatedly on the rise. Potential donors are deluged by huge amounts of mailings of many different charities, all soliciting their donations (Abdy and Barclay 2001; Andreoni 2006). When multiple organizations send multiple mailings, interference is likely to occur (Greyser 1973). Interference of direct mailings may affect charitable giving along two dimensions: 1) along the time dimension, affecting future donations and 2) along the competitive dimension, affecting donations to other charities (see Chapter 2 of this thesis).

Existing literature on donating to charities has mainly focused on donation behavior in response to a single mailing, see Karlan and List (2007) and Landry et al. (2006) for some recent examples. Although these studies provide important new insights, they do not study the impact of the focal mailing on donations to other mailings, neither from other charities nor future mailings from the same charity. Consequently, little is known about the impact of a mailing on other mailings.

At the same time, insights into the competitive interactions between charitable mailings across multiple charities are a necessary ingredient for a proper focusing of future theoretical developments on charitable giving. Some of the important questions that are yet unanswered include: Are different charities perfect substitutes as one would implicitly infer from Andreoni's theory of warm glow giving (Andreoni 1990)? Does the warm glow feeling cool down over time? Is there a preference for variety? Our analysis on the competitive effects of mailings from different charities over time aims to shed some light on these issues.

In general, competitive charitable direct mailings will reduce each other's effectiveness by increasing irritation and by drawing from a limited pool of financial resources. However, the competitive impact of mailings of multiple charities might vary over time. In particular, when they are received (almost) simultaneously, negative interactions can occur. Over time, competitive charitable direct mailings may also have synergetic effects, possibly due to increased awareness of those who need help or through an increased sense of guilt (see Chapters 2 and 3 of this thesis). As charities, more than other types of companies, interact regularly and discuss when the various mailing campaigns will take place, they could exploit knowledge on direct mailing effects by mutually tuning their mailing strategies.

In sum, the precise effects of competitive direct mailings of multiple charities over time are important to understand but they are under researched. Indeed, in a recent review on charitable literature, Andreoni (2006) explicitly indicates that both the dynamic and the competitive aspects of fundraising and charitable giving are important unexplored areas. The main reason why attention for this topic has been scarce appears to be the lack of relevant data.

But even with access to individual-level data of direct mailings from and donations to multiple charities over time, an additional issue arises to complicate matters, that is, the endogeneity of the mailings. Instead of randomly selecting individuals from their list of addresses to send a mailing, charities generally apply target selection. They aim to select those targets that are most likely to respond or those that are expected to give a large amount of money. Commonly used target selection techniques rely on the fact that past behavior predicts future behavior, so that the best donators – based on past behavior – receive the most direct mails in the future. As a consequence of these behavior-driven target selection rules, charitable direct mailings are endogenous. When modeling the relationship between charitable direct mailings and

donating behavior based on the responses to these endogenously selected mailings, the parameter estimates will be biased (see Donkers et al. (2006)) and the precise effects of mail pressure are hard to establish.[12]

In this chapter we solve the endogeneity issue by designing a natural field experiment[13]. We make use of a unique opportunity provided by our cooperation with five of the largest Netherlands-based charities to induce exogenous variation in the mailings that individuals receive of multiple charities. We then collect information on the actual donations made in response to the experimental mailings, as well as the responses to subsequent mailings sent out by the charities. This allows us to study the competitive effects of charitable direct mailings in both the short run and the long run.

To put our study in context we first briefly discuss findings from the literature on competitive interference of direct mailings, of which charitable solicitation letters are a subset, and we review previous field experiments on charitable giving. Next, we describe our experimental design and data, followed by our empirical results. We conclude with a discussion of the main results and their implications for theory development on charitable giving.

4.2 Competitive interference of direct mailings

Until recently, the literature on direct mailings did not pay much attention to the impact of a mailing over time. Generally the focus was on a static context, ignoring potential long-term effects of direct mailing activities. However, as people tend to remember past events, a direct mailing organization, such as a charity, should bear in mind that the decision to mail an individual today affects the response to tomorrow's mailings (Campbell et al. 2001; Piersma and Jonker 2004). The most prominent effect for the charity itself is that the current mailing competes with its own future mailings and cannibalization occurs (Campbell et al. 2001). Thus, a current mailing can reduce response to a subsequent mailing.

One obvious reason for cannibalization between successive mailings is that an individual cannot spend an unlimited amount of money on donations, so donations in

[12] One could try to correct for the endogeneity of the mailings building on the ideas of Donkers et al. (2006). With multiple charities, however, this requires a model for the simultaneous mailing strategies of all charities, which is very complicated as the charities' mailings are not independent.

[13] See Harrison and List (2004) for a classification of different types of field experiments.

response to a mailing limit the available financial resources for subsequent requests. In addition, excessive direct mail clutter could result in irritation, reducing the mailings' effectiveness (Elliott and Speck 1998). This effect can be even stronger for charitable direct mail as opposed to regular direct mail, as there are no obvious immediate personal benefits of responding for the recipient (Rothschild 1979). Indeed, Francis and Holland (1999) show that consumers have much stronger feelings about charitable direct mail than about other types of direct mail. Also, charitable direct mail results in more irritation.

Recently, there have been some studies that do account for dynamic effects of direct mailings (Elsner, Krafft and Huchzermeier 2004; Gönül and Shi 1998; Gönül and Ter Hofstede 2006; Simester et al. 2007; Simester, Sun and Tsitsiklis 2006). These studies, however, focus on a single company and thus ignore competitive activity, thereby neglecting potential competitive interference. At the same time, several studies on advertising have shown that competitive interference can severely reduce the effectiveness of marketing actions (Danaher, Bonfrer and Dhar 2008; Unnava and Sirdeshmukh 1994; Yoo and Mandhachitara 2003). On the other hand, there may be situations where positive competitive externalities exist. For new products, for example, competitive advertising may increase awareness thereby enhancing total sales (Prins and Verhoef 2007).

These studies all highlight the potential relevance of competitive interference of charitable direct mailings. Still, there are also vast differences between buying a product from a catalog and donating money to a charity (Bendapudi, Singh and Bendapudi 1996; Chapter 2 of this thesis), warranting further study of charitable solicitations.

4.3 Field experiments on charitable giving

Charitable donating has been studied extensively for a long time, from a psychological, sociological and economic perspective. Many different issues and aspects have been scrutinized, both through laboratory experiments (Eckel, Grossman and Johnston 2005; Konow 2006; List and Rondeau 2003) and using naturally-occurring data (Andreoni 2006; Frey and Meier 2004a; Chapter 2 of this thesis). Only recently, however, researchers have started to conduct field experiments on charitable giving.

Field experiments have been called a bridge between lab and naturally-occurring data (List 2007). Unlike lab experiments (see Bardsley (2005) for comments on the artificiality of the lab), they provide the right amount of realism, since the field

experiment takes place in a natural environment and subjects are not aware that they are being studied (List and Reiley 2008). Nevertheless, the researcher is in control of the relevant manipulations and can apply randomization where appropriate. This ensures that effects are not spurious and that causal relationships can be established. The latter relationships are difficult to examine when using only naturally-occurring data, due to selection bias and other endogeneity issues.

Various studies have addressed the field experiment methodology in general and the application to charitable giving in particular. A comprehensive discussion on different types of field experiments can be found in Harrison and List (2004). List (2007) provides an extensive review of the merits of field experiments and the application of field experiments to various research areas, among which are charitable donations. Levitt and List (2007) examine which factors determine the potential differences between individual behavior in a lab and in the real world in studies on social preferences. A comparison of donating behavior in laboratory experiments and in the field demonstrates that the two can diverge considerably, although they are positively correlated (Benz and Meier 2006).

The number of papers on charitable donations that use the field experiment methodology is growing rapidly, now that academics have come to recognize its high potential as a research tool. Most studies focus on the effectiveness of various fundraising mechanisms. Examples are the use of seed money, where potential donors are informed of a certain initial amount already available for the campaign (List and Lucking-Reiley 2002), and matching, where potential donors are promised their donation will be matched according to a certain ratio (Karlan and List 2007; Meier 2007; Meier and Frey 2004). Other studies make explicit comparisons between different fundraising mechanisms (Landry et al. 2006; Rondeau and List 2008). Eckel and Grossman (2006) compare differences in response to requests that are subsidized through matching vs. a rebate, in a setting where both mechanisms are equivalent in purely economic terms.

A second stream of research using a field experiment explores the underlying motivations for contributing to charity. Falk (2007) investigates the reciprocity motivation. In a direct mail campaign, some potential donors receive no gift, some a small gift and others a large gift. Subsequently, the differences in response are analyzed. Frey and Meier (2004b) and Shang and Croson (2008) study the effect of social pressure on response rate and amount donated, respectively.

A number of related studies examine how content and contextual factors of solicitations affect donating behavior. For example, Smith and Berger (1996) report results on framing and suggested anchors, Bekkers and Crutzen (2007) study the use of colored pictures on direct mail envelopes, and Liu and Aaker (2008) present results on asking for volunteering time instead of money.

Most of the studies described above focus on a single single-shot fundraising campaign, ignoring potential competitive effects both across charities and over time. Indeed, most fundraising literature deals with capital campaigns aimed at obtaining a given amount of money to implement a large, fixed-cost project, as opposed to continuing campaigns, where donations are used to cover the costs of the ongoing business of the charity. As most research on capital campaigns does not apply to the continuing campaign situation, this suggests an important avenue for research on fundraising (Andreoni 1998). For continuing campaigns the need to study dynamic effects, and in particular the degree of cannibalization, seems much more obvious and pressing.

The few exceptions that do consider long-run effects study potential cannibalization of an increase in revenues due to a certain type of request (Falk 2007; Meier 2007; Shang and Croson 2008). For example, Meier (2007) investigates whether subsidizing donations through a matching mechanism affects future donating decisions and finds that matching has a negative net effect on the future participation rate. No field experiment, however, addresses the long-run effects of the request by itself. That is, no field experiment has yet been designed to test whether an extra request has indeed a positive effect on overall contributions in the long run, or that this effect is nullified or even negative as a result of cannibalization.

As mentioned before, the field experiment literature on charitable donating has mostly studied single shot campaigns, ignoring the consequences of the mailings on other, competing campaigns. Not only do these studies neglect effects on future campaigns by the same organization, they also disregard campaigns by other organizations. Nonetheless, as potential donors are being deluged by mailings, competitive interference can greatly reduce the effectiveness of a charity's campaigns and is hence an important issue. For example, an individual might simply have no financial resources left to donate if a mailing was preceded by many other successful requests.[14]

[14] Obviously we do not expect an individual to donate his very last penny before he stops donating, but his mental account for charitable donations might run empty (Thaler 1985).

Summarizing, little is known about the competitive interactions between donations towards multiple charities over time in the context of continuing campaigns. In this study we attempt to fill the current gap in the literature by conducting a field experiment to analyze the competitive effects of charitable direct mailings over time. In the next section, we present our experimental design.

4.4 Design of the natural field experiment

To study the effects of competitive charitable direct mailings we design a natural field experiment, meaning that the individuals are not aware of the fact that they participate in a field experiment. For this experiment we obtained the cooperation of five charitable organizations that have agreed to send experimental mailings according to a mailing schedule designed by us. To be able to uncover the effect of competitive mailings we will vary the number of direct mailings in one week. We select individuals from the joint data set obtained after merging the databases of the five charities.[15] Privacy regulations form a boundary condition, in that charities are only allowed to store addresses of individuals who have donated at least once to their organization in the past. Hence, we only select previous donators of a charity to receive experimental mailings of that charity (see Karlan and List (2007) for a similar sampling frame).

The charities to which an individual donates vary across individuals. That is, individuals can be donator to one, two, three, four or five of the charities we consider and every charity combination is possible. An individual that is donator to two charities can at most receive experimental mailings from these two charities. For example, an individual that is donator to charity A and B, and hence is only on the mailing list of charity A and B, can only receive experimental mailings of charity A and B and not of charity C, as he is not active with charity C.

Different experimental treatment conditions are created by varying the number of experimental mailings subjects will receive. Each charity sends at most one experimental mailing to each individual in addition to the regular mailing campaigns that are scheduled throughout the year. The experimental mailings are *extra* mailings compared to the charities' regular mailing strategies and the charities agreed not to

[15] The databases were merged by a commercial firm that specializes in database and list management.

adjust their mailing strategies in response to the experimental mailings.[16] Note that for the execution of the experiment we selected a week in which no regular mailings were planned by the five charities. Consequently, subjects will not receive multiple mailings of the same charity organization within that week. Competitive mail pressure thus only results from multiple mailings from other, non-participating organizations and the experimental mailings. In Table 4.1 we depict the experimental design that is aimed at creating the necessary exogenous variation in direct mailings. It provides the proposed distribution of subjects over the various experimental treatments.

As individuals that are donator to n of the five participating charities can only receive a maximum of n experimental mailings, not all cells in Table 4.1 are filled. For the treatments with experimental mailings, we allocate 600 individuals to each feasible experimental cell. For example, from the individuals with three active charities, 600 receive one experimental mailing, 600 receive two experimental mailings and 600 receive three experimental mailings. In total, this results in 21000 mailings being sent to 9000 subjects. Of course, there are various possible charity combinations for a particular number of charities. We choose to distribute the subjects uniformly across the different charity combinations, so that each of the five charities sends out 4200 experimental mailings.

For the control group we select 12000 subjects, consisting of 2400 subjects from each ' number of active charities' condtion. Within each condition of the number of active charities, subjects are again distributed uniformly across different charity combinations. This way we match the experimental group as good as possible. To clarify, consider the following example. With five charities A, B, C, D and E, one can be donator to four charities in five different ways, that is, A-B-C-D, A-B-C-E, A-B-D-E, A-C-D-E and B-C-D-E. We select 2400/5 = 480 individuals from each of these five combinations.

All subjects are selected randomly from the relevant populations. This ensures that given the number of active charities, there are no systematic differences across treatment in terms of past behavior, traits and demographics. The only differences are in the mailings they received, and this is the key variable of interest.

[16] This holds at least for the period we study, being the five months following the experiment. The charities might have updated their target selection rules at a later stage.

Table 4.1: Distribution of subjects over treatment conditions according to experimental design

		Number of active charities					Total	
		1	2	3	4	5	Subjects	Mailings
Treatment	0 mailings	2400	2400	2400	2400	2400	12000	0
	1 mailing	600	600	600	600	600	3000	3000
	2 mailings	-	600	600	600	600	2400	4800
	3 mailings	-	-	600	600	600	1800	5400
	4 mailings	-	-	-	600	600	1200	4800
	5 mailings	-	-	-	-	600	600	3000
							21000	21000

4.5 Data

For this study we have access to the databases of five large charity organizations in the Netherlands. This allows us to create a unique dataset of direct mailings and donations at the individual level. The charities are active in three different sectors, that is, two charities in the health sector, two charities in the international aid sector and one charity in the social welfare sector. Our dataset covers mailings and donations during more than three and a half years, from January 2004 until August 2007.

4.5.1 Sample

We restrict our attention to a sub-sample of the population that meets the following criteria. First, we only consider individuals who have been active in the past eighteen months, where by active we mean they have donated at least once. Consultation with the involved charities has resulted in this definition, which they use as well when performing analyses and selections on their databases.

Next, we eliminate individuals who have had an automatic transfer or membership of at least one of the charities in the past eighteen months. The reason for this is that these individuals form a separate type of donators, and in particular the dynamic component of their behavior might be very different.[17] Furthermore, these individuals are highly valuable to the charities and we were requested not to bother them with additional experimental mailings.

[17] Donating through an automatic transfer is a completely different dimension of charitable giving that raises many more interesting questions. We leave these for future research.

Table 4.2: Distribution of individuals across different numbers of active charities

Number of active charities	Number of individuals
1	341845
2	72625
3	22922
4	8611
5	2278

Next, charities keep track of individual mailing restrictions. Donators can communicate to the charities that they want to receive a maximum of two mailings a year, for example. Individuals with such restrictions are left out of consideration for obvious reasons. And finally, the commercial party that merged the databases also provided us with a list of deceases and general advertising mail blocks. This data cleaning procedure results in 448281 potential experimental subjects, all of which are donator to at least one and at most all five charities. Table 4.2 shows the distribution of these individuals across the number of active charities.

4.5.2 Implementation of the experimental design

From the sample in Table 4.2 we select our experimental subjects. Clearly, we are confronted with some upper bounds with regards to the numbers of potential experimental subjects. For example, the original design dictates a total of 5400 subjects that are donator to all five charities (see Table 4.1), while in practice we find that only 2278 of those subjects exist in our database. As our data consist of the entire databases of the five charities, and thus contain information on the full population of donators to these charities in the Netherlands, this is the best we can achieve. The 2278 subjects truly concern all individuals that are donator to all five charities.

A similar, although less severe, situation arises for the subjects with three or four active charities. For some charity combinations fewer individuals exist than we had anticipated in the experimental design. To ensure that every charity combination is equally represented under these restrictions and every charity sends an equal number of experimental mailings we first substantially reduced the number of subjects in the control condition and when deemed necessary also had a proportional reduction in the experimental design cells where mailings were sent.

Table 4.3: Actually implemented distribution of individuals across treatment conditions with intended distribution in parentheses

		Number of active charities					Total	
		1	2	3	4	5	Subjects	Mailings
Treatment	0 mailings	2400 (2400)	2401 (2400)	2396 (2394)	1772 (1770)	383 (383)	9352 (9347)	0 (0)
	1 mailing	600 (600)	601 (600)	600 (600)	542 (544)	380 (379)	2723 (2723)	2723 (2723)
	2 mailings	-	598 (600)	604 (600)	547 (544)	380 (379)	2129 (2123)	4258 (4246)
	3 mailings	-	-	594 (600)	541 (544)	381 (379)	1516 (1523)	4548 (4569)
	4 mailings	-	-	-	544 (544)	381 (379)	925 (923)	3700 (3692)
	5 mailings	-	-	-	-	373 (379)	373 (379)	1865 (1895)
							17018 (17018)	17094 (17125)

To have as many subjects as possible, this also resulted in a somewhat unequal distribution of subjects across the possible charity combinations. In addition, even though we took the mailing restrictions that the charities supplied into account, these restrictions are dynamic and can therefore change in the short period of time between the delivery of our subject selection to the charities and the actual week of the experiment. Combined with some administration issues this results in slight discrepancies between our adjusted experimental design and the final implemented subject distribution. Table 4.3 presents the final distribution of subjects over the design cells. See Appendix 4.A for the exact distribution of subjects over charity combinations. A comparison with our adjusted design, which is presented in parentheses, shows that from the intended 17125 letters 17094 (99.8%) were eventually sent.

4.5.3 Timing of the experimental mailings

The experimental mailings of the five charities were sent in the last week of March 2007. To represent reality as close as possible we decided not to send all experimental direct mailings on one single day.

Table 4.4: Average yearly direct mailing frequency for different numbers of active charities

Number of active charities	Mean	Standard error
1	4.45	2.56
2	9.93	3.43
3	15.09	3.89
4	20.55	4.29
5	27.16	4.80

Although this would probably be the most effective way to measure competitive interference in the short run, consultation with the involved charity organizations convinced us that sending up to five mailings on a single day would raise suspicion with the experimental subjects, as this is an extremely rare situation in the Netherlands. Table 4.4 shows the average yearly direct mailing frequency of these five charities during our time span, for each number of active charities.

We find that individuals that are donator to all five charities receive on average one mailing every two weeks, for example. Furthermore, in our population, only 5% of the individuals have received multiple mailings of our five charities on the same day at least once in the past two years. However, for around 24% of the individuals there have been occasions in the past two years where they received multiple mailings of these charities in the same week. Thus, receiving multiple mailings of these charities in one week is a much more common situation than receiving them on the same day. Therefore, we decided to randomly distribute the experimental mailings for each individual over one week, to avoid subjects distrusting the mailings being real and guessing that something abnormal is going on.[18]

[18] The charities were asked to record donator contacts such as letters or phone calls that specifically mentioned high mail pressure in the weeks following the experimental mailings. No such events occurred.

4.5.4 Measuring charitable giving

To analyze the effects of the experimental mailings on charitable donating behavior we study the responses to the experimental mailings and to the mailings that were sent after our experiment, according to the mailing strategies of the charities. For the responses to the experimental mailings, or immediate response behavior, we consider all donations to experimental mailings received within six weeks after the experiment was conducted. For each experimental mailing, we know whether or not the recipient responded, and if so, with what amount.

To analyze donating behavior after the experimental mailings we have access to all mailings and donations of the five participating charities within five months after the experiment took place, so from April until August 2007. We distinguish between short run and long run behavior. For short run behavior we look at the first mailing campaign of each of the five charities in this period. Thus, we only consider the individuals from our sample that received a mailing from one of these campaigns. Again, we know for each mailing whether the individual responded and if so, with what amount. For long run behavior we use the total donated amount per charity during the five months after the experiment. Although five months may seem rather short to qualify as long run, in Chapter 2 we have shown that the impact of a direct mailing tends to disappear within half a year.

4.5.5 Descriptive statistics

To get a feel for the data we present some descriptive statistics. Our sample consists of 17018 individuals, 7666 of which receive experimental mailings (see Table 4.3). In Table 4.5 we present the number of experimental mailings each charity sent, the response rate and the average donation, conditional on response. The response rates vary over charities. Most noticeable is the very low response to the mailings of charity 5. This is caused by an administrative error, where charity 5 labeled a large part of the mailings with an incorrect name, although all individuals did receive a mailing[19]. We will control for these and other systematic differences between the charities and the letters they sent through charity-specific intercepts in all models. Finally, the average donation, conditional on response, is about the same across charities.

[19] Delivery of the mailings was verified by contacting some individuals on the charities' mailing lists. These individuals are excluded from the analysis.

Table 4.5: Descriptive statistics for the experimental mailings across charities

	# experimental mailings	response rate	average donation
Charity 1	3394	0.198	14.17
Charity 2	3398	0.109	12.95
Charity 3	3397	0.186	14.05
Charity 4	3538	0.187	12.08
Charity 5	3367	0.014	12.39
Total	17094	0.139	13.34

Table 4.6: Mailing dates and frequencies of the first mailing campaign after the experiment, measuring short run donation behavior

	mailing date	# mailings sent	response rate	average donation
Charity 1	May 24th 2007	6475	0.316	16.00
Charity 2	April 17th 2007	7144	0.233	13.29
Charity 3	May 26th 2007	9245	0.264	13.70
Charity 4	April 20th 2007	7523	0.218	12.50
Charity 5	May 1st 2007	9769	0.179	14.37

For short run behavior we consider the response to the first mailing campaign after the experiment for each charity. Obviously, these campaigns took place at different moments for the different charities. In Table 4.6 we present the mailing date at which each charity sent out its first mailing after the experiment, and the number of mailings that were sent. Furthermore, we present the response rates and average donations conditional on response for each of the charities. The mailing campaigns all took place within two months after the experiment. In total the charities sent out 40156 mailings with a response rate of 0.238. The response rates to these campaigns are substantially higher than the response rates for the experimental mailings. The most likely reason for this is that we sent out the experimental mailings based on a random selection of donators, while the charities use target selection techniques for their regular campaigns, which apparently work rather well.[20]

[20] This also highlights the fact that a straightforward analysis of the existing databases provides a very biased picture of *average* behavior, as the sampling for response behavior – that is, the sending of a mailing – is not random.

Table 4.7: Long run and past donating behavior

	# donators	Total donation long run	Total amount past year	# responses past year
Charity 1	9817	15.34	33.06	1.82
Charity 2	10032	6.56	22.50	1.54
Charity 3	9823	5.12	20.49	1.36
Charity 4	10463	7.29	16.15	1.29
Charity 5	9817	4.67	17.63	1.08
Total	17018	22.85	64.27	4.16

Finally, we study the long run impact of a direct mailing through the resulting change in the total donation in the five months after the experiment. We consider the total donations to active charities for each individual. Table 4.7 shows the number of donators per charity, and their average total donation in the five months after the experiment. The table also includes information on past behavior, in particular, the average total donation and number of responses per donator in the year before the experiment.[21] Differences between the charities stem from various sources, including differences in their mailing strategies, the attractiveness of their solicitations, and so on.

4.6 Empirical results

In this section we present the results of our analyses. We model the response behavior to the actual experimental mailings – the immediate response behavior – , and the donating behavior in response to the mailings the charities sent after the experimental mailings, where we look at short run and long run effects. We explain charitable donating behavior from the number of experimental mailings individuals received, distinguishing between own and other charity's mailings, where own effects relate to the charity sending the mailing, and other effects to the other four charities. We also include a number of control variables. In particular, we control for individual heterogeneity in donating behavior through the inclusion of two RFM-type[22] variables describing past behavior: the number of responses and the total donation in the year before the

[21] These variables are used to control for systematic differences between donators in the analysis.
[22] RFM comprises Recency, Frequency and Monetary value. RFM-type variables are often used as a basis for target selection, as they can describe past behavior, which in turn has been shown to be highly predictive of future behavior (Rossi, McCulloch and Allenby 1996).

experiment. For these past behavior variables we also distinguish between own and other effects. So, for example, when we model the response behavior to the experimental mailings, for an experimental mailing of charity 1 the number of own past responses concerns the donations made to charity 1 in the year before the experiment, while the number of other past responses concerns the donations made to charity 2, 3, 4 and 5. In addition, we include dummy variables to indicate which charities are active for each individual as this could be indicative of an individual's attitude towards donating.[23] Finally, we also include charity-specific intercepts to allow for systematic differences in response behavior towards charities.

4.6.1 Donating in response to the experimental mailings

To investigate the immediate effect of competitive mailings we model the response decision to the experimental mailings using a Tobit-2 specification (Amemiya 1985, p. 385). Thus, we assume that, for each experimental mailing that an individual receives, he jointly decides whether to respond or not and, if so, with which amount. Let R_i be a binary variable to indicate whether the recipient of experimental mailing *i* responded or not. Furthermore, A_i indicates the amount donated conditional on the decision to respond to experimental mailing *i*. Let R_i^* be the latent variable related to R_i and A_i^* the censored variable related to A_i, where ' censored' means partially observed and partially latent. Let *k* denote the number of explanatory variables, including the five charity-specific intercepts and X_i the $(1 \times k)$ vector of explanatory variables for experimental mailing *i*, then the Tobit-2 model reads as

$$R_i = \begin{cases} 1 & \text{if } R_i^* > 0 \\ 0 & \text{otherwise} \end{cases} \tag{4.1}$$

$$A_i = \begin{cases} A_i^* & \text{if } R_i^* > 0 \\ 0 & \text{otherwise} \end{cases} \tag{4.2}$$

with

$$R_i^* = X_i \beta_R + \varepsilon_{Ri} \tag{4.3}$$

$$A_i^* = X_i \beta_A + \varepsilon_{Ai} \tag{4.4}$$

[23] Individuals who derive much utility from donating, independent of the underlying process, might have been more responsive to acquisition mailings of the charities in the past.

Table 4.8: Estimation results for donating behavior in response to the experimental mailings (standard errors are in parentheses)

Explanatory variable	Response equation		Amount equation	
Intercept charity 1	-1.082***	(0.056)	-21.980***	(1.471)
Intercept charity 2	-1.392***	(0.057)	-29.458***	(1.534)
Intercept charity 3	-1.068***	(0.054)	-21.965***	(1.431)
Intercept charity 4	-1.061***	(0.054)	-22.095***	(1.432)
Intercept charity 5	-2.356***	(0.076)	-51.232***	(2.147)
# experimental mailings other	-0.019*	(0.013)	-0.620**	(0.304)
# past responses own	0.094***	(0.008)	1.436***	(0.199)
# past responses other	0.054***	(0.004)	1.082***	(0.100)
Total past donation own	0.001***	(0.000)	0.074***	(0.004)
Total past donation other	0.000**	(0.000)	0.020***	(0.002)
Active charity 1	-0.049*	(0.035)	-1.187*	(0.855)
Active charity 2	-0.098***	(0.033)	-2.101***	(0.803)
Active charity 3	-0.028	(0.034)	-0.258	(0.840)
Active charity 4	-0.107***	(0.036)	-2.702***	(0.877)
Active charity 5	-0.074***	(0.030)	-1.861***	(0.742)
σ	23.988***	(0.411)		
ρ	0.998***	(0.000)		

*,**,***: significant at a 10%, 5%, and 1% level, respectively.

In equation (4.3)-(4.4) ε_{Ri} and ε_{Ai} represent unobserved factors that influence the response decision and amount, respectively. Furthermore, $\varepsilon_{Ri} \sim N(0,1)$ for identification of the response equation, $\varepsilon_{Ai} \sim N(0,\sigma^2)$ and $E[\varepsilon_{Ri}\ \varepsilon_{Ai}] = \rho\sigma$, where ρ is the correlation coefficient. The subscripts *R* and *A* for the parameters indicate that the parameters are equation-specific.

In Table 4.8 we present the estimation results based on all 17094 experimental mailings. As we model response behavior to the experimental mailings, the explanatory variable *experimental mailing own*, that indicates whether an experimental mailing was received from the same charity as the charity that sent the mailing for which we are explaining the response behavior (in this case the experimental mailing itself) always equals one and is therefore redundant.

The impact of mailings from other charities on donating behavior towards another mailing is highlighted by the significant influence of the number of other experimental mailings in both the response and the amount equation. Thus, there is

competition and competitive mail pressure negatively affects donating behavior in response to a charity's mail both in terms of response probabilities and in terms of amounts donated.

The parameter estimates for experimental mailings represent the effects on the latent response and amount (see equation (4.3) and (4.4)) and are thus not straightforward to interpret. Furthermore, the strong correlation between ε_{Ri} and ε_{Ai} complicates direct interpretation of the estimated coefficients, as the expected amount donated contains a correction for a possible selection bias. So, to facilitate interpretation, we compute the effect of one extra mailing on the response probability and the expected donation, given the data. That is, for each mailing we compute the response probability and expected donation given that no competitive mailing vs. one competitive mailing is received. For all other explanatory variables we fill in the observed values. Thus, the effects vary across all the mailings and we report their average. We find that the effect of a competitive mailing on an individual's response probability to a mailing is -0.36 percentage point, compared to a predicted response rate of 13.39% for the situation with no competitive mailings. Next, we compare the predicted revenue from a mailing given that individuals receive no competitive mailings vs. that they receive one competitive mailing. We find that a competitive mailing reduces the donation conditional on response, predicted at €16.38 with no competitive mailings, with €0.25. The unconditional donation, including non-response and predicted at €2.41 with no competitive mailings, is reduced by €0.10. That is, each competitive mailing reduces revenues with more than 4%. Taking into account the costs of a mailing (both printing and postage costs), estimated by the involved fund managers at around €0.50 on average, the reduction in net revenues comes to more than 5%. Thus, competitive mailings harm the revenues of a charity's own mailing. The more mailings competitive charities send, the lower the revenues for the focal charity. As all experimental mailings were sent in one week, these results demonstrate competition between (effectively) simultaneous mailings.

Next, we discuss the effects of our control variables. First of all, we find significantly positive effects of all past behavior variables. These variables capture attitudinal differences between donators, indicating that good donators in the past will also be good donators today. The own effects indicate a certain loyalty towards the focal charity, while the other effects indicate a more global attitude towards charitable donating. Plausibly, the own effects are larger than the other effects. The dummy

variables for activity of the charities all have a negative effect, most of which are significant. This means that given an individual's donation level, for which we control through the past behavior variables, his response probability and donations are lower if more charities are active and he thus donates to more charities. That is, the more charities he donates to, the more charities he has to help with a limited budget for donations.

The charity-specific intercepts show some differences. In particular, the intercept for charity 5 is much smaller than that for the other charities. As explained in the previous section, this is due to an administrative error by charity 5 causing a very low response to this mailing. Overall, the intercepts in the amount equations are very small, resulting in highly negative predictions for the censored amount variable A_i^*. However, as the correlation coefficient is very high (0.998), the Heckman selection correction (Amemiya 1985) ensures positive predictions for both the conditional and unconditional donations.

Next, we discuss the results for the donating behavior in response to the mailings that were sent after the experimental mailings, where we focus our discussion on the impact of the experimental mailings.

4.6.2 Donating behavior after experimental mailings

Now that we have established that competitive mailings, when received simultaneously, negatively affect a charity's revenues, we study whether this persists over time. Thus, we analyze the effect of the experimental mailings on the donating behavior in response to the mailings the charities sent after the experiment, according to their original mailing strategies. We distinguish short run and long run donating behavior.

Short run - the first mailing campaign after the experiment

First, we study the short run effects by focusing on the first mailing campaign after the experiment for each of the charities. We combine the corresponding mailings and their response across charities, resulting in a total of 40156 observations (see Table 4.6). We investigate the competitive effects of charitable mailings on short term donating behavior by estimating a Tobit-2 model for the response to these 40156 mailings. Again, we include charity-specific intercepts to allow for differences between charities and we distinguish between the effects of own and other experimental mailings. In Table 4.9 we present the estimation results.

Table 4.9: Estimation results for donating behavior in response to the first mailing after the experimental mailings (standard errors are in parentheses)

Explanatory variable	Response equation		Amount equation	
Intercept charity 1	-1.017***	(0.032)	-17.171***	(0.705)
Intercept charity 2	-1.222***	(0.031)	-20.995***	(0.679)
Intercept charity 3	-1.094***	(0.029)	-18.595***	(0.639)
Intercept charity 4	-1.295***	(0.031)	-22.378***	(0.687)
Intercept charity 5	-1.282***	(0.030)	-22.189***	(0.658)
experimental mailing own	-0.130***	(0.018)	-2.549***	(0.379)
# experimental mailings other	-0.003	(0.008)	-0.093	(0.166)
# past responses own	0.173***	(0.006)	2.117***	(0.123)
# past responses other	0.045***	(0.003)	0.597***	(0.054)
Total past donation own	0.002***	(0.000)	0.157***	(0.001)
Total past donation other	0.001***	(0.000)	0.035***	(0.001)
Active charity 1	0.003	(0.018)	0.066	(0.390)
Active charity 2	-0.054***	(0.017)	-0.779**	(0.368)
Active charity 3	-0.035**	(0.018)	-0.675**	(0.389)
Active charity 4	-0.027*	(0.018)	-0.901***	(0.375)
Active charity 5	-0.047***	(0.018)	-0.514*	(0.374)
σ	20.752***	(0.053)		
ρ	0.996***	(0.000)		

*,**,***: significant at a 10%, 5%, and 1% level, respectively.

We find significant cannibalization effects on the charity's future revenues, as the experimental mailing of the same company has a negative impact on both response and amount. Individuals that received the experimental mailing donate less on the next occasion to donate to the same charity than individuals that did not receive the experimental mailing. In fact, the extra mailing reduces the response probability for the next mailing with 3.40 percentage point, compared to a predicted response rate of 22.38% for the situation without the extra mailing. Furthermore, it reduces the donation conditional on response, predicted at €16.92, with €0.46 and the unconditional donation, predicted at €4.21, even with €0.70, a reduction of almost 17%. Taking the costs of a mailing of €0.50 into account, the reduction in net revenues is almost 19%.

Table 4.10: Estimation results for the total donation in the five months after the experimental mailings

Explanatory variable	Estimate	Std. error
Intercept charity 1	5.871***	(0.484)
Intercept charity 2	-0.691	(0.473)
Intercept charity 3	-1.481***	(0.469)
Intercept charity 4	1.804***	(0.462)
Intercept charity 5	-0.743	(0.461)
experimental mailing own	-1.514***	(0.282)
# experimental mailings other	0.105	(0.126)
# past responses own	1.944***	(0.092)
# past responses other	-0.166***	(0.044)
Total past donation own	0.178***	(0.002)
Total past donation other	0.017***	(0.001)
Active charity 1	-0.023	(0.283)
Active charity 2	0.282	(0.280)
Active charity 3	0.352	(0.276)
Active charity 4	-0.250	(0.289)
Active charity 5	0.005	(0.274)

*,**,***: significant at a 10%, 5%, and 1% level, respectively.

The effects of competitive experimental mailings on response and amount are negative as well, but not significant. Thus, although competitive mailings reduce response to a charity's own mailings when sent simultaneously, this does not persist over time. In the short run, we do not find evidence of competition between charitable direct mailings.

Long run - total donation in the five months after the experiment

Next, we consider long run donation behavior, which we measure as the total donation in the five months after the experiment took place, so from April to August 2007. We study the effect of the experimental mailings on the total donation to each of the charities from all experimental subjects (see Table 4.3). That is, we aggregate the observations of all donators per charity (see Table 4.7) and we estimate a linear model with the resulting 49952 observations. In Table 4.10 we present the estimation results.

Just as for the short run, we find a significantly negative effect of the experimental mailing of the same charity. Thus, sending an extra mailing on top of the

current mailing strategy reduces the total future donation with around €1.51. Compared to the short run cannibalization effect of €0.70 on the first mailing this also implies further negative effects on subsequent mailings.[24] Thus, both in the short and in the long run, an extra mailing cannibalizes substantially on future revenues. The effect of competitive mailings is not significant, so there is no competitive effect of experimental mailings in the long run.[25]

Summarizing, we find that extra mailings of competitive charities reduce donations to simultaneous mailings of the focal charity. Over time, this effect disappears, that is, competitive mailings have no effect on future mailings of the focal charity. However, over time there is cannibalization. An extra mailing reduces short run and long run donations to future mailings of the same charity.

4.6.3 Net effect of an extra mailing on total charitable giving

As our results show a cannibalization effect of charitable direct mailings over time it is interesting to examine the actual net effect of an extra mailing on the total, overall amount of money donated. The mailing yields a certain amount by the donations it triggers, competes with simultaneous mailings and cannibalizes future revenues. To be able to draw general conclusions about the net effect of extra direct mailings on the total amount of charitable activity, we estimate three linear models. That is, we study the effect of the experimental mailings on the total amount donated to the experimental mailings, on the total donation in the five months after the experiment, and on the sum of the two.

As we look at the total donation of a donator to all five charities, we now have a single observation per individual. In addition there is only a single intercept and no distinction between own and other effects. Table 4.11 presents the estimation results of the three models for our sample of 17018 individuals. We see that on average an extra mailing yields €1.81 by itself. However, it reduces the donation revenues over the next five months with €1.12, resulting in a net income of €0.69.

[24] Of course, for a subsequent mailing other individuals may have been selected. For these individuals this mailing would still be their first mailing after the experiment.

[25] Although not significant, the effect of competitive mailings is positive, which can be viewed as an indication of synergy between charities. Similar results are reported in Chapter 2.

Table 4.11: Estimation results for total donation to experimental mailings, for total donation to mailings after experimental mailings, and for the sum of the two

Explanatory variable	Total donation experiment		Total donation long run		Total donation long run + experiment	
Intercept	0.213	(0.178)	-1.789*	(0.937)	-1.577	(0.986)
# experimental mailings	1.812***	(0.059)	-1.121***	(0.311)	0.691**	(0.327)
# past responses	0.130***	(0.023)	1.463***	(0.122)	1.594***	(0.128)
Total past donation	0.014***	(0.001)	0.225***	(0.003)	0.239***	(0.004)
Active charity 1	-0.367**	(0.157)	6.274***	(0.825)	5.906***	(0.868)
Active charity 2	-0.715***	(0.153)	0.710	(0.805)	-0.005	(0.847)
Active charity 3	-0.079	(0.153)	0.062	(0.802)	-0.017	(0.843)
Active charity 4	-0.620***	(0.155)	2.036**	(0.816)	1.416*	(0.859)
Active charity 5	-1.002***	(0.152)	-0.135	(0.796)	-1.136	(0.837)

*,**,***: significant at a 10%, 5%, and 1% level, respectively.

As the printing and postage costs amount to around €0.50 on average, the net revenue for the charities is only €0.19.[26]

Next, to examine if there are differences between individuals in their response behavior to more mailings, we perform a median split on our sample, where we divide the subjects into subjects that received few vs. many direct mailings in the year before the experiment. We compute the median conditional on the number of active charities. After all, the more charities an individual donates to, the more mailings he can expect to receive. Given a certain number of active charities and the average level of mail pressure that goes with this, an individual can receive relatively few or many mailings. There are 9742 individuals with few direct mailings and 7275 individuals with many, where we allocated all individuals who received the median number of mailings to the first sample. We re-estimate the models for the total amount donated to the experimental mailings, the total donation in the five months after the experiment, and the sum. To capture differential behavior in response to additional mailings we include the interaction between the number of experimental mailings and a dummy variable that indicates many direct mailings in the year before the experiment. Table 4.12 presents the estimation results.

[26] Note that these are *marginal* net revenues, that is, the effect of one *extra* mailing. The average revenues are higher. Still it is indicative of excessive fundraising, see Rose-Ackerman (1982) for an analytical study of its possible causes and remedies.

Table 4.12: Estimation results for total donation to experimental mailings, total donation to mailings after experimental mailings, and the sum of the two, including an interaction between experimental mailings and a dummy variable for many past mailings

Explanatory variable	Total donation experiment		Total donation long run		Total donation long run + experiment	
Intercept	0.218	(0.178)	-1.760*	(0.937)	-1.542	(0.986)
# experimental mailings	1.656***	(0.068)	-1.889***	(0.358)	-0.233	(0.377)
Interaction	0.397***	(0.086)	1.952***	(0.454)	2.349***	(0.478)
# past responses	0.110***	(0.024)	1.364***	(0.124)	1.474***	(0.130)
Total past donation	0.014***	(0.001)	0.224***	(0.003)	0.238***	(0.004)
Active charity 1	-0.357**	(0.157)	6.323***	(0.825)	5.966***	(0.867)
Active charity 2	-0.688***	(0.153)	0.845	(0.805)	0.157	(0.847)
Active charity 3	-0.034	(0.153)	0.280	(0.803)	0.246	(0.845)
Active charity 4	-0.622***	(0.155)	2.024**	(0.816)	1.402	(0.858)
Active charity 5	-0.946***	(0.152)	0.140	(0.798)	-0.806	(0.840)

*,**,***: significant at a 10%, 5%, and 1% level, respectively.

In all three models, the interaction term has a significant effect, indicating that individuals with few vs. many past mailings react differently to extra mailings. Individuals with few past mailings donate less to an extra mailing than individuals with many past mailings (€1.66 vs. €2.05) and their cannibalization is very high (-€1.89). For individuals with many past mailings cannibalization is absent. Consequently, the net effect of an extra mailing for individuals that already receive many mailings is €2.12, while the net effect for individuals that receive few mailings (-€0.23) is even negative, although not significant. There are multiple possible explanations for this. One possibility is that individuals that usually receive not so many mailings are more easily annoyed by increased mail pressure than individuals that are already used to high mailing frequencies. Another possibility is that the charities are currently doing a good job in targeting the good donators; they send the most mailings to the individuals that yield the highest revenues.

Finally, we investigate the endogeneity bias caused by the charities' target selection strategies. As charities send the most mailings to the individuals that have proven to be good donators in the past, and these individuals are likely to be good donators again in the future, the direct mailings charities send are endogenous.

Table 4.13: Estimation results for the total donation to the experimental mailings plus the mailings after the experiment, including the effect of regular direct mailings

Explanatory variable	Estimate	Std. error
Intercept	-0.806	(0.983)
# experimental mailings	0.684**	(0.325)
# regular mailings	2.711***	(0.200)
# past responses	0.872***	(0.138)
Total past donation	0.237***	(0.003)
Active charity 1	-2.270**	(1.054)
Active charity 2	-2.735***	(0.866)
Active charity 3	-4.259***	(0.896)
Active charity 4	-5.529***	(0.997)
Active charity 5	-8.770	(1.006)

*,**,***: significant at a 10%, 5%, and 1% level, respectively.

Then, when estimating the net effect of a mailing on the total long run revenues, this estimate will likely be biased. In Table 4.13 we present the results of a linear model for the total donation to the experimental mailings and the mailings in the five months after the experiment, where we include both the number of experimental mailings and the number of regular mailings sent by the charities as explanatory variables. Together these are all the donation opportunities provided to the individuals.

We find that the effect of regular mailings appears to be much larger than the effect of experimental mailings. Thus, if the charities analyzed the net effect of an extra mailing based on endogenous mailings alone, they would severely overestimate the effect, potentially resulting in bad decisions. For example, based on a €2.71 long run yield, the charities could easily decide to strongly increase the mail pressure, while the actual net revenues of an extra mailing hardly compensate printing and postage costs.

Indeed, when we include an interaction of regular mailings with the dummy indicating whether someone received many past mailings, we find it is not significant. Thus, only considering regular endogenous mailings does not uncover the difference between individuals that already receive many mailings versus individuals with low mailing frequencies, which we found exists (see Table 4.12). A charity could thus decide to increase mail pressure for all individuals, at the risk of actually losing money. For the same reasons, one would likely draw incorrect conclusions about the donation behavior itself, which we have left for the next section.

4.7 Discussion

The experimental mailings in our natural field experiment demonstrated that charitable direct mailings are not independent events, but instead affect individual response behavior towards each other. Existing research and theories on donating behavior have always treated the response to a mailing independent of the stream of other mailings individuals receive. The interactions between the various mailings, however, are informative about the type of behavior that might underlie the donation decisions.

4.7.1 Implications for theoretical models of charitable giving

The theory that is generally used to rationalize donating behavior is the theory of warm glow giving (Andreoni 1990). This theory states that one derives utility, that is, a good feeling, from making a donation. An alternative explanation could be that individuals feel a moral obligation[27] to donate whenever they are requested to do so. As long as one only considers a single mailing from a single charity, a theory of moral obligation would make predictions that are fairly similar to those of a theory of warm glow giving. The former would suggest making a donation to pay one's dues and the latter to buy warm glow, but the outcome would be similar. Investigating the natural extensions of both theories of charitable giving to the context of multiple donation occasions of multiple charities, their predictions diverge, as we outline below. Using our unique data, we will thus be able to provide new insights into the motives for donation behavior.

A theory of warm glow giving for multiple donation occasions

The theory of warm glow giving (Andreoni 1990) has been developed in a static, single decision context. As such, it is silent about the construction of a warm glow feeling from multiple donations. Extending the warm glow framework to the multiple decisions context and assuming all donations contribute to the feeling of warm glow, we should find strong substitution effects across mailings that are received simultaneously. An individual can simply choose to donate to the one charity that produces warm glow most efficiently, or split the amount of money across the charities in case they are equally efficient.

[27] Donation behavior in the Netherlands is not a very public event with people deriving status from donations. The moral obligations, hence, must be related to personal norms more than to social norms.

If there was heterogeneity in the warm glow production efficiency of charities, individuals would donate to the most efficient charity to achieve specialization in the production of warm glow. Compared to the single mailing situation, an individual might make a larger donation if a more efficient charity is amongst the multiple mailings. Thus, multiple mailings might lead to an increased efficiency in the production of warm glow, resulting in a higher donation, but we expect such differences to be small. If charities were equally efficient in warm glow production, the amount of money available for the donation could be divided over charities in any way. Compared to the single mailing situation, the total amount donated would not change if more mailings were received.

Hence, according to the extended warm glow framework, the average revenue on a direct mailing should drop substantially if multiple mailings were received simultaneously, particularly in case of equal efficiencies in warm glow production. Now, as explained before, the individuals in our dataset have all donated at least once to the charities from which they receive an experimental mailing, as they would not have been in these charities' databases otherwise. It is then reasonable to assume that the variation in the charities' efficiency of producing warm glow is not huge, at least among an individual's active charities.[28] We should thus observe a substantial decrease in amount donated per mailing when multiple mailings are received.

Our analysis of the effects of competitive mailings, however, results in a completely different picture than would be predicted from the extended warm glow framework. A single, additional mailing reduces the response rate from 13.39% to 13.03%, but this response rate holds for both the original and the additional mailing. So, assuming independence for simplicity, the response probability almost doubles to 24.36%[29] when an additional mailing is received, consistent with a distribution of the available money over multiple charities. However, the donated amount per response is only slightly reduced, which is inconsistent with the extended warm glow framework. In sum, the competitive influences on the revenues of a single mailing are relatively minor compared to a case of perfect substitutability (although the charitable organizations will

[28] Charities might differ much across individuals in the warm glow they provide, so multiple charities can survive in this setting.

[29] The probability of donating to both mailings is 0.1303*0.1303=0.0170 and that of donating to one of the two is 0.1303*(1-0.1303)=0.1133. The total probability of response is then 2*0.1133+0.0170=0.2436.

obviously not be happy with a 5% loss in net revenues for every competing mailing the individual receives).

A theory of moral obligation

According to a theory of moral obligation, charitable direct mailings can be complements as opposed to the substitutability of mailings predicted by the extended warm glow framework. When donations are made because one feels morally obligated to do so, mailings from multiple charities can be expected to strengthen one another, each of them creating a stronger need to help. Hence, the mailings are complementing each other in inducing moral obligation and the total amount of money is expected to rise substantially when more mailings are received. As one feels morally obliged to help as many of those in need as possible, it is also natural to see more but smaller donations, which is exactly what we observed in our analysis of competitive mailings.

Further support for a theory of moral obligation is provided by the strong cannibalization effects and the vanishing effect of competing mailings we found when studying the impact of charitable direct mailings on future donating behavior. In particular, warm glow could be conceptualized as source independent and hence, if the donator's decision process was driven by warm glow, we should not observe differences across senders in the impact of a mailing. In contrast, we find strong cannibalization effects of a charity's own experimental mailings, but no effects of mailings of other charities. Moral obligation can much easier be conceptualized as being source dependent, with individuals feeling a moral obligation to help the beneficiaries of each of the charitable organizations individually. That is, having recently donated to a particular charity would lower the inclination to donate to this specific charity again, but it would not affect the inclination to donate to other charities. This indeed agrees with our empirical results.

4.7.2 Implications for charities

Charities seem to be doing a decent job in selecting targets to send their mailings to, as they currently send the most mailings to the individuals that yield the highest revenues. An alternative explanation is that individuals that usually receive not so many mailings are more easily annoyed by increased mail pressure than individuals that are already used to high mailing frequencies. In any case, it seems to be a bad idea for charities to send extra mailings to those individuals that did not receive lots of mailings already as the net

revenues of an extra mailing for these individuals does not even exceed the printing and postage costs. At the same time, for those individuals that the charities currently mail frequently the yield of an extra mailing is quite substantial and could be worth increasing the mail pressure a little more.

Obviously, our estimate of the net long term revenues of an extra mailing is somewhat conservative, as we essentially chose a week at random in which we sent the experimental mailings. This means that some charities may have sent a mailing short before or after our experimental mailing, distorting the true achievable revenues. That is, if the charities would optimize the timing of their stream of mailings including the extra mailing, they should be able to achieve a higher yield. Still, cannibalization is strong and for those individuals with low mailing frequencies we do not expect that improved timing can compensate this.

Finally, we want to stress that endogeneity of the direct mailing observations in the charities' databases can result in a distorted image of reality with a severely overestimated net effect of an extra mailing. Based on this charities could make mailing decisions that are at the least suboptimal, if not disastrous. Therefore, endogeneity should always be accounted for when analyzing revenue implications of direct mailings.

4.8 Conclusion

Using a natural field experiment to circumvent the issue of endogenously selected mailings, we studied individual donating behavior in response to charitable direct mailings. We found strong competitive effects across mailings received within a single week and also strong cannibalization effects on the donations made to future mailings of the same charity. The effects of competing mailings vanish quickly.

Our empirical results suggest that donation behavior should be studied as a comprehensive process that extends beyond a set of repeated single-shot decisions. Our results gave rise to a discussion of an extension to a multiple decisions context of the well-known warm glow framework. We argued that one needs observations on mailings of multiple charities and donating behavior towards multiple charities to distinguish between a theory of warm glow giving and, for example, a theory of moral obligation. Having had access to such data, our results support the latter theory.

4.A Distribution of experimental subjects over charity combinations

Table 4.14 presents the distribution of subjects over charity combinations in the implemented experimental design.

Table 4.14: Distribution of experimental subjects over charity combinations

Donator to	Experimental treatment: experimental mailings from	Total # of subjects	Distribution over experimental treatments
A	A	120	120
B	B	120	120
C	C	120	120
D	D	120	120
E	E	120	120
AB	A / B / AB	120	30 / 30 / 60
AC	A / C / AC	120	30 / 30 / 60
AD	A / D / AD	120	30 / 30 / 60
AE	A / E / AE	119	31/29/ 59
BC	B / C / BC	120	30 / 30 / 60
BD	B / D / BD	120	30 / 30 / 60
BE	B / E / BE	120	30 / 30 / 60
CD	C / D / CD	120	30 / 30 / 60
CE	C / E / CE	120	31 / 30 / 59
DE	D / E / DE	120	30 / 30 / 60

ABC	A / B / C / AB / AC / BC / ABC	180	20 / 20 / 20 / 20 / 20 / 20 / 60
ABD	A / B / D / AB / AD / BD / ABD	180	20 / 20 / 20 / 20 / 20 / 20 / 60
ABE	A / B / E / AB / AE / BE / ABE	180	20 / 20 / 20 / 21 / 20 / 20 / 59
ACD	A / C / D / AC / AD / CD / ACD	180	20 / 20 / 20 / 20 / 20 / 20 / 60
ACE	A / C / E / AC / AE / CE / ACE	180	21 / 20 / 20 / 21 / 19 / 20 / 59
ADE	A / D / E / AD / AE / DE / ADE	180	20 / 20 / 20 / 21 / 20 / 20 / 59
BCD	B / C / D / BC / BD / CD / BCD	180	20 / 20 / 20 / 20 / 20 / 20 / 60
BCE	B / C / E / BC / BE / CE / BCE	180	20 / 20 / 20 / 20 / 20 / 20 / 60
BDE	B / D / E / BD / BE / DE / BDE	179	20 / 20 / 19 / 20 / 20 / 20 / 60
CDE	C / D / E / CD / CE / DE / CDE	179	20 / 21 / 19 / 23 / 20 / 19 / 57

ABCD	A / B / C / D / AB / AC / AD / BC / BD / CD / ABC / ABD / ACD / BCD / ABCD	480	30 / 30 / 30 / 30 / 20 / 20 / 20 / 20 / 20 / 20 / 30 / 30 / 30 / 30 / 120
ABCE	A / B / C / E / AB / AC / AE / BC / BE / CE / ABC / ABE / ACE / BCE / ABCE	255	15 / 16 / 16 / 16 / 10 / 11 / 11 / 11 / 10 / 11 / 16 / 16 / 16 / 16 / 64
ABDE	A / B / D / E / AB / AD / AE / BD / BE / DE / ABD / ABE / ADE / BDE / ABDE	479	30 / 30 / 30 / 29 / 20 / 20 / 20 / 20 / 20 / 20 / 30 / 30 / 30 / 30 / 120
ACDE	A / C / D / E / AC / AD / AE / CD / CE / DE / ACD / ACE / ADE / CDE / ACDE	480	30 / 30 / 30 / 30 / 20 / 21 / 20 / 22 / 20 / 20 / 30 / 30 / 29 / 28/ 120
BCDE	B / C / D / E / BC / BD / BE / CD / CE / DE / BCD / BCE / BDE / CDE / BCDE	480	30 / 30 / 30 / 30 / 20 / 20 / 20 / 20 / 20 / 20 / 30 / 30 / 30 / 30 / 120
ABCDE	A / B / C / D / E / AB / AC / AD / AE / BC / BD / BE / CD / CE / DE / ABC / ABD / ABE / ACD / ACE / ADE / BCD / BCE / BDE / CDE / ABCD / ABCE / ABDE / ACDE / BCDE / ABCDE	1895	75 / 76 / 76 / 77 / 76 / 38 / 38 / 38 / 38 / 38 / 39 / 38 / 38 / 38 / 37 / 39 / 39 / 38 / 40 / 36 / 38 / 38 / 38 / 37 / 38 / 82 / 75 / 75 / 73 / 76 / 373

Chapter 5

Does Irritation Induced by Charitable Direct Mailings Reduce Donations?

5.1 Introduction

Charities rely heavily on direct mailings to attract the attention of potential donators. In addition, billboard, television and radio advertising, as well as online activities, are used, but direct mailings by far outnumber other commercial efforts. Much attention is paid to the design of the printed material, the catch phrases and the wording. Once the material is ready to be sent out, the next focus is on the target audience, where typically charities take a selection of donators from their current database or they purchase addresses from list brokers to contact prospective donators.

The careful attention paid to the content of the solicitation letters, however, has not been able to avoid a strong association between charitable direct mailings and what is known as "junk mail". The large number of charities sending out direct mailings, and the volumes at which they do this, results in self-stated annoyance towards the charities and their direct mailing activities for more than 60% of the population (TNS NIPO 2003; NFP Synergy 2004). Although people often see the value of charities, they also believe the charities are overdoing it and are wasting their donated money.

A potential consequence of irritation is that individuals cut their donations to charity or even stop donating all together. Obviously, and most importantly, this reduces revenues. Another effect is that the databases of charities become less reliable for future target selection. So, for charities it is important to understand what happens when people get irritated. Existing literature, however, only provides evidence for charitable direct mail irritation, but there is no detailed study on its behavioral

consequences, in particular not in terms of actual donating behavior. Diamond and Noble (2001) get closest to this, as they elicit respondents' general response behavior towards direct mailings through a survey.

Although data collection through a survey is a natural strategy to measure levels of irritation and response behavior, there also is a clear drawback of this approach. Individuals may misrepresent their actual behavior, as answers to questions on how much people actually donate could be subject to a social desirability bias (Burt and Popple 1998). In addition, individuals might not recall exactly how many mailings they received. To meet these drawbacks, the approach we take in this chapter is to compare stated measures of irritation with actual donating behavior. Moreover, as charities compete, and hence individuals may receive multiple mailings from multiple charities in short stretches of time, we design a natural field experiment in which we create controlled variation in the number of mailings individuals receive. This permits us to investigate the impact of direct mailings and irritation in a realistic setting within the appropriate subject pool (see List and Reiley (2008)). To carry out this natural field experiment, we cooperated with five of the largest charities in the Netherlands. An analysis of our unique database results in a surprising conclusion. While people do claim to get irritated by direct mailings, and they state to get more irritated when they receive more mailings, this irritation affects neither stated nor actual donating behavior.

The remainder of this chapter is organized as follows. Before we arrive at our data analysis and results, we first provide a discussion of the relevant literature. Then we discuss the data collection and our statistical methodology. We conclude with a discussion of the main results.

5.2 Background

In this section we describe the relevant background that motivates our study. The central issue is the fact that potential donators nowadays feel overwhelmed by so many direct mailings from so many charities (Abdy and Barclay 2001; Sargeant and Kähler 1999), and this may lead to "donor fatigue" (Andreoni 2006). The term junk mail surfaces frequently in reference to direct mailings. These unwanted exposures may cause irritation, which could in turn influence behavior, for example by reducing charitable donations.

Over the past decades, companies have continuously increased their use of direct marketing, with direct mail as the most important direct marketing activity of all

(Direct Marketing Association 2007). One type of company that is known for making extensive use of direct print mail is the charity (Francis and Holland 1999). In the fundraising process, charity organizations largely depend on soliciting direct mailings for approaching potential donators.

As each direct mail provides an individual with an opportunity to donate, it may seem appealing to send direct mailings at high frequencies. The more mailings, the higher is the probability that at least one mailing will not be overlooked in the large amounts of mail or simply discarded out of lack of interest at the time of receipt. Also, repeated advertising exposures can lead to familiarity and liking of a company and can prevent forgetting over time (Zajonc 1968; Zielske 1959). Direct mailings can thus serve as a reinforcement of the message. Indeed, the amount of charitable direct mailings is unabatedly on the rise (Direct Marketing Association 2007).

Despite the obvious relevance of the subject, not much research has been devoted to investigating the attitudinal and behavioral consequences of direct mail advertising in general and of charitable direct mail in particular. An exception is the study of Korgaonkar, Karson and Akaah (1997), who investigate consumers' attitudes towards direct marketing solicitations. They find that even though part of the consumers enjoy direct mailings (for example in the case of catalogs) and describe them as informative and entertaining, many consumers view them as useless junk mail.

5.2.1 Charitable direct mailing irritation

Recently there have appeared some studies establishing that too many direct mailings in a short period of time may have a negative long-run effect on the attitude towards the mailing company, for example caused by irritation (Diamond and Noble 2001; Elliott and Speck 1998). Besides the displeasure incurred by the content of an advertisement (as studied by Aaker and Bruzzone (1985), for example), the sheer frequency of exposure may cause annoyance (Greyser 1973; Zajonc 1968). Additional, indirect, evidence for this frequency induced irritation is presented by Naik and Piersma (2002), who find that cumulative direct mailing exposures cause irritation which erodes goodwill towards the company.

This negative effect of direct mailings may be even stronger in the case of charitable direct mailings as opposed to, for example, catalogs. This is because charitable requests suggest obligation and there are no obvious immediate personal benefits of responding for the recipient (Rothschild 1979). Bruce (1995) notes that direct mail

donors frequently complain, amongst other things, about the frequency of approaches. Individuals do not like to be confronted with an appeal (Diamond and Noble 2001), and their tendency to get irritated by high charitable mail frequencies may be much stronger than it is with regular direct mail. Another important reason why irritation due to charitable direct mail may be stronger than irritation due to other types of direct mail is that people feel that charities are wasting their donated money, instead of directing it to the cause it was meant for. Indeed, Francis and Holland (1999) show that consumers have much stronger feelings about charitable direct mail than other types of direct mail and that charitable direct mail results in more irritation.

5.2.2 Behavioral consequences

So far, only individuals' attitudinal responses were discussed. High frequencies of direct mailings can cause unfavorable attitudinal and emotional responses, such as irritation. Obviously, however, the true significance of this knowledge lies in the potential link between these responses and the direct mail effectiveness. Naik and Piersma (2002) argue that the role of marketing communications and their effects on attitudinal variables in direct mailing response is generally ignored. This is particularly striking as it is generally agreed that consumer attitudes influence consumer behavior (Fishbein and Ajzen 1975). For example, perceived advertising clutter may have an effect on the effectiveness of direct mail (Stafford, Lippold and Sherron 2003), possibly due to ad avoidance (Elliott and Speck 1998). In sum, individuals who feel they receive too much direct mail may have lower intentions to respond to the mail they receive.

Excessive charitable direct mail could cause so much irritation that response rates and donations decrease. Diamond and Noble (2001), for example, find that high frequencies of unsolicited donation requests can induce defensive responses. Hence, super-saturation might occur (Leeflang et al. 2000, p. 68) and the marginal returns to excessive direct mailings might be negative. Irritation caused by charitable direct mailing overload could thus reduce total donations. Whereas with regular direct mail people only harm the sender of the direct mail when they stop responding, with charitable direct mail a third party – the beneficiaries of the charity – is harmed.

Although the literature provides clear evidence of direct mailing induced irritation and has suggested serious consequences for direct mailing effectiveness, not a single study has linked direct mailing irritation with actual donating behavior. It is precisely this that we study in this chapter.

5.3 Data

We created a unique data set by combining data from three different sources. The three sources all address a specific problem inherent to this type of study and subject matter. First, to avoid social desirability bias, which is a common problem when measuring social behavior such as charitable donating, we need objective behavioral data on actual levels of charitable donating. Second, in order to solve potential endogeneity issues, that is, people who donate more are also likely selected for a next round of mailings, we need to ensure exogenously determined variation in the number of mailings received by individuals. To this end, we set up a field experiment. Third, we need a survey to measure the subjective construct "irritation", which cannot be objectively measured from behavioral data. Below, we will elaborate on each of these three data sources.

5.3.1 Source 1: Charity databases

Motivation

To study the relationships between charitable direct mailings, irritation and donating behavior, an obvious method would be to conduct a survey. A well-known problem with this type of research, however, is the possibility of a social desirability bias in self-stated data. Charitable donating is a typical example of this phenomenon. People tend to overestimate their true behavior in an attempt to appear more socially acceptable (Burt and Popple 1998). Hence, we cannot be certain that people actually donate as much as they say they do.

In addition, it is quite plausible that people would overestimate the number of charitable direct mailings they receive, simply because they are annoyed by them. Thus, if one were to find an effect of the perception of the number of mailings received on irritation, but this perception does not correspond to reality, there is not much that charities can do about it. They can only directly influence the true number of mailings, not people's perceptions.

Hence, for reliable and practically relevant inference on the impact of direct mailing induced irritation on donating behavior, we need objective data about the driver of irritation, that is, the actual mailing frequencies, and the consequences of irritation, that is, actual donating behavior. Both constructs would be poorly captured by self-stated measures. Of course, it would be very hard, if not impossible, to obtain objective individual level data on total mailing frequencies and donations across all charities. For this study, however, we have access to the databases of five large charity organizations in

the Netherlands, allowing us to create a unique dataset of the number of direct mailings received and the actual donations made for a sample of active donators.

Measures

From our combined dataset of the five charities, we can construct an abundance of different measures. However, for the purpose of this study, we focus on three main constructs. The first is donating behavior. We want to investigate the effect of irritation on future donating behavior. Thus, we need to construct a measure of donating behavior following the moment that we measure irritation. As a single-donation event is often not representative for total donating behavior (Diamond and Gooding-Williams 2002), we consider an aggregate donating behavior measure. Thus, to measure actual future donating behavior, we use the total donation to the five charities in our study in the four months after we surveyed irritation.

The next construct we extract from this dataset is mailing frequency. To study the effect of mailing frequency on irritation, we need a measure for the mailing frequency prior to our irritation measurement. Thus, we measure past mailing frequency as the total number of direct mailings an individual has received from the five charities in the twelve months preceding the irritation measurement.

Finally, not every individual in our dataset is a donator to all five charities. Privacy regulations in the Netherlands allow charities to store only addresses of individuals that have donated at least once to their organization in the past. Hence, the vast majority of the mailings are sent to individuals that are their own donators.[30] If someone donates to multiple charities, he may also expect to receive more direct mailings. To control for this type of heterogeneity, we construct dummy variables indicating to which charities someone donates, and thus which charities are, so to say, active.

Sample

Our charities concern three different issues. Two charities are in health issues, two charities are in an international aid issue and one charity concerns social welfare. Our dataset covers mailings and donations during more than three and a half years, spanning January 2004 until August 2007.

[30] Charities also send out direct mailings to acquire new donators, but the number of such mailings is negligible in comparison to the mailings sent out to donators on their house lists.

5.3.2 Source 2: Natural field experiment

Motivation

Instead of randomly selecting individuals from their list of addresses to send a mailing, charities generally apply target selection. They aim to select the targets that are most likely to respond. As it is generally believed that past behavior is the best predictor for future behavior (Rossi, McCulloch and Allenby 1996), most companies use measures like Recency, Frequency, and Monetary value (RFM) to implement target selection. Essentially, this amounts to predicting future response probabilities using variables of the RFM type. Recency can for example be measured by the response to the last mailing, Frequency by the total number of purchases in the past, and the average amount donated each time can be viewed as Monetary value.

As a consequence of these behavior-driven target selection rules, the best donators receive most direct mails. This means that the number of mailings an individual receives from a charity depends on his past donating behavior. When modeling the relationship between charitable direct mailings, irritation and donating behavior, the number of direct mailings is therefore endogenous. In a sense the sample is not fully random anymore, and parameter estimates may be biased, see Donkers et al. (2006) or Manchanda, Rossi and Chintagunta (2004).

Experimental design

To meet potential endogeneity we design a field experiment. Our goal is to introduce exogenous variation in the number of mailings that individuals receive, so that we can draw reliable and unbiased conclusions about the relations between direct mailings, irritation and donating behavior. It is important to note that the individuals are not aware of the fact that they participate in a field experiment. Such experiments are known as *natural* field experiments. See List and Reiley (2008) for the benefits of this approach.

In our field experiment, the five charities sent experimental mailings to their donators. Note that the content of these experimental mailings was typical for the charities. The experimental feature of the mailings relates to the mailing schedule that was designed by us to circumvent the endogeneity problem. To be able to uncover the effect of mailing frequency we vary the number of mailings donators receive from the charities. We select individuals from the dataset we constructed by merging the databases of the five charities. As mentioned before, charities can only send mailings to

their previous donators. Hence, for this experiment, we can only select previous donators of a charity to receive experimental mailings of that charity. For example, an individual that is donator to charity A and B, and is thus on the mailing list of charity A and B, can only receive experimental mailings of charity A and B and not of charity C, for example.

We select a treatment group, which will receive experimental mailings, and a control group that will receive no experimental mailings. For the treatment group we impose different treatments by varying the number of experimental mailings. Each charity will send at most one experimental mailing to each individual and the number of experimental mailings is therefore equal to the number of charities that send an experimental mailing. As this is a field experiment, the charities do continue their usual mailing strategies, and we cannot influence that. However, the experimental subjects will receive extra mailings compared to the control group, and this manipulation is fully under our control. To ensure that the experimental mailings would be able to affect irritation, the experimental mailings were all sent out in the same week. This week was selected not to coincide with an existing mailing campaign of one of the charities as a single charity sending two mailings in one week to one donator would not be realistic.

In Table 5.1 we depict our initial experimental design, that is, the proposed distribution of subjects across the experimental treatments. An individual can also be a donator to one charity or to five charities, but these individuals are not included here. For the donators to only one charity, we do not expect to find distinct results with regards to irritation. For the donators to five charities, our participating charities requested that they would not be bothered.

Donators to n charities can only receive a maximum of n experimental mailings, and hence not all cells in Table 5.1 are filled. We allocate 600 individuals to each feasible experimental cell. For example, from the individuals that are donator to three charities, 600 receive one experimental mailing, 600 receive two experimental mailings and 600 receive three experimental mailings. Of course, there are various possible charity combinations for a particular number of charities. We choose to distribute the subjects equally across the different charity combinations, so that each charity sends the same number of experimental mailings. We decided to have a relatively large control group, as this is the reference group for all treatments within a ' number of active charities' condition. We randomly assigned donators from the relevant populations to both the control group and the various treatment conditions.

Table 5.1: Number of individuals across treatments according to experimental design

		Number of active charities		
		2	3	4
Control	0 mailings	2400	2400	2400
Treatment	1 mailing	600	600	600
	2 mailings	600	600	600
	3 mailings	-	600	600
	4 mailings	-	-	600

Sample

For the experiment we restrict our attention to that part of the population that meets the following criteria. First, we only consider individuals that have been active in the past eighteen months, where active means they have donated at least once. Consultation with the charities involved has resulted in this definition, also because they themselves use it when performing analyses and selections on their databases. Next, we eliminate individuals that have had an automatic transfer or membership of at least one of the charities in the past eighteen months. The reason for this is that these individuals constitute a separate type of donator whose behavior is driven by motivations that are not very relevant for this study. Furthermore, these individuals are highly valuable to the charities and are therefore requested not to be bothered with extra mailings. Finally, charities keep track of individual mailing restrictions. For example, donators can communicate to the charities that they want to receive a maximum of two mailings a year. Individuals with such restrictions are left out of consideration.

For some charity combinations fewer individuals exist than we had anticipated in the experimental design. To ensure that each charity combination is equally represented under these restrictions and that each charity sends an equal number of experimental mailings, we decided to consider the distribution in Table 5.2, reducing the size of the control group for donators active with three charities and having smaller cell sizes for donators active with four charities. The experimental mailings of the five charities were sent to the selected individuals in the last week of March 2007 and were randomly distributed across this week. The actual distribution of donators over the various conditions deviates slightly from the design as the charities did not send out 18 of the 10840 mailings we had scheduled. This was mainly the result of the charities continuously updating the status of their donators.

Table 5.2: Number of individuals across experimental treatments according to population size restricted experimental design

		Number of active charities		
		2	3	4
Control	0 mailings	2400	2394	1770
Treatment	1 mailing	600	600	544
	2 mailings	600	600	544
	3 mailings	-	600	544
	4 mailings	-	-	544

5.3.3 Source 3: Survey

Motivation

We have argued that ideally one should use objective, behavioral measures to obtain reliable results. However, for some constructs this is simply not feasible. Subjective constructs such as emotions and attitudes cannot be measured objectively from observed behavioral data. Of course, we can make conjectures about an emotion or attitude from its behavioral consequences, but alternative explanations and underlying processes cannot be ruled out this way. Hence, to find out how people feel we have to ask them. Therefore, we conduct a survey to measure irritation regarding charitable direct mailings.

Measures

Data were collected through a questionnaire which was conducted amongst the subjects in the experiment via postal mail three weeks after the experiment took place. Two main constructs for this study were measured through the survey, that is, irritation and donating behavior. Although we measure actual donating behavior through the charities' databases, we decided to measure stated donating behavior as well. We can then compare our results based on stated and actual donation behavior and we can investigate whether social desirability bias might affect our conclusions.

Irritation was measured by four items which are all related to direct mailing induced irritation (intrusiveness, annoyance, quantity, boredom) and were partly based on Akaah, Korgaonkar and Lund (1995). For each item, respondents indicated their degree of agreement/disagreement on a seven-point Likert scale. For future donating behavior, we use donation intent, that is, intended total donation to charities in the next

year. This was measured in seven categories, ranging from "Less than 25 Euros" to "More than 1000 Euros". The exact measures are presented in Appendix 5.A.

To minimize common-method bias the two constructs were measured using different methods. That is, we used a multi-item Likert scale for irritation and an ordinal scale for donating behavior. Furthermore, we attempt to control for common-method variance using Harman's one-factor test (Podsakoff and Organ 1986). As factor analysis in our case does not indicate a single ' general' factor that accounts for the majority of the covariance in our variables, common-method bias is unlikely to be present here.

Sample

We sent the questionnaire to 4230 donators, split almost equally across the treatment group (2050 questionnaires) and the control group (2180 questionnaires). These precise numbers were obtained from a procedure that ensured an equal distribution of questionnaires across all possible experimental conditions in combination with the set of charities for which the donators are active. Particularly the latter makes this a nontrivial task, as there are, for example, ten combinations of three active charities out of the five charities participating. We use all completed questionnaires that we received within two weeks after they were sent out. Eliminating useless responses, such as completely blank questionnaires or decease notifications, resulted in a final sample of 1020 respondents, which amounts to a reasonably high response rate of 24.1%.

Data cleaning and reduction

On average, the 1020 respondents failed to complete 1% of the questions used in measuring our constructs. We applied mode substitution for the four items measuring irritation and for donation intent. In each of our analyses we check whether they are robust to removing the observations that had a missing value. We then applied confirmatory factor analysis and reliability analysis to form a composite scale of the multiple item measure for irritation. Indeed, irritation appears to be a one-dimensional construct and 67% of the variance is accounted for by one component. Furthermore, this measurement is sufficiently reliable (Cronbach's alpha = 0.83). As the factor loadings of all four items are very similar, we use average scores to form the composite irritation variable. As a robustness check, we also did all analyses with factor regression scores for irritation instead of average scores, but this did not alter any conclusions.

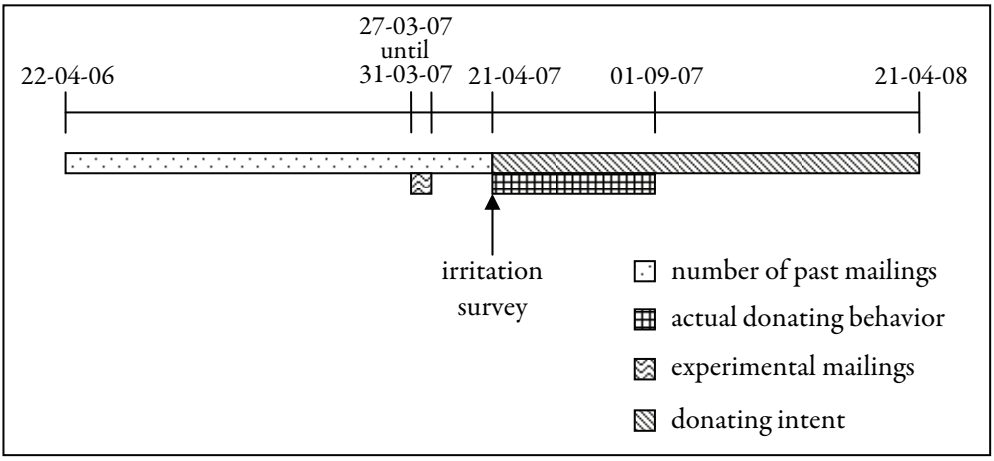

Figure 5.1: Time frame of the variables

5.3.4 Combined dataset

Our final dataset consists of ten variables for 1020 individuals. That is, from the charities' databases (source 1) we have actual future donating behavior, the total number of charitable direct mailings in the past year, and the five dummy variables for activity concerning each of the charities. From the experiment (source 2) we have the number of experimental mailings for each individual, and from the survey (source 3) we have a measure for irritation and for self-stated future donation behavior. For an overview of the time frames for the various measures, see the (rough) time line in Figure 5.1. Figure 5.1 does not show the activity dummy variables. The fact that an individual is in a charity's database means that this individual has donated at least once to this charity in the recent past and thus that the indicator for activity of this charity is one. No specific time frame can be attached to these variables.

Descriptive statistics

Perceived irritation is quite high, as, on a seven-point scale, it obtains an average value of 5.33 (standard deviation is 1.42). We find that 829 individuals (81.3%) have an average score higher than 4 across the four items, meaning they are (at least somewhat) irritated by charitable direct mailings. Moreover, 163 individuals (16.0%) scored the maximum on all items and accordingly they are very irritated. Thus, irritation is indeed substantial.

Table 5.3: Distribution of respondents to the survey across the various conditions in the experiment

		Number of active charities		
		2	3	4
Control	0 mailings	148	188	140
Treatment	1 mailing	64	51	65
	2 mailings	54	53	68
	3 mailings	-	70	55
	4 mailings	-	-	64

Table 5.4: Descriptive statistics for individuals with different numbers of active charities (Standard deviations are in parentheses)

Number of active charities	Number of direct mailings past year	Actual donating behavior	Stated donating behavior
2	9.30 (2.98)	12.12 (24.83)	4.76 (1.55)
3	14.13 (3.12)	22.71 (86.16)	5.17 (1.46)
4	19.83 (3.53)	27.81 (48.43)	5.27 (1.34)

In Table 5.3 we present the distribution of the 1020 respondents across the experimental conditions. Note that none of them noticed a connection between the survey and the experiment. That is, in the space for general comments, no one indicated a recent unusual high number of mailings. Individuals in the combined dataset received on average 1.1 experimental mailings, and 2.1 conditional on experimental treatment.

In the year prior to the survey, individuals received an average of 15.1 (standard deviation is 5.3) direct mailings in total from the five charities in our study, so about one mailing every three weeks. This may seem low for US standards, but charities in the Netherlands have a much lower mailing frequency that in the US. Importantly, the number of experimental mailings sent out represents a substantial increase in mail pressure, at least in the week of the field experiment.

As expected, we see that when someone donates to more charities, he will also receive more direct mailings, see Table 5.4. And, when a person donates to more charities, actual and stated donating behavior also increase. Note that the two are not directly comparable, as actual donating behavior is measured by the total donation amount in the four months after the survey, so this is in real money, while stated

donating behavior is measured on an ordinal scale of 1 to 7 representing categories with increasingly higher intended donation amounts. The fact that both show the same pattern is an indication that stated behavior is linked with actual behavior. However, as we do not observe the total amount of money actually donated, we cannot conclude whether people are truly honest about their donating behavior, or whether they systematically over-report their actual behavior.

5.4 Empirical results

To uncover the relationships between charitable direct mailings, irritation, and donating behavior, we estimate various models. The first relates irritation associated with charitable direct mailings to the received number of these mailings. Thus, we study the effect of charitable mailings on irritation. Do more mailings indeed lead to more irritation? Or are people simply irritated with charitable requests in general, no matter how many mailings they receive? Next, we estimate a model for both stated and actual donating behavior, relating them to irritation and charitable direct mailings. Given that people tend to be quite irritated about charitable direct mailings, does this irritation reduce revenues for the charities?

5.4.1 Irritation

In Table 5.5 we present the results of two linear models. The first model is a linear regression of irritation on charitable direct mailings in the past year, where we distinguish between mailings from the experiment and mailings according to the charities' mailing strategies. For the regular mailings, there is systematic variation in the number of direct mailings people receive, depending on the number of active charities. In addition, donators have chosen to donate to a given number of charities, depending at least in part on their overall attitude towards charities. To control for these systematic influences, we add five dummy variables, one for the activity of each of the five charities. We present the results where missing values are substituted by the mean of irritation. Excluding individuals with a missing value for irritation from the analyses effectively gives the same conclusions.

First of all, we find from model 1 that the experimental mailings and the regular mailings both have a significant and positive effect on irritation. So, at first sight, we conclude that charitable direct mailings do in fact cause irritation. The more mailings someone has received previously, the higher is the level of irritation.

Table 5.5: Estimation results for irritation

(Standard errors are in parentheses)

Explanatory variable	Model 1		Model 2	
Intercept	4.977 ***	(0.141)	4.796 ***	(0.194)
Number of experimental mailings	0.078 **	(0.033)	0.061 *	(0.034)
Number of mailings past year	0.018 **	(0.009)	-0.007	(0.014)
Active charity 1	---		0.216	(0.133)
Active charity 2	---		0.233 **	(0.115)
Active charity 3	---		0.193 *	(0.116)
Active charity 4	---		0.268 *	(0.138)
Active charity 5	---		0.005	(0.115)

*,**,***: significant at a 10%, 5%, and 1% level, respectively.

However, as said, endogeneity could complicate the interpretation of the effect of past mailings. To clarify, we describe how target selection affects the estimation process and explain how the direction of causality may be reversed. Obviously, there is heterogeneity across individuals in the extent to which direct mailings cause irritation. Thus, some individuals might get easily irritated, so that mailings have a large effect on irritation for them, while others do not get irritated that easily and mailings have only a small effect on irritation. The total effect of mailings on irritation is the average of the effects per individual. Target selection by the charities causes the good donators to receive more mailings. Also, if irritation affects donating behavior, people that are highly irritated will generally donate less than people with a low level of irritation. Then, someone who does not get easily irritated will generally have a high donation level and will receive many direct mailings.

In sum, because of target selection, the number of mailings an individual receives may be negatively correlated with his irritation tendency. So, the number of mailings negatively correlates with the degree to which mailings cause irritation through the donation behavior. That is, someone with a low irritation tendency and thus a low irritation level will have a high donation level and will receive many direct mailings, and vice versa.

When estimating the effect of mailings on irritation, target selection may induce an overrepresentation of people with many mailings and little irritation and of people with few mailings and a lot of irritation. The result would be a general underestimation of the effect of mailings on irritation. Hence, although endogeneity

does complicate interpretation of the estimated effect, we can conclude that the already significantly positive effect of mailings on irritation in Table 5.5 may be downwards biased and could in reality be even larger.

To solve the endogeneity issue we conducted the mailing experiment described before. As the experimental mailings are randomly assigned and thus exogenously varied across individuals, they are independent from the individual irritation tendencies. Hence, the estimate of the effect of experimental mailings does not suffer from potential endogeneity bias, demonstrating a positive effect, see Table 5.5 again. All in all, we can conclude from model 1 that charitable direct mailings do indeed cause irritation.

To be more precise, the experimental mailings were indeed randomly assigned across individuals, but they were conditional on the number of active charities. That is, if an individual is a donator to three charities, he randomly receives at most three experimental mailings. In model 1 the number of experimental mailings is actually not completely random, and therefore we have to correct for heterogeneity by including dummy variables for activity of the five charities in model 2. However, the results of model 2 confirm that direct mailings from charities cause irritation as the number of experimental mailings still has a significant and positive effect on irritation.

Comparing the results for model 1 with those of model 2 in Table 5.5 indicates that the "active charity" dummy variables mop up the effect of the number of regular mailings in the past year. That is, the cause of irritation appears to be not so much the number of direct mailings per se, but the number of charities someone has chosen to be a donator to, and not which specific charities, as the parameter estimates for the activity dummy variables do not differ significantly (p-value = 0.236). Hence, if one decided to donate to many charities, one will receive many mailings, and therefore one gets irritated.

5.4.2 Donation behavior

Next we investigate the effect of irritation and mailings on donating behavior. Our combined data set of both self-stated and actual data allows us to study potential differences between the two. For example, people may overestimate their true charitable donations in an attempt to appear more socially acceptable. This could nullify a potential negative effect of irritation on donations. For self-stated behavior, we estimate an ordered logit model for donation intention for next year, where such an intention is

measured in the survey as an ordinal variable with seven categories. This ordered logit model reads as follows:

$$donation^* = X'\beta + \varepsilon \tag{5.1}$$

with

$$\begin{aligned} &donation = 1 \quad &&if\ donation^* \le \mu_1 \\ &donation = j \quad &&if\ \mu_{j-1} < donation^* \le \mu_j,\ j = 2,...,6 \\ &donation = 7 \quad &&if\ \mu_6 < donation^* \end{aligned} \tag{5.2}$$

Here $donation^*$ is a latent variable and μ_1 to μ_6 are unobserved thresholds that satisfy $\mu_1 < \mu_2 < ... < \mu_5 < \mu_6$. Furthermore, X contains all relevant explanatory variables and ε has a cumulative standard logistic distribution. For actual behavior, we estimate a linear regression for the total donation to the five charities in our study in the four months after the survey, acquired from the charities' databases.

Table 5.6 presents the estimation results. In both models we include dummy variables for the activity of each charity to correct for systematic heterogeneity in the number of mailings people receive. Excluding these dummy variables does not alter the conclusions regarding the effects of irritation and direct mailings. Therefore we do not present results without these dummy variables. Including a dummy variable for the missing values in irritation does not alter the conclusions either. Furthermore, repeating the analyses without the individuals with missing values for the respective dependent variables also results in the same conclusions. Therefore, we only present the results where missing values are substituted by either the mean or the mode, depending on the type of variable.

Remarkably, and contrary to expectations, there are hardly any differences between the self-stated and actual behavior models. Of course, because of differences in scale and type of the dependent variable, we cannot directly compare the parameter estimates in the two models, but we can compare the main conclusions about the direction and significance of the effects. There are no differences in the conclusions about our main constructs and hence, social desirability bias does not appear to bias the conclusions in our study.

Table 5.6: Estimation results for self-stated and actual donating behavior

(Standard errors in parentheses)

Explanatory variable	Stated behavior		Actual behavior	
Intercept	---		3.737	(9.327)
Irritation	-0.011	(0.040)	-0.785	(1.245)
Number of experimental mailings	0.017	(0.047)	-0.922	(1.309)
Number of mailings past year	0.070 ***	(0.018)	2.906 ***	(0.829)
Active charity 1	0.126	(0.171)	0.701	(4.081)
Active charity 2	-0.067	(0.152)	-7.045	(6.964)
Active charity 3	0.296 **	(0.146)	-4.026	(3.008)
Active charity 4	-0.424 **	(0.184)	-9.955 **	(4.247)
Active charity 5	-0.041	(0.151)	-11.530	(7.231)
μ_1	-3.370 ***	(0.374)	---	
μ_2	-2.280 ***	(0.312)	---	
μ_3	-0.953 ***	(0.297)	---	
μ_4	0.203	(0.294)	---	
μ_5	1.242 ***	(0.296)	---	
μ_6	2.283 ***	(0.303)	---	

*,**,***: significant at a 10%, 5%, and 1% level, respectively

We find that the effect of irritation, although negative in both models, is not significantly different from zero. In other words, we find no indications that irritation reduces donations. Although people are highly annoyed by the high direct mailing frequencies of charities, this does not seem to affect their donating behavior.

Curiously, we find a significant and positive effect of the number of mailings in the year *before* the survey on donating behavior *after* the survey. This unlikely reflects a direct causal relationship. An explanation might again lie in the potential endogeneity of the number of mailings in the past year. Most target selection is based on the idea that past behavior is the best predictor for future behavior. In general, generous donators in the past will be generous donators in the future, so past and future donations are positively correlated. Through target selection, charities send most direct mailings to the most generous donators in the past, who will also be generous donators in the future. Thus, the positive effect is caused by reversed causality, in that people with a high total donation after the survey are the people that also receive many direct mailings. The

number of direct mailings in the past can therefore best be interpreted as an attitudinal measure, indicating generosity.

The effects of the dummy variables for activity of the different charities are significantly different from each other in both the stated behavior (p-value = 0.001) and the actual behavior model (p-value = 0.004). These dummy variables for activity of the charities pick up all relevant variation across charities. For both models it holds that being a donator of charity 4 has a negative effect on future donation behavior. Thus, on average donators of charity 4 are less generous.

Table 5.6 also reports a positive effect of being a donator of charity 3 on stated donating behavior. Donators of charity 3 apparently are relatively generous donators. A possible explanation is that charity 3 is the only social welfare charity, while the others are health and international aid organizations. There are a number of reasons why, in general, people will be less likely to donate to social welfare charities, as we learned from our communications with various charity managers. They will be less likely to benefit themselves from the donation, unlike from donations to health organizations. In comparison with international aid organizations, people sympathize more with poor people in 3rd world countries than with those closer to home, as the people in the 3rd world countries cannot be blamed for being born there, while poor people closer to home are more likely to have had an opportunity to become affluent. Hence, donators who do donate to social welfare organizations can be expected also to donate to many other charities.

In related research we performed for the charities involved we indeed found that the fraction of donators donating to five or more charities from a set of fourteen is twice as high for donators to charity 3 than for donators to charity 2, 4 and 5. Contrary to our arguments above, the fraction for international aid charity 1 is on the same level as social welfare charity 3, so donators of charity 1 also donate to relatively many other charities. This can be explained by the fact that charity 1 has a religious background, and therefore has many religious donators. Indeed, religion tends to increase generosity, as has been shown previously (Bekkers and Schuyt 2008). In sum, the direction of the effects of the dummy variables matches our previous findings.

The results for actual donating behavior in Table 5.6 do not corroborate the positive effect of being a donator to charity 3. The reason for this lies in our experimental design and sampling frame. Actual donating behavior is measured only for the five charities contributing to our study, while stated behavior concerns donations to

all charitable causes. Although individuals that donate to charity 3 donate to a relative high number of charities on average, we selected our subjects in such as way that this effect is annulled for the five charities under consideration. That is, for all five charities we selected an equal number of individuals that donate to no other charities, to one other charity, and so forth. Hence, being a donator to charity 3 cannot have an effect on the number of other active charities by design.

In sum, we find that there are no major differences between the results for self-stated and actual behavior. It appears that donating behavior is mainly determined by attitudinal factors, and is not affected by feelings of irritation regarding charitable direct mailings.

5.5 Discussion and conclusion

The main conclusions from our study can be easily summarized. Individuals are irritated by the amount and frequency of charitable direct mailings, but these negative feelings are not propagated into stated nor actual donating behavior. We could obtain these clear-cut findings due to the fact that five of the largest charities in the Netherlands allowed us to control the number of mailings that individuals received in a field experiment. In contrast, in a non-experimental setting one would have a hard time disentangling the consequences of target selection rules typically used by charities and the actual received messages and subsequent reactions. In particular, because of target selection, people who donated more – as a result of their inherently positive attitude towards charities – will receive more mailings and hence will be more irritated. Not controlling for endogeneity could hence lead to the conclusion that charities should induce more irritation, as the irritated donators donate most.

Our analysis of this unique database does support a common wisdom amongst managers at charities. They always felt that irritation could arise but also that donations were not slowing down. A main message from this study could be that irritation is not a key emotional driver when it comes to responding to charities' direct mailings. It is quite conceivable that such mailings induce feelings of guilt and of social responsibility that are stronger than irritation. In addition, donators cannot blame the eventual beneficiaries of the money they donate, that is, the children in 3rd world countries or those suffering from a particular disease, for the unpleasant behavior of the charity.

This separation of beneficiary and charity and the resulting disconnection between the requester and the recipient of the money seems to result in a failure of

market-like correction mechanisms. If a regular store provides poor service, you simply go to shop elsewhere. In case all charities send many mailings, as they tend to do, you cannot go elsewhere to help the beneficiaries. With the charities sending more and more mailings, but the donators having nowhere else to go, this is a typical case for government intervention or at least self-regulation from the charities. In particular, caps could be imposed on the number of solicitations sent our or on the amount of irritation induced by charitable direct mailings. The rise of the number of private initiatives to provide aid to those in need, even suggests that more and more donators have found an alternative means to reach the final beneficiaries without being irritated.

Note that our findings do not refute those of Diamond and Noble (2001). They found that direct mail pressure and the resulting negative affective responses like irritation cause recipients to use defensive actions. Taking their results as a starting point, our results show that these defensive mechanisms are not very effective. Similar to regular advertising, where people think they are not affected as they develop defensive strategies (e.g. Speck and Elliott 1997), people also seem to think they have found an effective way of handling charitable mailings, but still keep on donating in response to at least some of them.

Our study does have one limitation, which we feel opens up an important avenue for further research. In the field experiment, we manipulated mail pressure by having five different charities send additional direct mailings on top of their regular mailing strategy in a single week. Although this did boost the mail pressure substantially, it did so in only a limited period of time. Further research could extend the duration of the variation in mail pressure to see whether our results continue to hold in these circumstances. It is, however, important to note that our experiment already did increase irritation among the recipients, so our manipulation was effective in that respect.

5.A Measures used in the questionnaire

Irritation and stated donating behavior were measured using the following questions.

1. To what extent do you agree with the following statements? (1 = strongly disagree, 7 = strongly agree)
    a) It irritates me that I am approached by charities without my consent
    b) The frequency at which I am approached by charities annoys me
    c) I find letters of charities annoying
    d) I am bored by the large amounts of letters from charities I receive

2. How much do you expect to donate to charity next year?
    - Less than €25
    - €25 - €50
    - €50 - €100
    - €100 - €250
    - €250 - €500
    - €500 - €1000
    - More than €1000

Chapter 6
Summary and Conclusions

In this thesis we studied the dynamic and competitive effects of charitable direct mailings on donating behavior. In this way we contributed to the direct mailing and charitable giving literature, which both have largely overlooked these effects. Besides establishing that substantial dynamic and competitive effects exist and that the single decision context can thus not be justified for accurately describing direct mailing response behavior, we also illustrated some practical implications of these results for charities.

In the first part, we discussed two direct mailing response models, with the first focusing primarily on the competitive dimension, and the second mainly on the dynamic dimension. In the second part, we presented the analysis of our direct mailing field experiment, where we concentrated first on the direct mailing effects on actual behavior, and second on the underlying motivational process. Below we provide a summary of each of the four chapters, followed by our main conclusions, implications, and recommendations for further research.

6.1 Summary

In Chapter 2 we have presented a dynamic direct mailing response model with competitive effects. We discussed the lack of dynamic and competitive effects in the current direct marketing literature and motivated why they are important to incorporate in direct marketing models. Furthermore, we described the theoretical ambiguity of both dimensions. Past direct mailings can be argued to have positive and negative effects, and although one would generally expect negative competitive effects, situations have been found where positive competitive externalities exist.

We modeled the individual response decision using a Tobit-2 specification that incorporates past direct mailings and past purchase behavior. The effect of an event was diminishing over time through a Koyck lag structure and we distinguished between own effects and cross effects. We accounted for unobserved heterogeneity through individual-specific parameters and estimated the model using Bayesian estimation methods. To overcome a possible endogeneity bias due to the non-randomness of the direct mailing observations, we simultaneously estimated both our Tobit-2 model for the response decision and mailing strategy models for all organizations as a function of the individual-specific parameters.

Although applicable to all kinds of direct mailings that elicit a direct response, we applied our model to donating behavior to charities. As charitable mailings differ from regular mailings in various respects, we described the implications of a number of theoretical drivers of donating behavior for the model parameters. These drivers were irritation, guilt buildup, licensing, defection, generosity, competition and giving patterns.

To estimate the model we had access to a dataset of direct mailings from and donations to three health charities, for 5000 individuals during a five year period. Our estimation results indicated that substantial dynamic and competitive effects exist. This result is interesting, as the relevant literature on direct mailings has largely overlooked these effects. In our context of charitable giving, direct mailings of the same charity are short-run substitutes, in that an extra mailing cannibalizes the revenues of subsequent mailings. In fact, we found that up to a quarter of the revenues of an extra mailing are cancelled out within two years. Most cannibalization takes place in the first six months and this effect dies out over time. Regarding competitive interactions, we found that particularly in the short run, competitive charitable direct mailings tend to be complements, so that competition is reinforcing.

Finally, we used our model to shed light on the practical relevance of a number of theoretical drivers of donating behavior. Our main findings substantiated the idea of direct mailing irritation, in that too many requests can be detrimental for a charity's revenues. However, small numbers of competitive mailings seem to be reinforcing, suggesting that these increase guilt and consequently the inclination to donate. Also, licensing appears to take place, in that people who recently donated feel licensed to donate smaller amounts. And finally, people give according to certain giving patterns,

that is, some people give a substantial donation occasionally, while others frequently give small amounts.

In Chapter 3 we have presented a dynamic model of donating behavior in response to direct mailings of multiple charities, where the main driving force was guilt. We focused on guilt as this is a driver of donating behavior that can be viewed as a dynamic concept. Guilt can be experienced as a reaction to past behavior and also future guilt can be anticipated. Moreover, guilt can be a consequence and a driver of behavior.

Based on psychological and charitable giving literature we developed a structural model of donating behavior. We considered an individual's *stock of guilt* that represents the total accumulated feelings of guilt at a certain point in time. We assumed people have a *single* stock of guilt and we proposed that the stock of guilt will typically grow as a result of a general sense of moral obligation and receiving charitable direct mailings. The model also accounts for other but unobserved changes in guilt feelings. Making a donation reduces the stock of guilt, but comes at certain costs. The model assumptions imply that a donation is made when the stock of guilt reaches a sufficiently high level and the donation will be higher, the higher the level of guilt. Because of target selection techniques, charities send more mailings to their better donators. Assuming rational expectations, individuals anticipate the impact of their donating decision on the amount of mailings they will receive in the future. They take this into account when deciding on their donation and plan their donations optimally.

We inferred individual donating behavior by solving the corresponding stochastic dynamic programming model. We estimated the model using a dataset with records of all direct mailings received from and donations made to five charities for 5000 individuals during three years. We introduced heterogeneity in the parameters by imposing a latent class structure with two segments. Our parameter estimates indicated that there is a large segment of individuals who donate not so often but with large amounts, and that there is a smaller segment of individuals who donate more frequently with smaller amounts. This corroborates the result in Chapter 2 where we found that people give according to certain giving patterns. Furthermore, some charities seem to induce more guilt than others, and also some charities are more effective in reducing guilt than others. We showed that our model of guilt build-up and relief fits actual behavior quite accurately. The predicted distributions of donated amounts and of the number of non-responses between two consecutive responses closely followed the patterns in the data. Differences between charities were also matched remarkably well.

The structural model enabled us to do policy experiments, which is an important contribution. We showed that the mailing strategies can be improved, where two cases are particularly relevant. The optimal mailing strategy from the beneficiaries' point of view acquires more funds for the charities, but decreases donators' welfare. In this case, charities which induce guilt should increase their mailing frequencies, because individuals will then donate more often to reduce their high guilt levels. The optimal mailing strategy from the donators' point of view makes donators feel better but reduces revenues for the charities. In this case, the charities that do not induce guilt should increase their mailing frequencies, as this would result in more opportunities to attenuate guilt without increasing it. The results of the current mailing strategies of the charities are somewhere between the results of the optimal strategies from both viewpoints, indicating that the charities seem to be taking both types of stakeholders into account.

In Chapter 4 we have discussed the analysis of the charitable direct mailing field experiment we conducted. In order to study the effect of a mailing on other mailings – both on future mailings from the same organization and on mailings from competitive organizations – we need individual level data of direct mailings and donations of multiple charities over time. However, because of target selection, observations available from the charities' databases are endogenous. Instead of solving this issue using intricate econometric modeling techniques as we did in Part I of this thesis, in this chapter we designed a field experiment to create new data that does not suffer from endogeneity. That is, we induced exogenous variation in the number of mailings that 7666 individuals received of five charities in a single week, and collected information on actual donations made in response to the experimental mailings, as well as the responses to subsequent mailings sent out by the charities. In this way we could draw reliable and unbiased conclusions about the competitive effects of charitable direct mailings over time through relatively simple analyses.

Our results indicated that competitive mailings sent contemporaneously have a negative effect on both the response probability and the amount donated to the focal mailing. In fact, each competitive mailing reduces the net revenues with more than 5%. Thus, competitive mailings sent simultaneously harm the revenues of a charity's own mailing and the more mailings competitive charities send, the lower the revenues for the focal charity. In the short run, we found significantly negative effects of the experimental mailing of the same company on both response and amount. Thus,

sending an extra mailing on top of the charity's current mailing strategy cannibalizes on the charity's future revenues. In fact, the extra mailing reduces the net revenues for the next mailing with almost 19%. In the long run, the extra mailing cannibalizes even further on future revenues. In both the short and the long run, the effects of competitive experimental mailings on response and amount were not significant. Thus, although competitive mailings reduce response to a charity's own mailings when sent simultaneously, this effect does not persist over time.

Another finding was that the net revenues of an extra mailing, taking competition and cannibalization into account, only just covers the printing and postage costs in the current charitable mailing environment. It appeared that the net effect of an extra mailing for individuals that already receive many mailings was quite substantial, while the net effect for individuals that receive few mailings was even negative, although not significant. Thus, it seems that charities should not send extra mailings to those individuals that did not receive lots of mailings already, whereas for those individuals that the charities currently mail frequently it could be worth increasing the mail pressure a little more.

A final important finding was that charities could make disastrous mailing decisions if they ignored the endogeneity of the direct mailing observations in their databases. Analyzing the net effect of an extra mailing based on endogenous mailings alone resulted in a severe overestimation of the effect. Thus, if endogeneity is ignored, charities could easily decide to strongly increase mail pressure, while the actual net revenues of an extra mailing only just compensate printing and postage costs.

All in all, our results suggested that donation behavior should be studied as a comprehensive process that extends beyond a set of repeated single-shot decisions. We considered our results a starting-point to reflect on their implications for theoretical development of charitable giving. We discussed an extension of the well-known warm glow framework, the theory that is generally used to rationalize donating behavior, to a multiple decisions context. We argued that one needs observations on mailings and donations for multiple charities to distinguish between a theory of warm glow giving and, for example, a theory of moral obligation. Our results, which sprung from such data, supported the latter theory.

In Chapter 5 we combined the data from our field experiment with a survey in which we measured irritation, in order to study the underlying motivational process of donating in response to direct mailings. As charitable direct mailing frequencies are

increasing, potential donators may become overwhelmed by so many direct mailings from so many charities. High frequencies of unwanted exposures may cause irritation, which in turn could influence behavior, for example by reducing charitable donations. Although existing literature provides evidence for charitable direct mail irritation and has suggested serious consequences for direct mailing effectiveness, not a single study has linked direct mailing irritation with actual donating behavior, which is what we did in this chapter.

We created a unique dataset by combining data from three different sources. The three sources all addressed a specific problem inherent to this type of study and subject matter. First, to avoid social desirability bias, which is a common problem when measuring social behavior such as charitable donating, we obtained objective behavioral data on actual levels of charitable donating from the databases of five charities. Second, in order to solve potential endogeneity issues, we had to ensure exogenously determined variation in the number of mailings received by individuals, which we achieved through the field experiment described above. Third, we conducted a survey to measure the subjective construct "irritation", which could not be objectively measured from behavioral data. In this survey we also measured stated donating behavior, to be able to assess potential differences with actual donating behavior. In sum, our dataset contained observations on charitable direct mail frequencies, irritation and both stated and actual donating behavior for 1020 individuals.

The analysis of this dataset showed first of all that charitable direct mailings do indeed cause irritation. That is, the more mailings someone received, the higher was the level of irritation. Surprisingly, we found no significant effects of irritation on donating behavior. Thus, we found no indications that irritation reduces donations. Although people are highly annoyed by the high direct mailing frequencies of charities, this does not affect their donating behavior. Donating behavior seems to be mainly determined by attitudinal factors such as generosity, and is not affected by feelings of irritation. Contrary to expectations, there were hardly any differences between the results for self-stated and actual behavior. Hence, social desirability bias did not appear to bias the conclusions in our study.

A key insight from this chapter was that irritation is not a key emotional driver when responding to direct mailings from charities. It is quite conceivable that charitable mailings induce feelings of guilt and social responsibility that are stronger than irritation. In addition, donators cannot blame the eventual beneficiaries of the money

they donate for the annoying behavior of the charity. Although they may want to punish the charity, they do not want the beneficiaries to suffer for it.

6.2 Conclusions

This thesis originated from a scientific and a societal motivation. Below we will describe our main conclusions, implications and further research suggestions from both viewpoints.

Scientifically, we aimed to fill a gap in the direct mailing and charitable giving literature, which both have generally ignored dynamic and competitive effects. All four chapters showed that substantial dynamic and competitive effects of charitable direct mailings exist. The response to a current direct mailing is affected by past direct mailings from the same charity, and also by direct mailings from competing charities. Hence, charitable direct mailings cannot be viewed independently and donation behavior in response to direct mailings should be studied as a comprehensive process.

This finding of course opens up myriads of avenues for further research both for charitable direct mail studies in particular and for direct mail studies in general. Existing knowledge of charitable giving and direct mail should be re-evaluated in the light of these insights. For example, existing direct mail response models could be extended to include dynamic and competitive effects and well-known drivers of charitable giving may be reconsidered in a multiple-decision context.

Also, extending the studies in this thesis would contribute to a further understanding of dynamic and competitive effects. For example, although our studies focused on the charitable giving context, we suspect that these types of effects also exist for other types of mailings, such as catalogs and promotional offers. It would be interesting to investigate what role dynamics and competition play in different contexts, and to assess potential differences with the charitable giving context. To this end, one could apply several methods presented in this thesis, such as the direct mailing response model from Chapter 2.

Furthermore, our data did not cover all competition. An interesting extension would be to include more charities and investigate patterns across different types of charities. Questions that could be answered include: Is competition stronger between charities within the same sector than between charities in different sectors? Do donators spread their donations over different sectors or over different charities within a sector?

Finally, our field experiment can be extended and refined along multiple directions. One can think of the number of charities included in the experiment, variation in the timing of the experimental mailings and variation in the content of the experimental mailings. We feel our experiment is a great starting point to inspire lots of new insights.

Besides the two main scientific themes of this thesis, we also shed some light on the endogeneity issue resulting from the target selection procedures applied by charities. In several instances we established empirically that charities indeed apply target selection and direct mail observations are therefore endogenous. Furthermore, we illustrated the bias that results from this endogeneity if it is ignored and argued that in some cases ignoring endogeneity can even lead to opposite conclusions. Hence, to obtain accurate and reliable results when studying charitable direct mail effects – or direct mail from any targeting organization, for that matter – one should find a way to solve the endogeneity issue. This can be done through econometric techniques, from which we presented two examples in Part I of this thesis, or by creating exogenous variation in the variable of interest, for example through an experiment, as we did in Part II of this thesis. As not much research has been done on correction mechanisms for endogeneity bias, this issue provides further opportunities for future research.

The second part of the motivation for this thesis was of a societal nature and sprung from the frustrations and complaints regarding charitable direct mail that nowadays surface more and more frequently. We aimed to study whether society's current opinions translate to actual donating behavior and to provide socially relevant insights to charities to guide their mailing strategies and help increase their revenues.

In this light, the main conclusion from this thesis is that charities should mail more to increase their revenues. The results from all four chapters indicate that higher mailing frequencies will increase revenues, even in the long run. An extra mailing will cannibalize on future revenues of the same charity, but the net effect will still be positive, although this only holds for people that already receive many direct mailings and not for all donators. And although competitive mailings may have a negative effect when sent simultaneously, over time they tend to have a complementing effect. Thus, charities in the Netherlands have not yet reached the limit and there is still room for more mailings and more funds to raise. A hint for this result is also provided by the situation in the US, where mailing frequencies are many times higher than in the Netherlands, and charities still raise enormous amounts of money. Future research could further explore the

boundaries of charities' mailing behavior and investigate when donations would actually start to decrease.

This thesis showed that donators may become annoyed but their irritation does not find its way into their donating behavior. We feel that the most plausible explanation for this comes from the fact that the charity serves as an intermediary to transfer funds from the donators to the eventual beneficiaries. As mentioned before, donators may want to punish the charities for deluging them with requests, but in the end their will to help the beneficiaries outweighs their will to punish.

Obviously it would still be wise for charities to attempt to contain irritation amongst potential donators. However, instead of adjusting their mailing frequencies there could be other ways for charities to achieve this. For example, the content of the mailings and information brochures can be experimented with, and charities can try to restore trust by better communicating what the donated money is spent on exactly. Future research could investigate which factors affect donators' attitudes in order to aid charities in turning around the negative opinions and sustaining a fruitful relationship with their donators.

Nederlandse Samenvatting (Summary in Dutch)

Motivatie

De goededoelenindustrie is een enorme industrie. Alleen al in Nederland zamelden goede doelen in 2005 in totaal zo'n 4,4 miljard euro in. Hoewel stichtingen en bedrijven substantieel bijdragen aan dit bedrag is het grootste gedeelte afkomstig van individuele donateurs. Om ervoor te zorgen dat donateurs blijven geven, maken goede doelen gebruik van allerlei hulpmiddelen en activiteiten, waarvan de meest populaire direct mail is. Potentiële donateurs worden tegenwoordig overstelpt door enorme aantallen mailings van vele goede doelen, die allemaal om een donatie vragen. Aangezien goede doelen voor een groot deel afhankelijk zijn van hun inkomsten uit direct mail is het belangrijk de precieze effecten van deze mailings op donatiegedrag te achterhalen.

De motivatie voor dit proefschrift is tweeledig, wetenschappelijk en maatschappelijk. Vanuit wetenschappelijk oogpunt zijn twee aspecten vooral van belang, namelijk dynamiek en concurrentie. Bestaande modellen van donatiegedrag beperken zich tot een eenmalige beslissingscontext, een enkele donatie aan een enkel goed doel. In werkelijkheid ontvangen mensen echter vele donatieverzoeken, die intuïtief niet onafhankelijk zijn. Men kan zich bijvoorbeeld voorstellen dat iemand die kortgeleden aan een bepaald goed doel heeft gegeven vandaag niet opnieuw aan dit doel zal geven. En wanneer hij tegelijkertijd verzoeken ontvangt van meerdere goede doelen zal hij misschien beslissen om er één te kiezen of om kleinere bedragen aan allemaal te doneren. In dit proefschrift bestuderen we individueel donatiegedrag jegens meerdere goede doelen over de tijd, waarbij we nieuwe inzichten verschaffen in geefgedrag en het fondsenwervingsproces.

Het tweede deel van de motivatie voor dit proefschrift is van maatschappelijke aard. Aangezien goede doelen steeds meer mailings sturen, zouden mensen zich overweldigd kunnen gaan voelen of zelfs geïrriteerd raken. De term ' junkmail' wordt steeds vaker genoemd naar aanleiding van direct mail van goede doelen. Ook de vele artikelen in kranten en tijdschriften over verzoeken van goede doelen en de ergernis die deze veroorzaken getuigen van de ernst van het onderwerp. De fondsenwervings-methoden en direct mailings in het bijzonder zijn onderwerpen die de maatschappij bezighouden. De publieke opinie lijkt steeds meer te worden gedomineerd door negatieve aspecten. Vanuit het oogpunt van de goede doelen is dan de vraag of hun mailfrequentie het donatiegedrag op de lange termijn wellicht negatief beïnvloedt. In dit proefschrift onderzoeken we dus de effecten van direct mailings van goede doelen op donatiegedrag.

Samenvattend is het doel van dit proefschrift het bestuderen van donatiegedrag in reactie op direct mailings van meerdere goede doelen over de tijd, om zo bij te dragen aan de geefgedrags- en directmailliteratuur op twee belangrijke, weinig onderzochte fronten, en tegelijkertijd aan goede doelen maatschappelijk relevante inzichten te verschaffen die als richtlijn kunnen dienen voor hun mailstrategieën en hun inkomsten kunnen helpen verhogen. In deel I van dit proefschrift bespreken we twee directmail-responsmodellen, waarbij het eerste zich voornamelijk richt op de concurrentiedimensie en het tweede voornamelijk op de dynamische dimensie. In deel II presenteren we de analyse van ons directmailveldexperiment, waarbij we ons eerst concentreren op de effecten van direct mailings op werkelijk donatiegedrag en vervolgens op het onderliggende motivatieproces. Hieronder volgt een samenvatting van elk van de vier hoofdstukken, gevolgd door onze voornaamste conclusies, implicaties en aanbevelingen voor vervolgonderzoek.

Samenvatting

In hoofdstuk 2 presenteren we een dynamisch directmailingresponsmodel met competitieve effecten. We bespreken het gebrek aan dynamische en competitieve effecten in de huidige directmarketingliteratuur en motiveren waarom deze belangrijk zijn om op te nemen in directmarketingmodellen. Ook beschrijven we de theoretische dubbelzinnigheid van beide dimensies: van direct mailings in het verleden kan worden beargumenteerd dat zij positieve en negatieve effecten hebben, en hoewel men in het

algemeen negatieve competitieve effecten zou verwachten, komen er situaties voor waarin positieve competitieve externaliteiten bestaan.

We modelleren de individuele responsbeslissing met een Tobit-2-specificatie waarin zowel direct mailings als aankoopgedrag in het verleden zijn opgenomen. Het effect van een gebeurtenis neemt af over de tijd door middel van een Koyck-lagstructuur en we maken onderscheid tussen eigen en kruiseffecten. We houden rekening met ongeobserveerde heterogeniteit via individueel specifieke parameters en schatten het model met Bayesiaanse schattingsmethoden. Om een mogelijke endogeniteits-vertekening als gevolg van de onwillekeurigheid van de directmailingobservaties te voorkomen, schatten we ons Tobit-2-model voor de responsbeslissing en mailingstrategiemodellen voor alle organisaties als functie van de individuele parameters simultaan.

Hoewel ons directmailingresponsmodel toepasbaar is op allerlei soorten direct mailings die een directe reactie opwekken, passen wij het toe op donatiegedrag aan goede doelen. Aangezien mailings van goede doelen in meerdere opzichten verschillen van reguliere mailings, beschrijven we eerst de implicaties voor de modelparameters van een aantal theoretische invloeden op donatiegedrag. Deze invloeden zijn irritatie, opbouw van schuldgevoel, rechtvaardiging, defectie, vrijgevigheid, concurrentie en geefpatronen.

Om het model te schatten, maken we gebruik van een dataset met direct mailings van en donaties aan drie gezondheidsfondsen, voor 5000 individuen gedurende een periode van vijf jaar. Onze schattingsresultaten tonen aan dat er substantiële dynamische en competitieve effecten bestaan. Dit is een interessant resultaat, aangezien de relevante literatuur over direct mailings deze effecten grotendeels buiten beschouwing laat. In onze context van donatiegedrag zijn direct mailings van hetzelfde goede doel substituten op de korte termijn, wat wil zeggen dat een extra mailing de opbrengsten van vervolgmailings kannibaliseert. Het blijkt dat tot aan een kwart van de opbrengsten van een extra mailing binnen twee jaar teniet worden gedaan. De meeste kannibalisatie vindt plaats in de eerste zes maanden en dit effect verdwijnt over de tijd. Wat betreft de competitieve effecten vinden we dat met name op de korte termijn concurrerende mailings van goede doelen elkaar lijken te complementeren, zodat concurrentie versterkend werkt.

Ten slotte gebruiken we ons model om inzicht te geven in de praktische relevantie van een aantal theoretische invloeden op donatiegedrag. Onze voornaamste bevindingen staven het idee van directmailingirritatie, wat wil zeggen dat te veel

verzoeken nadelig kunnen zijn voor de opbrengsten van een goed doel. Echter, kleine aantallen concurrerende mailings lijken een versterkende werking op de opbrengsten te hebben, wat suggereert dat deze mailings schuldgevoelens verhogen en daarmee de geefintentie. Verder blijkt er rechtvaardiging plaats te vinden, waarmee wordt bedoeld dat mensen die kortgeleden hebben gedoneerd zich gerechtvaardigd voelen om nu kleinere bedragen te doneren. Ten slotte geven mensen volgens zekere geefpatronen, wat wil zeggen dat sommige mensen af en toe een grote donatie doen, terwijl anderen regelmatig een klein bedrag geven.

In hoofdstuk 3 presenteren we een dynamisch model van donatiegedrag naar aanleiding van direct mailings van meerdere goede doelen, met schuldgevoel als voornaamste drijvende kracht. We richten ons op schuldgevoel aangezien dit een drijfveer van donatiegedrag is die kan worden gezien als een dynamisch concept. Schuldgevoel kan worden ervaren als een reactie op gedrag in het verleden en op toekomstige schuldgevoelens kan ook worden geanticipeerd. Daarbij kan schuldgevoel een gevolg van, maar ook een aanleiding tot gedrag zijn.

Aan de hand van de psychologische en donatieliteratuur ontwikkelen we een structureel model van donatiegedrag. We gaan uit van een individu's *voorraad schuldgevoel*, die het totaal aan opgebouwde schuldgevoelens op een bepaald moment weergeeft. We nemen aan dat mensen een *enkele* voorraad schuldgevoel hebben en stellen voor dat deze voorraad doorgaans zal groeien als gevolg van een algemeen gevoel van morele verplichting en het ontvangen van mailings van goede doelen. Het model houdt ook rekening met andere, ongeobserveerde veranderingen in schuldgevoelens. Het maken van een donatie verlaagt de voorraad schuldgevoel, maar brengt zekere kosten met zich mee. De modelaannamen impliceren dat een donatie zal worden gedaan wanneer de voorraad schuldgevoel een voldoende hoog niveau bereikt, en de donatie zal hoger zijn naarmate het schuldniveau hoger is. Door doelgroepselectietechnieken sturen goede doelen meer mailings naar hun betere donateurs. Uitgaande van rationele verwachtingen, anticiperen individuen op de invloed van hun donatiebeslissing op het aantal mailings dat zij in de toekomst zullen ontvangen. Ze houden hier rekening mee wanneer zij hun donatiebeslissing nemen en plannen hun donaties optimaal.

We leiden individueel donatiegedrag af uit het oplossen van het bijbehorende stochastisch dynamisch programmeringsmodel. We schatten het model met behulp van een dataset met alle direct mailings van en donaties aan vijf goede doelen voor 5000 individuen gedurende drie jaar. We introduceren heterogeniteit in de parameters door

een latenteklassenstructuur met twee segmenten op te leggen. Onze parameterschattingen suggereren dat er een groot segment bestaat van individuen die niet zo vaak doneren, maar wel grote bedragen, en dat er een kleiner segment bestaat van individuen die vaker kleinere bedragen doneren. Dit bevestigt het resultaat in hoofdstuk 2 waar we constateren dat mensen geven volgens zekere geefpatronen. Verder blijken sommige goede doelen meer schuldgevoel te veroorzaken dan andere, en zijn sommige goede doelen effectiever in het reduceren van schuldgevoel dan andere. We laten zien dat ons model van opbouw en verlichting van schuldgevoel vrij nauwkeurig overeenkomt met werkelijk gedrag. De voorspelde verdelingen van gedoneerde bedragen en van het aantal non-responsen tussen twee opeenvolgende responsen volgen de patronen in de data nauwgezet. Verschillen tussen goede doelen worden ook opvallend goed opgepikt.

Een belangrijke bijdrage is dat het structurele model het mogelijk maakt om beleidsexperimenten te doen. We tonen aan dat de mailingstrategieën kunnen worden verbeterd, waarbij twee gevallen in het bijzonder relevant zijn. De optimale mailingstrategie vanuit het oogpunt van de begunstigden verwerft meer fondsen, maar verlaagt het welzijn van de donateurs. Bij deze strategie dienen goede doelen die schuldgevoel opwekken hun mailfrequentie te verhogen aangezien individuen dan vaker zullen doneren om hun hoge schuldniveau te verlagen. De optimale mailingstrategie vanuit het oogpunt van de donateurs zorgt voor een beter gevoel voor de donateurs, maar lagere inkomsten voor de goede doelen. Bij deze strategie dienen goede doelen die geen schuldgevoel opwekken hun mailfrequentie te verhogen, aangezien dit zal leiden tot meer mogelijkheden tot vermindering van het schuldgevoel, zonder het te verhogen. De resultaten van de huidige mailingstrategieën van de goede doelen zitten ergens tussen de resultaten van de optimale strategieën uit beide oogpunten in, wat aangeeft dat de goede doelen met zowel de donateurs als de begunstigden rekening lijken te houden.

In hoofdstuk 4 bespreken we de analyse van het veldexperiment over direct mailings van goede doelen dat we hebben uitgevoerd. Om het effect van een mailing op andere mailings te bestuderen – zowel op toekomstige mailings van dezelfde organisatie als op mailings van concurrerende organisaties – hebben we individuele data van direct mailings en donaties van meerdere goede doelen over de tijd nodig. Echter, vanwege doelgroepselectie door de goede doelen zijn de observaties in hun databases endogeen. In plaats van dit probleem op te lossen door middel van ingewikkelde econometrische modelleringstechnieken zoals we doen in deel I van dit proefschrift, zetten we in dit hoofdstuk een veldexperiment op om nieuwe data te creëren die geen last hebben van

endogeniteit. Dat wil zeggen, we brengen exogene variatie aan in het aantal mailings dat 7666 individuen ontvangen van vijf goede doelen in een enkele week. Vervolgens verzamelen we informatie over daadwerkelijk gemaakte donaties in reactie op de experimentele mailings, alsmede de responsen op vervolgmailings die worden verzonden door de goede doelen. Op deze manier kunnen we via relatief simpele analyses betrouwbare en onvertekende conclusies trekken over de competitieve effecten van direct mailings van goede doelen over de tijd.

Onze resultaten laten zien dat zowel de responskans als het gedoneerde bedrag op een mailing negatief wordt beïnvloed door concurrerende mailings die ongeveer gelijktijdig worden ontvangen. Elke concurrerende mailing verlaagt de netto-opbrengst zelfs met meer dan 5%. Dus, concurrerende mailings die gelijktijdig worden verzonden, schaden de inkomsten op een mailing van een goed doel, en hoe meer concurrerende mailings worden verstuurd, hoe lager de opbrengsten voor het goede doel. Op de korte termijn vinden we significant negatieve effecten van de experimentele mailing van dezelfde organisatie op zowel respons als bedrag. Het sturen van een extra mailing bovenop de huidige mailstrategie van een goed doel kannibaliseert dus de toekomstige opbrengsten van dat goede doel. De extra mailing verlaagt de netto-opbrengst van de volgende mailing zelfs met bijna 19%. Op de lange termijn treedt nog meer kannibalisatie op. De effecten van concurrerende experimentele mailings op respons en bedrag zijn echter zowel op de korte als de lange termijn niet significant. Dus, hoewel concurrerende mailings die gelijktijdig worden verzonden de respons op een mailing van een goed doel verlagen, zet dit effect niet door over de tijd.

Een ander resultaat is dat de netto-opbrengst van een extra mailing, waarbij rekening wordt gehouden met concurrentie en kannibalisatie, de druk- en portokosten maar net dekken in het huidige mailklimaat. Het netto-effect van een extra mailing voor individuen die reeds veel mailings ontvangen blijkt aanzienlijk, maar het netto-effect voor individuen die weinig mailings ontvangen is, hoewel niet significant, zelfs negatief. Het lijkt er dus op dat goede doelen geen extra mailings moeten sturen naar individuen die niet al veel mailings ontvingen, terwijl het voor de individuen die van de goede doelen nu al vaak mailings krijgen, de moeite waard zou zijn om de maildruk nog iets te verhogen.

Een laatste belangrijke bevinding is dat goede doelen desastreuze mail-beslissingen zouden kunnen nemen wanneer zij de endogeniteit van de directmailing-observaties in hun databases zouden negeren. Wanneer het netto-effect van een extra

mailing wordt geanalyseerd puur op basis van endogene mailings wordt het effect ernstig overschat. Wanneer goede doelen de endogeniteit zouden negeren, zouden zij dus gemakkelijk kunnen besluiten om de maildruk sterk te verhogen, terwijl de werkelijke netto-opbrengsten van een extra mailing de druk- en portokosten maar net compenseren.

Al met al wijzen onze resultaten uit dat geefgedrag moet worden bestudeerd als een alomvattend proces, dat verder reikt dan een stel herhaalde eenmalige beslissingen. We beschouwen onze resultaten als een uitgangspunt om na te denken over hun implicaties voor de ontwikkeling van geefgedragtheorieën. We bespreken een uitbreiding naar een meervoudige beslissingscontext van de bekende *warm glow*-theorie, die vaak gebruikt wordt om geefgedrag te rationaliseren. We beargumenteren dat men observaties van mailings en donaties voor meerdere goede doelen nodig heeft om een onderscheid te kunnen maken tussen een warmglowtheorie en bijvoorbeeld een theorie van morele verplichting. Onze resultaten, die voortkomen uit zulke data, ondersteunen deze laatste theorie.

In hoofdstuk 5 combineren we de data van ons veldexperiment met een enquête waarin we irritatie meten, om zo het onderliggende motivatieproces van doneren naar aanleiding van direct mailings te bestuderen. Aangezien de mailfrequentie van goede doelen alsmaar stijgt, zouden potentiële donateurs overweldigd kunnen worden door zoveel mailings van zoveel goede doelen. Een hoge frequentie van ongewenste blootstelling kan irritatie veroorzaken, wat vervolgens gedrag kan beïnvloeden, bijvoorbeeld door donaties te verlagen. Hoewel de bestaande literatuur bewijs levert voor irritatie naar aanleiding van direct mail van goede doelen en serieuze gevolgen voor de effectiviteit van de direct mailings suggereert, heeft geen enkele studie directmailirritatie gekoppeld aan werkelijk donatiegedrag, zoals wij in dit hoofdstuk doen.

We creëren een unieke dataset door data uit drie verschillende bronnen te combineren. Elk van de drie bronnen richt zich op een specifiek probleem dat inherent is aan dit type studie en dit onderwerp. Ten eerste gebruiken we, om een vertekening door sociaal wenselijke antwoorden – een veelvoorkomend probleem bij het meten van sociaal gedrag zoals doneren aan goede doelen – te voorkomen, objectieve gedragsdata over werkelijke donatieniveaus uit de databases van vijf goede doelen. Ten tweede zorgen we, met het oog op potentiële endogeniteitskwesties, voor exogeen bepaalde variatie in het aantal mailings dat de individuen ontvangen, door middel van het

veldexperiment dat hierboven is beschreven. Ten derde gebruiken we een enquête om het subjectieve construct ' irritatie' te meten, aangezien dit niet objectief kan worden gemeten met gedragsdata. In deze enquête meten we ook gerapporteerd donatiegedrag om mogelijke verschillen met werkelijk donatiegedrag vast te kunnen stellen. Samenvattend bevat onze dataset observaties van directmailfrequenties van goede doelen, irritatie, en zowel gerapporteerd als werkelijk donatiegedrag voor 1020 individuen.

De analyse van deze dataset toont allereerst aan dat direct mailings van goede doelen inderdaad irritatie veroorzaken. Dat wil zeggen, hoe meer mailings iemand ontvangt, hoe hoger zijn irritatieniveau is. Verrassend genoeg vinden we geen significante effecten van irritatie op donatiegedrag en we vinden dus geen aanwijzingen dat irritatie donaties verlaagt. Hoewel mensen zeer geërgerd zijn door de hoge mailfrequenties van goede doelen, beïnvloedt dit hun donatiegedrag niet. Donatiegedrag lijkt voornamelijk te worden bepaald door attitudefactoren zoals vrijgevigheid, en wordt niet beïnvloed door irritatiegevoelens. Tegen de verwachtingen in blijken de resultaten voor gerapporteerd en werkelijk gedrag nauwelijks te verschillen. Sociaal wenselijke antwoorden lijken de conclusies in onze studie dus niet te vertekenen.

Een belangrijk inzicht uit dit hoofdstuk is dat irritatie geen centrale emotionele drijfveer is bij de reactie op direct mailings van goede doelen. Het is goed denkbaar dat mailings van goede doelen gevoelens van schuld en sociale verantwoordelijkheid opwekken die sterker zijn dan irritatie. Daarbij komt dat donateurs de uiteindelijke begunstigden van het geld dat zij doneren het vervelende gedrag van het goede doel niet kunnen verwijten. Hoewel ze wellicht het goede doel willen bestraffen, willen ze niet dat de begunstigden hieronder lijden.

Conclusies

Dit proefschrift komt voort uit een wetenschappelijke en een maatschappelijke motivatie. Hieronder beschrijven wij de voornaamste conclusies, implicaties en suggesties voor vervolgonderzoek vanuit beide oogpunten.

Wetenschappelijk gezien is het doel van dit proeschrift een gat te vullen in de directmailing- en de geefgedragsliteratuur, die beide dynamische en competitieve effecten in het algemeen genegeerd hebben. Alle vier de hoofdstukken tonen aan dat er wel degelijk substantiële dynamische en competitieve effecten van mailings van goede doelen bestaan. De respons op een direct mailing nu wordt beïnvloed door mailings in

het verleden van het zelfde goede doel, en ook door direct mailings van concurrerende goede doelen. Direct mailings van goede doelen kunnen dus niet als onafhankelijk beschouwd worden en donatiegedrag in reactie op direct mailings moet worden bestudeerd als een doorlopend proces en niet als opzichzelfstaande beslissingen.

Deze bevinding opent natuurlijk oneindig veel richtingen voor vervolgonderzoek, zowel voor studies naar direct mail van goede doelen als voor studies naar direct mail in het algemeen. Bestaande kennis van geefgedrag en direct mail moet opnieuw worden geëvalueerd in het licht van deze inzichten. Bestaande directmail-responsmodellen kunnen bijvoorbeeld worden uitgebreid met dynamische en competitieve effecten en bekende drijfveren van geefgedrag kunnen worden heroverwogen in een meervoudige beslissingscontext.

Ook het uitbreiden van de studies in dit proefschrift zou bijdragen aan een verder begrip van dynamische en competitieve effecten. Hoewel onze studies zich bijvoorbeeld richten op een donatiecontext, vermoeden we dat dit soort effecten ook bestaan voor andere soorten mailings, zoals catalogi en reclameacties. Het zou interessant zijn om te onderzoeken welke rol dynamiek en concurrentie spelen in verschillende contexten, en om mogelijke verschillen met de donatiecontext vast te stellen. Hiertoe zou men verschillende methoden die zijn beschreven in dit proefschrift kunnen toepassen, zoals het directmailingresponsmodel uit hoofdstuk 2.

Daarnaast bevatten onze data niet alle concurrentie. Een interessante uitbreiding zou zijn om meer goede doelen bij het onderzoek te betrekken en patronen tussen verschillende soorten goede doelen te onderzoeken. Voorbeelden van vragen die zouden kunnen worden beantwoord zijn: Is concurrentie sterker tussen goede doelen in dezelfde sector dan tussen goede doelen in verschillende sectoren? Spreiden donateurs hun donaties over meerdere sectoren of over meerdere goede doelen binnen een sector?

Ten slotte kan ons veldexperiment op meerdere fronten worden uitgebreid en verfijnd. Men kan denken aan het aantal goede doelen betrokken bij het experiment, variatie in de timing van de experimentele mailings en variatie in de inhoud van de experimentele mailings. Wij beschouwen ons experiment als een prima startpunt om vele nieuwe inzichten te inspireren.

Naast de twee wetenschappelijke hoofdthema's van dit proefschrift werpen we ook enig licht op de endogeniteitskwestie die voortvloeit uit de doelgroepselectie-procedures die worden toegepast door goede doelen. In verschillende gevallen stellen we empirisch vast dat goede doelen inderdaad doelgroepselectie toepassen en dat de

directmailobservaties daardoor endogeen zijn. Daarnaast illustreren we de vertekening die het gevolg is van deze endogeniteit wanneer deze wordt genegeerd, en betogen we dat het negeren van endogeniteit in sommige gevallen zelfs kan leiden tot tegengestelde conclusies. Om dus nauwkeurige en betrouwbare resultaten te verkrijgen wanneer men de effecten van direct mailings van goede doelen bestudeert – of overigens van elke organisatie die aan doelgroepselectie doet – moet men een manier vinden om de endogeniteitskwestie op te lossen. Dit kan worden bereikt via econometrische technieken, waarvan we twee voorbeelden beschrijven in deel I van dit proefschrift, of door exogene variatie te creëren in de variabele waar het om draait, bijvoorbeeld door middel van een experiment, zoals wij doen in deel II van dit proefschrift. Aangezien er niet veel onderzoek is gedaan naar correctiemechanismen voor de vertekening door endogeniteit, levert deze kwestie verdere mogelijkheden voor vervolgonderzoek.

Het tweede deel van de motivatie voor dit proefschrift is van maatschappelijke aard en komt voort uit de tegenwoordig steeds vaker opduikende frustraties en klachten over direct mail van goede doelen. Het doel is om te bestuderen of de huidige meningen van de maatschappij zich daadwerkelijk vertalen naar donatiegedrag en om aan goede doelen maatschappelijk relevante inzichten te verschaffen die als richtlijn kunnen dienen voor hun mailstrategieën en die hun inkomsten kunnen helpen verhogen.

In dit licht is de belangrijkste conclusie van dit proefschrift dat goede doelen meer moeten mailen om hun inkomsten te verhogen. De resultaten van alle vier de hoofdstukken wijzen uit dat hogere mailfrequenties de opbrengsten zullen verhogen, zelfs op de lange termijn. Een extra mailing zal de toekomstige opbrengsten voor hetzelfde goede doel kannibaliseren, maar het netto-effect zal nog steeds positief zijn, hoewel dit alleen geldt voor mensen die reeds veel mailings ontvangen en niet voor alle donateurs. Concurrerende mailings mogen dan een negatief effect hebben wanneer ze gelijktijdig worden verstuurd, over de tijd lijken ze een aanvullend effect te hebben. Nederlandse goede doelen hebben de grens dus nog niet bereikt en er is nog steeds ruimte om meer mailings te sturen en meer fondsen te werven. Een hint voor dit resultaat wordt ook al verschaft door de situatie in de VS, waar de mailfrequenties vele malen hoger zijn dan in Nederland en goede doelen nog steeds enorme bedragen werven. Vervolgonderzoek zou de grenzen van het mailgedrag van goede doelen verder kunnen verkennen en onderzoeken wanneer donaties daadwerkelijk zouden beginnen te dalen.

Dit proefschrift laat zien dat donateurs weliswaar geïrriteerd raken, maar dat hun irritatie niet tot uiting komt in hun donatiegedrag. Volgens ons komt de meest

plausibele verklaring hiervoor voort uit het feit dat het goede doel dient als intermediair voor de overdracht van fondsen van de donateurs naar de uiteindelijke begunstigden. Zoals al eerder gezegd, donateurs willen de goede doelen misschien wel bestraffen voor de stortvloed aan verzoeken, maar uiteindelijk wint hun wil om de begunstigden te helpen het van hun wil om de goede doelen te bestraffen.

Uiteraard zou het voor goede doelen nog steeds verstandig zijn om te proberen irritatie onder potentiële donateurs in te dammen. In plaats van hun mailstrategieën aan te passen zouden er echter andere manieren kunnen zijn om dit te bereiken. Er kan bijvoorbeeld worden geëxperimenteerd met de inhoud van de mailings en de nieuwsbrieven, en goede doelen kunnen proberen het vertrouwen te herstellen door beter te communiceren waar het gedoneerde geld precies aan wordt uitgegeven. Vervolgonderzoek kan bestuderen welke factoren de attitude van donateurs beïnvloeden, om zo goede doelen te helpen de negatieve meningen te verbeteren en een vruchtbare relatie met hun donateurs te behouden.

References

Aaker, David A. and Donald E. Bruzzone (1985), "Causes of Irritation in Advertising", *Journal of Marketing*, 49 (2), 47-57.

Abdy, Meg and Jean Barclay (2001), "Marketing Collaborations in the Voluntary Sector", *International Journal of Nonprofit and Voluntary Sector Marketing*, 6 (3), 215-230.

Akaah, Ishmael P., Pradeep K. Korgaonkar and Daulatram Lund (1995), "Direct Marketing Attitudes", *Journal of Business Research*, 34 (3), 211-219.

Amemiya, Takeshi (1985), *Advanced Econometrics*, Cambridge, MA: Harvard University Press.

Andreoni, James (1990), "Impure Altruism and Donations to Public goods: A Theory of Warm-glow Giving", *The Economic Journal*, 100 (401), 464-477.

Andreoni, James (1998), "Toward a Theory of Charitable Fund-Raising", *Journal of Political Economy*, 106 (6), 1186-1213.

Andreoni, James (2006), "Philanthropy", in *Handbook of Giving, Reciprocity and Altruism*, S-C. Kolm and J. Mercier Ythier, eds., Amsterdam: North Holland, 1201-1269.

Andreoni, James and A. Abigail Payne (2003), "Do Government Grants to Private Charities Crowd Out Giving or Fund-raising?" *American Economic Review*, 93 (3), 792-812.

Ansari, Asim, Carl F. Mela and Scott A. Neslin (2008), "Customer Channel Migration", *Journal of Marketing Research,* 45 (1), 60-76.

Ausubel, David P. (1955), "Relationships between Shame and Guilt in the Socializing Process", *Psychological Review*, 62 (5), 378-390.

Bardsley, Nicholas (2005), "Experimental Economics and the Artificiality of Alteration", *Journal of Economic Methodology*, 12 (2), 239-251.

Basil, Debra Z., Nancy M. Ridgway and Michael D. Basil (2008), "Guilt and Giving: A Process Model of Empathy and Efficacy", *Psychology and Marketing*, 25 (1), 1-23.

Baumeister, Roy F., Arlene M. Stillwell and Todd F. Heatherton (1994), "Guilt: An Interpersonal Approach", *Psychological Bulletin*, 115 (2), 243-267.

Bekkers, René and Olaf Crutzen (2007), "Just Keep it Simple: A Field Experiment on Fundraising Letters", *International Journal of Nonprofit and Voluntary Sector Marketing*, 12 (4), 371-378.

Bekkers, René and Theo N.M. Schuyt (2008), "And who is your neighbor? Explaining the effect of religion on charitable giving and volunteering", *Review of Religious Research,* forthcoming.

Bendapudi, Neeli, Surendra N. Singh and Venkat Bendapudi (1996), "Enhancing Helping Behavior: An Integrative Framework for Promotion Planning", *Journal of Marketing*, 60 (3), 33-49.

Bennett, Roger (2003), "Factors Underlying the Inclination to Donate to Particular Types of Charity", *International Journal of Nonprofit and Voluntary Sector Marketing*, 8 (1), 12-29.

Benz, Matthias and Stephan Meier (2006), "Do People Behave in Experiments as in the Field? – Evidence from Donations", *Working Paper No. 248*, Institute for Empirical Research in Economics, University of Zurich.

Bruce, Ian (1995), "Do Not-for-profits Value Their Customers and Their Needs?", *International Marketing Review*, 12 (4), 77-84.

Bult, Jan R. and Tom Wansbeek (1995), "Optimal Selection for Direct Mail", *Marketing Science*, 14 (4), 378-394.

Burnett, Melissa S. and Dale A. Lunsford (1994), "Conceptualizing Guilt in the Consumer Decision-making Process", *Journal of Consumer Marketing*, 11 (3), 33-43.

Burt, Christopher D.B. and Jennifer S. Popple (1998), "Memorial distortions in donation data", *Journal of Social Psychology*, 138 (6), 724-733.

Campbell, Deb, Randy Erdahl, Doug Johnson, Eric Bibelnieks, Michael Haydock, Mark Bullock and Harlan Crowder (2001), "Optimizing Customer Mail Streams at Fingerhut", *Interfaces*, 31 (1), 77-90.

Chib, Siddhartha and Edward Greenberg (1995), "Understanding the Metropolis-Hastings Algorithm", *American Statistician*, 49 (4), 327-335.

Clarke, Darral G. (1976), "Econometric Measurement of the Duration of Advertising Effect on Sales", *Journal of Marketing Research*, 13 (4), 345-357.

Colombo, Richard and Weina Jiang (1999), "A Stochastic RFM Model", *Journal of Interactive Marketing*, 13 (3), 2-12.

Dahl, Darren W., Heather Honea and Rajesh V. Manchanda (2003), "The Nature of Self-Reported Guilt in Consumption Contexts", *Marketing Letters*, 14 (3), 159-171.

Dahl, Darren W., Heather Honea and Rajesh V. Manchanda (2005), "Three Rs of Interpersonal Consumer Guilt: Relationship, Reciprocity, Reparation", *Journal of Consumer Psychology*, 15 (4), 307-315.

Danaher, Peter J., André Bonfrer and Sanjay Dhar (2008), "The Effect of Competitive Advertising Interference on Sales for Packaged Goods", *Journal of Marketing Research*, 45 (2), 211-225.

Darlington, Richard B. and Clifford E. Macker (1966), "Displacement of Guilt-produced Altruistic Behavior", *Journal of Personality and Social Psychology*, 4 (4), 442-443.

Diamond, William D. and Sara Gooding-Williams (2002), "Using Advertising Constructs and Methods to Understand Direct Mail Fundraising Appeals", *Nonprofit Management and Leadership*, 12 (3), 225-242.

Diamond, William D. and Stephanie M. Noble (2001), "Defensive Responses to Charitable Direct Mail Solicitations", *Journal of Interactive Marketing*, 15 (3), 2-12.

Direct Marketing Association (2007), *DMA 2007 Statistical Fact Book: The Definitive Source for Direct Marketing Benchmarks*, New York: Direct Marketing Association.

Donkers, Bas, Richard Paap, Jedid-Jah Jonker and Philip Hans Franses (2006), "Deriving Target Selection Rules from Endogenously Selected Samples", *Journal of Applied Econometrics*, 21(5), 549-562.

D'Souza, Giles and Ram C. Rao (1995), "Can Repeating an Advertisement More Frequently than the Competition Affect Brand Preference in a Mature Market", *Journal of Marketing*, 59 (2), 32-42.

Dutch consumers' association (2005), "Moderne Liefdadigheid Irriteert Gevers", *Consumentengids*, December, 28-31.

Dwyer, F. Robert (1997), "Customer Lifetime Valuation to Support Marketing Decision Making", *Journal of Direct Marketing*, 11 (4), 6-13.

Eckel, Catherine C. and Philip J. Grossman (2006), "Subsidizing Charitable Contributions: A Field Test Comparing Matching and Rebate Subsidies," *Working Paper*, Virginia Tech.

Eckel, Catherine C., Philip J. Grossman and Rachel M. Johnston (2005), "An Experimental Test of the Crowding Out Hypothesis", *Journal of Public Economics*, 89 (8), 1543-1560.

Elliott, Michael T. and Paul S. Speck (1998), "Consumer Perceptions of Advertising Clutter and Its Impact across Various Media", *Journal of Advertising Research*, 38 (1), 29-41.

Elsner, Ralf, Manfred Krafft and Arnd Huchzermeier (2004), "The 2003 ISMS Practice Prize Winner – Optimizing Rhenania's Direct Marketing Business Through Dynamic Multilevel Modeling (DMLM) in a Multicatalog-Brand Environment", *Marketing Science*, 23 (2), 192-206.

Falk, Armin (2007), "Gift Exchange in the Field", *Econometrica*, 75 (5), 1501-1511.

Fishbein, Martin and Icek Ajzen (1975), *Belief, Attitude, Intention, and Behavior: An Introduction to Theory and Research*, Reading, MA: Addison-Wesley.

Fok, Dennis, Csilla Horváth, Richard Paap and Philip Hans Franses (2006), "A Hierarchical Bayes Error Correction Model to Explain Dynamic Effects of Price Changes", *Journal of Marketing Research,* 43 (3), 443-461.

Francis, Nick and Neville Holland (1999), "The Diary of a Charity Donor: an Exploration of Research Information from the Royal Mail Consumer Panel and Mail Characteristics Survey", *International Journal of Nonprofit and Voluntary Sector Marketing*, 4 (3), 217-223.

Frey, Bruno S. and Stephan Meier (2004a), "Pro-Social Behavior in a Natural Setting", *Journal of Economic Behavior and Organization*, 54 (1), 65-88.

Frey, Bruno S. and Stephan Meier (2004b), "Social Comparisons and Pro-social Behavior: Testing "Conditional Cooperation" in a Field Experiment", *American Economic Review*, 94 (5), 1717-1722.

Geman, Stuart and Donald Geman (1984), "Stochastic Relaxations, Gibbs Distributions, and the Bayesian Restoration of Images", *IEEE Transaction on Pattern Analysis and Machine Intelligence*, 6 (6), 721-741.

Giving USA (2007), "U.S. charitable giving reaches $295.02 billion in 2006", *press releases*, *http://www.aafrc.org/press_releases/gusa/20070625.pdf*.

Gönül, Füsun F. and Meng Ze Shi (1998), "Optimal Mailing of Catalogs: A New Methodology Using Estimable Structural Dynamic Programming Models", *Management Science*, 44 (9), 1249-1262.

Gönül, Füsun F. and Frenkel Ter Hofstede (2006), "How to Compute Optimal Catalog Mailing Decisions", *Marketing Science*, 25 (1), 65-74.

Greyser, Stephen A. (1973), "Irritation in Advertising", *Journal of Advertising Research*, 13 (1), 3-10.

Guy, Bonnie S. and Wesley E. Patton (1989), "The Marketing of Altruistic Causes: Understanding Why People Help", *Journal of Consumer Marketing*, 6 (1), 19-30.

Haggberg, Maggie (1992), "Why Donors Give", *Fund Raising Management*, 23 (2), 39-40.

Harrison, Glenn W. and John. A. List (2004), "Field Experiments", *Journal of Economic Literature*, 42 (4), 1009-1055.

Heckman, James J. (1981), "The Incidental Parameters Problem and the Problem of Initial Conditions in Estimating a Discrete Time, Discrete Data Stochastic Process", in *Structural Analysis of Discrete Data with Econometric Applications*, C. Manski and D. McFadden (Eds.), Cambridge: MIT Press.

Hibbert, Sally, Andrew Smith, Andrea Davies and Fiona Ireland (2007), "Guilt Appeals: Persuasion Knowledge and Charitable Giving", *Psychology and Marketing*, 24 (8), 723-742.

Hobert, James P. and George Casella (1996), "The Effect of Improper Priors on Gibbs Sampling in Hierarchical Linear Mixed Models", *Journal of American Statistical Association*, 91 (436), 1461-1473.

Huhmann, Bruce A. and Timothy P. Brotherton (1997), "A Content Analysis of Guilt Appeals in Popular Magazine Advertisements", *Journal of Advertising*, 26 (2), 35-45.

Izard, Carroll E. (1977), *Human Emotions*, New York: Plenum.

Jedidi, Kamel, Carl F. Mela and Sunil Gupta (1999). "Managing Advertising and Promotion for Long-Run Profitability", *Marketing Science,* 18 (1), 1-22.

Jewell, Robert D. and H. Rao Unnava (2003), "When Competitive Interference can be Beneficial", *Journal of Consumer Research*, 30 (2), 283-291.

Kahneman, Daniel and Jack L. Knetsch (1992), "Valuing Public Goods: The Purchase of Moral Satisfaction", *Journal of Environmental Economics and Management*, 22 (1), 57-70.

Karlan, Dean and John A. List (2007), "Does Price Matter in Charitable Giving? Evidence from a Large-Scale Natural Field Experiment", *American Economic Review*, 97 (5), 1774-1793.

Keller, Kevin L. (1991), "Memory and Evaluation Effects in Competitive Advertising Environments," *Journal of Consumer Research*, 17 (4), 463-476.

Kestnbaum, Robert D., Kate T. Kestnbaum and Pamela W. Ames (1998), "Building a Longitudinal Contact Strategy", *Journal of Interactive Marketing*, 12 (1), 56-62.

Khan, Uzma and Ravi Dhar (2006), "Licensing Effect in Consumer Choice", *Journal of Marketing Research*, 43 (2), 259-266.

Konow, James (2006), "Mixed Feelings: Theories and Evidence of Warm Glow and Altruism", *Working Paper*, Loyola Marymount University.

Korgaonkar, Pradeep K., Eric J. Karson and Ishmael P. Akaah (1997), "Direct Marketing Advertising: The Assents, the Dissents, and the Ambivalents", *Journal of Advertising Research*, 37 (5), 41-55.

Krebs, Dennis L. (1970), "Altruism – An Examination of the Concept and a Review of the Literature", *Psychological Bulletin*, 73 (4), 258-302.

Landry, Craig, Andreas Lange, John A. List, Michael K. Price and Nicholas G. Rupp (2006), "Toward an Understanding of the Economics of Charity: Evidence from a Field Experiment", *Quarterly Journal of Economics*, 121 (2), 747-782.

Lascu, Dana-Nicoleta. (1991), "Consumer Guilt: Examining the Potential of a New Marketing Construct", *Advances in Consumer Research,* 18 (1), 290-293.

Leeflang, Peter S.H., Dick R. Wittink, Michel Wedel and Philippe A. Naert (2000), *Building Models for Marketing Decisions*, Dordrecht: Kluwer.

Levitt, Steven D. and John A. List (2007), "What Do Laboratory experiments Measuring Social Preferences Reveal About the Real World?", *Journal of Economic Perspectives*, 21 (2), 153-174.

Lindsey, Lisa L.M. (2005), "Anticipated Guilt as a Behavioral Motivation – An Examination of Appeals to Help Unknown Others through Bone Marrow Donation", *Human Communication Research*, 31 (4), 453-481.

List, John A. (2007), "Field Experiments: A Bridge Between Lab and Naturally-Occurring Data", *Working Paper No. 12992*, National Bureau of Economic Research.

List, John A. and David Lucking-Reiley (2002), "The Effects of Seed Money and Refunds on Charitable Giving: Experimental Evidence from a University Capital Campaign", *Journal of Political Economy*, 110 (1), 215-233.

List, John A. and David Reiley (2008), "Field Experiments", "The New Palgrave Dictionary of Economics", Eds. Steven N. Durlauf and Lawrence E. Blume, Palgrave Macmillan, 2008.

List, John A. and Daniel Rondeau (2003), "The Impact of Challenge Gifts on Charitable Giving: An Experimental Investigation", *Economics Letters*, 79 (2), 153-159.

Liu, Wendy and Jennifer L. Aaker (2008), "The Happiness of Giving: The Time-Ask Effect", *Journal of Consumer Research*, forthcoming.

Manchanda, Puneet, Peter E. Rossi and Pradeep K. Chintagunta (2004), "Response Modeling with Nonrandom Marketing-mix Variables", *Journal of Marketing Research*, 41 (4), 467-478.

Mazar, Nina, On Amir and Dan Ariely (2007), "The Dishonesty of Honest People: A Theory of Self-Concept Maintenance", *working paper*.

McCulloch, Robert E., Nicholas G. Polson and Peter E. Rossi (2000), "A Bayesian Analysis of the Multinomial Probit Model with Fully Identified Parameters", *Journal of Econometrics*, 99 (1), 173-193.

Meier, Stephan (2007), "Do Subsidies Increase Charitable Giving in the Long Run? Matching Donations in a Field Experiment", *Journal of the European Economic Association*, 5 (6), 1203-1222.

Meier, Stephan and Bruno S. Frey (2004), "Matching Donations: Subsidizing Charitable Giving in a Field Experiment", *Working Paper No. 181*, Institute for Empirical Research in Economics, University of Zurich.

Monin, Benoit and Dale T. Miller (2001), "Moral Credentials and the Expression of Prejudice", *Journal of Personality and Social Psychology*, 81 (1), 33-43.

Naik, Prasad A., Murali K. Mantrala and Alan G. Sawyer (1998), "Planning Media Schedules in the Presence of Dynamic Advertising Quality", *Marketing Science*, 17 (3), 214-235.

Naik, Prasad A. and Nanda Piersma (2002), "Understanding the Role of Marketing Communications in Direct Marketing", Econometric Institute Report EI 2002-13, Econometric Institute, Erasmus University Rotterdam.

Naik, Prasad A., Kalyan Raman and Russell S. Winer (2005), "Planning Marketing-Mix Strategies in the Presence of Interaction Effects", *Marketing Science*, 24 (1), 25-34.

NFP Synergy (2004), "Disgusted or Delighted: What Does the Concern the Public About Charities?", http://www.nfpsynergy.net/reportdownload.php?pdf=Disgusted or delighted March 2004.pdf

O'Keefe, Daniel J. and Marianne Figgé (1997), "A Guilt-based Explanation of the Door-in-the-face Influence Strategy", *Human Communication Research,* 24 (1), 64-81.

Onze Wereld (2008), "Doet U Genoeg Voor Een Betere Wereld?", *Onze Wereld*, 2, 8-10, http://www.onzewereld.nl/index.php?page=3&articleId=596.

Pauwels, Koen, Dominique M. Hanssens and S. Siddarth (2002), "The Long-Term Effects of Price Promotions on Category Incidence, Brand Choice, and Purchase Quantity," *Journal of Marketing Research*, 39 (4), 421-449.

Piersma, Nanda and Jedid-Jah Jonker (2004), "Determining the Optimal Direct Mailing Frequency", *European Journal of Operational Research*, 158 (1), 173-182.

Podsakoff, Philip M. and Dennis W. Organ (1986), "Self-Reports in Organizational Research: Problems and Prospects", *Journal of Management*, 12 (4), 531-544.

Prins, Remco and Peter C. Verhoef (2007), "Marketing Communication Drivers of Adoption Timing of a New E-Service among Existing Customers", *Journal of Marketing*, 71 (2), 169-183.

Rawlings, Edna I. (1970), "Reactive Guilt and Anticipatory Guilt in Altruistic Behavior", in *Altruism and Helping Behavior*, Macaulay, J.R. and Berkowitz, L. (Eds), New York, NY: Academic Press, 163-177.

Regan, Judith W. (1971), "Guilt, Perceived Injustice, and Altruistic Behavior", *Journal of Personality and Social Psychology*, 18 (1), 124-132.

Richins, Marsha L. (1997), "Measuring Emotions in the Consumption Experience", Journal of Consumer Research, 24 (2), 127-146.

Rondeau, Daniel and John A. List (2008), "Matching and Challenge Gifts to Charity: Evidence from Laboratory and Natural Field Experiments", *Working Paper No. 13728*, National Bureau of Economic Research

Rose-Ackerman, Susan (1982), "Charitable Giving and "Excessive" Fundraising", *Quarterly Journal of Economics*, 92 (2), 193-212.

Rossi, Peter E., Robert E. McCulloch and Greg M. Allenby (1996), "The Value of Purchase History Data in Target Marketing", *Marketing Science*, 15 (4), 321-340.

Rothschild, Michael L. (1979), "Marketing Communications in Nonbusiness Situations or Why It's So Hard to Sell Brotherhood Like Soap", *Journal of Marketing*, 43 (2), 11-20.

Sargeant, Adrian (1999), "Charitable Giving: Towards a Model of Donor Behaviour", *Journal of Marketing Management*, 15 (4), 215-238.

Sargeant, Adrian and Jürgen Kähler (1999), "Returns on Fundraising Expenditures in the Voluntary Sector", *Nonprofit Management & Leadership*, 10 (1), 5-19.

Shang, Jen and Rachel T.A. Croson (2008), "Field Experiments in Charitable Contribution: The Impact of Social Influence on the Voluntary Provision of Public Goods", *Economic Journal*, under review.

Shapiro, Benson P. (1973), "Marketing for Nonprofit Organizations", *Harvard Business Review*, 51 (5), 123-132.

Simester, Duncan I., Yu Hu, Erik Brynjolfsson and Eric T. Anderson (2007), "Dynamics of Retail Advertising: Evidence from a Field Experiment", *Economic Inquiry,* forthcoming.

Simester, Duncan I., Peng Sun and John N. Tsitsiklis (2006), "Dynamic Catalog Mailing Policies", *Management Science,* 52 (5), 683-696.

Smith, Gerald E. and Paul D. Berger (1996), "The Impact of Direct Marketing Appeals on Charitable Marketing Effectiveness", *Journal of the Academy of Marketing Science*, 24 (3), 219-232.

Speck, Paul Surgi and Michael T. Elliott (1997), "Predictors of Advertising Avoidance in Print and Broadcast Media", *Journal of Advertising*, 26 (3), 61-76.

Stafford, Marla Royne, Eric M. Lippold and C. Todd Sherron (2003), "The Contribution of Direct Mail Advertising to Average Weekly Unit Sales", *Journal of Advertising Research*, 43 (2), 172-179.

Tangney, June P., Jeff Stuewig and Debra J. Mashek (2007), "Moral Emotions and Moral Behavior", *Annual Review of Psychology*, 58, 345-372.

Tanner, Martin A. and Wing Hung Wong (1987), "The Calculation of Posterior Distributions by Data Augmentation", *Journal of the American Statistical Association*, 82 (398), 528-549.

Thaler, Richard (1985), "Mental Accounting and Consumer Choice", *Marketing Science*, 4 (3), 199-214.

TNS NIPO (2003), "Goede Doelen Doen Goed Werk! Zolang Ze Mij Maar Niet Lastig vallen", *TNS NIPO Publications*, http://www.tns-nipo.com/pages/nieuws-pers-vnipo.asp?file=persvannipo\goededoelen03.htm.

Train, Kenneth (2003), *Discrete Choice Methods with Simulation*, Cambridge: Cambridge University Press.

Unnava, H. Rao and Deepak Sirdeshmukh (1994), "Reducing Competitive Ad Interference", *Journal of Marketing Research*, 31 (3), 403-411.

Van Diepen, Merel, Bas Donkers and Philip Hans Franses (2008a), "Dynamic and Competitive Effects of Direct Mailings: A Charitable Giving Application", *Journal of Marketing Research*, forthcoming.

Van Diepen, Merel, Bas Donkers and Philip Hans Franses (2008b), "Does Irritation Induced by Charitable Direct Mailings Reduce Donations?", *ERIM Report ERS-2008-036-MKT*, Erasmus Research Institute of Management, Erasmus University Rotterdam, http://hdl.handle.net/1765/12704.

Verhoef, Peter C., Penny N. Spring, Janny C. Hoekstra and Peter S.H. Leeflang (2003), "The Commercial Use of Segmentation and Predictive Modeling Techniques for Database Marketing in the Netherlands", *Decision Support Systems*, 34 (4), 471-481.

Yoo, Boonghee and Rujirutana Mandhachitara (2003), "Estimating Advertising Effects on Sales in a Competitive Setting", *Journal of Advertising Research*, 43 (3), 310-321.

Zajonc, Robert B. (1968), "Attitudinal Effects of Mere Exposure", *Journal of Personality and Social Psychology*, 9 (Supp. 2 Pt. 2), 1-27.

Zielske, Hubert A. (1959), "The Remembering and Forgetting of Advertising", *Journal of Marketing*, 23 (3), 239-243.

Curriculum Vitae

Merel van Diepen (1981) obtained her master's degree in econometrics with honors from the Erasmus University Rotterdam in December 2003. In January 2004 she started her PhD research in the fields of marketing and econometrics at the Erasmus Research Institute of Management. Her main research interests are econometric models in marketing and charitable giving. She presented her research at various international conferences and part of her work will be published in the *Journal of Marketing Research*.

ERASMUS RESEARCH INSTITUTE OF MANAGEMENT (ERIM)

ERIM PH.D. SERIES

RESEARCH IN MANAGEMENT

ERIM Electronic Series Portal: http://hdl.handle.net/1765/1

Althuizen, N.A.P., *Analogical Reasoning as a Decision Support Principle for Weakly Structured Marketing Problems*, Promotor: Prof. dr. ir. B. Wierenga, EPS-2006-095-MKT, ISBN: 90-5892-129-8, http://hdl.handle.net/1765/8190

Alvarez, H.L., *Distributed Collaborative Learning Communities Enabled by Information Communication Technology*, Promotor: Prof. dr. K. Kumar, EPS-2006-080-LIS, ISBN: 90-5892-112-3, http://hdl.handle.net/1765/7830

Appelman, J.H., *Governance of Global Interorganizational Tourism Networks: Changing Forms of Co-ordination between the Travel Agency and Aviation Sector*, Promotors: Prof. dr. F.M. Go & Prof. dr. B. Nooteboom, EPS-2004-036-MKT, ISBN: 90-5892-060-7, http://hdl.handle.net/1765/1199

Assem, M.J. van den, *Deal or No Deal? Decision Making under Risk in a Large-Stake TV Game Show and Related Experiments*, Promotor: Prof. dr. J. Spronk, EPS-2008-138-F&A, ISBN: 978-90-5892-173-4, http://hdl.handle.net/1765/1

Baquero, G, *On Hedge Fund Performance, Capital Flows and Investor Psychology*, Promotor: Prof. dr. M.J.C.M. Verbeek, EPS-2006-094-F&A, ISBN: 90-5892-131-X, http://hdl.handle.net/1765/8192

Berens, G., *Corporate Branding: The Development of Corporate Associations and their Influence on Stakeholder Reactions*, Promotor: Prof. dr. C.B.M. van Riel, EPS-2004-039-ORG, ISBN: 90-5892-065-8, http://hdl.handle.net/1765/1273

Berghe, D.A.F. van den, *Working Across Borders: Multinational Enterprises and the Internationalization of Employment*, Promotors: Prof. dr. R.J.M. van Tulder & Prof. dr. E.J.J. Schenk, EPS-2003-029-ORG, ISBN: 90-5892-05-34, http://hdl.handle.net/1765/1041

Berghman, L.A., *Strategic Innovation Capacity: A Mixed Method Study on Deliberate Strategic Learning Mechanisms*, Promotor: Prof. dr. P. Mattyssens, EPS-2006-087-MKT, ISBN: 90-5892-120-4, http://hdl.handle.net/1765/7991

Bijman, W.J.J., *Essays on Agricultural Co-operatives: Governance Structure in Fruit and Vegetable Chains*, Promotor: Prof. dr. G.W.J. Hendrikse, EPS-2002-015-ORG, ISBN: 90-5892-024-0, http://hdl.handle.net/1765/867

Bispo, A., *Labour Market Segmentation: An investigation into the Dutch hospitality industry*, Promotors: Prof. dr. G.H.M. Evers & Prof. dr. A.R. Thurik, EPS-2007-108-ORG, ISBN: 90-5892-136-9, http://hdl.handle.net/1765/10283

Blindenbach-Driessen, F., *Innovation Management in Project-Based Firms*, Promotor: Prof. dr. S.L. van de Velde, EPS-2006-082-LIS, ISBN: 90-5892-110-7, http://hdl.handle.net/1765/7828

Boer, C.A., *Distributed Simulation in Industry,* Promotors: Prof. dr. A. de Bruin & Prof. dr. ir. A. Verbraeck, EPS-2005-065-LIS, ISBN: 90-5892-093-3, http://hdl.handle.net/1765/6925

Boer, N.I., *Knowledge Sharing within Organizations: A situated and Relational Perspective,* Promotor: Prof. dr. K. Kumar, EPS-2005-060-LIS, ISBN: 90-5892-086-0, http://hdl.handle.net/1765/6770

Boer-Sorbán, K., *Agent-Based Simulation of Financial Markets: A modular, Continuous-Time Approach,* Promotor: Prof. dr. A. de Bruin, EPS-2008-119-LIS, ISBN: 90-5892-155-0, http://hdl.handle.net/1765/10870

Boon, C.T., *HRM and Fit: Survival of the Fittest!?,* Promotors: Prof. dr. J. Paauwe & Prof. dr. D.N. den Hartog, EPS-2008-129-ORG, ISBN: 978-90-5892-162-8, http://hdl.handle.net/1765/1

Brito, M.P. de, *Managing Reverse Logistics or Reversing Logistics Management?* Promotors: Prof. dr. ir. R. Dekker & Prof. dr. M. B. M. de Koster, EPS-2004-035-LIS, ISBN: 90-5892-058-5, http://hdl.handle.net/1765/1132

Brohm, R., *Polycentric Order in Organizations: A Dialogue between Michael Polanyi and IT-Consultants on Knowledge, Morality, and Organization,* Promotors: Prof. dr. G. W. J. Hendrikse & Prof. dr. H. K. Letiche, EPS-2005-063-ORG, ISBN: 90-5892-095-X, http://hdl.handle.net/1765/6911

Brumme, W.-H., *Manufacturing Capability Switching in the High-Tech Electronics Technology Life Cycle,* Promotors: Prof. dr. ir. J.A.E.E. van Nunen & Prof. dr. ir. L.N. Van Wassenhove, EPS-2008-126-LIS, ISBN: 978-90-5892-150-5, http://hdl.handle.net/1765/1

Burgers, J.H., *Managing Corporate Venturing: Multilevel Studies on Project Autonomy, Integration, Knowledge Relatedness, and Phases in the New Business Development Process,* Promotors: Prof. dr. ir. F.A.J. Van den Bosch & Prof. dr. H.W. Volberda, EPS-2008-136-STR, ISBN: 978-90-5892-174-1, http://hdl.handle.net/1765/1

Campbell, R.A.J., *Rethinking Risk in International Financial Markets*, Promotor: Prof. dr. C.G. Koedijk, EPS-2001-005-F&A, ISBN: 90-5892-008-9, http://hdl.handle.net/1765/306

Chen, H., *Individual Mobile Communication Services and Tariffs*, Promotor: Prof. dr. L.F.J.M. Pau, EPS-2008-123-LIS, ISBN: 90-5892-158-1, http://hdl.handle.net/1765/11141

Chen, Y., *Labour Flexibility in China's Companies: An Empirical Study*, Promotors: Prof. dr. A. Buitendam & Prof. dr. B. Krug, EPS-2001-006-ORG, ISBN: 90-5892-012-7, http://hdl.handle.net/1765/307

Damen, F.J.A., *Taking the Lead: The Role of Affect in Leadership Effectiveness*, Promotor: Prof. dr. D.L. van Knippenberg, EPS-2007-107-ORG, http://hdl.handle.net/1765/10282

Daniševská, P., *Empirical Studies on Financial Intermediation and Corporate Policies*, Promotor: Prof. dr. C.G. Koedijk, EPS-2004-044-F&A, ISBN: 90-5892-070-4, http://hdl.handle.net/1765/1518

Delporte-Vermeiren, D.J.E., *Improving the Flexibility and Profitability of ICT-enabled Business Networks: An Assessment Method and Tool*, Promotors: Prof. mr. dr. P.H.M. Vervest & Prof. dr. ir. H.W.G.M. van Heck, EPS-2003-020-LIS, ISBN: 90-5892-040-2, http://hdl.handle.net/1765/359

Derwall, J.M.M., *The Economic Virtues of SRI and CSR*, Promotor: Prof. dr. C.G. Koedijk, EPS-2007-101-F&A, ISBN: 90-5892-132-8, http://hdl.handle.net/1765/8986

Dijksterhuis, M., *Organizational Dynamics of Cognition and Action in the Changing Dutch and US Banking Industries*, Promotors: Prof. dr. ir. F.A.J. van den Bosch & Prof. dr. H.W. Volberda, EPS-2003-026-STR, ISBN: 90-5892-048-8, http://hdl.handle.net/1765/1037

Elstak, M.N., *Flipping the Identity Coin: The Comparative Effect of Perceived, Projected and Desired Organizational Identity on Organizational Identification and Desired Behavior*, Promotor: Prof. dr. C.B.M. van Riel, EPS-2008-117-ORG, ISBN: 90-5892-148-2, http://hdl.handle.net/1765/10723

Erken, H.P.G., *Productivity, R&D and Entrepreneurship*, Promotor: Prof. dr. A.R. Thurik, EPS-2008-147-ORG, ISBN: 978-90-5892-179-6, http://hdl.handle.net/1765/1

Fenema, P.C. van, *Coordination and Control of Globally Distributed Software Projects*, Promotor: Prof. dr. K. Kumar, EPS-2002-019-LIS, ISBN: 90-5892-030-5, http://hdl.handle.net/1765/360

Fleischmann, M., *Quantitative Models for Reverse Logistics*, Promotors: Prof. dr. ir. J.A.E.E. van Nunen & Prof. dr. ir. R. Dekker, EPS-2000-002-LIS, ISBN: 35-4041-711-7, http://hdl.handle.net/1765/1044

Flier, B., *Strategic Renewal of European Financial Incumbents: Coevolution of Environmental Selection, Institutional Effects, and Managerial Intentionality*, Promotors: Prof. dr. ir. F.A.J. van den Bosch & Prof. dr. H.W. Volberda, EPS-2003-033-STR, ISBN: 90-5892-055-0, http://hdl.handle.net/1765/1071

Fok, D., *Advanced Econometric Marketing Models*, Promotor: Prof. dr. Ph.H.B.F. Franses, EPS-2003-027-MKT, ISBN: 90-5892-049-6, http://hdl.handle.net/1765/1035

Ganzaroli, A., *Creating Trust between Local and Global Systems*, Promotors: Prof. dr. K. Kumar & Prof. dr. R.M. Lee, EPS-2002-018-LIS, ISBN: 90-5892-031-3, http://hdl.handle.net/1765/361

Gilsing, V.A., *Exploration, Exploitation and Co-evolution in Innovation Networks*, Promotors: Prof. dr. B. Nooteboom & Prof. dr. J.P.M. Groenewegen, EPS-2003-032-ORG, ISBN: 90-5892-054-2, http://hdl.handle.net/1765/1040

Ginkel, W.P. van, *The Use of Distributed Information in Decision Making Groups: The Role of Shared Task Representations*, Promotor: Prof. dr. D. van Knippenberg, EPS-2007-097-ORG, http://hdl.handle.net/1765/8424

Govers, R., *Virtual Tourism Destination Image: Glocal Identities Constructed, Perceived and Experienced*, Promotors: Prof. dr. F.M. Go & Prof. dr. K. Kumar, EPS-2005-069-MKT, ISBN: 90-5892-107-7, http://hdl.handle.net/1765/6981

Graaf, G. de, *Tractable Morality: Customer Discourses of Bankers, Veterinarians and Charity Workers*, Promotors: Prof. dr. F. Leijnse & Prof. dr. T. van Willigenburg, EPS-2003-031-ORG, ISBN: 90-5892-051-8, http://hdl.handle.net/1765/1038

Groot, E.A. de, *Essays on Economic Cycles*, Promotors: Prof. dr. Ph.H.B.F. Franses & Prof. dr. H.R. Commandeur, EPS-2006-091-MKT, ISBN: 90-5892-123-9, http://hdl.handle.net/1765/8216

Gutkowska, A.B., *Essays on the Dynamic Portfolio Choice*, Promotor: Prof. dr. A.C.F. Vorst, EPS-2006-085-F&A, ISBN: 90-5892-118-2, http://hdl.handle.net/1765/7994

Hagemeijer, R.E., *The Unmasking of the Other*, Promotors: Prof. dr. S.J. Magala & Prof. dr. H.K. Letiche, EPS-2005-068-ORG, ISBN: 90-5892-097-6, http://hdl.handle.net/1765/6963

Halderen, M.D. van, *Organizational Identity Expressiveness and Perception Management: Principles for Expressing the Organizational Identity in Order to Manage the Perceptions and Behavioral Reactions of External Stakeholders*, Promotor: Prof. dr. S.B.M. van Riel, EPS-2008-122-ORG, ISBN: 90-5892-153-6, http://hdl.handle.net/1765/10872

Hartigh, E. den, *Increasing Returns and Firm Performance: An Empirical Study*, Promotor: Prof. dr. H.R. Commandeur, EPS-2005-067-STR, ISBN: 90-5892-098-4, http://hdl.handle.net/1765/6939

Hermans. J.M., *ICT in Information Services; Use and Deployment of the Dutch Securities Trade, 1860-1970,* Promotor: Prof. dr. drs. F.H.A. Janszen, EPS-2004-046-ORG, ISBN 90-5892-072-0, http://hdl.handle.net/1765/1793

Heugens, P.P.M.A.R., *Strategic Issues Management: Implications for Corporate Performance*, Promotors: Prof. dr. ir. F.A.J. van den Bosch & Prof. dr. C.B.M. van Riel, EPS-2001-007-STR, ISBN: 90-5892-009-7, http://hdl.handle.net/1765/358

Heuvel, W. van den, *The Economic Lot-Sizing Problem: New Results and Extensions*, Promotor: Prof. dr. A.P.L. Wagelmans, EPS-2006-093-LIS, ISBN: 90-5892-124-7, http://hdl.handle.net/1765/1805

Hoedemaekers, C.M.W., *Performance, Pinned down: A Lacanian Analysis of Subjectivity at Work*, Promotors: Prof. dr. S. Magala & Prof. dr. D.H. den Hartog, EPS-2008-121-ORG, ISBN: 90-5892-156-7, http://hdl.handle.net/1765/10871

Hooghiemstra, R., *The Construction of Reality: Cultural Differences in Self-serving Behaviour in Accounting Narratives*, Promotors: Prof. dr. L.G. van der Tas RA & Prof. dr. A.Th.H. Pruyn, EPS-2003-025-F&A, ISBN: 90-5892-047-X, http://hdl.handle.net/1765/871

Hu, Y., *Essays on the Governance of Agricultural Products: Cooperatives and Contract Farming*, Promotors: Prof. dr. G.W.J. Hendrkse & Prof. Dr. B. Krug, EPS-2007-113-ORG, ISBN: 90-5892-145-1, http://hdl.handle.net/1765/10535

Huij, J.J., *New Insights into Mutual Funds: Performance and Family Strategies*, Promotor: Prof. dr. M.C.J.M. Verbeek, EPS-2007-099-F&A, ISBN: 90-5892-134-4, http://hdl.handle.net/1765/9398

Huurman, C.I., *Dealing with Electricity Prices*, Promotor: Prof. dr. C.D. Koedijk, EPS-2007-098-F&A, ISBN: 90-5892-130-1, http://hdl.handle.net/1765/9399

Iastrebova, K, *Manager's Information Overload: The Impact of Coping Strategies on Decision-Making Performance*, Promotor: Prof. dr. H.G. van Dissel, EPS-2006-077-LIS, ISBN: 90-5892-111-5, http://hdl.handle.net/1765/7329

Iwaarden, J.D. van, *Changing Quality Controls: The Effects of Increasing Product Variety and Shortening Product Life Cycles,* Promotors: Prof. dr. B.G. Dale & Prof. dr. A.R.T. Williams, EPS-2006-084-ORG, ISBN: 90-5892-117-4, http://hdl.handle.net/1765/7992

Jansen, J.J.P., *Ambidextrous Organizations*, Promotors: Prof. dr. ir. F.A.J. Van den Bosch & Prof. dr. H.W. Volberda, EPS-2005-055-STR, ISBN: 90-5892-081-X, http://hdl.handle.net/1765/6774

Jennen, M.G.J., *Empirical Essays on Office Market Dynamics*, Promotors: Prof. dr. C.G. Koedijk & Prof. dr. D. Brounen, EPS-2008-140-F&A, ISBN: 978-90-5892-176-5, http://hdl.handle.net/1765/1

Jong, C. de, *Dealing with Derivatives: Studies on the Role, Informational Content and Pricing of Financial Derivatives*, Promotor: Prof. dr. C.G. Koedijk, EPS-2003-023-F&A, ISBN: 90-5892-043-7, http://hdl.handle.net/1765/1043

Keizer, A.B., *The Changing Logic of Japanese Employment Practices: A Firm-Level Analysis of Four Industries,* Promotors: Prof. dr. J.A. Stam & Prof. dr. J.P.M. Groenewegen, EPS-2005-057-ORG, ISBN: 90-5892-087-9, http://hdl.handle.net/1765/6667

Kijkuit, R.C., *Social Networks in the Front End: The Organizational Life of an Idea,* Promotor: Prof. dr. B. Nooteboom, EPS-2007-104-ORG, ISBN: 90-5892-137-6, http://hdl.handle.net/1765/10074

Kippers, J., *Empirical Studies on Cash Payments,* Promotor: Prof. dr. Ph.H.B.F. Franses, EPS-2004-043-F&A, ISBN: 90-5892-069-0, http://hdl.handle.net/1765/1520

Klein, M.H., *Poverty Alleviation through Sustainable Strategic Business Models: Essays on Poverty Alleviation as a Business Strategy,* Promotor: Prof. dr. H.R. Commandeur, EPS-2008-135-STR, ISBN: 978-90-5892-168-0, http://hdl.handle.net/1765/1

Kole, E., *On Crises, Crashes and Comovements*, Promotors: Prof. dr. C.G. Koedijk & Prof. dr. M.J.C.M. Verbeek, EPS-2006-083-F&A, ISBN: 90-5892-114-X, http://hdl.handle.net/1765/7829

Kooij-de Bode, J.M., *Distributed Information and Group Decision-Making: Effects of Diversity and Affect*, Promotor: Prof. dr. D.L. van Knippenberg, EPS-2007-115-ORG, http://hdl.handle.net/1765/10722

Knapp, S., *The Econometrics of Maritime Safety: Recommendations to Enhance Safety at Sea*, Promotor: Prof. dr. Ph.H.B.F. Franses, EPS-2007-096-ORG, ISBN: 90-5892-127-1, http://hdl.handle.net/1765/7913

Koppius, O.R., *Information Architecture and Electronic Market Performance*, Promotors: Prof. dr. P.H.M. Vervest & Prof. dr. ir. H.W.G.M. van Heck, EPS-2002-013-LIS, ISBN: 90-5892-023-2, http://hdl.handle.net/1765/921

Kotlarsky, J., *Management of Globally Distributed Component-Based Software Development Projects,* Promotor: Prof. dr. K. Kumar, EPS-2005-059-LIS, ISBN: 90-5892-088-7, http://hdl.handle.net/1765/6772

Kuilman, J., *The Re-Emergence of Foreign Banks in Shanghai: An Ecological Analysis,* Promotor: Prof. dr. B. Krug, EPS-2005-066-ORG, ISBN: 90-5892-096-8, http://hdl.handle.net/1765/6926

Langen, P.W. de, *The Performance of Seaport Clusters: A Framework to Analyze Cluster Performance and an Application to the Seaport Clusters of Durban, Rotterdam and the Lower Mississippi*, Promotors: Prof. dr. B. Nooteboom & Prof. drs. H.W.H. Welters, EPS-2004-034-LIS, ISBN: 90-5892-056-9, http://hdl.handle.net/1765/1133

Le Anh, T., *Intelligent Control of Vehicle-Based Internal Transport Systems*, Promotors: Prof. dr. M.B.M. de Koster & Prof. dr. ir. R. Dekker, EPS-2005-051-LIS, ISBN: 90-5892-079-8, http://hdl.handle.net/1765/6554

Le-Duc, T., *Design and Control of Efficient Order Picking Processes*, Promotor: Prof. dr. M.B.M. de Koster, EPS-2005-064-LIS, ISBN: 90-5892-094-1, http://hdl.handle.net/1765/6910

Leeuwen, E.P. van, *Recovered-Resource Dependent Industries and the Strategic Renewal of Incumbent Firm: A Multi-Level Study of Recovered Resource Dependence Management and Strategic Renewal in the European Paper and Board Industry*, Promotors: Prof. dr. ir. F.A.J. Van den Bosch & Prof. dr. H.W. Volberda, EPS-2007-109-STR, ISBN: 90-5892-140-6, http://hdl.handle.net/1765/10183

Lentink, R.M., *Algorithmic Decision Support for Shunt Planning*, Promotors: Prof. dr. L.G. Kroon & Prof. dr. ir. J.A.E.E. van Nunen, EPS-2006-073-LIS, ISBN: 90-5892-104-2, http://hdl.handle.net/1765/7328

Liang, G., *New Competition: Foreign Direct Investment and Industrial Development in China,* Promotor: Prof. dr. R.J.M. van Tulder, EPS-2004-047-ORG, ISBN: 90-5892-073-9, http://hdl.handle.net/1765/1795

Liere, D.W. van, *Network Horizon and the Dynamics of Network Positions: A Multi-Method Multi-Level Longitudinal Study of Interfirm Networks,* Promotor: Prof. dr. P.H.M. Vervest, EPS-2007-105-LIS, ISBN: 90-5892-139-0, http://hdl.handle.net/1765/10181

Loef, J., *Incongruity between Ads and Consumer Expectations of Advertising*, Promotors: Prof. dr. W.F. van Raaij & Prof. dr. G. Antonides, EPS-2002-017-MKT, ISBN: 90-5892-028-3, http://hdl.handle.net/1765/869

Londoño, M. del Pilar, *Institutional Arrangements that Affect Free Trade Agreements: Economic Rationality Versus Interest Groups*, Promotors: Prof. dr. H.E. Haralambides & Prof. dr. J.F. Francois, EPS-2006-078-LIS, ISBN: 90-5892-108-5, http://hdl.handle.net/1765/7578

Maas, A.A., van der, *Strategy Implementation in a Small Island Context: An Integrative Framework,* Promotor: Prof. dr. H.G. van Dissel, EPS-2008-127-LIS, ISBN: 978-90-5892-160-4, http://hdl.handle.net/1765/1

Maeseneire, W., de, *Essays on Firm Valuation and Value Appropriation,* Promotor: Prof. dr. J.T.J. Smit, EPS-2005-053-F&A, ISBN: 90-5892-082-8, http://hdl.handle.net/1765/6768

Mandele, L.M., van der, *Leadership and the Inflection Point: A Longitudinal Perspective*, Promotors: Prof. dr. H.W. Volberda & Prof. dr. H.R. Commandeur, EPS-2004-042-STR, ISBN: 90-5892-067-4, http://hdl.handle.net/1765/1302

Meer, J.R. van der, *Operational Control of Internal Transport*, Promotors: Prof. dr. M.B.M. de Koster & Prof. dr. ir. R. Dekker, EPS-2000-001-LIS, ISBN: 90-5892-004-6, http://hdl.handle.net/1765/859

Mentink, A., *Essays on Corporate Bonds*, Promotor: Prof. dr. A.C.F. Vorst, EPS-2005-070-F&A, ISBN: 90-5892-100-X, http://hdl.handle.net/1765/7121

Meyer, R.J.H., *Mapping the Mind of the Strategist: A Quantitative Methodology for Measuring the Strategic Beliefs of Executives*, Promotor: Prof. dr. R.J.M. van Tulder, EPS-2007-106-ORG, ISBN: 978-90-5892-141-3, http://hdl.handle.net/1765/10182

Miltenburg, P.R., *Effects of Modular Sourcing on Manufacturing Flexibility in the Automotive Industry: A Study among German OEMs*, Promotors: Prof. dr. J. Paauwe & Prof. dr. H.R. Commandeur, EPS-2003-030-ORG, ISBN: 90-5892-052-6, http://hdl.handle.net/1765/1039

Moerman, G.A., *Empirical Studies on Asset Pricing and Banking in the Euro Area,* Promotor: Prof. dr. C.G. Koedijk, EPS-2005-058-F&A, ISBN: 90-5892-090-9, http://hdl.handle.net/1765/6666

Mol, M.M., *Outsourcing, Supplier-relations and Internationalisation: Global Source Strategy as a Chinese Puzzle*, Promotor: Prof. dr. R.J.M. van Tulder, EPS-2001-010-ORG, ISBN: 90-5892-014-3, http://hdl.handle.net/1765/355

Mom, T.J.M., *Managers' Exploration and Exploitation Activities: The Influence of Organizational Factors and Knowledge Inflows*, Promotors: Prof. dr. ir. F.A.J. Van den Bosch & Prof. dr. H.W. Volberda, EPS-2006-079-STR, ISBN: 90-5892-116-6, http://hdl.handle.net/1765

Mulder, A., *Government Dilemmas in the Private Provision of Public Goods*, Promotor: Prof. dr. R.J.M. van Tulder, EPS-2004-045-ORG, ISBN: 90-5892-071-2, http://hdl.handle.net/1765/1790

Muller, A.R., *The Rise of Regionalism: Core Company Strategies Under The Second Wave of Integration*, Promotor: Prof. dr. R.J.M. van Tulder, EPS-2004-038-ORG, ISBN: 90-5892-062-3, http://hdl.handle.net/1765/1272

Nalbantov G.I., *Essays on Some Recent Penalization Methods with Applications in Finance and Marketing*, Promotor: Prof. drP.J.F. Groenen, EPS-2008-132-F&A, ISBN: 978-90-5892-166-6, http://hdl.handle.net/1765/1

Nguyen, T.T., *Capital Structure, Strategic Competition, and Governance*, Promotor: Prof. dr. A. de Jong, EPS-2008-148-F&A, ISBN: 90-5892-178-9, http://hdl.handle.net/1765/1

Ning, H., *Hierarchical Portfolio Management: Theory and Applications*, Promotor: Prof. dr. J. Spronk, EPS-2007-118-F&A, ISBN: 90-5892-152-9, http://hdl.handle.net/1765/10868

Noeverman, J., *Management Control Systems, Evaluative Style, and Behaviour: Exploring the Concept and Behavioural Consequences of Evaluative Style*, Promotors: Prof. dr. E.G.J. Vosselman & Prof. dr. A.R.T. Williams, EPS-2007-120-F&A, ISBN: 90-5892-151-2, http://hdl.handle.net/1765/10869

Oosterhout, J., van, *The Quest for Legitimacy: On Authority and Responsibility in Governance*, Promotors: Prof. dr. T. van Willigenburg & Prof.mr. H.R. van Gunsteren, EPS-2002-012-ORG, ISBN: 90-5892-022-4, http://hdl.handle.net/1765/362

Paape, L., *Corporate Governance: The Impact on the Role, Position, and Scope of Services of the Internal Audit Function*, Promotors: Prof. dr. G.J. van der Pijl & Prof. dr. H. Commandeur, EPS-2007-111-MKT, ISBN: 90-5892-143-7, http://hdl.handle.net/1765/10417

Pak, K., *Revenue Management: New Features and Models*, Promotor: Prof. dr. ir. R. Dekker, EPS-2005-061-LIS, ISBN: 90-5892-092-5, http://hdl.handle.net/1765/362/6771

Pattikawa, L.H, *Innovation in the Pharmaceutical Industry: Evidence from Drug Introduction in the U.S.*, Promotors: Prof. dr. H.R.Commandeur, EPS-2007-102-MKT, ISBN: 90-5892-135-2, http://hdl.handle.net/1765/9626

Peeters, L.W.P., *Cyclic Railway Timetable Optimization*, Promotors: Prof. dr. L.G. Kroon & Prof. dr. ir. J.A.E.E. van Nunen, EPS-2003-022-LIS, ISBN: 90-5892-042-9, http://hdl.handle.net/1765/429

Pietersz, R., *Pricing Models for Bermudan-style Interest Rate Derivatives*, Promotors: Prof. dr. A.A.J. Pelsser & Prof. dr. A.C.F. Vorst, EPS-2005-071-F&A, ISBN: 90-5892-099-2, http://hdl.handle.net/1765/7122

Poel, A.M. van der, *Empirical Essays in Corporate Finance and Financial Reporting*, Promotors: Prof. dr. A. de Jong & Prof. dr. G.M.H. Mertens, EPS-2007-133-F&A, ISBN: 978-90-5892-165-9, http://hdl.handle.net/1765/1

Popova, V., *Knowledge Discovery and Monotonicity*, Promotor: Prof. dr. A. de Bruin, EPS-2004-037-LIS, ISBN: 90-5892-061-5, http://hdl.handle.net/1765/1201

Pouchkarev, I., *Performance Evaluation of Constrained Portfolios*, Promotors: Prof. dr. J. Spronk & Dr. W.G.P.M. Hallerbach, EPS-2005-052-F&A, ISBN: 90-5892-083-6, http://hdl.handle.net/1765/6731

Prins, R., *Modeling Consumer Adoption and Usage of Value-Added Mobile Services*, Promotors: Prof. dr. Ph.H.B.F. Franses & Prof. dr. P.C. Verhoef, EPS-2008-128-MKT, ISBN: 978/90-5892-161-1, http://hdl.handle.net/1765/1

Puvanasvari Ratnasingam, P., *Interorganizational Trust in Business to Business E-Commerce*, Promotors: Prof. dr. K. Kumar & Prof. dr. H.G. van Dissel, EPS-2001-009-LIS, ISBN: 90-5892-017-8, http://hdl.handle.net/1765/356

Quak, H.J., *Sustainability of Urban Freight Transport: Retail Distribution and Local Regulation in Cities*, Promotor: Prof. dr.M.B.M. de Koster, EPS-2008-124-LIS, ISBN: 978-90-5892-154-3, http://hdl.handle.net/1765/11990

Radkevitch, U.L, *Online Reverse Auction for Procurement of Services*, Promotor: Prof. dr. ir. H.W.G.M. van Heck, EPS-2008-137-LIS, ISBN: 978-90-5892-171-0, http://hdl.handle.net/1765/1

Rinsum, M. van, *Performance Measurement and Managerial Time Orientation*, Promotor: Prof. dr. F.G.H. Hartmann, EPS-2006-088-F&A, ISBN: 90-5892-121-2, http://hdl.handle.net/1765/7993

Romero Morales, D., *Optimization Problems in Supply Chain Management*, Promotors: Prof. dr. ir. J.A.E.E. van Nunen & Dr. H.E. Romeijn, EPS-2000-003-LIS, ISBN: 90-9014078-6, http://hdl.handle.net/1765/865

Roodbergen, K.J., *Layout and Routing Methods for Warehouses*, Promotors: Prof. dr. M.B.M. de Koster & Prof. dr. ir. J.A.E.E. van Nunen, EPS-2001-004-LIS, ISBN: 90-5892-005-4, http://hdl.handle.net/1765/861

Rook, L., *Imitation in Creative Task Performance*, Promotor: Prof. dr. D.L. van Knippenberg, EPS-2008-125-ORG, http://hdl.handle.net/1765/11555

Schauten, M.B.J., *Valuation, Capital Structure Decisions and the Cost of Capital,* Promotors: Prof. dr. J. Spronk & Prof. dr. D. van Dijk, EPS-2008-134-F&A, ISBN: 978-90-5892-172-7, http://hdl.handle.net/1765/1

Schramade, W.L.J., *Corporate Bonds Issuers,* Promotor: Prof. dr. A. De Jong, EPS-2006-092-F&A, ISBN: 90-5892-125-5, http://hdl.handle.net/1765/8191

Schweizer, T.S., *An Individual Psychology of Novelty-Seeking, Creativity and Innovation,* Promotor: Prof. dr. R.J.M. van Tulder, EPS-2004-048-ORG, ISBN: 90-5892-077-1, http://hdl.handle.net/1765/1818

Six, F.E., *Trust and Trouble: Building Interpersonal Trust Within Organizations*, Promotors: Prof. dr. B. Nooteboom & Prof. dr. A.M. Sorge, EPS-2004-040-ORG, ISBN: 90-5892-064-X, http://hdl.handle.net/1765/1271

Slager, A.M.H., *Banking across Borders*, Promotors: Prof. dr. R.J.M. van Tulder & Prof. dr. D.M.N. van Wensveen, EPS-2004-041-ORG, ISBN: 90-5892-066-6, http://hdl.handle.net/1765/1301

Sloot, L., *Understanding Consumer Reactions to Assortment Unavailability*, Promotors: Prof. dr. H.R. Commandeur, Prof. dr. E. Peelen & Prof. dr. P.C. Verhoef, EPS-2006-074-MKT, ISBN: 90-5892-102-6, http://hdl.handle.net/1765/7438

Smit, W., *Market Information Sharing in Channel Relationships: Its Nature, Antecedents and Consequences*, Promotors: Prof. dr. ir. G.H. van Bruggen & Prof. dr. ir. B. Wierenga, EPS-2006-076-MKT, ISBN: 90-5892-106-9, http://hdl.handle.net/1765/7327

Sonnenberg, M., *The Signalling Effect of HRM on Psychological Contracts of Employees: A Multi-level Perspective*, Promotor: Prof. dr. J. Paauwe, EPS-2006-086-ORG, ISBN: 90-5892-119-0, http://hdl.handle.net/1765/7995

Speklé, R.F., *Beyond Generics: A closer Look at Hybrid and Hierarchical Governance*, Promotor: Prof. dr. M.A. van Hoepen RA, EPS-2001-008-F&A, ISBN: 90-5892-011-9, http://hdl.handle.net/1765/357

Szkudlarek, B.A., *Spinning the Web of Reentry: [Re]connecting reentry training theory and practice*, Promotor: Prof. dr. S.J. Magala, EPS-2008-143-ORG, ISBN: 978-90-5892-177-2, http://hdl.handle.net/1765/1

Teunter, L.H., *Analysis of Sales Promotion Effects on Household Purchase Behavior*, Promotors: Prof. dr. ir. B. Wierenga & Prof. dr. T. Kloek, EPS-2002-016-MKT, ISBN: 90-5892-029-1, http://hdl.handle.net/1765/868

Tims, B., *Empirical Studies on Exchange Rate Puzzles and Volatility*, Promotor: Prof. dr. C.G. Koedijk, EPS-2006-089-F&A, ISBN: 90-5892-113-1, http://hdl.handle.net/1765/8066

Tuk, M.A., *Empirical Studies on Exchange Rate Puzzles and Volatility*, Promotors: Prof. dr. ir. A. Smidts & Prof.dr. D.H.J. Wigboldus, EPS-2008-130-MKT, ISBN: 978-90-5892-164-2, http://hdl.handle.net/1765/1

Valck, K. de, *Virtual Communities of Consumption: Networks of Consumer Knowledge and Companionship*, Promotors: Prof. dr. ir. G.H. van Bruggen & Prof. dr. ir. B. Wierenga, EPS-2005-050-MKT, ISBN: 90-5892-078-X, http://hdl.handle.net/1765/6663

Valk, W. van der, *Buyer-Seller Interaction Patterns During Ongoing Service Exchange*, Promotors: Prof. dr. J.Y.F. Wynstra & Prof. dr. ir. B. Axelsson, EPS-2007-116-MKT, ISBN: 90-5892-146-8, http://hdl.handle.net/1765/10856

Verheul, I., *Is There a (Fe)male Approach? Understanding Gender Differences in Entrepreneurship*, Prof. dr. A.R. Thurik, EPS-2005-054-ORG, ISBN: 90-5892-080-1, http://hdl.handle.net/1765/2005

Vis, I.F.A., *Planning and Control Concepts for Material Handling Systems*, Promotors: Prof. dr. M.B.M. de Koster & Prof. dr. ir. R. Dekker, EPS-2002-014-LIS, ISBN: 90-5892-021-6, http://hdl.handle.net/1765/866

Vlaar, P.W.L., *Making Sense of Formalization in Interorganizational Relationships: Beyond Coordination and Control,* Promotors: Prof. dr. ir. F.A.J. Van den Bosch & Prof. dr. H.W. Volberda, EPS-2006-075-STR, ISBN 90-5892-103-4, http://hdl.handle.net/1765/7326

Vliet, P. van, *Downside Risk and Empirical Asset Pricing*, Promotor: Prof. dr. G.T. Post, EPS-2004-049-F&A, ISBN: 90-5892-07-55, http://hdl.handle.net/1765/1819

Vlist, P. van der, *Synchronizing the Retail Supply Chain*, Promotors: Prof. dr. ir. J.A.E.E. van Nunen & Prof. dr. A.G. de Kok, EPS-2007-110-LIS, ISBN: 90-5892-142-0, http://hdl.handle.net/1765/10418

Vries-van Ketel E. de, *How Assortment Variety Affects Assortment Attractiveness: A Consumer Perspective*, Promotors: Prof. dr. G.H. van Bruggen & Prof. dr. ir. A. Smidts, EPS-2006-072-MKT, ISBN: 90-5892-101-8, http://hdl.handle.net/1765/7193

Vromans, M.J.C.M., *Reliability of Railway Systems*, Promotors: Prof. dr. L.G. Kroon, Prof. dr. ir. R. Dekker & Prof. dr. ir. J.A.E.E. van Nunen, EPS-2005-062-LIS, ISBN: 90-5892-089-5, http://hdl.handle.net/1765/6773

Vroomen, B.L.K., *The Effects of the Internet, Recommendation Quality and Decision Strategies on Consumer Choice*, Promotor: Prof. dr. Ph.H.B.F. Franses, EPS-2006-090-MKT, ISBN: 90-5892-122-0, http://hdl.handle.net/1765/8067

Waal, T. de, *Processing of Erroneous and Unsafe Data*, Promotor: Prof. dr. ir. R. Dekker, EPS-2003-024-LIS, ISBN: 90-5892-045-3, http://hdl.handle.net/1765/870

Watkins Fassler, K., *Macroeconomic Crisis and Firm Performance,* Promotors: Prof. dr. J. Spronk & Prof. dr. D.J. van Dijk, EPS-2007-103-F&A, ISBN: 90-5892-138-3, http://hdl.handle.net/1765/10065

Wennekers, A.R.M., *Entrepreneurship at Country Level: Economic and Non-Economic Determinants,* Promotor: Prof. dr. A.R. Thurik, EPS-2006-81-ORG, ISBN: 90-5892-115-8, http://hdl.handle.net/1765/7982

Wielemaker, M.W., *Managing Initiatives: A Synthesis of the Conditioning and Knowledge-Creating View*, Promotors: Prof. dr. H.W. Volberda & Prof. dr. C.W.F. Baden-Fuller, EPS-2003-28-STR, ISBN: 90-5892-050-X, http://hdl.handle.net/1765/1042

Wijk, R.A.J.L. van, *Organizing Knowledge in Internal Networks: A Multilevel Study*, Promotor: Prof. dr. ir. F.A.J. van den Bosch, EPS-2003-021-STR, ISBN: 90-5892-039-9, http://hdl.handle.net/1765/347

Yu, M, *Enhancing Warehouse Performance by Efficient Order Picking*, Promotor: Prof. dr. M.B.M. de Koster, EPS-2008-139-LIS, ISBN: 978-90-5892-167-3, http://hdl.handle.net/1765/1

Zhang, X., *Strategizing of Foreign Firms in China: An Institution-based Perspective*, Promotor: Prof. dr. B. Krug, EPS-2007-114-ORG, ISBN: 90-5892-147-5, http://hdl.handle.net/1765/10721

Zhu, Z., *Essays on China's Tax System*, Promotors: Prof. dr. B. Krug & Prof. dr. G.W.J. Hendrikse, EPS-2007-112-ORG, ISBN: 90-5892-144-4, http://hdl.handle.net/1765/10502

Zwart, G.J. de, *Empirical Studies on Financial Markets: Private Equity, Corporate Bonds and Emerging Markets*, Promotors: Prof. dr. M.J.C.M. Verbeek & Prof. dr. D.J.C. van Dijk, EPS-2008-131-F&A, ISBN: 978-90-5892-163-5, http://hdl.handle.net/1765/1

Erasmus Research Institute of Management - ERIM

DYNAMICS AND COMPETITION IN CHARITABLE GIVING

Nowadays potential donors receive many direct mailings from many different charities, all soliciting their donations. As charities depend for a large part on their revenues from direct mail it is important to uncover the precise effects of charitable direct mailings on donating behavior. Existing studies on donating behavior generally focus on a single decision context, that is, a single donation to a single charitable cause. In reality, however, people receive many donation requests, and the responses to these requests may not be independent.

In this thesis we study the dynamic and competitive effects of charitable direct mailings on donating behavior. We present two direct mailing response models, with the first focusing primarily on the competitive dimension, and the second focusing mainly on the dynamic dimension. To calibrate these models we have access to a unique dataset consisting of the databases of multiple charity organizations, providing us with detailed information on direct mailings and donations at the individual donor's level. In addition, we conducted a direct mailing field experiment in cooperation with various charities. In the analysis of this experiment, we zoom in on the direct mailing effects on actual behavior and on the underlying motivational process. We establish that substantial dynamic and competitive effects exist and that the single decision context can thus not be justified for properly analyzing direct mailing response behavior. We also provide some practical implications of these results for charities. One of our surprising results is that - contrary to the public opinion - charities would have to send even more mailings in order to increase their revenues.

ERIM

The Erasmus Research Institute of Management (ERIM) is the Research School (Onderzoekschool) in the field of management of the Erasmus University Rotterdam. The founding participants of ERIM are Rotterdam School of Management (RSM), and the Erasmus School of Economics (ESE). ERIM was founded in 1999 and is officially accredited by the Royal Netherlands Academy of Arts and Sciences (KNAW). The research undertaken by ERIM is focussed on the management of the firm in its environment, its intra- and interfirm relations, and its business processes in their interdependent connections.

The objective of ERIM is to carry out first rate research in management, and to offer an advanced doctoral programme in Research in Management. Within ERIM, over three hundred senior researchers and PhD candidates are active in the different research programmes. From a variety of academic backgrounds and expertises, the ERIM community is united in striving for excellence and working at the forefront of creating new business knowledge.

Design & layout: B&T Ontwerp en advies (www.b-en-t.nl) Print: Haveka (www.haveka.nl)

ERIM PhD Series
Research in Management

Erasmus Research Institute of Management - ERIM
Rotterdam School of Management (RSM)
Erasmus School of Economics (ESE)
P.O. Box 1738, 3000 DR Rotterdam
The Netherlands

Tel. +31 10 408 11 82
Fax +31 10 408 96 40
E-mail info@erim.eur.nl
Internet www.erim.eur.nl