

Quantitative Empirical Studies on Sustainable Consumption

Von der Fakultät für Wirtschaft, Recht und Gesellschaft
der Brandenburgischen Technischen Universität Cottbus–Senftenberg
zur Erlangung des akademischen Grades einer
Doktorin der Wirtschafts- und Sozialwissenschaften (Dr. rer. pol.)

genehmigte Dissertation

vorgelegt von
Bachelor of Science, Master of Arts
Kathleen Jacobs, geb. Krause
geboren am 11. November 1986 in Gera

Vorsitzender: Prof. Dr. oec. habil. Jan Schnellenbach
Gutachter: Prof. Dr. rer. pol. habil. Wolfram Berger
Gutachterin: Vertr.-Prof. Dr. rer. oec. habil. Ines Brusch
Gutachterin: Yoko Nagase, Ph.D (Oxford Brookes University)
Tag der mündlichen Prüfung: 12.11.2020

Summary

Although consumer interest in socially responsible and environmentally friendly consumption options has substantially increased over the past years, respective market shares are still lagging behind. As a consequence, researchers and practitioners need support in strengthening the demand for sustainable products and services. The overall research goal of this doctoral thesis is, therefore, to better understand the determinants of sustainable purchase behaviour. By approaching several context-specific subgoals in a series of four quantitative empirical studies, major research gaps in the field of sustainable consumption are addressed.

The first article examines the market potential for social banking in Germany. A conceptual framework for differentiating social from conventional banking customers is developed, based on which the market size is estimated. By means of an experimental survey using adaptive conjoint analysis, a sample of 2896 German social banking customers and a population-representative sample of 641 German conventional banking customers are compiled. Logistic regression modelling reveals that social banking customers differ significantly from their conventional counterparts regarding several socio-demographic, behavioural and psychographic factors. For instance, social banking customers demonstrate stronger sustainable buying patterns and weaker preferences for financial, but stronger preferences for social return. The results further indicate a considerable untapped growth potential for social banks by uncovering a market size ranging between 10 and 26% of the German population in 2011. Social banks can, therefore, be advised to target customers based on a mixture of consumer characteristics, to cooperate with suppliers of more established sustainable sectors, and to continuously develop their core business.

The second article investigates the phenomenon of the attitude-behaviour gap in the context of sustainable clothing. The value-attitude-behaviour hierarchy is used as a theoretical framework, augmented by further psychographic constructs hypothesised to influence behaviour. Based on survey data of 1085 female German consumers, a structural equation model is estimated to assess how large the possible gap between a positive attitude towards sustainable clothing and the corresponding purchase behaviour is, and which factors enhance or hinder purchase behaviour.

Apart from a considerable attitude-behaviour gap, the article indicates that a positive attitude towards social-ecological clothing standards, biospheric and altruistic values, as well as an affinity to online and catalogue shopping, enhance sustainable clothing purchases. Egoistic and hedonic values and, remarkably, a preference for durable clothing hinder sustainable clothing purchase behaviour. No significant effects of fashion consciousness and price sensitivity have been identified. The findings thus highlight the practical relevance of changing attitudes and values towards sustainability, and of focusing on the durability of sustainable clothing and its availability via retail stores.

The third article studies how product lifetime labelling of electrical appliances influences purchase behaviour. Based on a conceptual model that combines the consumer theory of Lancaster with the theory of reasoned action, motivational drivers of preferences for product longevity are also investigated. Using choice-based conjoint analysis, experimental survey data is collected from a population-representative sample of 499 German consumers. Hierarchical Bayes utility modelling suggests a decreasing positive effect of the label on purchase decisions and a deterioration of the purchase influence of existing brands compared to new brands. Structural equation modelling indicates that the preference for a long product lifetime is fostered by the positive attitude and the subjective norm towards purchasing long-lasting electrical home appliances. However, the attitude only exerts a significant influence if it is driven by personal rather than environmental gains. It is further documented that biospheric values enhance, while stimulation values inhibit, both attitude types. Hedonic values only enhance the attitude based on personal gains. Policymakers are informed about the label's potential to stimulate the supply of, and demand for, more durable electrical home appliances. Marketers should focus on business models for product longevity which account for product variety and up-to-dateness, and communicate the personal benefits of product longevity.

The fourth article sheds light on the effects of favourable and unfavourable environmental product information on consumers' willingness to pay. Alternative hypotheses derived from prospect theory and disappointment theory are tested. The analysis draws on data gained from a survey-based experiment conducted among a population-representative sample of 524 German consumers by the example of batteries. Using a two-level, within and between-subjects structural equation model, the results document a strong orientation of consumers on given reference points, such as an industry average, and confirm key assertions of prospect theory. The negative effect caused by unfavourable product carbon footprint information on consumers' willingness to pay is significantly stronger than the positive effect caused by respective favourable information. Furthermore, consumers tend to not substantially differentiate between different high-range degrees of positive or negative environmental information. Policymakers can learn from the analysis that providing consumers also with negative information, raising consumers' reference points, setting minimum industry standards, and subsidizing companies for radical improvements are of utmost importance.

Contents

Summary.....	i
Contents	iii
List of figures	vii
List of tables.....	ix
Abbreviations.....	xi
Acknowledgements	xiii
1 Introduction	1
1.1 Research goal.....	2
1.2 Research gaps and research questions.....	4
1.3 Description of articles	11
2 Article I – Social banking in Germany: An empirical analysis of consumer characteristics and market size	21
Contextual transition.....	22
Abstract	23
2.1 Introduction	24
2.2 Literature review and hypotheses development.....	26
2.2.1 Preliminary considerations	26
2.2.2 Socio-demographic characteristics	27
2.2.3 Behavioural and psychographic characteristics.....	28
2.3 Methods.....	31
2.3.1 Adaptive conjoint analysis	31
2.3.2 Binary logistic regression	35
2.4 Results and discussion	39
2.4.1 Differences between social and conventional banking customers.....	39
2.4.2 Size of the German social banking market.....	43

2.5	Conclusions and implications.....	47
2.6	Appendices.....	50
3	Article II – An empirical extension of the value-attitude-behaviour hierarchy in sustainable clothing	55
	Contextual transition.....	56
	Abstract	57
3.1	Introduction	58
3.2	Theoretical framework, literature review and hypotheses development.....	60
3.2.1	Value-attitude-behaviour hierarchy	60
3.2.2	Enablers.....	62
3.2.3	Barriers.....	63
3.3	Method	65
3.3.1	Data collection and sample characteristics.....	65
3.3.2	Operationalisation of constructs.....	67
3.4	Results.....	70
3.4.1	Validity and reliability of constructs.....	70
3.4.2	Assessment of proposed model and hypotheses	72
3.5	Discussion.....	76
3.6	Conclusions and implications.....	80
3.7	Appendix	82
4	Article III – The influence of product lifetime labelling on purchase decisions	85
	Contextual transition.....	86
	Abstract	87
4.1	Introduction	88
4.2	Theoretical framework and hypotheses.....	91
4.2.1	Interdisciplinary approach	91
4.2.2	The influence of a product lifetime label on purchase decisions	92
4.2.3	Motivational drivers of consumer preferences for product longevity	93
4.3	Methods.....	96
4.3.1	Data collection and sample characteristics.....	96
4.3.2	Choice-based conjoint analysis.....	98
4.3.3	Structural equation modelling	102
4.4	Results.....	107

Contents

4.4.1 Hierarchical Bayes utility modelling.....	107
4.4.2 The influence of a product lifetime label on purchase decisions	107
4.4.3 Motivational drivers of consumer preferences for product longevity	114
4.5 Discussion.....	118
4.6 Conclusions and limitations	122
4.7 Appendices.....	125
5 Article IV – The effects of favourable and unfavourable environmental information on consumers’ willingness to pay	137
Contextual transition.....	138
Abstract	139
5.1 Introduction	140
5.2 Theoretical background and research hypotheses.....	141
5.3 Method	147
5.3.1 Sample and experimental design.....	147
5.3.2 Measurements	149
5.3.3 Model and analysis.....	152
5.4 Results.....	155
5.5 Discussion.....	161
5.6 Conclusions and limitations	162
5.7 Appendices.....	164
6 Conclusion.....	177
6.1 Summary	178
6.2 Contribution to literature	180
6.3 Practical implications	185
6.4 Limitations and future research.....	189
References.....	xv

List of figures

Chapter 2

2.1	Conceptual framework for differentiating social from conventional banking customers...	30
-----	--	----

Chapter 3

3.1	Conceptual model of sustainable clothing purchase behaviour based on an extension of the value-attitude-behaviour hierarchy	65
3.2	Path diagram of the extended structural equation model explaining sustainable clothing purchase behaviour (significance of standardised path coefficients based on the Wald test statistic; significance level: + $p \leq 0.10$; * $p \leq 0.05$; ** $p \leq 0.01$; *** $p \leq 0.001$).....	75
3.3	Impact of socio-demographic covariates on the constructs in the structural equation model (point estimates and 95% confidence intervals; joint significance of standardised regression coefficients for each covariate based on the omnibus Wald test statistic; black = significant ($p \leq 0.05$); grey = insignificant ($p > 0.05$))	83

Chapter 4

4.1	Conceptual model of consumers' preference for a long lifetime of electrical home appliances	96
4.2	Visualisation of the change in willingness to pay.....	112
4.3	Path diagram of the structural equation model explaining the preference for a long lifetime of electrical home appliances (significance of fully standardised path coefficients based on Wald tests; significance level: + $p \leq 0.10$; * $p \leq 0.05$; ** $p \leq 0.01$; *** $p \leq 0.001$).....	117
4.4	Introduction texts and exemplary choice tasks (original in German).....	127
4.5	Impact of socio-demographic covariates on the constructs in the structural equation model (point estimates; reference categories [female, 60 years and older, secondary	

modern school qualification]; joint significance of fully standardised regression coefficients for each covariate based on omnibus Wald tests; black = significant ($p \leq 0.05$); grey = insignificant ($p > 0.05$)).....	134
---	-----

Chapter 5

5.1 Alternative hypothesised shapes of the willingness-to-pay reaction function with (a – prospect theory) declining or (b – disappointment theory) increasing effects of deviating environmental performance and with (solid lines) or without (dashed lines) negativity bias	146
5.2 Confirmatory factor analysis	151
5.3 Path diagram of two-level repeated measurements structural equations model (random intercept and slopes shown as solid circles on within-subjects level).....	153
5.4 Positive and negative components of willingness-to-pay reaction function for different parameterisations (exponents η^+ and η^- of power function)	154
5.5 Floodlight analysis of willingness-to-pay surplus and deficit coefficients for varying values of concern about climate change (point estimates and 95%-confidence intervals).....	159
5.6 Differential willingness-to-pay reaction function for a reference subject under model (2)	160
5.7 Survey questionnaire (original in German)	165
5.8 Exemplary purchase scenarios (original in German).....	169
5.9 Formal specification of two-level repeated measurements structural equation model.....	174

List of tables

Chapter 1

1.1 Overview of the quantitative empirical studies on sustainable consumption	17
---	----

Chapter 2

2.1 Attributes and attribute levels of the adaptive conjoint analysis survey	32
2.2 Comparison of sample 2 with the German adult population	35
2.3 Test for multicollinearity of the initial and final variable set	37
2.4 Factor matrix of variables concerning sustainable buying behaviour	38
2.5 Binary logistic regression model for the differentiation between social and conventional banking customers	39
2.6 Confusion matrix of the binary logistic regression model ($p^* = 0.5$)	44
2.7 Range estimation of the market size based on respondent-specific confidence intervals.....	45
2.8 Analysis of wealth of potential social banking customers	46
2.9 Descriptive statistics of the independent variables for sample 1 and sample 2	50
2.10 Comparison of the training subsample of sample 2 with the German population	52
2.11 Comparison of the control subsample of sample 2 with the German population	53
2.12 Distribution of wealth of the German female population	54
2.13 Distribution of wealth of the German male population	54

Chapter 3

3.1 Socio-demographic composition of the sample compared to the female adult population of Germany	66
3.2 Descriptive statistics of each construct's indicators	69
3.3 Pattern matrix of the exploratory factor analysis for pre-validating the measurement models of the constructs	70

3.4	Factor loadings and reliability measures of the confirmatory factor analysis for verifying the measurement models of the constructs.....	71
3.5	Factor correlations in the confirmatory factor analysis model.....	72
3.6	Structural equation modelling results of the basic and the extended model explaining sustainable clothing purchase behaviour	73
3.7	Causal effects of self-transcendence and self-enhancement values on sustainable clothing purchase behaviour.....	76
 Chapter 4		
4.1	Socio-demographic composition of the sample compared to the German adult population.....	97
4.2	Attributes and attribute levels of washing machines in the choice tasks.....	101
4.3	Factor loadings and reliability measures from the confirmatory factor analysis model as well as item sources.....	105
4.4	Factor correlations in the confirmatory factor analysis model.....	106
4.5	Hierarchical Bayes utility modelling results of both choice-based conjoint exercises	109
4.6	Change in willingness to pay from the first to the second choice-based conjoint exercise	111
4.7	Relative importances of attributes for both choice-based conjoint exercises	114
4.8	Structural equation modelling results explaining the preference for a long lifetime of electrical home appliances.....	115
4.9	Descriptive statistics of each construct's items	131
 Chapter 5		
5.1	Nonlinear effects of environmental information on consumer behaviour	143
5.2	Parameter estimates (and standard errors) for alternative analysis models.....	155
5.3	Survey sampling quotas and frequencies	164
5.4	Factor loadings from the confirmatory factor analysis model.....	171
5.5	Correlation coefficients from the confirmatory factor analysis model	172
5.6	Residual variances from the confirmatory factor analysis model	172

Abbreviations

ABG	Attitude-behaviour gap
ACA	Adaptive conjoint analysis
CaCC	Concern about climate change
CBC	Choice-based conjoint
CO ₂	Carbon dioxide
CFA	Confirmatory factor analysis
EFA	Exploratory factor analysis
EU	European Union
GHG	Greenhouse gas
HB	Hierarchical Bayes
LCA	Life cycle assessment
MNL	Multinomial logit model
NGOs	Non-governmental organisations
PCF	Product carbon footprint
PVQ	Portrait values questionnaire
RLH	Root likelihood
SEM	Structural equation model
SRI	Socially responsible investment or investing
SR investors	Socially responsible investors
TPB	Theory of planned behaviour
TRA	Theory of reasoned action
VABH	Value-attitude-behaviour hierarchy
VIF	Variance inflation factor
WTP	Willingness to pay, Willingness-to-pay

Acknowledgements

I would like to start by thanking my first supervisor Prof. Dr. Wolfram Berger from the Faculty of Business, Law and Social Sciences of the Brandenburg University of Technology Cottbus-Senftenberg as well as my second supervisor Prof. Dr. Dirk Battenfeld from the Faculty of Business Management of the Alanus University of Arts and Social Sciences for their trust and support. I am particularly grateful for their competent guidance during the decisive phases of writing the doctoral thesis.

My thanks also go to Prof. Dr. Lars Petersen and Jun.-Prof. Dr. Jacob Hörisch who co-authored two articles of the doctoral thesis with me. I have learned a lot from working with them and have always felt privileged to carry out research within such a highly qualified and cheerful team.

Furthermore, I am strongly indebted to my husband Leif Jacobs. He has supported me not only professionally but also emotionally. Even though writing the doctoral thesis took a substantial share of my free time over the past years, he never put me under pressure. On the contrary, he constantly reminded me to also appreciate the work process and to remain true to myself and my strengths.

I would also like to express my gratitude to my brother Dr. Marko Krause for his advice. His ingenuity and his high level of motivation have always been a role model for me.

Finally, I am thankful to all my family members and friends for their patience and moral support.

Chapter 1

Introduction

1.1 Research goal

The previous way of consuming products and services has led to serious social and environmental problems worldwide (e.g. Intergovernmental Panel on Climate Change, 2014; Lorek and Vergragt, 2015). Climate change, for instance, is one of the most pressing environmental issues (Rockström et al., 2009; Steffen et al., 2015), which has mainly been caused by human behaviour since the middle of the 20th century (Intergovernmental Panel on Climate Change, 2014). Industrial countries such as Germany currently top the list of the largest per capita carbon dioxide (CO₂) emitters (World Bank, 2017). In addition, emerging nations have increased their contribution to global CO₂ emissions sharply over the past decades due to economic growth (Nguyen et al., 2018). Ensuring sustainable consumption and production patterns has, therefore, become one of the official sustainable development goals of the '2030 Agenda for Sustainable Development', adopted by all member states of the United Nations in 2015 (United Nations, 2015). In 2016, the German government has decided on a 'National Programme for Sustainable Consumption' in order to commit itself more strongly to implementing this goal (Bundesministerium für Umwelt, Naturschutz und nukleare Sicherheit, 2017).

Concurrent with the political debate, consumers have recently become more aware of the adverse effects of their consumption behaviour and thus demand more socially responsible and environmentally friendly consumption options (e.g. Nielsen, 2018; Thøgersen and Ölander, 2002; Vermeir and Verbeke, 2006). By offering the latter, companies play a key role in fostering sustainable consumption (e.g. Shrivastava and Hart, 1995; Veleva and Ellenbecker, 2001). In line with the triple bottom line concept (Elkington, 1997), companies have increasingly taken over responsibility in terms of corporate sustainability by implementing business strategies that pursue social, environmental and economic targets (e.g. Doluca et al., 2018; Montiel and Delgado-Ceballos, 2014; White et al., 2019). Porter and Kramer (2011, 2006) stress that a company can thus create value not only for society but for the company itself. More precisely, corporate sustainability is likely to lead to higher long-term profitability due to strategic advantages such as higher organisational efficiency, improved brand image, greater innovativeness and enhanced access to new markets (e.g. Banerjee et al., 2003; Berns et al., 2009). However, generating economic success through voluntary social and environmental activities, so-called 'business cases for sustainability' (Schaltegger et al., 2012), requires companies to gain greater knowledge about sustainable consumer behaviour (e.g. Fraj and Martinez, 2007; White et al., 2019). This is because sustainable companies are dependent on "consumers to recognize, embrace, and reward their [the companies', KJ] sustainable values and actions in ways that spur sustainable consumption" (White et al., 2019, p. 2).

Research on sustainable consumption generally aims at understanding and strengthening all consumption practices which foster sustainable development (Reisch and Thøgersen, 2015). This

emerging field of research consists mainly of discipline-oriented research strands from areas such as marketing, psychology and economics (e.g. Reisch and Thøgersen, 2015; White et al., 2019). Over time, the research focus has shifted from characterising sustainable consumers (e.g. Anderson Jr. and Cunningham, 1972; Diamantopoulos et al., 2003; Kilbourne and Beckmann, 1998) to predicting sustainable consumer behaviour (e.g. Panzone et al., 2016; Paul et al., 2016; White et al., 2019). This shift is particularly due to the often reported inconsistency between consumers' favourable attitudes towards sustainability and their actual – mostly unsustainable – consumption behaviours (e.g. Aschemann-Witzel and Niebuhr Aagaard, 2014; Blok et al., 2015). The so-called 'attitude-behaviour gap' is one of the main challenges in fostering sustainable consumption (Prothero et al., 2011). Even if the demand for sustainable products and services is on the rise, corresponding market shares are still lagging far behind the level of expressed consumer interest (e.g. Jacobs et al., 2018; Krause and Battenfeld, 2019). Consequently, not only companies but also policymakers aiming at the stimulation of sustainable consumption are in need of further behavioural insights (e.g. Prothero et al., 2011; Reisch and Thøgersen, 2015). Policy measures such as sustainability labelling schemes¹ should be backed up by evidence on how they would affect consumer behaviour (Noblet and Teisl, 2015). Likewise, Reisch and Thøgersen (2015, p. 14) stress that stronger research on sustainable consumption is required "[t]o advise them [policymakers, KJ] in 'doing their job' as effectively as possible".

Although the research field of sustainable consumption has gained considerable attention over the past decades, consensus on a common definition of the term itself is still lacking (e.g. Jackson, 2007; Mont and Plepys, 2008; Reisch and Thøgersen, 2015). What unites many of the definitional approaches (e.g. Fischer et al., 2012; Geiger et al., 2018) is their reference to the classic notion of sustainable development, i.e. a development "that meets the needs of the present without compromising the ability of future generations to meet their own needs" (World Commission on Environment and Development, 1987). Geiger et al. (2018, p. 20), for example, define sustainable consumption as "individual acts of satisfying needs in different areas of life by acquiring, using and disposing goods and services that do not compromise the ecological and socioeconomic conditions of all people (currently living or in the future) to satisfy their own needs". Sustainable consumption is thus a wide-ranging concept of behaviour that enables a multitude of interpretations. In the scientific debate, two understandings of sustainable consumption are often distinguished (e.g. Belz and

¹ In the following, the term sustainability information refers to any information about the sustainability performance of a company's product or service. A sustainability label is understood as a specific type of certified sustainability information which is usually issued by a company-independent authority on the basis of a standardised test procedure (e.g. Gertz, 2005; Horne, 2009). A sustainability label can be introduced by legislation (Noblet and Teisl, 2015).

Bilharz, 2007; Fuchs and Lorek, 2005). According to Belz and Bilharz (2007), sustainable consumption is regarded either as consumption activities that are inter- and intragenerationally generalisable without jeopardising a sustainable development (narrow understanding), or as such activities that merely reduce the negative socio-ecological impact of consumption compared to the status quo (broad understanding). Advocates of the narrow understanding thus consider the current focus on developing more sustainable consumption options to be insufficient and call for more radical, systemic changes, including the questioning of the current economic growth model (e.g. Fuchs and Lorek, 2005; Seyfang, 2011). While it is recognised that sustainable consumption should ideally be directed towards the absolute goal of sustainable development, this rather abstract perspective seems difficult to operationalise. The more practical notion of sustainable consumption aiming at relative improvements in terms of social and environmental effects is therefore used as a basis for this doctoral thesis. Similarly, much of the pertinent literature is explicitly or implicitly grounded on this broad understanding (e.g. Balderjahn et al., 2013; McDonald et al., 2009; White et al., 2019).

As reflected by their definition, Geiger et al. (2018) stress the necessity of differentiating between different consumption phases when investigating sustainable consumer behaviour. They, for instance, assign all production-related sustainability effects to the first stage of acquisition (Geiger et al., 2018). Moreover, the characteristics of a chosen product or service can strongly influence the socio-ecological impact caused in the subsequent phases of usage and disposal. Consumers can thus strongly contribute to sustainable development by deciding for the more sustainable consumption option at the point of purchase. The focus of the present work is therefore set on this early stage of the consumption process. Consequently, the overall research goal of this doctoral thesis is to better understand the determinants of sustainable purchase behaviour in order to support practitioners and researchers in strengthening the demand for sustainable products and services. Based on the micro-level, this work focuses on the investigation of consumer-specific factors that may promote or impede individual behaviour. By approaching several context-specific subgoals in a series of four quantitative empirical studies, major research gaps in the field of sustainable consumption are addressed. In the subsequent section, the research questions of each article are derived from these research gaps.

1.2 Research gaps and research questions

Research on the determinants of sustainable consumption in general (e.g. Kilbourne and Beckmann, 1998; White et al., 2019), and of sustainable purchase behaviour in particular (e.g. Balderjahn et al.,

2013; Pepper et al., 2009), has made progress over the past 50 years.² However, social and environmental problems related to unsustainable consumption practices are still growing (Prothero et al., 2011). Scholars have therefore identified topics most in need of additional research within the field of sustainable consumption (e.g. Prothero et al., 2011; Vergragt et al., 2014). One of them includes an explicit call for future studies to cover a wider range of industries (Prothero et al., 2011). A large amount of literature on sustainable consumer behaviour is based on relatively low-involvement products such as food and household products (e.g. Geiger et al., 2018; Liobikienė, et al. 2016; McDonald et al., 2009). Expanding the scope of research is critical in advising businesses and policymakers since consumer behaviour varies strongly across different product and service contexts (e.g. Johnstone and Tan, 2015a, 2015b). In addition, Liobikienė and Bernatoniene (2017) emphasise the importance of product specificity when examining the influencing factors of sustainable purchase behaviour. Prothero et al. (2011) therefore plead for investigating fields of application that are relatively unexplored and have a relatively high social-ecological impact. Likewise, several other researchers have stressed the necessity for changing the focus to high-impact behaviours (e.g. Gatersleben, 2013; Geiger et al., 2018; Steg and Vlek, 2009). The present work addresses this research gap by generating findings for the sectors of banking (article I), clothing (article II) and electrical appliances (article III).

The first article of this doctoral thesis investigates the antecedents of purchase behaviour in the context of social banking. According to the triple bottom line principle (Elkington, 1997), social banking refers to a bank's equal consideration of profit, the environment and people when judging investment and lending opportunities, unlike the traditional focus on profit alone (Benedikter, 2011; Paulet et al., 2015). By investing in social banking products, consumers, therefore, gain a blended value return combining both financial and social returns (Emerson, 2003). Consequently, the financial sector plays a key role in positively contributing to sustainable development (Weber et al., 2014; Wiek and Weber, 2014). As financial intermediaries, social banks are able to channel capital to projects or industries with favourable socio-ecological effects (e.g. Thompson and Cowton, 2004; Weber, 2014a).

The social banking market constitutes a small but rapidly growing submarket of the global banking sector (Weber, 2013). In Germany, social banking has heavily strengthened its position during the last years (Öko-Test, 2010), yet it still is a niche market. The number of German social banking customers amounted to roughly 0.3% of the German adult population in 2011 (Axel Springer and Bauer Media Group, 2011; Handelsblatt, 2010) and 0.5% of the German adult population in 2017

² For reviews and compilations on sustainable consumption see, for instance, Jackson (2006), Kilbourne and Beckmann (1998), Newholm and Shaw (2007), Reisch and Thøgersen (2015) and White et al. (2019).

(Ethische-banken.de, 2017; Statistisches Bundesamt, 2019). An emerging market, such as the German social banking market, usually embraces substantial growth reserves (Becker, 2012). Social banks in Germany would hence benefit particularly from information on the number and reachability of potential social banking customers in order to grow and further promote sustainable consumption in finance. According to Kotler and Keller (2006), the size of the social banking market is defined as the number of potential social banking customers.

However, social banking is considered a relatively new field of scientific research. Due to the paucity of research on social banking customers, major empirical findings regarding the market size and purchase behaviour are still lacking. In fact, no study estimating the size of the social banking market can be found. Moreover, research on sustainable consumer behaviour in the banking sector has, so far, mainly focused on socially responsible investors (SR investors) (e.g. Junkus and Berry, 2010; Lewis, 2001; Nilsson, 2009) and thus failed to incorporate the social banking perspective. Consequently, this article generates the first insights into the German social banking market and addresses the above-mentioned research gaps by tackling the following research questions:

1. *What is the size of the social banking market in Germany?*
2. *What characteristics are suitable to differentiate between social and conventional banking customers in Germany?*

As mentioned above, the attitude-behaviour gap (ABG) has been discussed as one of the main obstacles for companies and policymakers in promoting sustainable consumption. Prothero et al. (2011) therefore first cite the inconsistency between sustainable attitudes and unsustainable behaviours as a key area of future sustainable consumption research. Despite the generally vast research attention behavioural gaps³ have received, many contributions identify a need for further research (e.g. Blok et al., 2015; Moser, 2015). Blok et al. (2015, p. 21) call for a greater understanding of why these gaps exist and of “how to ensure that attitudes, intentions and behaviours are aligned to sustainable outcomes”. Similarly, Moser (2015) encourages further research on the ABG to determine the barriers to sustainable consumption. As a result, the present work picks up on this major opportunity of research.

The second article of the doctoral thesis examines the ABG in sustainable clothing. When investigating the influencing factors on purchase behaviour, a particular focus is thus set on the attitude-behaviour relationship. Sustainable clothing has been defined as clothing that “incorporates one or more aspects of social and environmental sustainability, such as Fair Trade manufacturing or

³ Researchers have named further gaps including the value-action gap and the intention-behaviour gap (e.g. Carrington et al., 2010; Flynn et al., 2009). To account for the entirety of the various gaps, the term ‘behavioural gaps’ is used in the following.

fabric containing organically-grown raw material” (Goworek et al., 2012, p. 938). The ABG is particularly evident in the context of sustainable clothing purchases (e.g. Ha-Brookshire and Norum, 2011; Hassan et al., 2016; Reimers et al., 2016). In Germany, approximately three-quarters of clothing consumers consider product sustainability an important purchase criterion (Splendid Research, 2016). However, the sustainable clothing sector is still a niche segment with a market share of eco-labelled textiles of not more than 3.7% in 2013 (It Fits, 2013). Moreover, clothing demonstrates a high-impact area of sustainable consumption according to Geiger et al. (2018). Sustainability problems in the clothing industry comprise, for instance, poor working conditions of Asian textile workers as well as environmental pollution caused by an excessive utilisation of chemicals in garment manufacturing and the transportation of non-domestically produced textiles (e.g. Chowdhury, 2017; Mair et al., 2016; Van der Velden and Vogtländer, 2017). Consequently, marketers and policymakers would benefit from a better understanding about the size of gap and the enablers of, and barriers to, purchase behaviour in order to develop their strategies aimed at closing the gap in sustainable clothing.

While many authors have already dealt with behavioural gaps in some product categories (e.g. Aschemann-Witzel and Niebuhr Aagaard, 2014; Johnstone and Tan, 2015a), a relatively limited amount of attention has been paid to sustainable clothing (e.g. Ha-Brookshire and Norum, 2011; Reimers et al., 2016). This is surprising given the huge issues of unsustainability inherent in this industry (e.g. Chowdhury, 2017; Mair et al., 2016). In the specific context of behavioural gaps in sustainable clothing, Hassan et al. (2016) argue that factors influencing the gap’s magnitude have not been systematically examined yet. Drawing on these research needs, this article investigates the following research questions:

- 1. How large is the possible gap between a positive attitude towards sustainable clothing and sustainable clothing purchase behaviour?*
- 2. Which factors enhance (enablers) or hinder (barriers) sustainable clothing purchase behaviour?*

The previous debate on sustainable consumption has focused on substituting conventional products and services with more sustainable ones, rather than on reducing consumption as such (Prothero et al., 2011). Scientists increasingly demand a shift in focus from ‘consuming differently’ to ‘consuming less’ in order to reach true progress towards limiting the negative socio-ecological effects of consumption (e.g. Lorek and Fuchs, 2013; Prothero et al., 2011; Seyfang, 2011). However, strategies concerning the latter such as the extension of product lifetimes have received relatively little attention in research and practice so far (e.g. Bakker et al., 2014; Van Nes and Cramer, 2005). Product lifetime refers to the period from acquisition to disposal of a product, and is determined

both by the consumer's willingness to keep the product in use and by the product's functional durability (Cox et al., 2013). Looking at the electrical appliance sector in Europe, there is empirical evidence that the lifetime of appliances has decreased over time (Prakash et al., 2016). Consequently, improving the lifetime and, in particular, the durability of electrical appliances has recently become a political objective of the European Union (EU). One of the most discussed measures in this respect is the introduction of a product lifetime label (e.g. European Economic and Social Committee, 2013; Montalvo et al., 2016; Sircome et al., 2016).

In contrast to all other articles of this doctoral thesis, the third article focuses on the aspect of purchasing fewer products and thus comes closest to a narrow understanding of sustainable consumption (see section 1.1). The study analyses the effects of product lifetime labelling on purchase behaviour in the context of electrical appliances as well as the psychographic determinants of purchasing long-lasting appliances. The tested product lifetime label is defined as a mandatory label which indicates the expected number of years an appliance will function without restriction and which is issued by a manufacturer-independent testing institute. Research has repeatedly shown that consumers have an unmet need for better information on the lifetime of products (e.g. Cooper, 2004; Cooper and Christer, 2010; Cox et al., 2013). This need arises because durability is a so-called experience attribute that can only be evaluated after purchase (Darby and Karni, 1973; Nelson, 1970). Sustainability-related characteristics of products and services usually reflect experience or credence attributes, i.e. they cannot be assessed by consumers at the point of purchase (e.g. Darby and Karni, 1973; Sammer and Wüstenhagen, 2006). The resulting information asymmetries between consumers and suppliers can lead to an adverse selection mechanism so that high-quality consumption options may be pushed out of the market (Akerlof, 1970). Such asymmetries can be resolved by providing consumers with better information, for instance by means of labelling (e.g. Larson, 2003; Sammer and Wüstenhagen, 2006). Consequently, a label indicating the expected lifetime of a product could reduce information asymmetries in terms durability and thus stimulate the supply of, and demand for, long-lasting products (e.g. Montalvo et al., 2016; Sircome et al., 2016). While the study would inform policymakers about the effectiveness of product lifetime labelling, marketers of long-lasting products would benefit in particular from insights into the underlying motivations of consumer preferences for product longevity.

In general, sustainable consumption of electrical appliances constitutes an underdeveloped field of research that has concentrated on aspects of disposal and energy consumption (McDonald et al., 2009; Prothero et al. 2011). Prothero et al. (2011) explicitly call for more research on this product category due to its high sustainability impact. While much consumer research has already dealt with sustainability labels such as energy labels (e.g. Grankvist et al., 2004; Heinzle and Wüstenhagen, 2012; Sammer and Wüstenhagen, 2006), empirical findings about the influence of product lifetime

labelling on purchase behaviour are rare (e.g. Artinger et al., 2018; Wilhelm, 2012). To the author's best knowledge, Wilhelm's (2012) study is the only academic study in this respect. In addition, current studies commissioned by political institutions in the EU have begun to analyse product lifetime labelling and present partly contradictory results (e.g. Prakash et al., 2018; Sircome et al., 2016). Consequently, it remains largely unclear how consumers would react to the introduction of a product lifetime label. Likewise, previous studies call for future research on how product lifetime labelling affects purchase behaviour (e.g. Cox et al., 2013; Wilhelm, 2012). Furthermore, apart from the secondary results of some studies (Sircome et al., 2016; Wilhelm, 2012), there is a lack of in-depth knowledge about the psychographic antecedents of purchasing long-lasting products. In order to address these research gaps, the research questions are formulated as follows:

- 1. What influence does a product lifetime label exert on purchase decisions?*
- 2. What motivational drivers precede consumer preferences for product longevity?*

Due to the aforementioned prevalence of information asymmetries in markets for sustainable products and services, much research has already been done on the impact of sustainability information on purchase behaviour (e.g. Larson, 2003; Sammer and Wüstenhagen, 2006; Thøgersen et al., 2010). While most of the sustainability labels in practice such as the EU Organic Label or the International Fairtrade Certification Mark solely label a product's positive, i.e. favourable, sustainability performance, there is indication that combined positive and negative labelling may be more effective in terms of fostering sustainable consumption (e.g. Grankvist et al., 2004; Heinzle and Wüstenhagen, 2012; Van Dam and De Jonge, 2015). The EU's mandatory energy labelling scheme is one of the few practical examples that also marks a product's negative environmental performance and has thus triggered innovations towards energy efficiency over time (e.g. Heinzle and Wüstenhagen, 2012; Ölander and Thøgersen, 2014).⁴ However, the translation of consumer information on the environmental performance of products into actual pro-environmental purchase behaviour is anything but straightforward (e.g. Noblet and Teisl, 2015; O'Rourke and Ringer, 2016). Many studies implicitly assume a linear relationship between such information and purchase behaviour (e.g. Ha-Brookshire and Norum, 2011; Loureiro and Lotade, 2005; Zander and Hamm, 2010). Empirical findings from experimental research, in contrast, give reason to expect nonlinear consumer reactions to environmental product information (e.g. Moosmayer, 2012; Van Dam and De Jonge, 2015). Consequently, further research on nonlinearities concerning the impact of

⁴ It is generally argued that mandatory sustainability labels are more effective than voluntary ones as the former mark the full range of a product's sustainability performance, including unfavourable levels of performance (e.g. Maitre-Ekern and Dalhammer, 2016; Wiel and McMahon, 2005). The product lifetime label tested in the third article (see chapter 4) was therefore designed as a mandatory label.

environmental product information is needed which would primarily serve policymakers in the field of sustainability labelling.

The fourth article of the doctoral thesis investigates the effects of positive and negative environmental product information on purchase behaviour, specifically on consumers' willingness to pay. Based on previous literature (e.g. Hartikainen et al., 2014; O'Rourke und Ringer, 2016), a product's carbon footprint is chosen as the information to be tested. Product carbon footprint (PCF) is a quantitative tool from the field of industrial ecology which provides consumers with practical guidance for judging climate change-related impacts of products (e.g. Lehmann et al., 2017; Lenzen, 2014). Drawing on Alvarez et al. (2018), PCF can be defined as an indicator measuring the direct and indirect greenhouse gas emissions caused by a specific product during its entire life cycle. O'Rourke and Ringer (2016) identify a need for further research on how the quantitative information provided by industrial ecology research influences consumer decisions. Similarly, Hartikainen et al. (2014) call for studies measuring the impact of PCF information on consumer behaviour.

However, little attention has yet been paid to the explanation of nonlinear effects of environmental product information on consumer behaviour. Moreover, except for O'Rourke and Ringer (2016), all of the few pertinent studies have tested the influence of information which, unlike PCF information, is qualitative by nature and does not stem from the industrial ecology discourse (e.g. Mohr and Webb, 2005; Van Dam and De Jonge, 2015). In addition, apart from Moosmayer (2012), previous studies have examined dependent variables other than WTP, such as attitudes and purchase intentions (e.g. O'Rourke and Ringer, 2016; Van Dam and De Jonge, 2015). However, investigating WTP appears more meaningful, since this measure accounts for a consumer's price consciousness which is of great importance given the fact that environmentally friendly products are usually more expensive than their environmentally harmful equivalents (e.g. Brécard et al., 2009; Vanclay et al., 2011). Focusing on WTP also provides insights into the extent to which companies would be rewarded in monetary terms for labelling increases in the environmental performance of their products. As a consequence, the present study addresses various research gaps by examining nonlinear effects in consumers' WTP reaction functions with respect to a product's quantitative environmental performance information derived from industrial ecology, namely PCF information. The following research question is investigated:

How does the effect of positive and negative environmental information increase or decrease with progressively higher (or lower) levels of a product's environmental performance?

Based on the presented research questions, each article is briefly described in the next section. In particular, the theoretical-conceptual approaches, the methodological approaches as well as the key findings are pointed out.

1.3 Description of articles

For each article, hypotheses regarding the determinants of sustainable purchase behaviour as well as their relationships with each other are derived from theoretical considerations and summarised in conceptual models. Theories from the areas of marketing, economics, social psychology and behavioural economics are applied, extended and combined. This multi-perspective approach enriches the classical economic principle of rational choice and utility maximisation by integrating various psychological factors such as individual attitudes and values (Jackson, 2006; Nocella et al., 2012). In a comprehensive theoretical overview, Jackson (2006) stresses the need for further interdisciplinary approaches of this kind in order to increase the explanatory power of sustainable consumption research.

All conceptual models developed in this doctoral thesis are tested by means of quantitative empirical methods. This methodological approach is chosen for the following reasons. First, numerous articles in the research field of sustainable consumption are based on conceptual approaches (e.g. Fuchs and Lorek, 2005; Jackson, 2006) or qualitative empirical approaches (e.g. Henninger et al., 2016; Longo et al., 2017; Shaw et al., 2016). Findings from conceptual and qualitative work on the factors influencing sustainable consumption should, therefore, be validated. Likewise, Hassan et al. (2016) call for more quantitative empirical studies assessing the abounding qualitative findings from previous sustainable consumption research. Second, quantitative empirical methods are ideally suited not only to identify factors of sustainable purchase behaviour but also to explain their respective influential power as well as their causal relationships among each other (Hair Jr. et al., 2013). In addition, certain analytical techniques, including conjoint analysis, adequately map complex decision-making processes such as purchase decisions, which are usually characterised by trade-offs between competing alternatives and their characteristics (Rao, 2014). Third, the generation of large, population-representative samples allows generalised conclusions to be drawn about the influence of certain behavioural antecedents. Fourth, the use of experimental research designs enables the investigation of consumer responses to hypothetical measures such as not yet existing sustainability information. Consequently, insights based on quantitative empirical research are very useful in supporting decision makers from industry and politics in developing their sustainability strategies. In addition to the overall research goal (see section 1.1), the methodological subgoal of this doctoral thesis is, therefore, to deliver more quantitative empirical evidence in the field of sustainable purchase behaviour.

The first article on social banking develops a conceptual model for differentiating social from conventional banking customers, based on which the market size is estimated. The model explains the purchase of social banking products as compared to the exclusive purchase of conventional

banking products. Consumer characteristics are chosen as determinants in a way to not only represent potential differentiators between social and conventional banking customers but to be of practical relevance for marketers. With reference to market segmentation theory (e.g. Kotler and Keller, 2006; Wedel and Kamakura, 2000), it appears highly effective to address customers based on a mixture of socio-demographic, behavioural and psychographic characteristics. Socio-demographic criteria are helpful for identifying and addressing customers, e.g. by marketing communication, whereas the other two types of criteria show a higher relevance for purchase behaviour. Likewise, previous research on profiling sustainable consumers has increasingly highlighted the importance of examining not only socio-demographic but also behavioural and psychographic aspects (e.g. Diamantopoulos et al., 2003; Nilsson, 2009). A special focus is set on preferences for product attributes since they provide a fundamental basis for explaining consumer choices regarding multi-attributed alternatives such as financial products (Rao, 2014). In addition, ratings of perceived importance for bank-specific features are also modelled as influencing factors.

For the purpose of data collection, a sample of 2896 German social banking customers and a population-representative sample of 641 German conventional banking customers were compiled. Based on that, an experimental online survey was conducted using adaptive conjoint analysis (ACA). Conjoint analysis represents a bundle of multivariate methods well suited to estimate the structure of an individual's preferences for various levels of attributes of choice alternatives (Rao, 2014). The consumer theory of Lancaster (1966), a well-established economic theory, provides the theoretical framework of conjoint analysis by postulating that consumer preferences are not directed to a product or service as such, but to its characteristics. The basic idea behind traditional conjoint analysis is to decompose a consumer's overall preference judgments for multi-attributed product profiles into separate attribute-specific utility values or rather part-worth functions (Green and Rao, 1971). ACA expands the traditional decompositional approach by a preceding compositional task within the questionnaire to estimate part-worth functions more accurately in terms of each respondent's true underlying preferences (Johnson, 1987; Rao, 2014). Conjoint analysis has already been used in the conventional banking context (e.g. Oppewal and Vriens, 2000; Laukkanen, 2007), but not yet in the context of social banking. Finally, for testing the conceptual model, binary logistic regression was applied due to its strong ability to analyse group differences and predict group affiliation based on multiple variables from various scale levels (Sreejesh et al., 2014).

The study provides an empirical indication that social banking customers differ significantly from their conventional counterparts regarding several socio-demographic, behavioural and psychographic factors. In comparison with conventional banking customers, social banking customers tend to be younger, higher educated and located in larger places of residence. Contrary to existing research on SR investors, they are male to a higher proportion than female. Moreover, social banking

customers demonstrate stronger sustainable buying patterns and weaker preferences for financial, but stronger preferences for social return than conventional banking customers. The results further indicate a considerable untapped growth potential for social banks by uncovering a market size ranging between 10 and 26% of the German adult population in 2011.

The second article on sustainable clothing develops a conceptual model for assessing the magnitude of the ABG and the impact of possible enablers of, and barriers to, sustainable clothing purchase behaviour. Homer and Kahle's (1988) value-attitude-behaviour hierarchy (VABH) is chosen as the theoretical framework for this study. This social-psychological theory assumes an indirect effect of values on behaviour through attitudes, i.e. rather abstract values influence more specific attitudes which, in turn, influence particular behaviour patterns (Homer and Kahle, 1988). Attitudes can be regarded as key antecedents of behaviour and are therefore an integral component of other behavioural models, such as the theory of reasoned action (TRA) (Ajzen and Fishbein, 1980; Fishbein and Ajzen, 1975). In research on pro-environmental and prosocial behaviour, values have also been frequently cited as key determinants of behaviour (e.g. Lönnqvist et al., 2013; Schwartz, 2010; Urien and Kilbourne, 2011). Although value-attitude-behaviour models have some explanatory power, they seem unable to explain behaviour comprehensively (e.g. Homer and Kahle, 1988; McCarty and Shrum, 1994). Research has therefore emphasised the need for extending the VABH (e.g. Do Paço et al., 2013; Milfont et al., 2010). In line with this, a common approach in narrowing behavioural gaps in research has been the identification of further variables improving the translation of, for instance, attitudes into behaviour (e.g. Chatzidakis et al., 2016; Vermeir and Verbeke, 2006). Consequently, further potential psychographic enablers of, and barriers to, sustainable clothing purchases are integrated into the conceptual model to better explain behaviour and to strengthen the attitude-behaviour linkage.

Based on online survey data of 1085 female German consumers, a structural equation model (SEM) was estimated to test the conceptual model. Structural equation modelling enables the assessment of causal relationships between so-called latent variables, i.e. variables which cannot be directly observed such as attitudes and values (Hair Jr. et al., 2013). The effect of sociodemographic covariates on the various constructs measured in the SEM was also assessed.

Apart from a considerable ABG, the study indicates that a positive attitude towards social-ecological clothing standards, biospheric and altruistic values, as well as an affinity to online and catalogue shopping, enhance sustainable clothing purchases. Egoistic and hedonic values and, remarkably, a preference for durable clothing hinder sustainable clothing purchase behaviour. No significant effects of the suspected barriers – fashion consciousness and price sensitivity – have been identified.

The third article on product lifetime labelling of electrical appliances develops a conceptual model for explaining the preference for a long lifetime of electrical home appliances, in addition to further hypotheses on the purchase influence of the product lifetime label. This study follows an interdisciplinary theoretical approach (see Nocella et al., 2012, for a similar approach). By combining the consumer theory of Lancaster (1966) with the TRA (Ajzen and Fishbein, 1980; Fishbein and Ajzen, 1975), two complementary frameworks from economics and social psychology are merged. Lancaster's consumer theory is well suited to examining decision-making processes in multi-attribute choice contexts (Nocella et al., 2012) and thus provides a sound basis for measuring consumer preferences for certain product attributes such as product lifetime. The theory is, however, less useful in explaining potential heterogeneity in preferences (Nocella et al., 2012). For this reason, the TRA is consulted which belongs to the most prominent social-psychological theories in research on sustainable consumption (see, e.g., Joshi and Rahman, 2015; Liobikienė et al., 2016; Vermeir and Verbeke, 2008). According to the TRA, intention for a specific behaviour is determined by the attitude towards the behaviour and the corresponding subjective norm (Ajzen and Fishbein, 1980; Fishbein and Ajzen, 1975). Subjective norm refers to the perceived social pressure to perform or not to perform a behaviour (Ajzen, 2019). More research is often called for on the influence of social pressure on the purchase of sustainable products or services (e.g. Demarque et al., 2015; Phipps et al., 2013; Vermeir and Verbeke, 2008). Due to the TRA's lower predictive power in choice contexts (Sheppard et al., 1988), Lancaster's consumer theory is chosen as the main theoretical framework and enriched with elements of the TRA. Consequently, attitude and subjective norm are defined as direct psychographic antecedents of consumers' preference for a long lifetime of electrical home appliances. To gain deeper insights into the underlying motivational structure, consumers' values are also integrated as determinants into the conceptual model. Consequently, while the first two studies of the doctoral thesis are based on one theory each, the third article combines an economic with a socio-psychological theory in one framework. The article thus contributes to the scarce occurrence of interdisciplinary approaches in sustainable consumption research (Nocella et al., 2012).

Using choice-based conjoint (CBC) analysis, experimental online survey data was collected from a population-representative sample of 499 German consumers. Instead of analysing preferences expressed by rating product or service profiles, the more recent CBC analysis examines stated choice data collected under hypothetical purchase decision scenarios. CBC analysis is thus considered more realistic than rating-based techniques. The process of making trade-offs among competing attribute level combinations and of choosing the most preferred alternative is closer to actual market activity (Rao, 2014). CBC analysis is currently considered the most widely used type of conjoint analysis (Sawtooth Software, 2017). Many CBC studies have already been conducted in the context of sustainable consumption (e.g. Nocella et al., 2012; Sammer and Wüstenhagen, 2012;

Scherer et al., 2018), but not yet related to product lifetime (Lieder et al., 2018; Wilhelm, 2012). By using CBC analysis, this article differs greatly from the few studies commissioned on product lifetime labelling (e.g. Prakash et al., 2018; Sircome et al., 2016), which are based on less sophisticated research methods. Preference estimation was based on Hierarchical Bayes (HB) utility modelling which is considered the state-of-the-art approach in analysing CBC data since it accounts for heterogeneity in respondents' preferences (e.g. Huber and Train, 2001; Orme and Chrzan, 2017). In general, the approach delivers more accurate utility estimates than traditional aggregation techniques (Orme, 2000). Finally, an SEM was estimated to test the conceptual model. The influence of sociodemographic covariates was also accounted for in the SEM.

HB utility modelling suggests a decreasing positive effect of the product lifetime label on purchase decisions and a deterioration of the purchase influence of existing brands compared to new brands. Structural equation modelling indicates that the preference for a long product lifetime is fostered by the positive attitude and the subjective norm towards purchasing long-lasting electrical home appliances. However, the attitude only exerts a significant influence if it is driven by personal rather than environmental gains. It is further documented that biospheric values enhance, while stimulation values inhibit, both attitude types. Hedonic values only enhance the attitude based on personal gains.

The fourth article develops a conceptual model mapping the effects of favourable and unfavourable environmental product information on consumers' WTP. More precisely, alternative hypotheses derived from two behavioural economic theories are tested. Similar to the third study of the doctoral thesis, this study thus combines economic and psychological considerations. Prospect theory (Kahneman et al., 1991; Kahneman and Tversky, 1979; Tversky and Kahneman, 1991) and disappointment theory (Loomes and Sugden, 1986) are chosen as they offer competing explanations and predictions of how consumers react to positive and negative information on a product's environmental performance. Based on prospect theory, it is expected that negative deviations of a product's environmental performance from a given reference point have a stronger effect on WTP than quantitatively corresponding positive deviations. Moreover, while prospect theory supports the argument that deviations of a product's environmental performance from a given reference point have a continually declining concordant effect on WTP, disappointment theory supports the reasoning that such deviations have a continually increasing concordant effect on WTP.

The analysis draws on data gained from a survey-based online experiment conducted among a population-representative sample of 524 German consumers. The conceptual model was tested by using a two-level, within and between-subjects SEM. The multilevel modelling approach is useful due to the repeated measures design of the experiment (Snijders and Bosker, 2012). Each respondent went through a series of three hypothetical purchase scenarios and reported his/her WTP for a pack

of batteries which only varied in its PCF information. This is why the purchase occasion was integrated as a control variable at the within-subjects level of the SEM. At the between-subjects level, it was also controlled for the influence of concern about climate change, social desirability bias and social demographics. Respondents' attitude towards climate change is included because environmental attitudes are acknowledged to impact purchase decisions (e.g. Brécard et al., 2009; Daziano et al., 2017; Harms and Linton, 2016). To mitigate the potential bias of stated WTP, it was explicitly controlled for the individual social desirability tendency.

Overall, the results document a strong orientation of consumers on given reference points, such as an industry average, and confirm key assertions of prospect theory. The negative effect caused by unfavourable PCF information on consumers' WTP is significantly stronger than the positive effect caused by respective favourable information. Furthermore, consumers tend to not substantially differentiate between different high-range degrees of positive or negative environmental product information; they rather generally reward or punish deviations from an industry average instead of consistently accounting for the size of these deviations. From a sustainable development perspective, the observed patterns thus highlight a problematic contrast between the need for substantial improvements in products' environmental performance and current market incentives for companies.

All in all, section 1.2 and 1.3 are summarised in table 1.1. Table 1.1 provides an overview of all articles presented in this work by showing the research questions, thematic foci, theoretical bases, determinants of purchase behaviour, main research methods, and the key findings.

This doctoral thesis is organised into six chapters. The first chapter has introduced the research goal, the research gaps and research questions as well as a description of the articles. Chapters 2, 3, 4 and 5 present the four different quantitative empirical studies in the order shown in table 1.1. Each article is preceded by a paragraph allowing for a contextual transition. The concluding chapter summarises the results of the doctoral thesis, presents the contribution to literature, provides practical implications and shows the limitations of the present work as well as ways for future research.

Table 1.1 Overview of the quantitative empirical studies on sustainable consumption

Article I	
<p>Research questions:</p> <ol style="list-style-type: none"> 1. <i>What is the size of the social banking market in Germany?</i> 2. <i>What characteristics are suitable to differentiate between social and conventional banking customers in Germany?</i> <p>Determinants of purchase behaviour:</p> <ul style="list-style-type: none"> • Consumer characteristics <ul style="list-style-type: none"> – Socio-demographic – Behavioural (sustainable buying behaviour) – Psychographic (preferences for social and financial return; perceived importance for bank-specific features) <p>(explanation of the purchase of social banking products versus the exclusive purchase of conventional banking products)</p> <p>Key findings:</p> <ol style="list-style-type: none"> 1. Social banking customers tend to be younger, higher educated and located in larger places of residence than conventional banking customers. 2. Contrary to existing research on socially responsible investors, social banking customers are male to a higher proportion than female. 3. Social banking customers demonstrate stronger sustainable buying patterns and weaker preferences for financial, but stronger preferences for social return than conventional banking customers. 4. The market size ranges between 10 and 26% of the German adult population which indicates a considerable untapped growth potential for social banks. 	<p>Thematic foci:</p> <ul style="list-style-type: none"> • Consumer characteristics and market size • Context: Social banking <p>Theoretical base:</p> <ul style="list-style-type: none"> • Market segmentation theory (e.g. Kotler and Keller, 2006; Wedel and Kamakura, 2000) <p>Main research methods:</p> <p><i>Data collection</i></p> <ul style="list-style-type: none"> • Experimental online survey using adaptive conjoint analysis • Sample 1: German social banking customers (n = 2896); sample 2: German conventional banking customers, population-representative (n = 641) <p><i>Data analysis</i></p> <ul style="list-style-type: none"> • Adaptive conjoint analysis • Binary logistic regression modelling
Article II	
<p>Research questions:</p> <ol style="list-style-type: none"> 1. <i>How large is the possible gap between a positive attitude towards sustainable clothing and sustainable clothing purchase behaviour?</i> 2. <i>Which factors enhance (enablers) or hinder (barriers) sustainable clothing purchase behaviour?</i> <p>Determinants of purchase behaviour:</p> <ul style="list-style-type: none"> • Attitude • Self-transcendence and self-enhancement values • Further psychographic enablers and barriers <p>(explanation of sustainable clothing purchase behaviour)</p> <p>Key findings:</p> <ol style="list-style-type: none"> 1. There is a considerable attitude-behaviour gap in sustainable clothing. 2. A positive attitude towards social-ecological clothing standards, biospheric and altruistic values, as well as an affinity to online and catalogue shopping, enhance sustainable clothing purchases. 3. Egoistic and hedonic values and, remarkably, a preference for durable clothing hinder sustainable clothing purchase behaviour. 4. No significant effects of the suspected barriers – fashion consciousness and price sensitivity – have been identified. 	<p>Thematic foci:</p> <ul style="list-style-type: none"> • Attitude-behaviour gap • Context: Sustainable clothing <p>Theoretical base:</p> <ul style="list-style-type: none"> • Value-attitude-behaviour hierarchy (Homer and Kahle, 1988) <p>Main research methods:</p> <p><i>Data collection</i></p> <ul style="list-style-type: none"> • Online survey • Sample: Female German consumers (n = 1085) <p><i>Data analysis</i></p> <ul style="list-style-type: none"> • Structural equation modelling (incl. socio-demographic covariates)

Article III

Research questions:

1. *What influence does a product lifetime label exert on purchase decisions?*
2. *What motivational drivers precede consumer preferences for product longevity?*

Determinants of purchase behaviour:

(apart from the product lifetime label itself)

- Attitudes (based on personal and environmental gains)
- Subjective norm
- Self-enhancement, self-transcendence and openness-to-change values

(explanation of the purchase preference for a long product lifetime of electrical home appliances)

Key findings:

1. The product lifetime label exerts a decreasing positive effect on purchase decisions and deteriorates the purchase influence of existing brands compared to new brands.
2. The preference for a long product lifetime is fostered by the positive attitude and the subjective norm towards purchasing long-lasting electrical home appliances.
3. However, the attitude only exerts a substantial influence if it is driven by personal rather than environmental gains.
4. Biospheric values enhance, while stimulation values inhibit, both attitude types.
5. Hedonic values only enhance the attitude based on personal gains.

Article IV

Research question:

How does the effect of positive and negative environmental information increase or decrease with progressively higher (or lower) levels of a product's environmental performance?

Determinants of purchase behaviour:

- Positive and negative product carbon footprint information

(explanation of willingness to pay for a pack of batteries)

Thematic foci:

- Product lifetime labelling and consumer preferences for product longevity
- Context: Electrical appliances

Theoretical bases:

- Consumer theory of Lancaster (1966)
- Theory of reasoned action (Ajzen and Fishbein, 1980; Fishbein and Ajzen, 1975)

Main research methods:*Data collection*

- Experimental online survey using choice-based conjoint analysis
- Sample: German consumers, population-representative (n = 499)

Data analysis

- Choice-based conjoint analysis (Hierarchical Bayes utility modelling)
- Structural equation modelling (incl. socio-demographic covariates)

Thematic foci:

- Favourable and unfavourable environmental product information
- Context: Low-involvement, utilitarian product category (batteries)

Theoretical bases:

- Prospect theory (Kahneman et al., 1991; Kahneman and Tversky, 1979; Tversky and Kahneman, 1991)
- Disappointment theory (Loomes and Sugden, 1986)

Main research methods:*Data collection*

- Survey-based online experiment
- Sample: German consumers, population-representative (n = 524)

Data analysis

- Multilevel structural equation modelling (controlling for purchase occasion, concern about climate change, social desirability bias and social demographics)

Article IV

Key findings:

1. The key assertions of prospect theory are confirmed.
2. The negative effect caused by unfavourable product carbon footprint information on consumers' willingness to pay is stronger than the positive effect caused by respective favourable information.
3. Consumers tend to not substantially differentiate between different high-range degrees of positive or negative environmental information; they rather generally reward or punish deviations from an industry average instead of consistently accounting for the size of these deviations.
4. From a sustainable development perspective, the observed patterns thus highlight a problematic contrast between the need for substantial improvements in products' environmental performance and current market incentives for companies.

Chapter 2

Article I – Social banking in Germany: An empirical analysis of consumer characteristics and market size¹

¹ This chapter is based on Krause and Battenfeld (2019). It is reprinted by permission from Springer Nature Customer Service Centre GmbH: Springer Nature, Journal of Business Ethics (Coming out of the niche? Social banking in Germany: An empirical analysis of consumer characteristics and market size, Kathleen Jacobs and Dirk Battenfeld), © Springer Science+Business Media Dordrecht 2017, (2017).

Contextual transition

The following chapter presents the first article on the determinants of sustainable purchase behaviour in the context of social banking. The article examines distinguishing characteristics between social and conventional banking customers as well as the size of the social banking market in Germany. A conceptual model for differentiating social from conventional banking customers is developed, based on which the market size is estimated. The model explains the purchase of social banking products as compared to the exclusive purchase of conventional banking products. Consumer characteristics are chosen as determinants in a way to not only represent potential differentiators between social and conventional banking customers but to be of practical relevance for marketers. With reference to market segmentation theory (e.g. Kotler and Keller, 2006; Wedel and Kamakura, 2000), it appears highly effective to address customers based on a mixture of socio-demographic, behavioural and psychographic characteristics. Socio-demographic criteria are helpful for identifying and addressing customers, e.g. by marketing communication, whereas the other two types of criteria show a higher relevance for purchase behaviour. A consumer's sustainable buying behaviour is chosen as the behavioural characteristic. With regard to the psychographic dimension, a special focus is set on preferences for product attributes since they provide a fundamental basis for explaining consumer choices regarding multi-attributed alternatives such as financial products (Rao, 2014). More precisely, preferences for social and financial return are included in the model. In addition, ratings of perceived importance for bank-specific features are also modelled as influencing factors. For the purpose of data collection, a sample of 2896 German social banking customers and a population-representative sample of 641 German conventional banking customers were compiled. Based on that, an experimental online survey was conducted using adaptive conjoint analysis. Conjoint analysis represents a bundle of multivariate methods well suited to estimate the structure of an individual's preferences for various levels of attributes of choice alternatives (Rao, 2014). The basic idea behind traditional conjoint analysis is to decompose a consumer's overall preference judgments for multi-attributed product profiles into separate attribute-specific utility values or rather part-worth functions (Green and Rao, 1971). Adaptive conjoint analysis expands the traditional decompositional approach by a preceding compositional task within the questionnaire to estimate part-worth functions more accurately in terms of each respondent's true underlying preferences (Johnson, 1987; Rao, 2014). Finally, for testing the conceptual model, binary logistic regression was applied due to its strong ability to analyse group differences and predict group affiliation based on multiple variables from various scale levels (Sreejesh et al., 2014).

Abstract

The social banking market constitutes a small but rapidly growing submarket of the global banking sector. Due to an explicit commitment to sustainability, social banking is a segment of banking services which is not exclusively focused on economic performance criteria but pursues ecological and social goal dimensions on an equal footing. Information on the number and reachability of potential social banking customers is essential for social banks to further promote sustainable consumption in finance. In scientific research, social banking is considered a relatively new field, still lacking empirical analyses regarding the market size and specific consumer behaviour. This study addresses the research gap by generating the first insights into the German social banking market. Based on an online survey using an adaptive conjoint analysis, a large data set covering 3537 respondents was compiled. Sample 1 comprises 2896 respondents who are customers of three major social banks in Germany. Sample 2 covers the remaining 641 respondents who represent the German adult population and exclusively buy from conventional banks. Logistic regression modelling reveals that social banking customers differ significantly from their conventional counterparts regarding several socio-demographic, behavioural and psychographic factors. In comparison with conventional banking customers, social banking customers tend to be younger, higher educated and located in larger places of residence. Contrary to existing research on socially responsible investors, they are male to a higher proportion than female. Moreover, social banking customers demonstrate stronger sustainable buying patterns and weaker preferences for financial, but stronger preferences for social return than conventional banking customers. The results further indicate a considerable untapped growth potential for social banks by uncovering a market size ranging between 10% and 26% of the German adult population. Finally, suggestions for marketing strategies and future research are given.

Keywords

Adaptive conjoint analysis, Consumer characteristics, Ethical banking, Market size, Social banking, Socially responsible investors, Sustainable consumer behaviour, Sustainable consumption

2.1 Introduction

As intermediaries, financial institutions are able to channel capital to different projects or industries and, therefore, to influence the sustainability impacts of their clients (e.g. Thompson and Cowton, 2004; Weber, 2014a). The financial sector thus plays a key role in positively contributing to the sustainable development of society (Weber et al., 2014; Wiek and Weber, 2014). However, corresponding business models such as social banking are only weakly pronounced (Weber et al., 2014). According to the triple bottom line principle, social banking refers to a bank's equal consideration of profit, the environment and people when judging investment and lending opportunities, unlike the traditional focus on profit alone (Benedikter, 2011; Paulet et al., 2015). By investing in social banking products, consumers, therefore, gain a blended value return combining both financial and social returns (Emerson, 2003). With a substantially different business model, social banking goes beyond the logic of corporate social responsibility, which is often used as a mere window-dressing device based on the striving for profits (Weber, 2014a; Wu and Shen, 2013). Instead of speculating on financial markets, social banks primarily invest in the real economy by concentrating on the core business of banks: savings collection and credit distribution (Cornée et al., 2016; Paulet et al., 2015). Social banking, also often referred to as ethical banking, is still a relatively recent phenomenon. In Europe, for example, it has been present for no more than about 40 years (Benedikter, 2011; Weber, 2013). Since the outbreak of the latest financial crisis in 2007, public interest in social banking has been rapidly increasing due to a growing need for ethics in finance (Benedikter, 2011; Boatright, 2014; Weber and Remer, 2011).

The social banking market constitutes a small but rapidly growing submarket of the global banking sector. The average total assets of social banks worldwide amounted to merely 0.2% of the average total assets of conventional financial institutions in 2012. However, social banks were growing more strongly than conventional banks with an average annual growth rate in net income of around 16% between 2007 and 2012 (Weber, 2013). In Germany, social banking has also heavily strengthened its position during the last years (Öko-Test, 2010), yet it still is a niche market. The number of German social banking customers amounted to roughly 0.3% of the German adult population in 2011.²

Principally, knowledge about the market size, defined as the number of potential buyers of certain products, provides a crucial basis for any manager's strategic planning and decision-making

² The number of customers of the three largest social banks in Germany (GLS Bank, UmweltBank and EthikBank) equalled 175,210 at the end of the first half of 2010 (Handelsblatt, 2010). The number of German citizens aged 16 years and above amounted to 69,015 thousand in 2011 (Axel Springer and Bauer Media Group, 2011).

(Kotler and Keller, 2006). An emerging market, such as the German social banking market, usually embraces substantial growth reserves (Becker, 2012). Social banks in Germany would thus benefit particularly from information on the market size. According to Kotler and Keller (2006), potential buyers of social banking products can be roughly described as all those conventional banking customers sharing a particular need for social banking products. Considering the largely conventional banking market, it appears beneficial to examine the characteristic differences between social and conventional banking customers. A resulting social banking customer profile can then be used by marketers to identify potential social banking customers among the conventional customer base. The underlying assumption here is that a person fitting to that profile is regarded as having a particular need for social banking products.

Information on the number and reachability of potential social banking customers is essential for social banks to grow and further promote sustainable consumption in finance. However, social banking is considered a relatively new field of scientific research, still lacking major empirical findings regarding the market size and specific consumer behaviour. In fact, no study estimating the size of the social banking market could be found due to the emergent nature of this trend. Moreover, research on sustainable consumer behaviour in the banking sector has mainly focused on socially responsible investors and, thus, failed to incorporate the social banking perspective so far. This study addresses the research gap by generating the first insights into the German social banking market. Consequently, the research questions are *'What is the size of the social banking market in Germany?'* (1st research question) and *'What characteristics are suitable to differentiate between social and conventional banking customers in Germany?'* (2nd research question).

To address both questions, a large-scale, quantitative study was conducted based on an adaptive conjoint analysis to effectively measure consumer preferences. A special focus was set on preferences since they provide a fundamental basis for explaining consumer choices regarding multi-attributed product alternatives such as financial products (Rao, 2014). For the purpose of data analysis, binary logistic regression was applied due to its strong ability to analyse group differences and predict group affiliation based on multiple variables from various scale levels (Sreejesh et al., 2014). The paper provides an empirical indication that customers of social banks differ significantly from customers of conventional banks regarding 16 out of 19 examined characteristics. Findings on the market size further suggest a considerable untapped growth potential for social banks. In contrast to a 0.3% share of current customers, the market size ranges between 10% and 26% of the German adult population in 2011.

Prompted by the paucity of research on social banking customers, the following section presents an overview of the extant literature on socially responsible investors and sustainable consumers as basis for developing the hypotheses of this paper ('Literature Review and Hypotheses

Development' section). 'Methods' describes the methodology and samples used to address the research questions. The results of the empirical analysis are presented and discussed in 'Results and Discussion'. Finally, 'Conclusions and Implications' draws conclusions as well as implications for sustainability marketing practice and future research based on the findings of this paper.

2.2 Literature review and hypotheses development

2.2.1 Preliminary considerations

Consumer characteristics chosen within this study are intended to not only represent potential differentiators between social and conventional banking customers but also to be of practical relevance for marketers. Referring to standard marketing literature with a special focus on market segmentation (e.g. Kotler and Keller, 2006; Wedel and Kamakura, 2000), it is highly effective to address customers based on a mixture of socio-demographic, behavioural and psychographic characteristics. Socio-demographic criteria are thus helpful for identifying and addressing customers, e.g. by marketing communication, whereas the other two types of criteria show a higher relevance for purchase behaviour. Likewise, previous research on profiling sustainable consumers has increasingly highlighted the importance of examining not only socio-demographic but also behavioural and psychographic aspects (Diamantopoulos et al., 2003; Nilsson, 2009; Straughan and Roberts, 1999). To avoid a prediction of market size based on an oversimplified consumer profile, a mixture of different types of consumer characteristics was therefore appropriate.

In the following sections, the literature on socially responsible investors (SR investors) and sustainable consumers is reviewed as a suitable basis for developing hypotheses. Socially responsible investment or investing (SRI) covers investment decisions which integrate social, environmental or corporate governance criteria into an otherwise financially driven investment process (Sandberg et al., 2009). Obviously, SRI and social banking are linked, since both concepts deal with ethics in finance. In contrast to social banking, the primary aim of SRI is, however, to guarantee attractive financial returns by investing in funds that also consider socially responsible aspects (Weber, 2014a; Weber et al., 2011). Hence, only a few SRI funds meet the holistic ethical needs of social banks (Weber, 2011). SR investors are therefore not necessarily customers of social banks. Nevertheless, research results on SR investors deliver first concrete insights into ethical or sustainable consumer behaviour³ in the banking industry. Even similar to this paper, previous studies on SR investors are

³ In line with a shared understanding in consumer research, the terms 'ethical' and 'sustainable' are used interchangeably throughout this article.

often based on a comparison with conventional investors (e.g. Junkus and Berry, 2010; McLachlan and Gardner, 2004; Rosen et al., 1991).

Additionally, findings from the more general literature stream on sustainable consumption, which refers to consumer behaviour that is motivated by social and/or environmental considerations (Luchs and Mooradian, 2012), were taken into account. For more than 40 years, interdisciplinary research has been conducted to explore the determinants of sustainable consumption (for reviews and compilations, see e.g. Jackson, 2006; Kilbourne and Beckmann, 1998; Newholm and Shaw, 2007; Reisch and Thøgersen, 2015). The research field has become, however, rather fragmented with weak interrelations between the literature references (McDonald et al., 2009). Whereas foodstuffs and household products are subject of the most established research on sustainable consumption (Liobikienė et al., 2016; McDonald et al., 2009), social banking can be seen as one of the many under-researched subareas. As patterns of sustainable consumer behaviour were found to differ across different product sectors (McDonald et al., 2009), research findings need to be transferred cautiously to the social banking context.

2.2.2 Socio-demographic characteristics

Several researchers concluded that the typical SR investor is female (e.g. Junkus and Berry, 2010; Nilsson, 2009; Schueth, 2003), younger and higher educated (e.g. Bauer and Smeets, 2015; Junkus and Berry, 2010; Tippet and Leung, 2001). Only a few deviating research results exist, for instance stating that SR investors are male (Haigh, 2007) or middle-aged (Escrig-Olmedo et al., 2013; Lewis and Mackenzie, 2000). These findings are largely in line with research on sustainable consumer behaviour such that sustainable consumption is predominately exercised by higher-educated women (e.g. Brécard et al., 2009; Diamantopoulos et al., 2003; Koos, 2011). Regarding age, some studies suggest sustainable consumers are being younger (Brécard et al., 2009; Diamantopoulos et al., 2003), whereas other studies highlight an inverted U-shaped age effect, which means that middle-aged people consume more sustainably relative to younger and older consumers (Koos, 2011; Kostakis and Sardanou, 2012; Starr, 2009). The hypotheses regarding gender, age and educational achievement follow the overall picture of previous research.

Hypothesis H1a Social banking customers are female to a higher proportion than male compared to conventional banking customers.

Hypothesis H1b Social banking customers are younger than conventional banking customers.

Hypothesis H1c Social banking customers are higher educated than conventional banking customers.

With regard to income, research results on SRI behaviour are highly ambiguous. Findings range from no influence on SRI behaviour (McLachlan and Gardner, 2004; Nilsson, 2009) to typically lower (Rosen et al., 1991), moderate (Lewis and Mackenzie, 2000) and higher levels of income (Escrig-Olmedo et al., 2013) of SR investors. It is important to note that Rosen et al. (1991) compared SR investors with conventional investors who earned over-average income. As measured by the population, the income level of SR investors was rather equal. Research on sustainable consumers frequently examines income as a potential determinant of sustainable consumption. Several studies indicate a positive relationship between income and sustainable consumption (e.g. Brécard et al., 2009; Koos, 2011; Starr, 2009), whereas there is also evidence for an inverted U-shaped income effect (Torgler and Garcia-Valiñas, 2007). Based on the more comprehensive and consistent research findings on sustainable consumers, a positive influence of income is hypothesised.

Hypothesis H1d Social banking customers earn higher levels of income than conventional banking customers.

In contrast to the above-mentioned determinants, which experienced relatively wide attention in SRI research, the influence of urbanity was hardly investigated. Nilsson (2009) concluded that investors living in urban areas do not invest differently in SRI funds than investors living in rural areas. More general research, however, revealed that sustainable consumers live in urban rather than in rural areas (BBMG, GlobeScan and SustainAbility, 2012; Brécard et al., 2009). Torgler and Garcia-Valiñas (2007) identified an inverted U-shaped effect between size of place of residence and sustainable consumer behaviour. Due to a lack of research on SR investors, the major finding from research on sustainable consumers serves as the basis for the following hypothesis.

Hypothesis H1e Social banking customers live in more urban areas than conventional banking customers.

2.2.3 Behavioural and psychographic characteristics

From a behavioural perspective, SR investors usually choose a more sustainable way of life compared to conventional investors (Lewis, 2001; Lewis and Mackenzie, 2000; Rosen et al., 1991). More general research likewise shows that sustainable consumption can be related to other forms of environmental action (e.g. Black and Cherrier, 2010; Gilg et al., 2005). Several well-established behavioural theories such as Ajzen's (1985) theory of planned behaviour or the value-attitude-behaviour hierarchy of Homer and Kahle (1988) imply that people principally act according to their values, beliefs or attitudes. A sustainable lifestyle, therefore, demonstrates a holistic concept comprising sustainable buying behaviours which can emerge in more than one area of life. It is thus

hypothesised that social banking customers differ from conventional banking customers regarding their general sustainable buying patterns such as grocery shopping of organic or fair trade products.

Hypothesis H2a Social banking customers practice sustainable buying behaviour more strongly than conventional banking customers.

Furthermore, psychographic factors were intensely examined by researchers such as the underlying motives of SR investors (e.g. Beal et al., 2005; Dorfleitner and Utz, 2014; Mackenzie and Lewis, 1999). On the one hand, studies highlight the importance of high financial return for SR investors (e.g. Dorfleitner and Utz, 2014; Koellner et al., 2005; Nilsson, 2009). Lower perceived future returns can thus lead to a decrease in demand for SRI (Nilsson, 2009). On the other hand, researchers figured out that SR investors are also driven by ethical concerns along with the willingness to sacrifice financial for social return (e.g. Hofmann et al., 2008; Lewis and Mackenzie, 2000; Pasewark and Riley, 2010). As the concept of social banking is even more strictly grounded on ethical values than the concept of SRI (Weber, 2011), it can be assumed that this willingness is even stronger among social banking customers. Besides, social return describes the unique selling proposition of social banks as well as their main point of differentiation compared to conventional banks (San-Jose et al., 2011). Likewise, a significant body of knowledge about fundamental psychographic characteristics of sustainable consumers, such as their values (e.g. Steg et al., 2014a; Thøgersen and Ölander, 2002), motivations (e.g. Freestone and McGoldrick, 2008; McEachern and McClean, 2002) and preferences (e.g. Hampl and Loock, 2013; Thompson et al., 2010), has developed. As consumer preferences for product attributes are often found to be particularly purchase relevant (Rao, 2014), they build the core of this examination. Preference studies on sustainable consumption have especially examined the trade-off between a product's price and its sustainability attributes. Overall, findings highlight the willingness of certain consumers to pay a price premium for the more sustainable product alternative (e.g. Hampl and Loock, 2013; Thompson et al., 2010). Preferences for social and financial return are thus hypothesised to be key differentiators between social banking customers and their conventional counterparts.

Hypothesis H2b Social banking customers have stronger preferences for social return than conventional banking customers.

Hypothesis H2c Social banking customers have weaker preferences for financial return than conventional banking customers.

The framework of hypotheses was extended by further variables to explore their influence as distinguishing features. Considering a possible change of bank, nine aspects regarding a consumer's perceived importance for bank-specific features were chosen based on exploratory expert interviews

with representatives of the cooperating social banks. The attributes mainly refer to general differences between social and conventional banks in Germany. For instance, German social banks offer comparatively few products and cashpoints, and rely relatively strongly on online banking services. The underlying assumption is that a conventional banking customer, apart from social and financial return, might cherish specific social banking features or might be willing to sacrifice specific conventional banking features in order to become a customer of a social bank. In summary, ‘comprehensive online and mobile banking services’, ‘competency and fairness in consulting’, ‘social commitment’ and ‘promise of non-gambling’ were chosen as rather social banking-related features. A ‘wide range of products’, ‘consulting also in the evening and on weekends’, ‘easy access to branches’, ‘free access to many cashpoints’ and ‘public image’ were chosen as rather conventional banking-related features. Figure 2.1 depicts the entire conceptual framework for differentiating social from conventional banking customers.

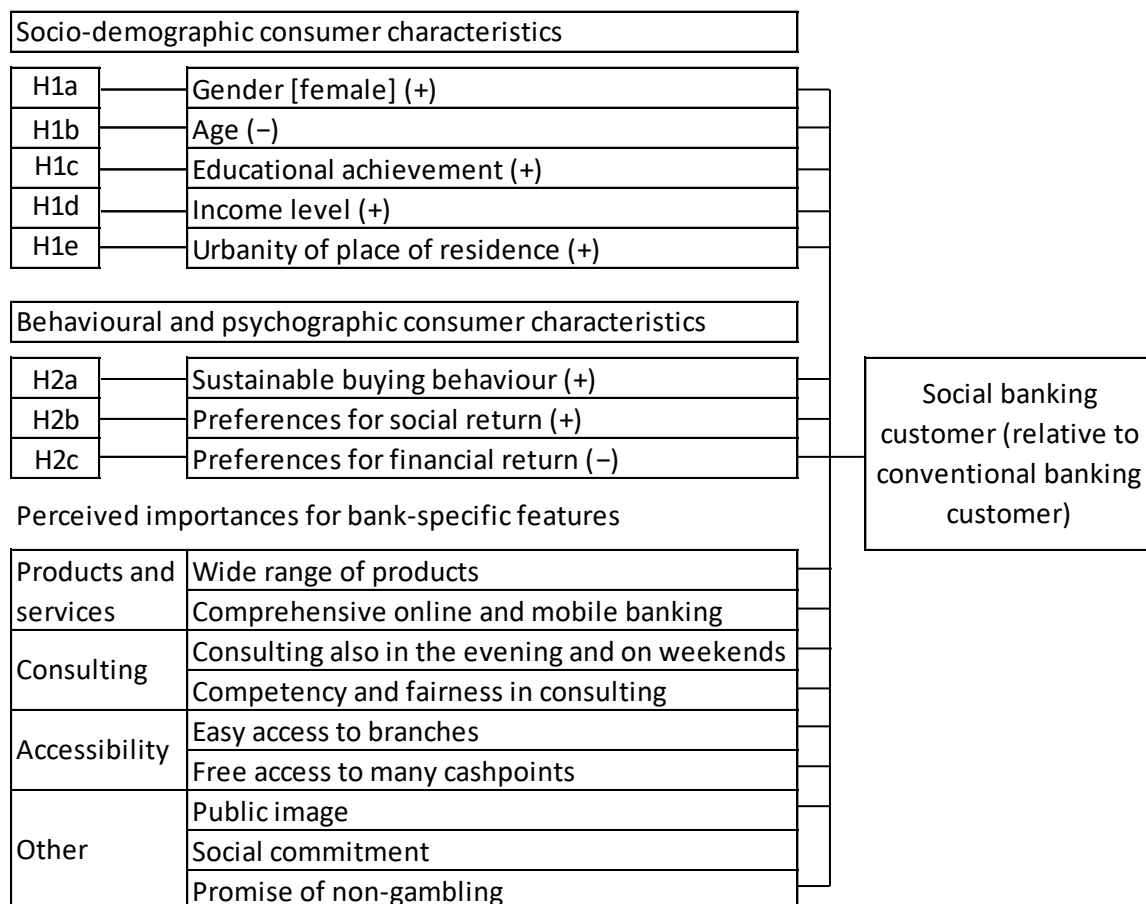


Figure 2.1 Conceptual framework for differentiating social from conventional banking customers

2.3 Methods

2.3.1 Adaptive conjoint analysis

Preliminary considerations

Conjoint analysis represents a bundle of multivariate methods well suited to estimate the structure of an individual's preferences for various levels of attributes of choice alternatives (Rao, 2014). The consumer theory of Lancaster (1966) provides the theoretical framework of conjoint analysis in marketing research by claiming that consumer preferences are not directed to the goods themselves, but to their attributes. The basic idea behind traditional conjoint analysis is to decompose a consumer's overall preference judgments for multi-attributed product profiles into separate attribute-specific utility values or rather part-worth functions (Green and Rao, 1971). Adaptive conjoint analysis (ACA) expands the traditional decompositional approach by a preceding compositional task within the questionnaire to estimate part-worth functions more accurately in terms of each respondent's true underlying preferences (Johnson, 1987; Rao, 2014). Conjoint analysis has already been used in the conventional banking context, e.g. to measure credit card preferences (Kara et al., 1994), service quality preferences (Oppewal and Vriens, 2000) or retail channel preferences (Laukkanen, 2007), but not yet in the context of social banking.

Survey design

A computerised ACA was designed by using the ACA package of Sawtooth Software, a supplier of standard survey software for conjoint analysis. The ACA questionnaire was built upon an instant access savings account, a common financial product of the social and conventional banking market in Germany. With regard to hypotheses H2b and H2c, consumer-relevant attributes needed to reflect a trade-off between social and financial return. They were thus chosen by means of company-specific information from corporate websites such as product portrayals and mission statements, as well as scientific evidence on the differences between social and conventional banks (San-Jose et al., 2011). The interest rate constitutes a critical product feature of an instant access savings account which is directly linked to a consumer's financial return. To account for social return, three more attributes were selected: social-ecological placement of assets, information transparency and participation. Besides a social-ecological placement of assets and information transparency as key distinguishing features (Cornée et al., 2016), social banks also support active participation of stakeholders in decision-making (San-Jose et al., 2011). Preferences for financial return are thus expressed by preferences for the interest rate, and preferences for social return are expressed by preferences for a

social-ecological placement of assets, information transparency and participation. A final constellation of product attributes and attribute levels is displayed in table 2.1.

Table 2.1 Attributes and attribute levels of the adaptive conjoint analysis survey

Attributes	Attribute levels
Interest rate	0.50%
	1.50%
	2.00%
	2.25%
	2.50%
	3.00%
Social-ecological placement of assets	None (conventional)
	Only instant access savings account
	Entire bank
Information transparency	None
	By sector
	Full
Participation	No
	Yes

Care was taken that all attribute levels were feasible from a company's point of view and easy to communicate to the respondents. To avoid distortion of the study results, it was aimed at setting an almost equal number of levels per attribute (Wittink et al., 1982, 1989). Only the interest rate was broken down into a comparatively large number of levels since it was expected that consumer preferences would respond strongly to small changes in interest rate levels. They ranged from 0.5% to 3.0% to amply cover the average interest rates for instant access savings accounts offered by social and conventional banks in Germany during the time of data collection. On average, social banks offered a lower interest rate than conventional banks.⁴ Three major types of a social-ecological placement of assets can be currently observed in the global banking market. Conventional banks primarily invest the money of their customers in conventional projects aiming at profit maximisation, whereas social banks usually place the entire assets according to sustainability criteria (San-Jose et al., 2011). Some conventional banks have, however, recently started to offer social banking products as an add-on to their overall conventional investment policy (Weber, 2014b). With regard to information transparency, consumers usually have either no transparency on the use of

⁴ According to a German comparison portal, the average interest rate for conventional instant access savings accounts with an investment amount of 5000 € stood at 2.2% at the beginning of October 2011 (Franke-Media.net, 2015). The corresponding average interest rate offered by social banks stood at around 1.0% (Öko-Test, 2010).

Chapter 2: Article I

their money or partial transparency concerning the branch they invest in or full transparency concerning the specific project they invest in. Social banks usually offer partial or full transparency. In the area of participation, social banking is less developed compared to other financial institutions and mainly refers to the consideration of a saver's intention regarding the utilisation of funds (Paulet et al., 2015; San-Jose et al., 2011). Hence, consumers can principally participate in the choice of their investment projects or not, so two levels seemed to be sufficient.

Procedure

The ACA was separated into four successive and interrelated survey phases (see Sawtooth Software, 2007, for a detailed technical explanation). The first two phases made up the compositional, or the so-called self-explicated task, where respondents (1) ranked their preferences for the attribute levels and (2) rated their relative importance of each attribute. Based on the resulting prior part-worth functions, a series of 13 paired comparisons of instant access savings accounts varying in their attribute levels was composed for each respondent. In the third phase, the core of the ACA, respondents had to indicate whether and how strongly they prefer a certain investment alternative over the other on a five-point ordinal rating scale. Following each paired comparison, estimated part-worth functions as well as subsequent pairs questions were updated. The resulting final part-worth functions were calibrated within the last phase. On this basis, the attribute-specific relative importance for each respondent was calculated.

Sample characteristics

On the basis of two samples, a total of 3537 usable online questionnaires were completed during the survey period in October 2011. All participants were recruited by email. Sample 1 comprises 2896 respondents who are customers of three major social banks in Germany (EthikBank, GLS Bank and Triodos Bank, Germany) and at least 16 years of age. As social banking customers, they may also be customers of conventional banks. The sample was drawn and provided by the respective social banks. Sample 2 covers the remaining 641 respondents who are German citizens aged 16 years and above and hold accounts exclusively with conventional banks. Sample 1 thus represents social and sample 2 conventional banking customers in Germany aged 16 years and above. The ACA revealed 45,981 evaluations resulting from 13 paired comparisons graded by each of the 3537 respondents.

Respondents of sample 2 were recruited via an online panel of a market research company (puls Marktforschung). It was intended to draw a sample representative of the German adult

population to allow for population-based implications regarding the market size.⁵ To verify population representativeness, chi-square tests were used to test the distribution of sample 2 for homogeneity with the one of the German adult population as reported by Axel Springer and Bauer Media Group (2011) regarding specific characteristics such as gender, age, highest educational achievement and size of place of residence (see Heinzle and Wüstenhagen, 2012, for a similar approach). As presented in table 2.2, no statistically significant differences were found between sample 2 and the German adult population with regard to the chosen criteria.⁶ Table 2.2 gives a thorough overview of the input factors (observed and expected marginal distribution of sample 2) and the output factors (chi-square value, degrees of freedom and p-value) of all chi-square tests. Apart from the ACA, all calculations of this study were carried out by using the statistical software packages R and IBM SPSS Statistics.

⁵ The German population covers not only conventional banking customers, but also a minor share of social banking customers. Since it can be assumed that this small group does not affect the fundamental population structure, it is reasonable to compare sample 2 with the German population.

⁶ Concerning education, it should be noted that the chi-square test only just failed to reach significance (p-value = 0.059). The respondents of sample 2 might be slightly higher educated on average than the population, indicated by a smaller share of people holding a secondary modern school qualification and larger shares in respect of the remaining higher educational levels. Such a difference could give rise to a selection bias, which should be kept in mind when appreciating the results of the study.

Table 2.2 Comparison of sample 2 with the German adult population

Characteristics	German		Sample 2		Chi-square test		
	population ^a		Observed	Expected	χ^2	df	p-value
	%	%	n	n			
	100.0	100.0	641	641			
Gender							
Female	51.2	49.9	320	328	0.209	1	0.647
Male	48.8	50.1	321	313			
Age							
Under 20 years old	5.6	3.7	24	36	3.261	5	0.660
20 to 29 years old	14.3	14.7	94	92			
30 to 39 years old	14.3	14.4	92	92			
40 to 49 years old	19.6	19.8	127	126			
50 to 59 years old	16.5	15.3	98	106			
60 years and older	29.8	32.1	206	191			
Highest educational achievement							
No school qualification or still at school	3.1	2.2	14	20	10.635	5	0.059
Secondary modern school qualification	42.2	34.3	220	271			
Secondary school certificate	28.8	32.8	210	185			
University entrance qualification	12.2	13.9	89	78			
University degree	12.6	15.4	99	81			
Doctorate ^b	1.1	1.4	9	7			
Size of place of residence							
Below 20,000 inhabitants	41.4	38.2	245	265	1.991	3	0.574
20,000 to 99,999 inhabitants	27.3	29.8	191	175			
100,000 to 499,999 inhabitants	15.0	14.4	92	96			
500,000 inhabitants and more	16.2	17.6	113	104			

^a Figures of Axel Springer and Bauer Media Group (2011)

^b Category added based on micro-census data (Statistisches Bundesamt, 2011)

2.3.2 Binary logistic regression

Preliminary considerations

Binary logistic regression investigates two predefined groups towards significant differentiators and enables the classification of new elements into those groups. On the basis of one or more independent variables, probabilities of group affiliation are determined. This classification function can be used to forecast buying behaviour and therefore enables the estimation of market size.⁷ The main advantage of logistic regression over discriminant analysis, which is often used alternatively, is

⁷ Generally, there are various techniques for market potential estimation (see Waheeduzzaman, 2008, for a comparison of different methods). If causality between variables is important, regression modelling demonstrates an approach of good predictive power. In contrast to economists, marketers commonly focus on the consumer when estimating market potential (Waheeduzzaman, 2008). It therefore seems appropriate to determine the demand for social banking products based on specific consumer characteristics.

its robustness. Without hurting any distribution assumptions, logistic regression allows for incorporating a mixture of independent variables of metric as well as non-metric scale levels (Sreejesh et al., 2014).

Procedure

In this study, two predefined groups were examined: social banking customers (sample 1) and conventional banking customers (sample 2). Both categories of the dependent variable can, therefore, be described as 'purchase of social banking products' versus 'exclusive purchase of conventional banking products'. Independent variables were determined on the basis of conceptual considerations, as described in the 'Literature Review and Hypotheses Development' section. In addition to preference data from the ACA, the questionnaire sought information on sociodemographic and further behavioural and psychographic characteristics of the respondents. From that, 21 metric and non-metric variables were selected in line with the conceptual framework. As customary, ordinal variables based on Likert scales were interpreted as metrically scaled and each of the remaining non-metric variables was transformed into one or several binary variables. Appendix 1 provides the descriptive statistics of all independent variables for both samples.

Since independent variables of any regression analysis should be largely free of multicollinearity, a test was conducted by measuring the variance inflation factors (VIF) based on linear regression (Midi et al., 2010). Considering that perfect multicollinearity exists among the measured preferences by nature⁸, one of the four variables had to be separated from the subsequent logistic regression model. The influence of one excluded variable can be explained by the influence of the remaining three variables though. The same is true for the categories of each nonmetric variable. According to table 2.3, the test indicated that a combination of the three preferences for social return (social-ecological placement of assets, information transparency and participation) yielded the best results in terms of low multicollinearity and, therefore, appeared to be the most suitable basis for logistic regression. Following propositions towards more conservative cut-off values (Allison, 1999; Zuur et al., 2010), a VIF of above two was chosen as an indicator of increased multicollinearity.

⁸ Based on the concept of relative importance within conjoint analysis, a respondent's values of all four preference variables always add up to 100%.

Table 2.3 Test for multicollinearity of the initial and final variable set

Variables	Variance inflation factor ^a	
	Initial variable set	Final variable set
<i>Socio-demographic consumer characteristics</i>		
Gender		
Female ^b		
Male	1.082	1.080
Age		
Under 20 years old	1.796	1.795
20 to 29 years old	1.635	1.634
30 to 39 years old ^b		
40 to 49 years old	1.629	1.627
50 to 59 years old	1.542	1.539
60 years and older	1.585	1.581
Highest educational achievement		
No school qualification or still at school	1.725	1.725
Secondary modern school qualification	1.372	1.360
Secondary school certificate	1.264	1.262
University entrance qualification	1.151	1.150
University degree ^b		
Doctorate	1.106	1.106
Monthly net household income		
Below 1000 €	1.388	1.381
1000 to 1999 €	1.540	1.539
2000 to 2999 € ^b		
3000 to 3999 €	1.449	1.449
4000 to 4999 €	1.335	1.335
5000 € and more	1.276	1.275
not specified	1.265	1.265
Size of place of residence		
Below 20,000 inhabitants	1.454	1.453
20,000 to 99,999 inhabitants	1.373	1.373
100,000 to 499,999 inhabitants	1.350	1.350
500,000 inhabitants and more ^b		
<i>Behavioural and psychographic consumer characteristics</i>		
Purchase of natural and organic products	3.663	
Purchase of fair trade products	2.179	1.694
Consideration of eco-labels when purchasing groceries	3.466	
Preferences		
Social-ecological placement of assets	1.550	1.548
Information transparency	1.199	1.199
Participation	1.254	1.249
Interest rate ^b		
Perceived importances for bank-specific features		
Wide range of products	1.316	1.315
Comprehensive online and mobile banking services	1.252	1.251
Consulting also in the evening and on weekends	1.206	1.205
Competency and fairness in consulting	1.491	1.490

Variables	Variance inflation factor ^a	
	Initial variable set	Final variable set
Easy access to branches	1.348	1.345
Free access to many cashpoints	1.318	1.317
Public image	1.230	1.225
Social commitment	1.449	1.449
Promise of non-gambling	1.482	1.482

^a Based on linear regression analysis (dependent variable: see logistic regression, n = 3537)

^b Excluded variables

As expected, the test further revealed increased multicollinearity among the three variables describing sustainable buying behaviour: ‘purchase of natural and organic products’, ‘purchase of fair trade products’ and ‘consideration of eco-labels when purchasing groceries’. Based on a factor analysis by means of principal axis factoring, these variables were condensed to one variable called ‘sustainable buying behaviour’ by weighting and averaging the items according to the factor loadings. A repetition of the test of multicollinearity with the final variable set showed that it seemed to be no longer affected by multicollinearity. The factor matrix along with its quality criteria is presented in table 2.4.

Table 2.4 Factor matrix of variables concerning sustainable buying behaviour

Variables	Factor ^a
Purchase of natural and organic products	0.900
Purchase of fair trade products	0.762
Consideration of eco-labels when purchasing groceries	0.907
Kaiser-Meyer-Olkin measure of sampling adequacy	0.727
Bartlett's test of sphericity (approx. χ^2)	6506.71 (df = 3, p-value = 0.000)

^a Extraction method: principal axis factoring

After having specified the variables, samples 1 and 2 were each halved by drawing two random samples. One half of each sample was used as a training sample for estimating the parameters of the logistic regression model. The remaining halves were withheld as control samples to subsequently classify their respondents by means of the regression model calculated first. Using only one sample for estimation and prediction purposes would lead to biased results as classification rates are then usually overestimated (Morrison, 1969). Consequently, both subsamples of sample 2 need to be population-representative as well. As presented in appendices 2 and 3, no statistically significant differences were found between them and the German population.

2.4 Results and discussion

2.4.1 Differences between social and conventional banking customers

Table 2.5 displays the estimated binary logistic regression model, especially regression coefficients (B) and odds ratios (Exp(B)) of all independent variables. Here, an odds ratio defines the factor by which the odds of purchasing social banking products change for a one-unit increase in the independent variable. To make regression parameters more comparable, all metric variables were standardised by setting means to 0 and standard deviations to 1 before using them in the logistic regression. Odds ratios were thus calculated for a one standard deviation unit change in the metric variables. For a dummy variable, the odds ratio is interpreted as the ratio of odds for one dummy variable category to the odds of the reference category (Pampel, 2000). According to table 2.5, social banking customers differ significantly from their conventional counterparts with regard to 16 out of 19 independent variables. The regression model reveals a high goodness of fit expressed by the p-value of the likelihood ratio test and the Nagelkerke pseudo-R² statistic.

Table 2.5 Binary logistic regression model for the differentiation between social and conventional banking customers

Independent variables	Regression parameters ^a (n = 3537)				p-value ^c	Hypothesis ^d
	B	SE	Exp(B)	% Δ^b		
<i>Socio-demographic consumer characteristics</i>						
Gender					***	H1a n.s.
Female ^e						
Male	1.094	0.274	2.986	199	***	
Age					***	H1b s.
Under 20 years old	1.042	1.023	2.835	183		
20 to 29 years old	1.492	0.454	4.444	344	***	
30 to 39 years old	1.955	0.438	7.063	606	***	
40 to 49 years old	1.923	0.404	6.842	584	***	
50 to 59 years old	1.600	0.424	4.954	395	***	
60 years and older ^e						
Highest educational achievement					***	H1c s.
No school qualification or still at school	1.793	1.305	6.009	501		
Secondary modern school qualification ^e						
Secondary school certificate	1.156	0.408	3.177	218	**	
University entrance qualification	1.933	0.456	6.910	591	***	
University degree	3.134	0.421	22.954	2195	***	
Doctorate	3.642	0.756	38.164	3716	***	
Monthly net household income						H1d n.s.
Below 1,000 € ^e						
1,000 to 1,999 €	0.514	0.532	1.672	67		
2,000 to 2,999 €	0.390	0.532	1.476	48		

Independent variables	Regression parameters ^a (n = 3537)				p-value ^c	Hypothesis ^d
	B	SE	Exp(B)	% Δ ^b		
3,000 to 3,999 €	0.366	0.555	1.442	44		
4,000 to 4,999 €	0.333	0.642	1.395	40		
5,000 € and more	1.599	0.854	4.949	395	+	
not specified	1.117	0.636	3.055	206	+	
Size of place of residence					*	H1e s.
Below 20,000 inhabitants	-0.829	0.340	0.437	-56	*	
20,000 to 99,999 inhabitants	-0.766	0.368	0.465	-54	*	
100,000 to 499,999 inhabitants	0.124	0.401	1.132	13		
500,000 inhabitants and more ^e						
<i>Behavioural and psychographic consumer characteristics</i>						
Sustainable buying behaviour	1.240	0.156	3.456	246	***	H2a s.
Preferences						H2b &
Social-ecological placement of assets	1.059	0.167	2.882	188	***	H2c s.
Information transparency	0.526	0.133	1.692	69	***	
Participation	0.303	0.131	1.354	35	*	
<i>Perceived importances for bank-specific features</i>						
Wide range of products	-0.481	0.154	0.618	-38	**	
Comprehensive online and mobile banking services	0.313	0.144	1.368	37	*	
Consulting also in the evening and on weekends	-0.496	0.142	0.609	-39	***	
Competency and fairness in consulting	0.261	0.143	1.298	30	+	
Easy access to branches	-0.740	0.171	0.477	-52	***	
Free access to many cashpoints	-0.153	0.157	0.858	-14		
Public image	-0.395	0.163	0.673	-33	*	
Social commitment	0.751	0.153	2.120	112	***	
Promise of non-gambling	0.517	0.138	1.677	68	***	
<i>Constant</i>	-0.729	0.656	0.482	-52		
Likelihood ratio test χ^2	1220.505 (df = 33, p-value = 0.000)					
Nagelkerke R ²	0.815					

^a Differentiators between the categories of the dependent variable 'purchase of social banking products' (coded as 1, n = 2896) and 'exclusive purchase of conventional banking products' (coded as 0, n = 641) were identified. B is the regression coefficient and Exp(B) the odds ratio.

^b Percent change in the odds of purchasing social banking products, % Δ = (Exp(B) - 1) * 100

^c Based on the Wald test; + p ≤ 0.10, * p ≤ 0.05, ** p ≤ 0.01, *** p ≤ 0.001

^d s. = supported, n.s. = not supported

^e Reference category

Regarding socio-demographic characteristics, results suggest that gender, age, highest educational achievement and size of place of residence are significant differentiators. For gender, the odds ratio of 2.99 indicates that the odds of purchasing social banking products are 2.99 times as large or 199% larger for men than for women. Contrary to a majority of research findings on SR investors (e.g. Junkus and Berry, 2010; Nilsson, 2009) and sustainable consumers (e.g.

Diamantopoulos et al., 2003; Koos, 2011; Luchs and Mooradian, 2012), our study indicates that social banking customers are male to a higher proportion than female. Hypothesis H1a is therefore not supported. A possible explanation for this could be derived from the diffusion of innovation theory (Rogers, 1962). According to this, social banking might be still in its early stages of the diffusion process with rather men than women as adopters. Some research findings support the idea that men are more likely to be the innovators or early adopters of innovations in the banking sector (Laukkanen and Pasanen, 2008; Yiu et al., 2007). Women, whose adoption of innovations usually relies more strongly on social influences (Mazman et al., 2009), might increasingly follow in the course of the diffusion process.

With regard to age, the odds are larger for all persons aged between 20 and 59 years compared to persons aged 60 years and older. No difference was evidenced for persons who are between 16 and 20 years of age. The middle age groups of 30 to 39 years and 40 to 49 years show the highest odds ratios; more specifically, the odds are roughly 7 times larger for persons of those age groups than for persons aged 60 years and older. Consequently, the effect that social banking customers tend to be younger than their conventional counterparts is especially strong in the middle age groups, similar to research findings on SR investors (Lewis and Mackenzie, 2000) and sustainable consumers (Koos, 2011). For the highest educational achievement, the odds ratios indicate that the higher the educational achievement, the greater the odds. Especially for university and doctorate graduates, the odds are around 23 and 38 times larger than for persons with a secondary modern school qualification. This result corresponds to a large body of previous literature (e.g. Brécard et al., 2009; Junkus and Berry, 2010) suggesting a strong positive influence of educational achievement on sustainable consumer behaviour. As 'the very nature of ecology with its complex interactions between organisms and environment serves to make its subject matter difficult to understand and assimilate' (Maloney et al., 1975, p. 585), younger and middle-aged persons with higher levels of education might have a greater awareness and understanding of social-ecological issues. Hypotheses H1b and H1c are therefore supported.

Although the descriptive statistics presented in appendix 1 suggest a higher monthly net household income of social compared to conventional banking customers, the variable was not found to be a significant differentiator. Income differences seem to be not large enough, so that hypothesis H1d cannot be supported. Correspondingly, research on SR investors has been rather contradictory regarding income (e.g. Lewis and Mackenzie, 2000; Nilsson, 2009). Some studies on sustainable consumers also indicate that income might be a poor indicator (Brécard et al., 2009; Roberts, 1996). For some branches such as groceries and clothing, a consumer's income might positively influence the magnitude of sustainable consumption because products are often more expensive than their conventional equivalents (Brécard et al., 2009). Higher prices may result from

additional costs for better raw materials and labelling authentication (Ling, 2013). A lack of financial resources can then act as a barrier to purchase sustainable products (Connell, 2010). Except for possible fees, financial investments offered by social banks are not more expensive than conventional investments though. A possible income effect could be related to the expected return of investment, as savings accounts at social banks usually offer lower interest rates than comparable accounts at conventional banks. However, there is a lack of scientific evidence on the influence of a person's level of income on the willingness to sacrifice interest.

With regard to size of place of residence, the odds are 54 to 56% smaller for persons living in places with less than 100,000 inhabitants compared to persons living in places with 500,000 inhabitants and more. No significant differences were found for persons living in places with 100,000 to 499,999 inhabitants compared to the reference group. Similarly, to research on sustainable consumers (BBMG, GlobeScan and SustainAbility, 2012; Brécard et al., 2009), social banking customers seem to live in urban rather than in rural areas. An explanation may be that people from urban areas are rather open-minded to new ideas such as social banking. The study thus finds support for hypothesis H1e.

Concerning the metrically scaled behavioural and psychographic measures, sustainable buying behaviour and the preferences for social and financial return were found to be significant differentiators. For sustainable buying behaviour, the odds ratio of 3.46 shows that a standard deviation unit increase in sustainable buying behaviour increases the odds of purchasing social banking products by a multiple of 3.46 or 246%. The variable constitutes the strongest positive differentiator among all the metric variables. Hypothesis H2a was therefore supported. The finding reveals a strong link between general sustainable buying patterns and the purchase of social banking products. Since purchasing sustainable products is a strong differentiator and the organic food sector is a relatively well-established sustainable sector (Bund Ökologische Lebensmittelwirtschaft e.V., 2016), purchasing organic food might be a strong antecedent of purchasing social banking products.

Referring to the preferences, all three variables reflecting social return positively affect the odds of purchasing social banking products, so that hypothesis H2b is supported. For a standard deviation unit increase, preferences for participation increase the odds by 35% and preferences for information transparency increase the odds by 69%. With an odds ratio of 2.88, preferences for a social-ecological placement of assets increase the odds by 188%. Therefore, they constitute the strongest positive differentiator among the preference variables and the second strongest positive differentiator among all metric variables. Similarly, Escrig-Olmedo et al. (2013) identified a social-ecological placement of assets and information transparency as key differentiators between social and conventional banks. The findings also indicate that preferences for the interest rate have a significant negative effect on the odds. Hence, hypothesis H2c is supported as well. Social banking

customers reveal stronger preferences for social return and weaker preferences for financial return compared to conventional banking customers. This conclusion is in line with research on SR investors showing that they are willing to sacrifice financial for social return (e.g. Hofmann et al., 2008; Pasewark and Riley, 2010).

All in all, six out of eight hypotheses can be supported. The previous findings thus contribute to resolving the research question on suitable characteristics differentiating social from conventional banking customers in Germany. Except for the gender effect, the results of this study are fairly consistent with those in a large part of the SRI and sustainable consumption literature. It would have been possible to arrive at a similar customer profile solely based on those literature streams. However, without population-representative empirical data, it is impossible to decide whether the transfer of findings from SRI and sustainable consumption literature to the field of social banking, closely related as the fields may seem, is permissible. Furthermore, the present study goes beyond what could have been inferred by extrapolating from the literature: measurement of preferences, indication of the differentiators' strength and estimation of market size.

2.4.2 Size of the German social banking market

Based on the comparative analysis of social and conventional banking customers, knowledge about the size of the German social banking market was generated. Estimated probabilities of group affiliation of all respondents served as a basis to identify potential buyers of social banking products. The commonly applied cut-off value (p^*) of 0.5 (Sreejesh et al., 2014) was chosen to assign each respondent to one of the two groups of the dependent variable ($p^* > 0.5 =$ 'purchase of social banking products', $p^* \leq 0.5 =$ 'exclusive purchase of conventional banking products'). The confusion matrix of table 2.6 demonstrates the predicted classification and misclassification of social and conventional banking customers separated into training and control sample.

Table 2.6 Confusion matrix of the binary logistic regression model ($p^* = 0.5$)

	Prediction							
	Training sample			Control sample				
	Banking customer		Sum	Correct	Banking customer		Sum	Correct
	Conventional	Social		%	Conventional	Social		%
<i>Observation</i>								
Banking customer								
Conventional	271	49	320	84.7 ^a	266	55	321	82.9 ^a
Social	31	1417	1448	97.9 ^b	46	1402	1448	96.8 ^b
Overall correct % (classification rate)				95.5				94.3

^a Specificity, i.e. the proportion of correct predicted conventional banking customers

^b Sensitivity, i.e. the proportion of correct predicted social banking customers

The overall percentage of correct predictions was high for the training (95.5%) and the control sample (94.3%).⁹ The model is thus characterised by a good fit and by a strong predictive power indicated by high classification rates. For both samples, sensitivity was greater than specificity, which means that conventional banking customers were misclassified more frequently than social banking customers. In other words, the share of conventional banking customers showing characteristics of social banking customers is greater than the share of social banking customers showing characteristics of conventional banking customers. For reasons of greater objectivity, the size of the German social banking market was solely derived from the control sample. Regarding the control sample, 96.8% of social banking customers were classified correctly, whereas this share was only 82.9% for conventional banking customers. In other words, 17.1% of conventional banking customers were identified as potential buyers of social banking products based on their personal characteristic values. Additionally, a range around that point estimate was calculated to enable the presentation of the market size as a spectrum from rather conservative to rather optimistic estimators. For this purpose, individual confidence intervals were computed regarding each respondent's probability to purchase social banking products. In other words, for each respondent, the probability of being a (potential) social banking customer was calculated at the lower and at the upper confidence limit. Compared to the point estimate, classification was then alternatively based on both confidence limits. For each limit, it was determined whether the individual probabilities were greater than 0.5. Taking an intermediate position with respect to the trade-off between a high level of statistical confidence and a narrow range of market size estimates, table 2.7 illustrates the results

⁹ It should be noted that both classification rates successfully exceed the maximum random distribution probability of 81.9%.

for a confidence level of 80%.¹⁰ The findings indicate that the market size ranges between 10% and 26% of the German adult population.

Table 2.7 Range estimation of the market size based on respondent-specific confidence intervals

	Prediction ^a			
	Banking customer		Sum	Market size ^b
	Conventional	Social		
<i>Observation</i>				
Conventional banking customer ^c				
Lower bound	290	31	321	9.7
Upper bound	237	84	321	26.2

^a Based on a 80% confidence level

^b Based on the misclassification rate of conventional banking customers ($p^* = 0.5$)

^c Based on the control subsample of sample 2

Consequently, these findings contribute to answering the research question on the market size of social banking in Germany. In contrast to the 0.3% share of current customers, the study suggests a huge unused growth potential for social banks in Germany. Strong preferences for social return, for instance, do not necessarily translate into purchases of social banking products. There seem to be reasons restraining potential social banking customers from becoming customers of social banks. Research has already started to examine the determinants of discrepancies between attitudes towards and actual purchase behaviour of sustainable products, referred to as attitude-behaviour gap, for various industries (e.g. Carrington et al., 2010; Padel and Foster, 2005). Factors impeding ethical consumption in finance could be, for instance, inertia, cynicism or just a lack of awareness (Bray et al., 2011; Escrig-Olmedo et al., 2013). Switching costs such as inertia might depend on the type of banking product. It is likely that they are higher for current accounts than for instant access savings accounts.

Besides estimating that between 10% and 26% of the German adult population might be willing to use social banking products, it would also be of practical relevance for social banks to know the proportion of wealth in the hands of those potential customers. As the survey did not cover this aspect, external data from the German socioeconomic panel (German Institute for Economic Research, 2012) were used to assign a wealth attribute to the existing data set. Both data sources were linked via shared sociodemographic variables, namely gender, age and highest educational

¹⁰ Despite the prevalence of 95% confidence intervals in research, the choice of any confidence level remains arbitrary. Likewise, Cohen (1990) challenges the routine use of 95% confidence intervals and recommends the more frequent use of 80% confidence intervals. A confidence level of 95% (90%) indicates a market size ranging between 7% (8%) and 31% (28%). Consequently, the higher the confidence level, the broader the confidence interval and the market size range. A confidence level of 80% appears to be a good compromise between a high level of statistical confidence and a narrow range of market size estimates.

achievement. Appendices 4 and 5 provide the underlying average wealth distributions of the German adult population in the year 2012 according to the various categories of the socio-demographic variables. Overall, it can be seen that the per-capita wealth of German adults tends to increase with age and educational achievement. It is also higher for men than for women. The different values for wealth were then assigned to the corresponding cases of the data set. Based on these data, table 2.8 shows the derivation of potential social banking customers' share in total wealth of the German adult population. The mean net overall wealth of potential social banking customers was calculated, weighted by the market size and set in relation to the mean net overall wealth of the German adult population.

Table 2.8 Analysis of wealth of potential social banking customers

	Point estimate	Range estimate ^a	
		Lower bound	Upper bound
<i>Potential social banking customers</i>			
Market size %	17.1	9.7	26.2
Mean net overall wealth per capita €	104,607	111,998	106,538
Mean net overall wealth per capita weighted by market size (1) €	17,888	10,864	27,913
<i>German adult population^b</i>			
Mean net overall wealth per capita (2) €	95,153	95,153	95,153
<i>Proportion of net overall wealth of potential social banking customers (1) / (2) %</i>	18.8	11.4	29.3

^a Based on a 80% confidence level

^b Based on the control subsample of sample 2

At a market size of 17%, for instance, the average wealth of potential social banking customers amounts to 104,607 €, whereas the average wealth of the German adult population amounts to merely 95,153 € per capita. Apparently, potential social banking customers account for around 19% of the wealth, but only for around 17% of the population of German adults. Corresponding to the range of 10–26% for the market size by headcount, a range of 11–29% for the market size in terms of wealth could be estimated. A comparison of these respective ranges shows that the wealth of potential social banking customers is slightly larger on average than in the German adult population. There might be several explanations for this. First, higher-educated people tend to hold more wealth than lower-educated people and are also more likely to engage in social banking. The logistic regression model indicates that high educational achievements have a very strong positive influence on the probability to purchase social banking products. Second, as men might hold more wealth than women and are also more likely to be social banking customers, the gender effect seems to promote the larger share of wealth held by potential social banking customers as well.

Third, only the age effect does not unequivocally correspond to the result, given that older persons tend to hold more wealth, but are less likely to use social banking products. The age effect on social banking affinity, however, is not monotonic, since it was found that social banking customers are especially strongly represented in the middle age groups. All in all, the wealth analysis should only be seen as a first rough estimation since the wealth variable was externally generated. The possibility of a selection bias exists, since a person's wealth might not be fully explained by the chosen socio-demographic variables. Further research in this field is welcomed.

2.5 Conclusions and implications

By means of a large-scale quantitative analysis, this paper advances the understanding of consumer behaviour in the emerging field of social banking. The purpose of this empirical, population-representative study was to explore the differences between social and conventional banking customers and to estimate the size of the social banking market in Germany. Logistic regression modelling revealed several significant socio-demographic, behavioural and psychographic differentiators. In comparison with conventional banking customers, social banking customers tend to be younger, higher educated and located in larger places of residence. Contrary to existing research on SR investors, they are male to a higher proportion than female. Particularly, persons between 30 and 50 years of age holding a university degree or doctorate show a comparatively strong affiliation with the group of social banking customers. However, the income level was not found to be a significant differentiator. From a social class perspective, social banking customers may not earn higher levels of income, but have higher levels of education than their conventional counterparts. As a result, becoming a social banking customer rather seems to be a matter of education than a matter of income.

Furthermore, the fact that social banking customers tend to practice sustainable buying patterns in everyday life more strongly demonstrates another key differentiator. Resulting from an ACA, social banking customers seem to have stronger preferences for social return, i.e. for a social-ecological placement of assets, information transparency and participation, and weaker preferences for financial return. Similar to sustainable buying behaviour, preferences for a social-ecological placement of assets have a strong distinctiveness. When weighting the different attributes of an investment alternative, social banking customers are mainly interested in how ethically their money is invested in. Results from analysing additional exploratory variables show that 'comprehensive online and mobile banking services', 'social commitment' as well as a 'promise of non-gambling' are more relevant, whereas a 'wide range of products', 'consulting also in the evening and on weekends', an 'easy access to branches' and the 'public image' of a bank are less relevant for social banking

customers, as initially expected. Only the importance of 'competency and fairness in consulting' as well as a 'free access to many cashpoints' is not found to be a significant differentiator, meaning that these criteria are equally relevant for social and conventional banking customers in case of switching bank accounts.

Furthermore, this paper presents the first scientific study estimating the market size of social banking. Therefore, the percentage of the German adult population currently not using social banking products but having the characteristics that would lead them to do so was predicted based on the aforementioned regression model. The examination indicates a considerable untapped growth potential for social banks by uncovering a market size ranging between 10% and 26% of the German adult population in 2011. Moreover, an additional wealth analysis suggests that the wealth of potential social banking customers is larger on average than in the German adult population.

The findings on the number and reachability of potential social banking customers reveal first practical implications for marketers of social banks to increase the presence of social banking in the German banking market. First, targeting activities of marketers should consider a mixture of consumer characteristics such as age, educational level, general sustainable buying patterns and preferences for a social-ecological placement of assets. By focusing on certain variable levels such as high educational achievements, particularly wealthy customers can be addressed. Second, marketing cooperation between social banks and suppliers in other more established sustainable sectors such as the organic food sector is recommended. Synergy effects can be generated by addressing a mutual customer base. Third, strong preferences for social return indicate that social banks should continuously develop their core business by following a transparent and participative social-ecological investing and lending policy. Besides certain product attributes, social commitment and non-gambling are highly valued by social banking customers and should, therefore, be pursued consequently. In fact, this study is also relevant to conventional banks. On the one hand, results indicate a serious danger of customer loss. On the other hand, the findings signal a great chance of selling sustainable products in addition to the conventional product range and thereby increasing sales. If social banks soon reach their structural limits, the latter option might become true. Social banking products could then increasingly enter the conventional banking market in the future.

However, this research is not free of limitations which should be addressed by future research. First, the data collection of this cross-sectional study took place at the end of 2011. As consumption patterns can change over time, the market size might not reflect recent changes in the economic conditions. Considering the current low-interest phase in Europe, the market size of social banking could now be different due to changes in consumer preferences as a reaction to lower interest rates. Future research studies should, therefore, employ longitudinal research designs to better account for possible time effects. Second, research findings on the market size do not provide

further information on how much of their assets potential social banking customers would invest in social banks. Future research is therefore challenged to provide a differentiated view on the expected asset distribution of potential social banking customers among social and conventional banks. Based on enhanced data and further analyses, for example, a distinction between weak, moderate and strong potential users of social banking could lead to more sophisticated customer profiles and market size estimates of greater practical relevance. Third, limitations result from the main assumption that the market size estimate depends on the selected consumer characteristics. There might be further relevant aspects influencing the market size. As demand forecasts in economics often incorporate macroeconomic figures such as economic growth or company-specific aspects such as advertisement, future research could consider an interplay of these variables. Fourth, the underlying rationale of identifying potential social banking customers based on the actual social banking customer profile neglects the fact that there might be potential buyers who are different from the status quo. Future research should hence account for this aspect, for instance by developing market segments independent of the status quo. Fifth, measuring preferences brings up the discussion of their relevance for purchase behaviour. An ACA already offers advantages compared to a traditional conjoint analysis. In future studies, however, one could think of applying choice-based conjoint analysis, which is often seen as the more realistic approach. Sixth, market size estimation by means of the classification function of the logistic regression, more specifically the misclassification rates, appears to be a novel approach, which could not be directly supported by previous studies. Future research should discuss this approach by comparing it to other methods of market size estimation.

Besides overcoming the limitations, future research is especially challenged to investigate the purchase barriers, in particular the switching costs, of potential social banking customers. As markets are imperfect in reality, the market potential for social banking has not been realised yet. Customers may not switch to social banks because of inertia, cynicism or just the lack of awareness concerning their existence. Furthermore, besides social and financial return, future research studies could benefit from an integration of further investment criteria such as account management fees, liquidity and risk. This goes along with an analysis of different banking products, apart from savings accounts alone. Finally, comparing sustainable consumer behaviour in the banking sector of Germany with that sector in other countries could add valuable insights into the generalisability of the empirical findings of this study. Therefore, future cross-cultural research in this area is highly recommended.

Growing socio-ecological problems and the increasing intensity of economic crises strengthen the need for sustainable consumption in the global banking sector. The huge unused market potential indicates an emancipation of social banking from being a niche and provides a basis

for higher consumption levels of social banking products in the future. Next steps in research and practice should, therefore, focus on how to activate this potential.

2.6 Appendices

Appendix 1 See table 2.9.

Table 2.9 Descriptive statistics of the independent variables for sample 1 and sample 2

Independent variables	Sample 1 (n = 2896)	Sample 2 (n = 641)		
Socio-demographic consumer characteristics				
Gender				
Female	44.3	49.9		
Male	55.7	50.1		
Age				
Under 20 years old	1.4	3.7		
20 to 29 years old	20.3	14.7		
30 to 39 years old	24.8	14.4		
40 to 49 years old	27.3	19.8		
50 to 59 years old	17.1	15.3		
60 years and older	9.2	32.1		
Highest educational achievement				
No school qualification or still at school	0.5	2.2		
Secondary modern school qualification	2.5	34.3		
Secondary school certificate	10.6	32.8		
University entrance qualification	17.7	13.9		
University degree	61.3	15.4		
Doctorate	7.4	1.4		
Monthly net household income				
Below 1000 €	9.3	12.6		
1000 to 1999 €	20.2	29.2		
2000 to 2999 €	23.5	27.6		
3000 to 3999 €	18.5	15.0		
4000 to 4999 €	11.8	6.2		
5000 € and more	8.3	2.3		
not specified	8.5	7.0		
Size of place of residence				
Below 20,000 inhabitants	24.9	38.2		
20,000 to 99,999 inhabitants	17.9	29.8		
100,000 to 499,999 inhabitants	23.3	14.4		
500,000 inhabitants and more	33.9	17.6		
Behavioural and psychographic consumer characteristics				
	Mean	SE	Mean	SE
Purchase of natural and organic products, even if expensive ^a	5.275	0.957	3.041	1.538
Purchase of fair trade products, if possible ^a	5.264	0.896	3.892	1.421
Consideration of eco-labels when purchasing groceries ^a	5.264	0.948	3.423	1.472
Preferences^b				
Social-ecological placement of assets	0.304	0.086	0.179	0.081

Independent variables	Sample 1 (n = 2896)		Sample 2 (n = 641)	
Information transparency	0.280	0.077	0.216	0.086
Participation	0.171	0.077	0.188	0.092
Interest rate	0.245	0.116	0.418	0.149
Perceived importances for bank-specific features (in the case of bank change) ^c				
Wide range of products	3.725	1.219	4.406	1.378
Comprehensive online and mobile banking services	5.148	1.194	4.825	1.544
Consulting also in the evening and on weekends	2.840	1.434	3.509	1.639
Competency and fairness in consulting	5.602	0.814	5.215	1.197
Easy access to branches	3.971	1.445	5.016	1.333
Free access to many cashpoints	5.306	0.986	5.402	1.193
Public image	4.076	1.421	4.515	1.372
Social commitment (local and social projects, sponsorship, donations)	4.890	1.178	3.647	1.448
Promise of non-gambling	5.451	0.980	4.476	1.422

^a Six-point Likert scale anchored by 1 (= do not agree at all) and 6 (= fully agree)

^b Relative importances derived from the adaptive conjoint analysis

^c Six-point Likert scale anchored by 1 (= very unimportant) and 6 (= very important)

Appendix 2 See table 2.10.

Table 2.10 Comparison of the training subsample of sample 2 with the German population

Characteristics	German population ^a	Training subsample of sample 2		Chi-square test				
		Observed		Expected		χ^2	df	p-value
		%	n	%	n			
	100.0	100.0	320	320				
Gender								
Female	51.2	53.4	171	164	0.238 ^c	1	0.626	
Male	48.8	46.6	149	156				
Age								
Under 20 years old	5.6	3.4	11	18	2.599	5	0.762	
20 to 29 years old	14.3	14.4	46	46				
30 to 39 years old	14.3	12.8	41	46				
40 to 49 years old	19.6	20.9	67	63				
50 to 59 years old	16.5	15.6	50	53				
60 years and older	29.8	32.8	105	95				
Highest educational achievement								
No school qualification or still at school	3.1	2.2	7	10			0.300 ^d	
Secondary modern school qualification	42.2	34.1	109	135				
Secondary school certificate	28.8	33.1	106	92				
University entrance qualification	12.2	12.8	41	39				
University degree	12.6	16.3	52	40				
Doctorate ^b	1.1	1.6	5	4				
Size of place of residence								
Below 20,000 inhabitants	41.4	40.0	128	132	0.771	3	0.856	
20,000 to 99,999 inhabitants	27.3	28.4	91	87				
100,000 to 499,999 inhabitants	15.0	13.4	43	48				
500,000 inhabitants and more	16.2	18.1	58	52				

^a Figures of Axel Springer and Bauer Media Group (2011)

^b Category added based on micro-census data (Statistisches Bundesamt, 2011)

^c With Yates' continuity correction

^d Fisher's exact test

Appendix 3 See table 2.11.**Table 2.11** Comparison of the control subsample of sample 2 with the German population

Characteristics	German population ^a	Control subsample of sample 2		Chi-square test				
		Observed		Expected		χ^2	df	p-value
		%	n	%	n			
	100.0	100.0	321	321				
Gender								
Female	51.2	46.4	149	164	1.28 4 ^c	1	0.257	
Male	48.8	53.6	172	157				
Age								
Under 20 years old	5.6	4.0	13	18	1.57 3	5	0.905	
20 to 29 years old	14.3	15.0	48	46				
30 to 39 years old	14.3	15.9	51	46				
40 to 49 years old	19.6	18.7	60	63				
50 to 59 years old	16.5	15.0	48	53				
60 years and older	29.8	31.5	101	96				
Highest educational achievement								
No school qualification or still at school	3.1	2.2	7	10			0.400 ^d	
Secondary modern school qualification	42.2	34.6	111	135				
Secondary school certificate	28.8	32.4	104	92				
University entrance qualification	12.2	15.0	48	39				
University degree	12.6	14.6	47	40				
Doctorate ^b	1.1	1.2	4	4				
Size of place of residence								
Below 20,000 inhabitants	41.4	36.4	117	133	1.91 7	3	0.590	
20,000 to 99,999 inhabitants	27.3	31.2	100	88				
100,000 to 499,999 inhabitants	15.0	15.3	49	48				
500,000 inhabitants and more	16.2	17.1	55	52				

^a Figures of Axel Springer and Bauer Media Group (2011)

^b Category added based on micro-census data (Statistisches Bundesamt, 2011)

^c With Yates' continuity correction

^d Fisher's exact test

Appendix 4 See table 2.12.

Table 2.12 Distribution of wealth of the German female population

	Mean net overall wealth ^a €					
	Age					
	Under 20 years old	20 to 29 years old	30 to 39 years old	40 to 49 years old	50 to 59 years old	60 years and older
<i>Highest educational achievement</i>						
No school qualification or still at school	6299	394	7429	-1553	15,210	48,773
Secondary modern school qualification	958	884	15,489	54,671	67,529	85,539
Secondary school certificate	2256	6572	27,660	81,892	99,456	145,463
University entrance qualification	3006	6071	35,706	92,516	156,557	221,208
University degree ^b	0	16,150	42,950	113,347	173,389	174,428

^a Figures from socio-economic panel data of the German Institute for Economic Research (2012)

^b Covers also doctorate

Appendix 5 See table 2.13.

Table 2.13 Distribution of wealth of the German male population

	Mean net overall wealth ^a €					
	Age					
	Under 20 years old	20 to 29 years old	30 to 39 years old	40 to 49 years old	50 to 59 years old	60 years and older
<i>Highest educational achievement</i>						
No school qualification or still at school	4362	3720	9820	67,055	22,218	38,153
Secondary modern school qualification	1413	3754	46,174	84,147	133,758	113,084
Secondary school certificate	5874	8766	46,123	84,287	147,597	141,336
University entrance qualification	8385	7511	36,434	146,628	122,388	196,155
University degree ^b	0	16,622	115,581	215,015	269,560	299,469

^a Figures from socio-economic panel data of the German Institute for Economic Research (2012)

^b Covers also doctorate

Chapter 3

Article II – An empirical extension of the value-attitude-behaviour hierarchy in sustainable clothing¹

¹ This chapter is based on Jacobs et al. (2018).

Contextual transition

The following chapter presents the second article on the determinants of sustainable purchase behaviour in the context of sustainable clothing. The article investigates how large the possible gap between a positive attitude towards sustainable clothing and sustainable clothing purchase behaviour is, and which factors enhance or hinder sustainable clothing purchase behaviour. The study thus develops a conceptual model for assessing the magnitude of the attitude-behaviour gap and the impact of possible enablers of, and barriers to, sustainable clothing purchase behaviour. Homer and Kahle's (1988) value-attitude-behaviour hierarchy is chosen as the theoretical framework for this study. This social-psychological theory assumes an indirect effect of values on behaviour through attitudes, i.e. rather abstract values influence more specific attitudes which, in turn, influence particular behaviour patterns (Homer and Kahle, 1988). Attitudes can be regarded as key antecedents of behaviour and are therefore an integral component of other behavioural models, such as the theory of reasoned action (Ajzen and Fishbein, 1980; Fishbein and Ajzen, 1975). In research on pro-environmental and prosocial behaviour, values have also been frequently cited as key determinants of behaviour (e.g. Lönnqvist et al., 2013; Schwartz, 2010). Often – as in the present model – a distinction is made between self-transcendence and self-enhancement values. Although value-attitude-behaviour models have some explanatory power, they seem unable to explain behaviour comprehensively (e.g. Homer and Kahle, 1988; McCarty and Shrum, 1994). Research has therefore emphasised the need for extending the value-attitude-behaviour hierarchy (e.g. Do Paço et al., 2013; Milfont et al., 2010). In line with this, a common approach in narrowing behavioural gaps in research has been the identification of further variables improving the translation of, for instance, attitudes into behaviour (e.g. Chatzidakis et al., 2016; Vermeir and Verbeke, 2006). Consequently, further potential psychographic enablers of, and barriers to, sustainable clothing purchases are integrated into the conceptual model to better explain behaviour and to strengthen the attitude-behaviour linkage. Online and catalogue shopping affinity as well as the preference for durable clothing are chosen as enablers, while fashion consciousness and price sensitivity are integrated as barriers. Based on online survey data of 1085 female German consumers, a structural equation model was estimated to test the conceptual model. Structural equation modelling enables the assessment of causal relationships between so-called latent variables, i.e. variables which cannot be directly observed such as attitudes and values (Hair Jr. et al., 2013). The effect of sociodemographic covariates on the various constructs measured in the structural equation model was also assessed.

Abstract

The clothing industry holds huge potential for improvement concerning various aspects of sustainability. Although consumer attitudes towards sustainable products and services, both in general and specifically in clothing, have grown more and more favourable in the past years, the market share of clothing produced in environmentally friendly and socially responsible ways is still lagging behind. This article empirically investigates this phenomenon, known as the attitude-behaviour gap, in the context of sustainable clothing. Based on a large sample of female German consumers, a structural equation model is estimated to assess the magnitude of the attitude-behaviour gap and the impact of possible enablers of, and barriers to, sustainable clothing purchase behaviour. The value-attitude-behaviour hierarchy is used as a theoretical framework, augmented by further psychographic constructs hypothesised to influence behaviour. Apart from a considerable attitude-behaviour gap, the article indicates that a positive attitude towards social-ecological clothing standards, biospheric and altruistic values, as well as an affinity to online and catalogue shopping, enhance sustainable clothing purchases. Egoistic and hedonic values and, remarkably, a preference for durable clothing hinder sustainable clothing purchase behaviour. No significant effects of the suspected barriers – fashion consciousness and price sensitivity – have been identified. The results thus highlight the importance of changing attitudes and values towards sustainability, and of focusing on the durability of sustainable clothing and its availability via retail stores.

Keywords

Attitude-behaviour gap, Determinants, Structural equation modelling, Sustainable clothing, Sustainable consumption, Value-attitude-behaviour hierarchy

3.1 Introduction

Public attention paid to sustainability in clothing has risen considerably during the past years (e.g. Dickenbrok and Martinez, 2018; Mora et al., 2014). Scandals in the clothing industry, such as the disastrous collapse of the Bangladeshi production building Rana Plaza in 2013, have reinforced the debate on poor working conditions for Asian textile workers (e.g. Chowdhury, 2017; Henninger et al., 2016; Siegle, 2017). Besides domestic working conditions, environmental pollution in garment manufacturing caused by excessive utilisation of chemicals and the transportation of non-domestically produced textiles are further relevant sustainability issues in the clothing industry (e.g. Dickenbrok and Martinez, 2018; Hansen and Schaltegger, 2013; Mirjalili et al., 2011). Sustainable clothing offers a possible solution to these problems. It has been defined as clothing that “incorporates one or more aspects of social and environmental sustainability, such as Fair Trade manufacturing or fabric containing organically-grown raw material” (Goworek et al., 2012, p. 938).² As a consequence of the public debate on sustainable clothing, consumer interest has increased considerably, though with little effect on actual consumer demand (e.g. Ha-Brookshire and Norum, 2011; Hassan et al., 2016; Reimers et al., 2016). In Germany, for instance, approximately three-quarters of clothing consumers consider product sustainability an important purchase criterion (Splendid Research, 2016). However, the sustainable clothing sector is still a niche segment with a market share of eco-labelled textiles of not more than 3.7% in 2013 (It Fits, 2013). In consumer research, especially in the field of sustainable consumption,³ such a phenomenon of discrepancy between attitudes and actual behaviour is commonly known as the attitude-behaviour gap (ABG) (e.g. Auger and Devinney, 2007; De Pelsmacker et al., 2005; Lane and Potter, 2007). Inconsistencies involving other psychographic factors of consumption, such as values and intentions, have also been documented. Researchers have therefore named further gaps including the value-action gap and the intention-behaviour gap (e.g. Carrington et al., 2010; Flynn et al., 2009). Although the ABG is sometimes used as a collective term for any of these kinds of discrepancies (e.g. Peattie, 2010; Reimers et al., 2016), in this study the ABG explicitly refers to the relationship between attitudes and behaviour. To account for the entirety of the various gaps, the term ‘behavioural gaps’ is used in the following.

² Alternatively, terms such as ‘green clothing’, ‘organic clothing’ and ‘ethical clothing’ have been used in prior literature (Thomas, 2008). However, the more common term ‘sustainable clothing’ is preferred in this article, as it clearly encompasses social, as well as environmental, aspects.

³ Other authors (e.g. Davies and Gutsche, 2016; Eckhardt et al., 2010) have used the term ‘ethical consumption’ as a synonym or related concept. In this article, however, the more common term ‘sustainable consumption’ is preferred.

Vergragt et al. (2014) emphasise the urgency of gaining a better understanding of the obstacles on the way to more sustainable production and consumption systems. Behavioural gaps are found to be among the main such obstacles (e.g. Akenji, 2014; Blok et al., 2015). In emerging sustainable markets, they may result in huge unused market potentials (Krause and Battenfeld, 2019). Marketers of sustainable clothing would hence benefit particularly from a greater understanding of the ABG in order to grow their business. Consequently, it is hardly surprising that behavioural gaps have received a lot of attention in research on sustainable consumption, with applications in areas such as groceries, personal care and clothing (e.g. Bray et al., 2011; Hassan et al., 2016; Longo et al., 2019; Moser, 2016). Overall, Belz and Peattie (2012) conclude that the inconsistency between consumer concerns about sustainability and actual consumer behaviour has been one of the most consistent findings in sustainable consumption research. Likewise, numerous studies support the existence of a gap between consumers' positive attitudes towards sustainable products and services and their actual sustainable buying patterns (e.g. Gupta and Ogden, 2009; Moser, 2016; Reimers et al., 2016).

Despite the generally vast research attention behavioural gaps have received, many contributions identify a need for further research. Blok et al. (2015, p. 21) call for a greater understanding of "why this gap exists, and [of] how to ensure that attitudes, intentions and behaviours are aligned to sustainable outcomes". Similarly, Moser (2015) encourages further research on the ABG to determine the barriers to sustainable consumption. In the specific context of sustainable clothing, Hassan et al. (2016) deal with the intention-behaviour gap and argue that factors influencing the magnitude of this gap have not been systematically examined yet. Moreover, while numerous qualitative studies on sustainable consumption exist (e.g. Henninger et al., 2016; Longo et al., 2019; Shaw et al., 2016), Hassan et al. (2016) call for more quantitative studies which assess abounding qualitative findings from previous research. Johnstone and Tan (2015a, 2015b) encourage future research on the ABG for different product categories, assuming that sustainable consumer behaviour depends on the respective industry. Likewise, based on a recent literature review, Liobikienė and Bernatoniė (2017) strongly emphasise the importance of product specificity when investigating the determinants of sustainable purchase behaviour. While many authors have already dealt with behavioural gaps in some product categories, such as sustainable household products and foods (e.g. Aschemann-Witzel and Niebuhr Aagaard, 2014; Johnstone and Tan, 2015a, 2015b), a relatively limited amount of attention has been paid to sustainable clothing (e.g. Ha-Brookshire and Norum, 2011; Reimers et al., 2016), which is surprising, given the huge problems of unsustainability inherent in this industry (e.g. Chowdhury, 2017; Mair et al., 2016; Van der Velden and Vogtländer, 2017). In fact, quantitative research explicitly measuring the attitude-behaviour relationship in the context of sustainable clothing purchases is scarce (e.g. Butler and Francis, 1997).

Drawing on these research needs, this article investigates *how large the possible gap between a positive attitude towards sustainable clothing and sustainable clothing purchase behaviour is* (1st research question), and *which factors enhance (enablers) or hinder (barriers) sustainable clothing purchase behaviour* (2nd research question).

The remainder of the article is structured as follows. The next section briefly introduces the theoretical framework of this study which is based on Homer and Kahle's (1988) value-attitude-behaviour hierarchy. Additionally, it summarizes specific extant literature on sustainable consumption and develops hypotheses. Section 3.3 describes the sample and the structural equation model used to address the research questions. The results of the empirical analysis are presented in section 3.4. Section 3.5 discusses the findings of this study while the last section draws conclusions and implications for marketing practice, policy making and non-governmental action.

3.2 Theoretical framework, literature review and hypotheses development

3.2.1 Value-attitude-behaviour hierarchy

Homer and Kahle's (1988) value-attitude-behaviour hierarchy (VABH) is chosen as the theoretical framework for this study. It assumes an indirect effect of values on behaviour through attitudes, i.e. rather abstract values influence more specific attitudes which, in turn, influence particular behaviour patterns (Homer and Kahle, 1988). In contemporary social psychology, an attitude is usually defined as a person's evaluation of a certain object (Fabrigar and Wegener, 2010). Attitudes can be regarded as key antecedents of behaviour and are therefore an integral component of other behavioural models, such as the theory of reasoned action (TRA) (Fishbein and Ajzen, 1975) and the theory of planned behaviour (TPB) (Ajzen, 1991). Besides the attitude-behaviour relationship, which is essential to explain the ABG, the VABH also accounts for the influence of an individual's values. According to Rokeach (1973, p. 5), a value system refers to “an enduring organization of beliefs concerning preferable modes of conduct or end-states of existence along a continuum of relative importance”. Values are hence considered to be the guiding principles in a person's life (e.g. Schwartz, 1994, 1992) and to be relatively stable in the course of time (e.g. Rokeach, 1973; Stern, 2000). In research on pro-environmental and prosocial behaviour, values have been frequently cited as key determinants of behaviour (e.g. Dunlap et al., 1983; Lönnqvist et al., 2013; Schwartz, 2010; Urien and Kilbourne, 2011). To understand the ABG in sustainable clothing, it is therefore valuable to examine not only the interplay between attitudes and behaviour but also their relations to an individual's values.

Like other behavioural models, the VABH builds on the assumption that the behaviour of consumers is shaped by their attitudes (Homer and Kahle, 1988). Research studies using the cognitive hierarchy model (e.g. Do Paço et al., 2013; Grob, 1995), as well as other work on sustainable consumption (e.g. Laroche et al., 2001; Schuhwerk and Lefkoff-Hagius, 1995; Vermeir and Verbeke, 2006), have consistently supported this causal relationship. Usually, however, sustainable attitudes are only partially translated into respective purchase behaviour, which may lead to weak or even insignificant attitude-behaviour linkages (e.g. Chekima et al., 2017; Moser, 2016, 2015). Despite this, Do Paço et al. (2013) strongly emphasise the usefulness of attitudes as behavioural predictors. Correspondingly, earlier articles on sustainable clothing consumption (e.g. Butler and Francis, 1997; Hustvedt and Dickson, 2009) suggest that this general influence of attitudes on behaviour also holds true in the context of sustainable clothing purchases. The first hypothesis, therefore, applies the main premise of the VABH to this context:

Hypothesis H1 A positive attitude towards sustainable clothing enhances sustainable clothing purchase behaviour.

Nevertheless, the debate on the ABG has shown that attitudes alone tend to be insufficient predictors of sustainable buying patterns (e.g. Butler and Francis, 1997; Moser, 2016, 2015). According to the VABH, not only attitudes but values are critical for explaining behaviour (Homer and Kahle, 1988). Consequently, the key influence of values in sustainable consumption has been addressed by prior publications (e.g. Jägel et al., 2012; Ladhari and Tchegnä, 2015; Shaw et al., 2005). In research on pro-environmental and prosocial behaviour, many studies make use of Schwartz's (1994, 1992) theory of basic human values by distinguishing between self-transcendence values (reflecting collective interests) and self-enhancement values (reflecting one's own interests). They predominantly conclude that self-transcendence values rather promote, whereas self-enhancement values rather inhibit pro-environmental and prosocial attitudes and behaviour (e.g. De Groot and Steg, 2010; Schwartz, 2010; Steg et al., 2014b). In contrast, some studies argue that sustainable purchase behaviour, for instance in clothing, is driven by individual interests, such as enhancing social status, rather than collective interests (e.g. Davies and Gutsche, 2016; Harris et al., 2016; Liobikienė and Juknys, 2016). Jägel et al. (2012), in turn, stress that consumer preferences for sustainability-related clothing attributes are rooted in self-transcendence values. All in all, assuming that purchase decisions between conventional and sustainable clothing elicit conflicts between competing values, the following two sets of hypotheses are formulated. As values are sometimes not fully mediated through attitudes (e.g. Do Paço et al., 2013; Grob, 1995), also direct effects of values on behaviour are taken into account:

Hypothesis H2a Self-transcendence values enhance a positive attitude towards sustainable clothing.

Hypothesis H2b Self-enhancement values hinder a positive attitude towards sustainable clothing.

Hypothesis H3a Self-transcendence values enhance sustainable clothing purchase behaviour.

Hypothesis H3b Self-enhancement values hinder sustainable clothing purchase behaviour.

Although value-attitude-behaviour models have some explanatory power, they seem unable to explain behaviour comprehensively (e.g. Homer and Kahle, 1988; McCarty and Shrum, 1994). Research has therefore emphasised the need for extending the VABH (e.g. Do Paço et al., 2013; Milfont et al., 2010). In line with this, a common approach in narrowing behavioural gaps in research has been the identification of further variables improving the translation of, for instance, attitudes into behaviour (e.g. Chatzidakis et al., 2016; Vermeir and Verbeke, 2006). In sustainable clothing, studies have especially stressed the necessity to also consider aspects other than sustainability-related ones in explaining consumer behaviour (e.g. Harris et al., 2016; Jägel et al., 2012). Consequently, further potential enablers of, and barriers to, sustainable clothing purchases are integrated into the conceptual model to better explain behaviour and to strengthen the attitude-behaviour linkage.

3.2.2 Enablers

Earlier research on sustainable consumption highlights that good availability of products and services can be crucial for how convenient consumers perceive their shopping experience and whether or not they finally perform the purchase (e.g. Johnstone and Tan, 2015a; Nocella et al., 2012; Young et al., 2010). Consequently, limited product availability in sustainable clothing is found to be a major purchase barrier (e.g. Hassan et al., 2016; Hiller Connell, 2010; Shaw et al., 2006). Hassan et al. (2016), for instance, argue that the current market conditions with only little availability of sustainable clothing could explain parts of the discrepancy between the consumers' strong motivation to act sustainably and their actual purchase behaviour. A more differentiated picture is drawn by Hiller Connell (2010) who argues that although there is a limited supply of sustainable clothing in retail stores, wide ranges of sustainable clothing are already available online. In Germany, sustainable clothing is, in fact, predominantly sold via online shops and catalogues rather than retail stores (Utopia, 2018). Consumers with higher levels of online and catalogue shopping affinity may, therefore, perceive better access to sustainable clothing than consumers with a stronger preference for retail stores. Based on this rationale, the following hypothesis is formulated:

Hypothesis H4 Online and catalogue shopping affinity enhances sustainable clothing purchase behaviour.

In the sustainable consumption literature, quality has often been referred to as a highly purchase-relevant product feature (e.g. Boulstridge and Carrigan, 2000; Carrigan and Attalla, 2001; Iwanow et al., 2005). The perceived high quality of sustainable products is likely to promote (e.g. Aertsens et al., 2011; Mondelaers et al., 2009), whereas the perceived low quality of sustainable products is likely to impede (e.g. Bray et al., 2011; Gleim and Lawson, 2014) purchase behaviour. In clothing, consumers' quality needs usually refer to aspects of durability (e.g. Jägel et al., 2012; Niinimäki, 2010). Niinimäki (2010) stresses that consumers want sustainable clothing above all to be long-lasting. Reinforced by the era of fast fashion, product longevity has recently become a pressing issue in research debates on sustainable clothing (e.g. Laitala et al., 2015; Niinimäki and Hassi, 2011). To overcome social-ecological threats posed by growing sales volumes, it becomes increasingly important to not only switch to fair trade and organic clothing but to also purchase fewer items and use them for a longer period of time (Niinimäki and Hassi, 2011). Reimers et al. (2016) indicate that consumers associate attributes like durability with sustainable clothing. Following the logic of perceived durability benefits of sustainable clothing, hypothesis H5 is phrased as follows:

Hypothesis H5 A preference for durability enhances sustainable clothing purchase behaviour.

3.2.3 Barriers

Vergragt et al. (2014) highlight the necessity for a better understanding of not only enablers of but barriers to sustainable consumption. Similarly, Moser (2015, p. 167) argues that "the attitude behaviour gap should be scrutinized by further research to identify further barriers to green consumption". Several studies (e.g. Hassan et al., 2016; Joergens, 2006; Shaw and Tomolillo, 2004) indicate that poor fashionability of sustainable clothing can act as such a barrier. Fashion-conscious consumers may be reluctant to purchase and wear sustainable clothing if this involves personal sacrifices in their fashionable appearance and lifestyle (e.g. Jägel et al., 2012; Michaelidou and Dibb, 2006; Shaw and Tomolillo, 2004). However, newer design strategies, such as customization and modularity (Niinimäki and Hassi, 2011), offer possibilities to make sustainable clothing more adaptable to fashion trends in a sustainable manner. Dickson (2000) even shows that a desire for fashion positively influences purchase intentions towards sustainable clothing. Nevertheless, due to the ever-changing nature of clothing in general (Fletcher, 2012), and the old-fashioned image of sustainable clothing in particular (Dickenbrok and Martinez, 2018), the following hypothesis is formulated:

Hypothesis H6 Fashion consciousness hinders sustainable clothing purchase behaviour.

In clothing, like in many other industries, sustainable products tend to be more expensive than their conventional equivalents due to, for instance, additional labour costs and better raw materials (see Brécard et al., 2009). High prices of products and corresponding economic considerations of consumers are therefore often discussed as a major purchase barrier in sustainable clothing (e.g. Eifler, 2014; Goworek et al., 2012; Jägel et al., 2012; Shaw et al., 2005). In contrast, some researchers argue that premium prices are not a key barrier towards sustainable purchase behaviour as consumers tend to show a higher willingness to pay for sustainable products and services (e.g. Chekima et al., 2016; Ha-Brookshire and Norum, 2011; Nielsen, 2014). However, following the dominant logic that higher prices in sustainable clothing act as an impeding factor, hypothesis H7 is phrased as follows:

Hypothesis H7 Price sensitivity hinders sustainable clothing purchase behaviour.

Figure 3.1 illustrates the hypothesised relationships and presents the conceptual model developed to explain sustainable clothing purchase behaviour. The VABH as suggested by Homer and Kahle (1988) is the central building block of the conceptual model. Based on the VABH, it is expected that values influence behaviour (H3a, b), as well as the attitude (H2a, b) which, in turn, influences behaviour (H1). This streamlined model is extended by adding further influencing factors which are expected to enhance (H4; H5) or hinder (H6; H7) sustainable clothing purchase behaviour.

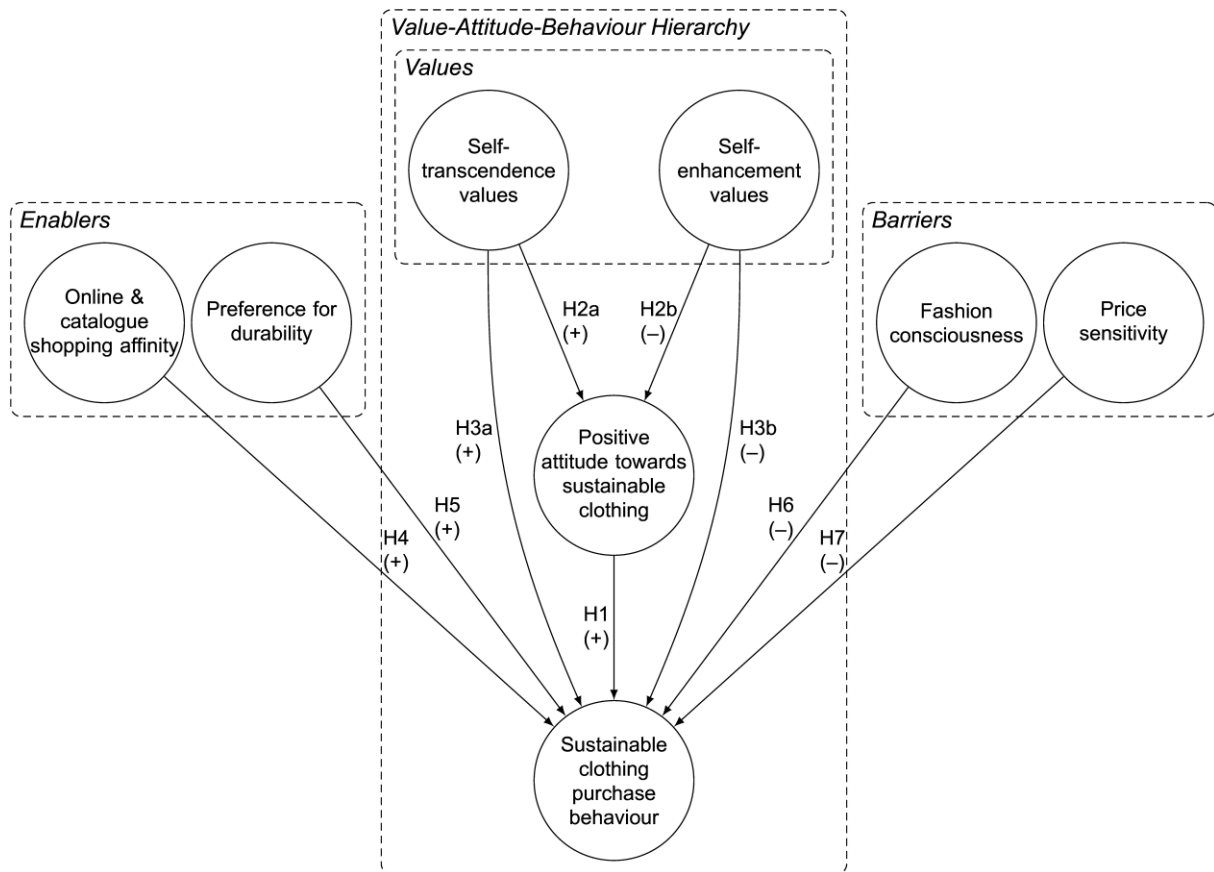


Figure 3.1 Conceptual model of sustainable clothing purchase behaviour based on an extension of the value-attitude-behaviour hierarchy

3.3 Method

3.3.1 Data collection and sample characteristics

The hypotheses were tested against empirical data from a market research study commissioned by a major German sustainable clothing company. The data was gathered through an online survey administered to German women recruited via an online panel. The survey design was based on the results of focus groups conducted in November 2012. 1085 usable questionnaires were completed during the survey period in March 2013.

The sample used avoids the typical representativeness bias associated with convenience or student samples (e.g. Antil, 1984; Reimers et al., 2016; Roberts, 1996). To conduct a meaningful statistical analysis with sufficient variation in the dependent variable, it was, furthermore, important not to draw on a sample of nearly exclusively conventional, i.e. non-sustainable, clothing buyers. Prior research has revealed that the typical sustainable consumer is female, younger to middle-aged and highly educated (e.g. Diamantopoulos et al., 2003; Koos, 2011; Starr, 2009), and that higher prices for sustainable clothing are one of the main purchase barriers (e.g. Hiller Connell, 2010; Shaw

et al., 2005). The survey was therefore administered to female consumers of the middle- to high-priced clothing segment in Germany, who were purposely chosen to be overrepresented in terms of the above-mentioned age and educational specifications. Table 3.1 presents a comparison of the socio-demographic composition of the sample with the female adult population of Germany.

Table 3.1 Socio-demographic composition of the sample compared to the female adult population of Germany

Socio-demographic consumer characteristic	Sample		Female adult population of Germany ^a
	n	%	%
	1085	100.0	100.0
Age			
Under 30 years old ^b	263	24.2	19.7
30–39 years old	261	24.1	13.4
40–49 years old	262	24.1	16.2
50–59 years old	208	19.2	17.5
60 years and older	91	8.4	33.2
Highest educational achievement			
Secondary modern school qualification at most	117	10.8	41.2
Secondary school certificate	435	40.1	32.1
University entrance qualification	310	28.6	13.1
University degree	223	20.6	13.6
Marital status			
Single	236	21.8	14.8
In partnership	295	27.2	11.5
Married	438	40.4	57.2
Divorced	95	8.8	6.8
Widowed	21	1.9	9.7
Number of children in household			
No children	696	64.1	56.8
One child	230	21.2	16.8
Two children	123	11.3	16.4
Three children and more	36	3.3	10.1

^a Figures of Gesellschaft für integrierte Konsumforschung (2016) based on data collected from 2014 to 2016

^b Minimum age of 14 years

The socio-demographic characteristics of table 3.1 were used as covariates in the subsequent analysis. Age, highest educational achievement and marital status were treated as categorical variables, which were represented by dummy variables. The number of children in the household was modelled as a numeric variable. All calculations of this article were performed with the statistical software R (version 3.3.1; R Core Team, 2016) using the package lavaan (version 0.5–22; Rosseel, 2012).

3.3.2 Operationalisation of constructs

Values

Recent research on pro-environmental and prosocial behaviour highlights the relevance of two main types of self-transcendence values [STV]: biospheric and altruistic values (e.g. De Groot and Steg, 2010; Grønhøj and Thøgersen, 2009). Self-enhancement values [SEV] are often defined as egoistic values making people focus on their personal resources, such as wealth, power and achievement (e.g. De Groot and Steg, 2008; Nordlund and Garvill, 2002; Urien and Kilbourne, 2011). To better understand environmentally relevant actions, Steg et al. (2014b) advance the widespread trilogy of biospheric, altruistic and egoistic values (e.g. Clark et al., 2003; Schultz, 2001; Stern et al., 1993) by adding hedonic values as another type of self-enhancement values. Hedonic values imply that people focus on improving their feelings and reducing their effort (Steg et al., 2014b). Drawing on this extended view, all four value types are covered by the value constructs of the conceptual model. More precisely, self-transcendence values and self-enhancement values were measured on five-point Likert scales (1 = 'totally disagree'; 5 = 'totally agree') by the following items⁴:

- 'An ecologically sound environment is very important to me' [stv1],
- 'Social responsibility is important to me' [stv2],
- 'Success in life is important to me' [sev1] and
- 'I frequently feel the urge to experience something intense and novel' [sev2].

Attitude

So far, research on sustainable clothing consumption has largely focused on either social criteria, such as fair manufacturing conditions (e.g. Dickson, 2001; Nicholls and Lee, 2006), or ecological criteria, such as organically-grown raw materials (e.g. Butler and Francis, 1997; Hiller Connell, 2010). Moreover, based on a review of sustainable consumption literature, Hassan et al. (2016) conclude that studies on the intention-behaviour gap mostly consider ecological rather than broader sustainable concerns. The notion of a positive attitude towards sustainable clothing [Att] pictured in this study aims to overcome these shortcomings by reflecting both dimensions of sustainability. The construct was therefore measured by two indicators based on the consumers' perceived attractiveness of the following two social-ecological attributes of a clothing item:

- 'Verifiably ecological from cultivation to delivery (100% ecological)' [att1] and
- 'Verifiably fair wages and fair working conditions (100% social standards)' [att2].

⁴ All items described in this article were translated from German.

Attractiveness of these attributes was queried on seven-point Likert scales (1 = 'very unattractive'; 7 = 'very attractive') and rescaled using individual attribute-specific importance ratings. The latter were also requested on seven-point Likert scales (1 = 'very unimportant'; 7 = 'very important').

Behaviour

Sustainable clothing purchase behaviour [Bhv] was operationalised as an individual's self-reported share of average annual expenses for organic clothing, in relation to their total average annual expenditure for clothing. A logit transform of this percentage [bhv1] was applied to approximate the empirical distribution more closely to a normal distribution.⁵ Considering that sustainable clothing purchase behaviour, as understood in the present research, is a clear-cut quantity construct, and not an abstract construct, using a single item for its measurement is a common approach (see, e.g., Hayduk and Littvay, 2012; Petrescu, 2013).

Enablers and barriers

Online and catalogue shopping affinity [OCSA] was measured by the relevance attributed to both online shopping and catalogue shopping as opposed to retail shopping. Respondents were asked to split up a total of 100% among the three channels named. Instead of the raw sum of relevance percentages of online and catalogue shopping, again, a logit transform of this total [ocsa1] was used for the actual measurement. Price sensitivity [PrSens] was measured by the importance rating of price as a product attribute of clothing [prsens1] on a seven-point Likert scale (1 = 'very unimportant'; 7 = 'very important'). As with behaviour, the constructs 'online and catalogue shopping affinity' and 'price sensitivity' are relatively narrow and clear-cut. A measurement approach using a single item is therefore appropriate (see, e.g., Hayduk and Littvay, 2012; Petrescu, 2013). Similar to attitude, the preference for durability [PrefDur] and fashion consciousness [FashC] reflect the consumers' perceived attractiveness of the respective attributes of a clothing item. For measuring the preference for durability, the highest two of four discrete values of the durability attribute were extracted as indicators. The items specifically account for the aspects of shape and colour communicated via a guarantee:

- 'High quality: shape and colour guaranteed for 5 years' [prefdur1] and
- 'Premium quality: shape and colour guaranteed for life' [prefdur2].

⁵ Before taking the logits, the interval boundaries of the percentage points were replaced from 0% and 100% to 0.5% and 99.5% to avoid numerical problems with infinite values. This adaption still allows for a clear differentiation from the value range, which extends beyond 1 to 99%.

Both items were rated on seven-point Likert scales (1 = ‘very unattractive’; 7 = ‘very attractive’) and rescaled according to an importance rating. Following the same procedure, fashion consciousness was based on the attractiveness ratings of two well-known conventional fashion brands [fashc1, fashc2] located in the middle to high price range. Again, both brand items were measured on seven-point Likert scales (1 = ‘very unattractive’; 7 = ‘very attractive’) and rescaled using an importance rating. An overview of the descriptive statistics of all presented indicators is given in table 3.2.

Table 3.2 Descriptive statistics of each construct's indicators

Indicator	Sample (n = 1085)	
	Mean	SD
Self-transcendence values [STV]		
Biospheric ^a [stv1]	4.140	0.910
Altruistic ^a [stv2]	4.099	0.885
Self-enhancement values [SEV]		
Egoistic ^a [sev1]	3.735	1.003
Hedonic ^a [sev2]	3.468	1.053
Positive attitude towards sustainable clothing [Att]		
Ecological clothing attribute ^b [att1]	0.798	0.835
Social clothing attribute ^b [att2]	1.005	0.791
Sustainable clothing purchase behaviour [Bhv]		
Share of expenses for organic clothing ^c [bhv1]	-2.040	2.324
Online and catalogue shopping affinity [OCSA]		
Share of relevance for online and catalogue shopping ^d [ocsa1]	0.156	1.877
Preference for durability [PrefDur]		
5-year shape and colour guarantee ^b [prefdur1]	0.241	0.708
Life-long shape and colour guarantee ^b [prefdur2]	0.311	0.860
Fashion consciousness [FashC]		
Fashion brand 1 ^b [fashc1]	0.649	0.790
Fashion brand 2 ^b [fashc2]	0.441	0.873
Price sensitivity [PrSens]		
Importance of price ^e [prsens1]	3.111	0.777

^a Five-point Likert scale (1 = ‘totally disagree’; 5 = ‘totally agree’)

^b Attractiveness rating measured on a seven-point Likert scale (1 = ‘very unattractive’; 7 = ‘very attractive’) and rescaled using an attribute-specific importance rating measured on a seven-point Likert scale (1 = ‘very unimportant’; 7 = ‘very important’)

^c Logit-transformed share of average annual expenses for organic clothing in relation to total average annual expenditure for clothing

^d Logit-transformed share of relevance score attributed to online and catalogue shopping as opposed to retail shopping

^e Seven-point Likert scale (1 = ‘very unimportant’; 7 = ‘very important’)

3.4 Results

3.4.1 Validity and reliability of constructs

To assess the validity and reliability of constructs, both an exploratory factor analysis (EFA) and a confirmatory factor analysis (CFA) were performed. The purpose of the EFA in this study was to prevalidate the measurement models of the latent variables rather than exploring a specific factor structure. As illustrated in table 3.3, the pattern matrix of the EFA closely corresponds to the factor structure posited in section 3.2. By means of principal axis factoring, eight factors were extracted, which explain around 71% of the total variance. There are no cross-loadings above 0.1 and the lowest loading on a target factor is still acceptable (0.568; sev1 on factor 7). All other loadings on target factors are at least 0.7.

Table 3.3 Pattern matrix of the exploratory factor analysis for pre-validating the measurement models of the constructs

Indicator	Construct/Factor ^{ab}							
	1 PrefDur	2 Att	3 FashC	4 STV	5 OCSA	6 Bhv	7 SEV	8 PrSens
stv1	-0.019	0.077	-0.028	0.695	-0.020	0.023	-0.020	0.025
stv2	0.002	-0.028	0.014	0.763	0.025	-0.006	0.014	-0.019
sev1	0.064	-0.082	0.051	0.084	-0.024	-0.034	0.568	-0.016
sev2	-0.070	0.084	-0.052	-0.079	0.023	0.033	0.809	0.022
att1	0.025	0.849	0.004	-0.017	-0.002	0.044	0.007	0.004
att2	0.012	0.825	0.015	0.065	-0.001	-0.054	0.006	-0.013
bhv1	0.006	-0.010	0.009	0.021	-0.002	0.987	0.003	0.000
ocsa1	0.007	-0.005	0.004	0.009	0.998	-0.002	0.003	-0.000
prefdur1	0.906	0.008	-0.036	-0.001	0.010	0.026	-0.019	-0.005
prefdur2	0.830	0.022	0.019	-0.016	-0.004	-0.021	0.004	0.017
fashc1	-0.050	0.003	0.770	0.007	0.005	-0.024	-0.042	0.048
fashc2	0.042	0.014	0.733	-0.020	-0.002	0.034	0.038	-0.046
prsens1	0.014	-0.010	0.009	0.004	-0.000	0.000	0.010	0.985
Variance extracted	11.8%	11.3%	8.7%	8.6%	7.7%	7.6%	7.4%	7.5%
Cumulative variance	11.8%	23.1%	31.8%	40.4%	48.0%	55.7%	63.1%	70.6%

Kaiser-Meyer-Olkin measure of sampling adequacy: 0.72

Bartlett's test of sphericity (approx. χ^2): 3,958.684 (df = 78; p-value < 0.001)

^a Extraction method: principal axis factoring; rotation method: promax rotation

^b Loadings with absolute value above 0.1 marked in bold face

The subsequent CFA served to verify the measurement models. Table 3.4 displays the maximum likelihood estimates of the fully standardised factor loadings with their respective 95% confidence intervals, as well as well-established reliability measures. The constructs are marked by

substantial factor loadings and adequate reliabilities. Only the ‘self-enhancement values’ construct barely falls short of widely recommended cut-off values (0.7 for α and ω ; 0.5 for AVE; e.g. Fornell and Larcker, 1981; Nunnally and Bernstein, 1994). Likewise, previous quantitative research has repeatedly shown that single constructs do not fulfil these reliability standards (e.g. Dickson, 2000; Homer and Kahle, 1988; Milfont et al., 2010). Bagozzi and Yi (2012) argue that the commonly used cut-off values for reliability measures should not be applied rigidly in the case of structural equation modelling. One should rather focus on the model fit and the conceptual relevance of constructs. Consequently, using the ‘self-enhancement values’ construct in the present context still seems appropriate. Error variances of single-indicator constructs (Bhv, OCSA and PrSens) were fixed so as to imply reliabilities of 0.85 – a conservative value chosen in line with pertinent recommendations (e.g. Fuchs and Diamantopoulos, 2009; Petrescu, 2013). The choice of this value had no effect on the model fit. Compared to the zero measurement error case, correlations between latent variables are slightly increased by compensating for the implied attenuating effect of the measurement error, as seen in table 3.5. The plausibility of the signs of the factor correlations and their limited magnitude suggest once more the validity of the constructs.

Table 3.4 Factor loadings and reliability measures of the confirmatory factor analysis for verifying the measurement models of the constructs

Construct (Factor)	Indicator	Factor loading ^a	95% confidence interval	Construct reliability ^b		
				α	ω	AVE
STV	stv1	0.779	[0.710; 0.849]	0.707	0.710	0.552
	stv2	0.702	[0.633; 0.770]			
SEV	sev1	0.771	[0.675; 0.867]	0.629	0.636	0.469
	sev2	0.595	[0.514; 0.676]			
Att	att1	0.882	[0.835; 0.928]	0.846	0.849	0.738
	att2	0.833	[0.784; 0.881]			
Bhv	bhv1	0.922	[0.879; 0.965]		(fixed at 0.850)	
OCSA	ocsa1	0.922	[0.864; 0.980]		(fixed at 0.850)	
PrefDur	prefdur1	0.888	[0.826; 0.950]	0.851	0.863	0.762
	prefdur2	0.850	[0.786; 0.915]			
FashC	fashc1	0.649	[0.563; 0.735]	0.712	0.737	0.592
	fashc2	0.856	[0.752; 0.959]			
PrSens	prsens1	0.922	[0.882; 0.962]		(fixed at 0.850)	

^a Estimation method: maximum likelihood estimation

^b α = Cronbach’s alpha; ω = McDonald’s omega; AVE = average variance extracted

Table 3.5 Factor correlations in the confirmatory factor analysis model

Correlation ^{ab}	STV	SEV	Att	Bhv	OCSA	PrefDur	FashC	PrSens
STV	1.000	0.353 ***	0.613 ***	0.427 ***	-0.003	0.286 ***	0.149 ***	0.159 ***
SEV	0.353 ***	1.000	0.067	0.027	-0.097 **	0.217 ***	0.345 ***	0.142 ***
Att	0.613 ***	0.067	1.000	0.440 ***	0.046	0.522 ***	0.118 **	0.186 ***
Bhv	0.463 ***	0.030	0.478 ***	1.000	0.061 +	0.136 ***	0.092 **	0.085 **
OCSA	-0.003	-0.105 **	0.050	0.071 +	1.000	0.044	-0.003	-0.028
PrefDur	0.286 ***	0.217 ***	0.522 ***	0.147 ***	0.048	1.000	0.306 ***	0.152 ***
FashC	0.149 ***	0.345 ***	0.118 **	0.100 **	-0.004	0.306 ***	1.000	0.151 ***
PrSens	0.172 ***	0.154 ***	0.202 ***	0.100 **	-0.033	0.165 ***	0.164 ***	1.000

^a Below (above) diagonal: alternative results with reliabilities of single-indicator constructs fixed at 0.850 (1.000)

^b Correlation coefficient; significance level: + $p \leq 0.10$; * $p \leq 0.05$; ** $p \leq 0.01$; *** $p \leq 0.001$

As is common with large sample sizes (e.g. Bagozzi and Yi, 2012; Bentler and Bonett, 1980), the chi-square statistic of the likelihood-ratio test for the goodness of fit is significant (scaled $\chi^2 = 97.796$; $df = 40$; $p < 0.001$). More informative is the chi-square statistic in relation to the degrees of freedom which signals a good fit by staying below the recommended value of 2.5 ($97.796 / 40 = 2.445$) (Homburg and Baumgartner, 1995). As the validity of the chi-square statistic is widely disputed, a number of other goodness-of-fit measures were consulted (robust CFI = 0.984; robust TLI = 0.969; robust RMSEA = 0.038 with a 90% confidence interval of [0.028; 0.047]; and SRMR = 0.020). They all indicate a very good fit of the model in respect of recommended cut-off values (e.g. Hair Jr. et al., 2013; Hu and Bentler, 1999; Kline, 2016).

3.4.2 Assessment of proposed model and hypotheses

For testing the conceptual model (figure 3.1), all measurement models from the CFA model were integrated into a full recursive structural equation model (SEM). Furthermore, all latent variables were regressed on the four socio-demographic covariates: age, highest educational achievement, marital status and number of children in the household. Table 3.6 compares the structural equation modelling results of a basic model, which accounts for the relationships between values, attitude and behaviour, and an extended model, which also integrates the enablers and barriers.

Table 3.6 Structural equation modelling results of the basic and the extended model explaining sustainable clothing purchase behaviour

Construct	Basic structural equation model (n = 1085)			Extended structural equation model (n = 1085)			Hypothesis ^c	
	β^a	SE	p-value ^b	β^a	SE	p-value ^b		
Regression								
Att on	STV	0.702	0.075	***	0.713	0.074	***	H2a s.
	SEV	-0.188	0.059	***	-0.193	0.055	***	H2b s.
Bhv on	STV	0.254	0.225	***	0.247	0.238	***	H3a s.
	SEV	-0.045	0.159		-0.042	0.181		H3b n. s.
	Att	0.283	0.154	***	0.339	0.192	***	H1 s.
	OCSA				0.063	0.040	*	H4 s.
	PrefDur				-0.118	0.127	**	H5 n. s.
	FashC				0.059	0.173		H6 n. s.
	PrSens				-0.016	0.101		H7 n. s.
OCSA on	STV				0.081	0.144		
	SEV				-0.150	0.131	**	
PrefDur on	STV				0.260	0.063	***	
	SEV				0.110	0.058	*	
FashC on	STV				-0.028	0.039		
	SEV				0.393	0.049	***	
PrSens on	STV				0.144	0.050	**	
	SEV				0.126	0.055	*	
Correlation								
STV with	SEV	0.460	0.026	***	0.455	0.025	***	
Att with	PrefDur				0.496	0.022	***	
	FashC				0.110	0.013	*	
FashC with	PrefDur				0.244	0.016	***	
Explained variance	29.7%			31.1%				
Goodness-of-fit statistics ^d								
Scaled χ^2	75.937 (df = 45; p = 0.003)			208.903 (df = 107; p < 0.001)				
Scaled χ^2 / df	1.688			1.952				
Robust CFI	0.986			0.974				
Robust TLI	0.967			0.943				
Robust RMSEA	0.026 (90% confidence interval: [0.015; 0.036])			0.030 (90% confidence interval: [0.024; 0.036])				
SRMR	0.012			0.018				

^a β = standardised path coefficient (regression or correlation coefficient); estimation method: maximum likelihood estimation

^b Based on the Wald test statistic; significance level: + p \leq 0.10; * p \leq 0.05; ** p \leq 0.01; *** p \leq 0.001

^c s. = supported; n. s. = not supported

^d CFI = comparative fit index; TLI = Tucker-Lewis index; RMSEA = root mean square error of approximation; SRMR = standardised root mean square residual

The basic SEM explains 29.7% and the extended SEM 31.1% of the variation in sustainable clothing purchase behaviour. As with the CFA model, the chi-square goodness-of-fit test statistic for the extended SEM shows a significant deviance (scaled $\chi^2 = 208.903$; $df = 107$; $p < 0.001$) but, again, the other criteria indicate a very good or at least, as for TLI, acceptable fit of the model (scaled $\chi^2 / df = 1.952$; robust CFI = 0.974; robust TLI = 0.943; robust RMSEA = 0.030 with a 90% confidence interval of [0.024; 0.036]; and SRMR = 0.018).

The path diagram of the extended SEM with maximum likelihood estimates of the fully standardised path coefficients is shown in figure 3.2. Hypothesised causal relationships were modelled as directed structural paths, as were regressions of each enabler and barrier construct (OCSA, PrefDur, FashC and PrSens) on both value constructs (STV and SEV). Correlations between constructs are represented by undirected paths.⁶

⁶ Only correlations involving the 'online and catalogue shopping affinity' and 'price sensitivity' constructs were excluded from the SEM, assuming that these constructs are of rather general nature. After controlling for personal values and socio-demographic criteria, they are expected to be mostly independent of each other and the more clothing-specific constructs, i.e. 'preference for durability', 'positive attitude towards sustainable clothing' and 'fashion consciousness'.

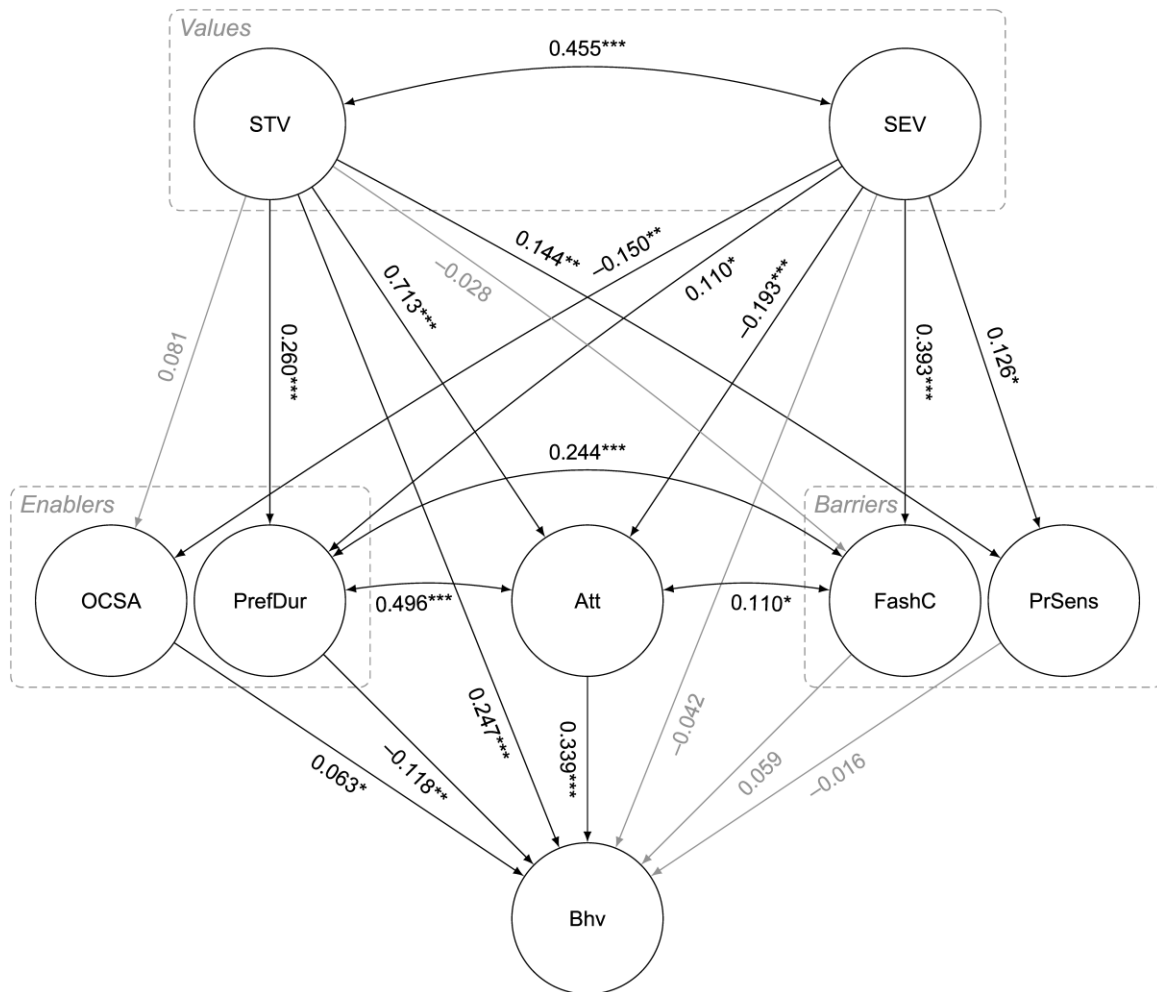


Figure 3.2 Path diagram of the extended structural equation model explaining sustainable clothing purchase behaviour (significance of standardised path coefficients based on the Wald test statistic; significance level: + $p \leq 0.10$; * $p \leq 0.05$; ** $p \leq 0.01$; *** $p \leq 0.001$)

In the SEM, the positive attitude towards sustainable clothing is found to have a positive direct effect on sustainable clothing purchase behaviour. Hypothesis H1 can thus be supported. Nevertheless, the path coefficient signals the existence of a large gap between attitude and behaviour in absolute terms ($1 - 0.339^2 = 0.885$). As shown in table 3.6, the path coefficients of the basic model are similar to those of the extended model, except for the direct effect of attitude on behaviour, which is stronger in the extended model.

As indicated in figure 3.2, self-transcendence (self-enhancement) values positively (negatively) affect the positive attitude towards sustainable clothing, as well as sustainable clothing purchase behaviour. According to table 3.7, both types of values exert a significant indirect influence on behaviour mediated through attitude. As implied by the VABH, values are associated more strongly with the attitude than with behaviour. The causal effect of self-transcendence values on attitude reveals by far the largest coefficient within the path diagram ($\beta = 0.713$ ***). A significant

direct effect of self-transcendence values on behaviour has also been identified, which is similar in size to the respective indirect effect. In contrast, the direct effect of self-enhancement values on behaviour is not found to be significant, i.e. the influence of self-enhancement values is fully mediated through the attitude. Hypotheses H2a, H2b and H3a, but not H3b, are therefore supported. Consequently, the results verify the basic causal relationships proposed by Homer and Kahle's (1988) VABH.

Table 3.7 Causal effects of self-transcendence and self-enhancement values on sustainable clothing purchase behaviour

	Causal effect ^a on sustainable clothing purchase behaviour [Bhv]		
	Direct	Indirect	Total
Self-transcendence values [STV]	0.247 ***	0.212 ^b ***	0.459 ***
Self-enhancement values [SEV]	-0.042	-0.067 ^c *	-0.109 *

^a Based on the Wald test statistic; significance level: + $p \leq 0.10$; * $p \leq 0.05$; ** $p \leq 0.01$; *** $p \leq 0.001$

^b Indirect effect mediated through the positive attitude towards sustainable clothing [Att]: 0.242***

^c Indirect effect mediated through the positive attitude towards sustainable clothing [Att]: -0.066**

With regard to further potential enablers, online and catalogue shopping affinity is found to enhance sustainable clothing purchases, supporting hypothesis H4. Strikingly, a significant negative effect of the preference for durability on sustainable clothing purchase behaviour has been identified, which contradicts hypothesis H5. Other than expected, both factors presumed to impede sustainable clothing purchases – fashion consciousness and price sensitivity – have no significant impact on sustainable clothing purchase behaviour. Neither of the corresponding hypotheses H6 and H7 can thus be supported. The impact of the sociodemographic covariates on the various constructs measured in the SEM is shown in the appendix. All in all, five out of nine hypotheses are supported by the present analysis.

3.5 Discussion

In line with much of the literature on sustainable consumption (e.g. Do Paço et al., 2013; Laroche et al., 2001; Vermeir and Verbeke, 2006), attitude is found to be a key antecedent of behaviour in sustainable clothing. However, the ABG can be considered relatively large because the positive attitude towards sustainable clothing explains only 11.5% of the variance in sustainable clothing

purchase behaviour. This finding supports previous research arguing that sustainable attitudes are only weakly translated into respective purchase behaviour (e.g. Moser, 2016, 2015). Overall, the results of this analysis reveal an adequate explanatory power of the VABH in the context of sustainable clothing purchases by explaining 31.1% of the variance in behaviour. Prior sustainable consumption studies based on the VABH (e.g. Do Paço et al., 2013; Grob, 1995) show similar levels of explanatory power. The explained variance is also in line with the typical 20–50% range identified with models such as the TRA or TPB (e.g. Armitage and Conner, 2001; Hassan et al., 2016), but well above figures reported by Hassan et al. (2016) and Butler and Francis (1997) in the specific sustainable clothing context (about 10% and 20%, respectively). This study shows that adding variables to the basic VABH model increases the proportion of explained variance in behaviour only by a small margin (basic model: 29.7%; extended model: 31.1%). However, similar to other studies on behavioural gaps (e.g. Chatzidakis et al., 2016; Vermeir and Verbeke, 2006), including additional variables substantially sharpens the direct effect of attitude on behaviour and therefore bridges the ABG (basic model: $\beta = 0.283^{***}$; extended model: $\beta = 0.339^{***}$).⁷

The results of this research also correspond to a large body of sustainable consumption literature (e.g. Jägel et al., 2012; Ladhari and Tchetgna, 2015; Shaw et al., 2005) by indicating that values play a key role in sustainable clothing. Moreover, in line with earlier studies (e.g. Schwartz, 2010; Steg et al., 2014b), biospheric and altruistic values seem to enhance, where egoistic and hedonic values seem to hinder, a positive attitude towards sustainable clothing, as well as sustainable clothing purchase behaviour. Clothing consumers thus tend to balance their trade-offs between competing values by choosing the products compatible with their individual value priorities (see Schwartz, 2010). Self-transcendence values especially exert a strong influence, which supports Jägel et al.'s (2012) reasoning on the importance of these values in sustainable clothing. Nevertheless, a large market potential seems to emanate from sustainability-minded consumers who prioritise self-enhancement motives (Davies and Gutsche, 2016). These consumers would focus more on the personal benefits of sustainable clothing, such as skin tolerance of organic fabrics and self-esteem gained by helping society (e.g. Ha-Brookshire and Norum, 2011; Jägel et al., 2012). The sustainable food market, for instance, is largely driven by health concerns of consumers (e.g. Aertsens et al., 2011; Chekima et al., 2017).

⁷ Chatzidakis et al. (2016) highlight that it is important to not only add variables to a model and measure their direct effect on behaviour, but to also test moderating variables influencing the attitude-behaviour relationship. Consequently, interaction effects were tested between the 'positive attitude towards sustainable clothing' construct and the 'online and catalogue shopping affinity', 'preference for durability', 'fashion consciousness' and 'price sensitivity' constructs. None of them is found to be significant.

Furthermore, the present article indicates that an affinity for online and catalogue shopping positively influences sustainable clothing purchase behaviour. This may be owed to the fact that sustainable clothing is mostly sold via online shops and catalogues rather than retail stores (e.g. Hiller Connell, 2010; Utopia, 2018). Following this logic, the findings also suggest that consumers who prefer retail shopping perceive reduced access to sustainable clothing. Earlier research has therefore identified limited product availability as a major purchase barrier in sustainable clothing (e.g. Hassan et al., 2016; Shaw et al., 2006). Sometimes, a lack of knowledge on where to purchase sustainable clothing rather than the actual lack of available products impedes consumer behaviour (Goworek et al., 2012). In contrast to the more established sustainable food sector which is characterised by a growing supply in supermarkets (Aschemann-Witzel and Niebuhr Aagaard, 2014), low product availability in retail stores seems to remain a key issue in the sustainable clothing niche. Overcoming this obstacle may have been too difficult for the still small and medium-sized sustainable clothing enterprises which are less economically capable than their larger conventional competitors (see Arnold, 2009).

This study's findings also show that a preference for durability affects sustainable clothing purchase behaviour. Previous research corroborates the fact that quality, especially durability, is a highly purchase-relevant product attribute in the sustainable clothing context (e.g. Iwanow et al., 2005; Jägel et al., 2012). In line with Niinimäki (2010), the substantial positive correlation between the preference for durability and the positive attitude towards sustainable clothing indicates that consumer needs for durability and social-ecological standards in clothing go hand in hand. A reason for this may be that durable clothing offers substantial sustainability benefits. By extending product lifetimes and reducing replacement purchases, improved durability of clothing could limit the negative environmental impacts from overconsumption, such as resource depletion and waste generation (Fletcher, 2012; see also, e.g., Cooper, 2005; Gnanapragasam et al., 2018).

Against the previous hypothesis, however, the present results on durability indicate that the stronger the preference for durability the less sustainable clothing is purchased. Earlier research has revealed that negative perceptions on the quality of sustainable products are likely to impede purchase behaviour (e.g. Bray et al., 2011; Gleim and Lawson, 2014); consumers may perceive sustainable clothing, such as fair trade and organic clothing, as less durable than conventional clothing. This could stem from either an actual shortfall of physical durability or a mere lack of pertinent consumer information in the sustainable clothing industry. On top of that, consumers may still preserve old stereotypes of sustainable clothing being of lower quality (Scaturro, 2008). Product design approaches such as robust materials and modular structures, as well as improved communication strategies, including the labelling of durability aspects (e.g. Fletcher, 2012; Laitala et al., 2015; Niinimäki and Hassi, 2011), could offer possible solutions to these issues. Following the

growing body of literature on sustainable business models (e.g. Bocken et al., 2014; Bocken and Short, 2016), a stronger service orientation could also foster product longevity. Product-service systems, for instance, offer great potential in intensifying the use phase of clothing by integrating services such as repairing, redesigning and renting into business practice (e.g. Armstrong et al., 2015; Piscicelli et al., 2015). Apart from a possible negative perception of sustainable clothing's durability, the present results could be solely based on a lack of sustainable clothing brands with a strong reputation for durability. Whereas there are a few conventional clothing companies offering, for instance, lifetime guarantees, the number of sustainable enterprises with an explicit focus on product longevity, such as Patagonia, seems to be very limited (The Manual, 2017). As consumers, however, tend to assess the durability of clothing based on cues such as brand name (Goworek et al., 2012), they may prefer conventional brands in terms of durability.

Fashion consciousness is found to neither hinder nor enhance sustainable clothing purchases. Compared to earlier research (e.g. Hassan et al., 2016; Joergens, 2006), this insight suggests that poor fashionability of sustainable clothing has ceased to be a purchase barrier. Likewise, Eifler (2014) claims that the old-fashioned image of sustainable clothing developed in the seventies no longer exists. Sustainable clothing may have become increasingly trendy, with more and more start-ups having entered the market (Dickenbrok and Martinez, 2018). Aside from that, consumer needs in clothing may have changed. Laitala et al. (2015), for instance, conclude that poor fashionability used to be a major driver for disposing of clothing but, recently, other factors such as poor durability have become more important.

The hypothesised negative effect of price sensitivity on sustainable clothing purchase behaviour cannot be supported either. The lack of statistical significance may be explained by the composition of the sample. Consumers of middle- to high-priced clothing are overrepresented, whereas price sensitivity may be strongest within the low-priced clothing segment. Also, even if many previous studies judge a high price to be a major purchase barrier in sustainable clothing (e.g. Eifler, 2014; Goworek et al., 2012; Hiller Connell, 2010), others counter by revealing a higher willingness to pay for sustainable products and services (e.g. Chekima et al., 2016; Nielsen, 2014).

Concerning the effect of socio-demographic variables on sustainable clothing purchase behaviour, this study corresponds to earlier research which finds that the typical sustainable consumers are middle-aged and highly educated (e.g. Koos, 2011; Starr, 2009). Finally, this study's findings suggest that there may be further relevant determinants explaining sustainable clothing purchase behaviour. Besides the ones tested, previous research in sustainable clothing has stressed the relevance of aspects such as consumer information, knowledge and trust, as well as the impact of social norms (e.g. Eifler, 2014; Hiller Connell, 2010; Shaw et al., 2006).

3.6 Conclusions and implications

By developing and empirically testing a model of sustainable clothing purchase behaviour, this article deepens the understanding of the ABG in sustainable clothing. Based on a large sample of female German consumers, an SEM was estimated to assess the magnitude of the ABG and the impact of possible enablers of, and barriers to, purchase behaviour. The contributions of this large-scale quantitative study are manifold. To the best knowledge of the authors, the VABH was applied to the context of sustainable clothing purchases for the first time. The model was enriched by the differentiation between self-transcendence and self-enhancement values, and additional enablers and barriers. Furthermore, the article indicates the existence of a considerable gap between a positive attitude towards sustainable clothing and actual sustainable clothing purchase behaviour (1st research question). The findings also show that, on the one hand, a positive attitude towards sustainable clothing, self-transcendence values and online and catalogue shopping affinity enhance sustainable clothing purchases. On the other hand, self-enhancement values and, remarkably, a preference for durability act as barriers (2nd research question). Fashion consciousness and price sensitivity do not influence behaviour significantly. In terms of influential strength, the positive attitude towards sustainable clothing and self-transcendence values are found to be the key determinants. All in all, despite the identified attitude-behaviour inconsistency, the study emphasises the high importance of a positive attitude towards social-ecological clothing standards, as well as biospheric and altruistic values, of sustainable clothing buyers. The findings also provide an indication that nowadays there is a greater need to improve durability rather than fashionability in sustainable clothing.

Based on the findings of this study, various practical implications can be derived for marketing, policy making and nongovernmental action aiming at stimulating sustainable clothing consumption. First, policymakers and non-governmental organisations (NGOs) should further develop educational measures for sustainable development to strengthen a positive attitude towards sustainable clothing, as well as self-transcendence rather than self-enhancement values, in society. While values are usually hard to change in the short run, such a context-specific attitude could be established more quickly by providing concrete information about sustainability issues in clothing. A contribution of marketers to an attitude and value change is also recommended – for instance, by improving transparency about the companies' sustainability efforts in general, and their products' social-ecological benefits in particular. In order to address consumers who are strongly guided by self-enhancement values as well, marketing communication could better account for the personal benefits of sustainable clothing, such as skin tolerance and self-esteem. Second, the availability of sustainable clothing in retail stores should be increased to also attract the consumers less willing to

shop online and via catalogues. As captive retail stores may be too costly for sustainable clothing enterprises, alliances with established retailers could be a feasible alternative. Furthermore, as there may be consumers who are unaware of the already existing offerings, better information on where to purchase sustainable clothing, such as via shopping guides, could increase the perceived availability to some extent. Third, all actors in sustainable clothing should understand durability as an important dimension of product sustainability. Integrating this aspect into sustainability marketing practice is highly recommended to improve the perception of sustainable clothing brands in terms of durability. This can be done, for instance, by offering longer lasting clothing based on durable designs and respective services. Communicating better consumer information on the clothing's durability is another viable approach, which could also involve the work of policymakers and NGOs. By targeting particularly durability-oriented consumers, sustainable clothing companies could activate unused market potential. Likewise, conventional clothing companies specialising in durability may be well-advised to offer more sustainability benefits, such as organic fabrics, in order to expand their customer group.

In terms of methodology, the findings of this study are statistically robust, but not free of limitations. First, the results may be subject to error due to the self-reported nature of all answers recorded. Social desirability bias, for instance, could have led to an over-reporting of socially desired concepts such as sustainable clothing purchase behaviour, the positive attitude towards sustainable clothing and self-transcendence values. As a consequence, the estimate of the ABG may be distorted. Future research is challenged to better account for such sources of error – for instance, by using multi-dimensional scales to quantify the degree of social desirability. Second, the construct of self-enhancement values shows relatively low levels of validity and reliability. It is therefore advisable for future studies to measure values by using well-established scales. Likewise, the measurement of other constructs could be enhanced with additional items. Third, only a few enablers and barriers with respect to sustainable clothing purchases have been identified. Despite the reasonable explanatory power of the SEM, a large part of the variation in purchase behaviour remains unexplained. Future research should address further potential determinants, such as a consumer's knowledge, trust and social norms, in order to investigate which ones further narrow the ABG in sustainable clothing. For those factors with no significant behavioural effect, i.e. fashion consciousness and price sensitivity, it may be worthwhile trying to identify yet undiscovered confounders which could mask an actual causal effect. Fourth, as the sample contains only German women, this study's findings cannot be extrapolated to the entire clothing market. For generalising the results, future replication and extension studies should draw on larger samples including men, as well as consumers from different countries.

In conclusion, the present findings suggest that, in order to narrow the ABG in sustainable clothing, market actors should strengthen sustainability-oriented attitudes and values in society, as well as improve the clothing's durability and availability in retail stores. This could help to translate the rising public attention sustainability in clothing receives into higher levels of demand for sustainable clothing. However, the overall goal should not simply be to replace conventional with sustainable clothing purchases but to reduce consumption and production levels in clothing in order to reach a real change towards sustainability. Consequently, the next steps in practice and research should also focus on business models aiming at the product lifetime extension of clothing.

3.7 Appendix

Appendix See figure 3.3.

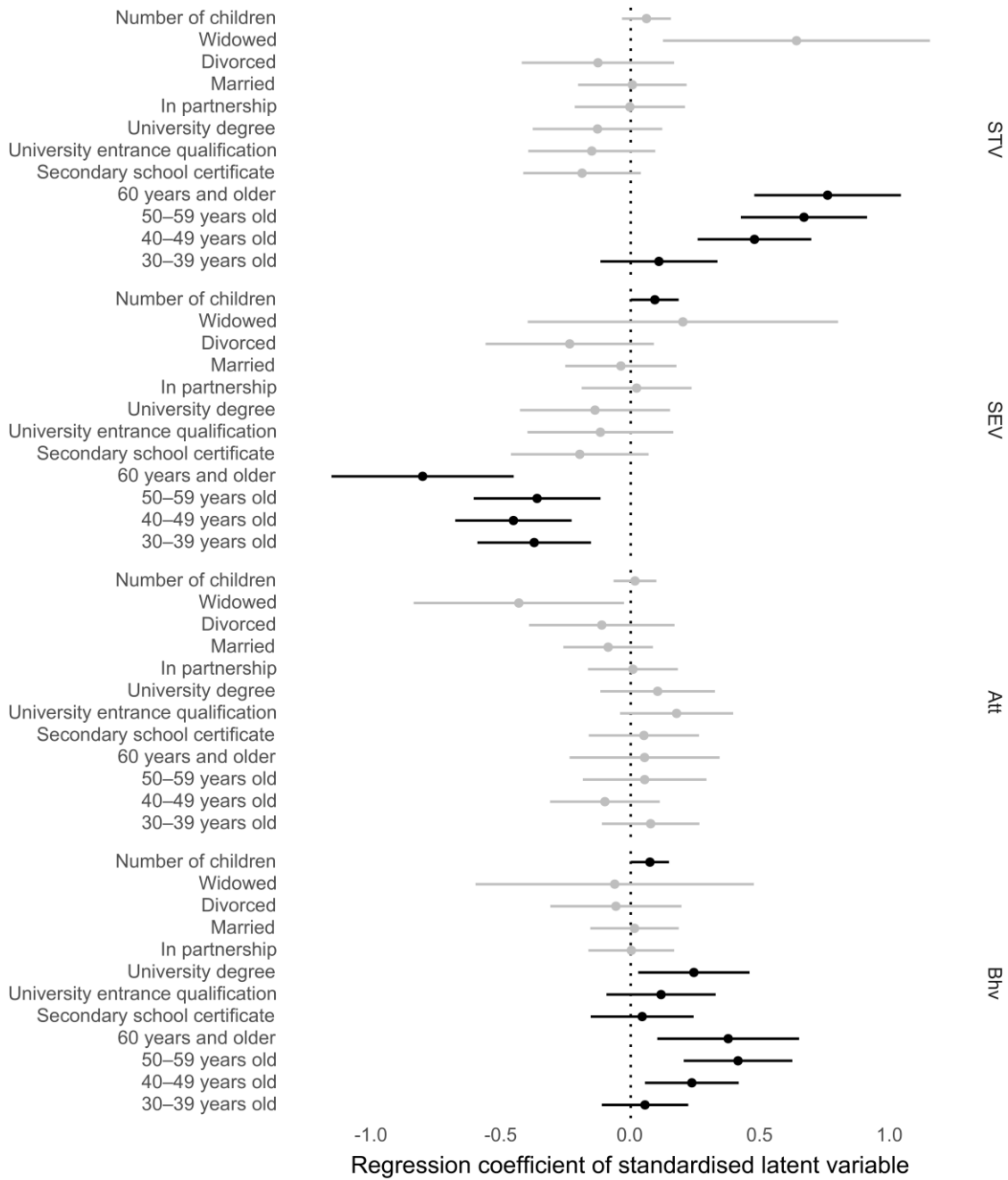


Figure 3.3 Impact of socio-demographic covariates on the constructs in the structural equation model (point estimates and 95% confidence intervals; joint significance of standardised regression coefficients for each covariate based on the omnibus Wald test statistic; black = significant ($p \leq 0.05$); grey = insignificant ($p > 0.05$))

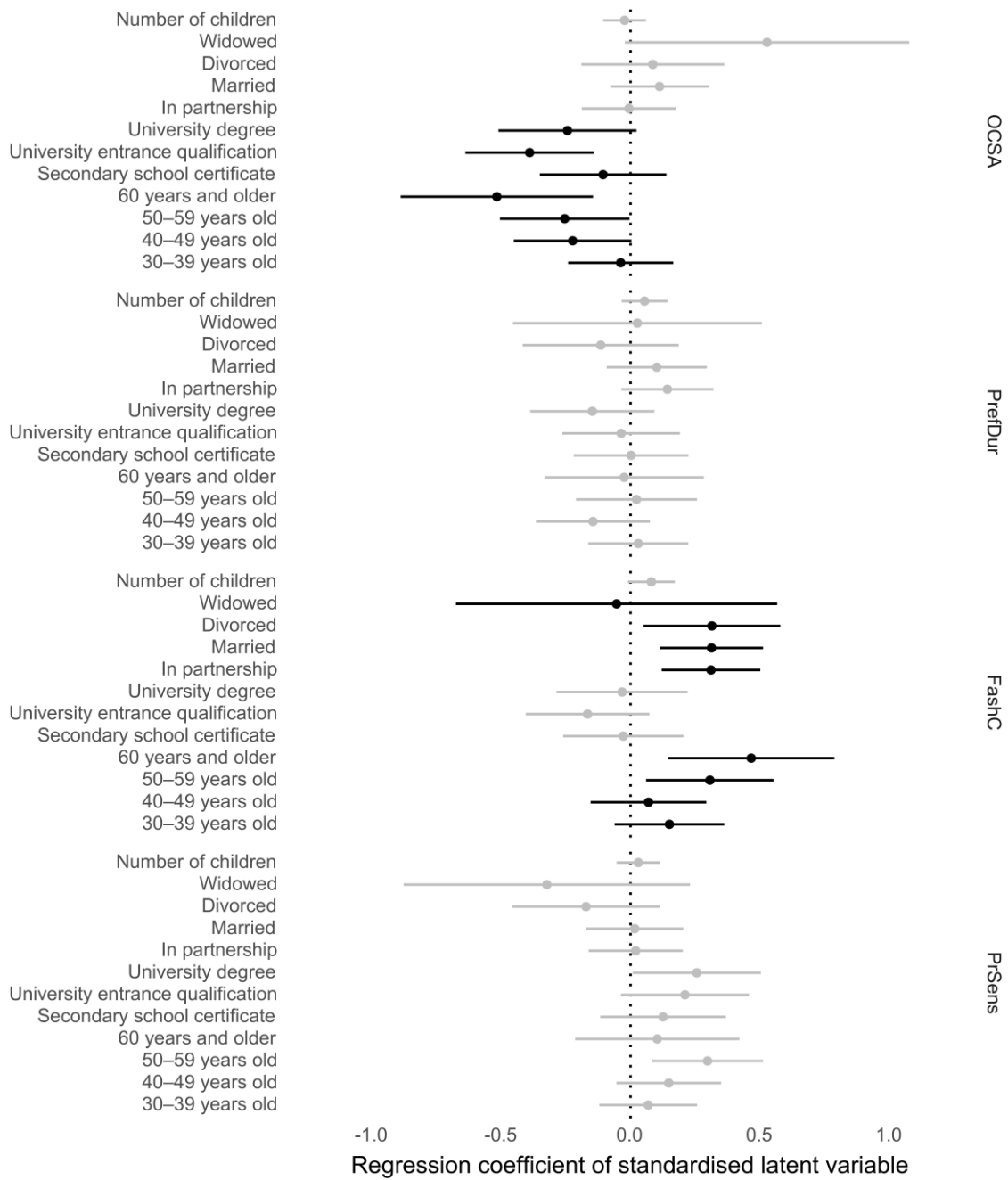


Figure 3.3 (continued)

Chapter 4

Article III – The influence of product lifetime labelling on purchase decisions

Contextual transition

The following chapter presents the third article on the determinants of sustainable purchase behaviour in the context of electrical appliances. The article examines the influence of product lifetime labelling on purchase decisions as well as the motivational drivers of consumer preferences for product longevity. A conceptual model for explaining the preference for a long lifetime of electrical home appliances is developed, in addition to further hypotheses on the purchase influence of the product lifetime label. The study follows an interdisciplinary theoretical approach by combining the consumer theory of Lancaster (1966) with the theory of reasoned action (Ajzen and Fishbein, 1980; Fishbein and Ajzen, 1975) – two complementary frameworks from economics and social psychology. Lancaster's consumer theory (1966) postulates that preferences are not directed to a product or service as such, but to its characteristics. It is well suited for investigating decision-making processes in multi-attribute choice contexts but less for explaining potential heterogeneity in preferences (Nocella et al., 2012). For this reason, the theory of reasoned action is consulted which belongs to the most prominent social-psychological theories in research on sustainable consumption (see, e.g., Joshi and Rahman, 2015; Liobikienė et al., 2016). According to the theory, intention for a specific behaviour is determined by the attitude towards the behaviour and the corresponding subjective norm (Ajzen and Fishbein, 1980; Fishbein and Ajzen, 1975). Due to its lower predictive power in choice contexts (Sheppard et al., 1988), Lancaster's consumer theory is chosen as the main theoretical framework and enriched with elements of the theory of reasoned action. Consequently, attitudes based on personal and environmental gains as well as subjective norm are defined as direct psychographic antecedents of the preference. To gain deeper insights into the underlying motivational structure, self-enhancement, self-transcendence and openness-to-change values are also integrated as determinants into the conceptual model. While the first two studies of the doctoral thesis each use one theory from a particular discipline, the third article thus combines an economic with a socio-psychological perspective within one framework. Using choice-based conjoint analysis, experimental online survey data was collected from a population-representative sample of 499 German consumers. Instead of analysing preferences expressed by rating product or service profiles, the more recent choice-based conjoint analysis examines stated choice data collected under hypothetical purchase decision scenarios. Choice-based conjoint analysis is thus considered more realistic than rating-based techniques. Preference estimation was based on Hierarchical Bayes utility modelling which is considered the state-of-the-art approach in analysing choice-based conjoint data since it accounts for heterogeneity in preferences (e.g. Huber and Train, 2001; Orme and Chrzan, 2017). Finally, a structural equation model was estimated to test the conceptual model. The influence of sociodemographic covariates was also accounted for in the structural equation model.

Abstract

Improving the durability of products has recently become an objective of environmental and consumer policy in the European Union. One of the most discussed measures in this respect is the introduction of a product lifetime label for electrical appliances. In line with the political debate, research has shown that consumers have an unmet need for better information on the lifetime of products. However, empirical findings about the effects of product lifetime labelling on purchase behaviour are rare. This article addresses the research gap by studying the influence of product lifetime labelling in the context of electrical appliances. Based on a conceptual model that combines the consumer theory of Lancaster with the theory of reasoned action, motivational drivers of preferences for product longevity are also investigated. Using choice-based conjoint analysis, experimental survey data is collected from a population-representative sample of 499 German consumers. Hierarchical Bayes utility modelling suggests a decreasing positive effect of the label on purchase decisions and a deterioration of the purchase influence of existing brands compared to new brands. Structural equation modelling indicates that the preference for a long product lifetime is fostered by the positive attitude and the subjective norm towards purchasing long-lasting electrical home appliances. However, the attitude only exerts a substantial influence if it is driven by personal rather than environmental gains. It is further documented that biospheric values enhance, while stimulation values inhibit, both attitude types. Hedonic values only enhance the attitude based on personal gains. Policymakers are informed about the label's potential to stimulate the supply of, and demand for, more durable electrical home appliances. Business practitioners should focus on business models for product longevity which account for product variety and up-to-dateness, and communicate the personal benefits of product longevity.

Keywords

Choice-based conjoint analysis, Consumer preferences, Consumer theory of Lancaster, Electrical home appliances, Hierarchical Bayes estimation, Product lifetime labelling, Purchase decisions, Structural equation modelling, Sustainable consumption, Theory of reasoned action, Willingness to pay, Values

4.1 Introduction

The past debate on sustainable consumption has focused on substituting conventional products and services with more sustainable ones, rather than on reducing consumption as such (Prothero et al., 2011). Consequently, the extension of product lifetimes has received relatively little attention in research and practice (e.g. Bakker et al., 2014; Van Nes and Cramer, 2005), despite its considerable potential for limiting negative environmental impacts (e.g. Cooper, 2010; Prakash et al., 2016). Product lifetime refers to the period from acquisition to disposal of a product, and is determined both by the consumer's willingness to keep the product in use and by the product's functional durability (Cox et al., 2013). There is empirical evidence that the lifetime of products in Europe has reduced over time. Study results from the German electrical appliance industry, for example, show that the average product lifetime of some product categories has decreased from 2004 to 2013. In the case of large home appliances, it was even observed that the proportion of appliances replaced after only five years has risen sharply (Prakash et al., 2016). The main reason for replacing electrical home appliances has been technical failure (Hennies and Stamminger, 2016; Prakash et al., 2016). As a result, improving the lifetime and, in particular, the durability of products has recently become an objective of environmental and consumer policy in the European Union (EU) (e.g. European Economic and Social Committee, 2013; Montalvo et al., 2016). One of the most discussed measures in this respect is the introduction of a product lifetime label¹ for electrical appliances. The underlying idea is that greater transparency for consumers about expected product lifetimes will stimulate the supply of, and demand for, long-lasting products (e.g. Montalvo et al., 2016; Sircome et al., 2016).

Labelling the lifetimes of electrical appliances can also be viewed critically. First, the ecological relevance of a long product lifetime has been questioned, as it counteracts the previous energy-saving paradigm. So far, consumers have been advised to replace still-functioning appliances with new, more energy-efficient ones (Oeko-Institut, 2018). However, recent life-cycle based research comparing the environmental impacts of appliances with varying levels of product lifetime and energy efficiency suggests that extending the product lifetime can lead to overall environmental

¹ In line with the political discourse, the product lifetime label examined in this article indicates the expected lifetime of a product from a technical point of view. In the following, product lifetime, therefore, refers only to the durability aspect of product lifetime. Furthermore, the label is framed as a comparison label. According to Wiel and McMahon (2005), comparison labels are mandatory labels which enable consumers to compare the performance of all products of the labelled product categories, whereas endorsement labels are voluntary seals of quality that are awarded according to defined criteria and thus only label the best performing products. In the field of energy labelling, Heinzle and Wüstenhagen (2012) argue that comparison labels are more widely used and have triggered innovations towards energy-efficient products. Likewise, mandatory labelling schemes are also claimed to be more effective than voluntary ones in the context of product lifetime (Artinger et al., 2018; Maitre-Ekern and Dalhammer, 2016).

benefits (e.g. Ardente and Mathieux, 2014; Bakker et al., 2014; Bobba et al., 2016). Likewise, the German Oeko-Institut (2018, p. 5) concludes that “(n)umerous studies on products such as notebooks and washing machines show that a long-lasting appliance is generally more eco-friendly – despite advances in energy efficiency”. This is mainly due to the resource-intensive production phase and the slowed pace of energy efficiency improvements (Oeko-Institut, 2018). Second, the feasibility of testing expected product lifetimes has often been mentioned as an area of concern (e.g. Stamminger et al., 2018; Maitre-Ekern and Dalhammer, 2016). For some product categories, such as televisions, lifetime tests seem impossible due to long test durations (Prakash et al., 2018), while for other product categories, such as washing machines, tests are already used in practice (see, e.g., the German consumer organisation Stiftung Warentest, 2018, and the German washing machine manufacturer Miele, 2019a). However, testing the lifetime of washing machines is still very time-consuming² and thus problematic in view of a mandatory labelling scheme that would require testing all washing machines available on offer (Stamminger et al., 2018). An attempt to solving this issue can be found in Stamminger et al. (2018) who have started to develop a framework for a standardised durability test based on accelerated testing applications.

In line with the political debate, research has shown that consumers have an unmet need for better information on the lifetime of products (e.g. Cooper, 2004; Cooper and Christer, 2010; Cox et al., 2013). The results of a consumer survey by Cooper (2004) reveal that the majority of respondents consider existing information on product lifetime to be inadequate. Likewise, on the basis of group discussions, Cox et al. (2013, p. 27) reason that “consumers lack the information on which to make robust assessments of potential lifetime”. The need for information arises from the difficulty consumers have in assessing durability at purchase (Akerlof, 1970). In contrast to search attributes that can easily be evaluated before purchase, experience attributes such as durability can only be evaluated after purchase (Darby and Karni, 1973; Nelson, 1970). Consequently, consumers orient themselves towards quality signals such as brands which, however, tend to be insufficient (e.g. Cox et al., 2013; Erdem and Swait, 1998). A label indicating the expected lifetime of a product could therefore considerably reduce the information asymmetry between consumers and manufacturers and might activate hidden consumer preferences for product longevity.

Although much consumer research has already dealt with sustainability labels such as energy labels (e.g. Grankvist et al., 2004; Heinzle and Wüstenhagen, 2012; Sammer and Wüstenhagen, 2006), empirical findings about the influence of product lifetime labelling on purchase behaviour are

² For example, testing a washing machine for an average lifetime of 12.5 years (Boyano Larriba et al., 2017) based on 220 standard washing cycles per year (European Commission, 2010) would require more than one year of testing by means of a conventional life test (Stamminger et al., 2018).

rare (e.g. Artinger et al., 2018; Wilhelm, 2012). To the author's best knowledge, Wilhelm's (2012) study is the only academic study that examines how mandatory information on the expected product lifetime affects purchase decisions. Based on an experimental survey which was answered by US-American students, Wilhelm (2012) finds that consumer information about the number of years a mobile phone is designed to function properly significantly affects consumer preferences. Beyond this, recent studies commissioned by political institutions in the EU have started to analyse product lifetime labelling for different product groups (Artinger et al., 2018; Prakash et al., 2018; Sircome et al., 2016). Contradictory results are presented for the German electrical appliances market. Prakash et al. (2018) observe that a mandatory product lifetime label leads to a significant shift towards more purchases of appliances with a longer lifetime, whereas Artinger et al. (2018) conclude that such a label has hardly any effects on purchase decisions.

Consequently, it remains largely unclear how consumers would react to the introduction of a product lifetime label. Likewise, previous studies have identified a need for future research on how product lifetime labelling affects purchase behaviour (e.g. Cox et al., 2013; Wilhelm, 2012). Cox et al. (2013) also stress that academic research should be consulted in addition to policy evidence. Furthermore, especially marketers of long-lasting products would benefit from insights into the underlying motivations of consumers who prefer a long product lifetime. Evans and Cooper (2010), however, state that acquisition preferences related to product lifetime have not been addressed systematically in research. Apart from secondary results of some studies (Sircome et al., 2016; Wilhelm, 2012), there is a lack of in-depth knowledge about how psychographic antecedents such as attitudes and values influence purchase decisions towards long-lasting products. Addressing these research gaps, this article investigates *what influence a product lifetime label exerts on purchase decisions* (1st research question), and *what motivational drivers precede consumer preferences for product longevity* (2nd research question).

The research questions are addressed using the example of electrical appliances. On the one hand, a large part of the political interest and the resulting commissioned research has centred on this product group (e.g. Artinger et al., 2018; Prakash et al., 2018), which thus provides useful preliminary information. On the other hand, in contrast to sustainable consumption of low-involvement products such as groceries, sustainable consumption of electrical appliances constitutes an underdeveloped field of research that has concentrated on aspects of disposal and energy consumption (McDonald et al., 2009; Prothero et al., 2011). Since purchase behaviour with regard to product lifetime can vary widely for different electrical appliances (Cox et al., 2013; Evans and Cooper, 2010), the application field was further narrowed down to the category of electrical home appliances. Compared to consumer electronics, for example, the durability of electrical home appliances tends to be of greater importance for consumers (Cox et al., 2013).

The remainder of this article is structured as follows. The next section briefly introduces the theoretical framework of this study, which is based on a combination of the consumer theory of Lancaster (1966) and the theory of reasoned action (Ajzen and Fishbein, 1980; Fishbein and Ajzen, 1975). Building upon this, hypotheses are developed. Section 4.3 provides details on the sample as well as the methods used to address the hypotheses. The results of the empirical analysis are presented in section 4.4 and discussed in section 4.5. The last section draws conclusions for policymakers, business practitioners and researchers; and summarises the limitations of this study.

4.2 Theoretical framework and hypotheses

4.2.1 Interdisciplinary approach

For addressing the research questions, this study follows an interdisciplinary theoretical approach (see Nocella et al., 2012, for a similar approach). By combining the consumer theory of Lancaster (1966) with the theory of reasoned action (TRA) (Ajzen and Fishbein, 1980; Fishbein and Ajzen, 1975), two complementary frameworks from economics and social psychology are merged. Lancaster's well-established economic theory postulates that consumer preferences are not directed to a product or service as such, but to its characteristics (Lancaster, 1966). The theory is therefore well suited to examining decision-making processes in multi-attribute choice contexts (Nocella et al., 2012). Various consumer studies, including those on sustainable purchase behaviour, have already applied the Lancastrian framework (e.g. Bronnmann and Asche, 2017; Lebeau et al., 2012; Scott, 2002). It thus provides a sound basis for measuring consumer preferences for certain product attributes such as product lifetime. Lancaster's consumer theory is, however, less useful in explaining potential heterogeneity in preferences (Nocella et al., 2012). For this reason, the TRA, a forerunner of the theory of planned behaviour (TPB) (Ajzen, 2005, 1991, 1985), is consulted.³ TRA and TPB belong to the most prominent social-psychological theories in research on sustainable consumption (see, e.g., Joshi and Rahman, 2015; Liobikienė et al., 2016; Vermeir and Verbeke, 2008). According to the TRA, intention for a specific behaviour is determined by the attitude towards the behaviour and the corresponding subjective norm (Ajzen and Fishbein, 1980; Fishbein and Ajzen, 1975). Due to the

³ The only difference between the TRA and TPB is that the latter also accounts for consumers' perceived behavioural control which refers to factors that can impair or facilitate the behaviour in question (Ajzen, 2005, 1991, 1985). It is assumed that perceived behavioural control does not have a substantial impact on consumer preferences for product longevity in this study, because a major barrier to purchasing long-lasting products, namely the lack of adequate consumer information on product lifetime (e.g. Cooper, 2004; Cox et al., 2013), is deliberately removed. More precisely, preferences for different levels of product lifetime are measured on the basis of choice experiments which explicitly communicate the expected product lifetime via labelling (see section 4.3.2).

TRA's lower predictive power in choice contexts (Sheppard et al., 1988), Lancaster's consumer theory is chosen as the main theoretical framework and enriched with elements of the TRA. Consequently, attitude and subjective norm are defined as direct psychographic antecedents of consumer preferences for product longevity. In the following, hypotheses for both research questions are developed.

4.2.2 The influence of a product lifetime label on purchase decisions

The studies recently commissioned on product lifetime labelling predominantly show that a mandatory label can have a positive effect on purchasing electrical home appliances (Artinger et al., 2018; Prakash et al., 2018; Sircome et al., 2016).⁴ However, they all lack a detailed analysis of how consumer preferences for different levels of product lifetime are shaped. With regard to the well-researched energy label, Sammer and Wüstenhagen (2006) and Sonnenberg et al. (2014) reveal that the utility consumers derive from the energy efficiency of washing machines increases linearly with an improvement in the energy efficiency class. However, in contrast to high energy efficiency, a long product lifetime can have disadvantages for consumers. Previous research suggests that consumers may be afraid of missing progress on certain product features such as design, performance or energy efficiency if they commit to product longevity (e.g. Cooper, 2004; Cox et al., 2013). In the area of consumer electronics (mobile phones), Wilhelm's (2012) study indeed points to a decreasing positive effect of product lifetime information on consumer preferences. Although consumer electronics are more exposed to fashion and innovation cycles (Cox et al., 2013), the aforementioned consumer concerns may also apply to purchases of long-lasting electrical home appliances. Based on this rationale, the first hypothesis is formulated as follows:

Hypothesis H1 The positive influence of a product lifetime label on purchase decisions for electrical home appliances decreases with an increase in product lifetime.

The introduction of a product lifetime label could activate consumer preferences for product lifetime, but also weaken the influence of other product characteristics on purchase behaviour. Brand is usually named as one of the most purchase-relevant attributes of electrical home appliances (e.g. Artinger et al., 2018; Sammer and Wüstenhagen, 2006). In general, brands fulfil various functions for consumers such as the function of building trust. The latter addresses the ability of brands to reduce consumers' perceived risk of making wrong purchase decisions by providing quality

⁴ Only Artinger et al. (2018) could not identify significant effects for most of the tested product categories such as washing machines.

signals (Meffert et al., 2018). Consumers thus rely heavily on brands when assessing the durability of electrical home appliances at the point of purchase (Cox et al., 2013). Previous studies on sustainability labelling, however, indicate that labels can partially take over the role of brands (e.g. Heinzle and Wüstenhagen, 2012; Jaffry et al., 2004). For example, Jaffry et al. (2004) investigate the introduction of certified seafood and find that all factors, including the sustainability label, significantly influence purchase decisions – except for the brand. It is therefore argued that the introduction of a product lifetime label can lead to a reduction in quality signals conveyed by existing brands. New brands, however, may remain unaffected as they have not yet been able to build trust in terms of durability. The following hypothesis transfers this logic to the choice context:

Hypothesis H2 The introduction of a product lifetime label negatively affects the influence of existing brands – compared to new brands – on purchase decisions for electrical home appliances.

4.2.3 Motivational drivers of consumer preferences for product longevity

In line with the theoretical framework, it is reasoned that consumers' preference for a long lifetime of electrical home appliances is determined by their positive attitude and subjective norm towards purchasing long-lasting electrical home appliances. According to the TRA, an attitude is defined as the degree to which a behaviour is positively or negatively valued, based on beliefs about the expected outcomes of the behaviour (Ajzen, 2019).⁵ Several studies have shown that a positive attitude towards purchasing sustainable products and services fosters the corresponding purchase intention (e.g. Robinson and Smith, 2002; Vermeir and Verbeke, 2008; Yadav and Pathak, 2017). Usually, these studies do not differentiate between the underlying expected outcomes of attitude. However, consumers may be motivated by two different types of potential outcomes when purchasing long-lasting products: personal gains, such as saving money (e.g. Brook Lyndhurst, 2011; Maitre-Ekern and Dalhammer, 2016), and environmental gains, such as protecting resources (e.g. Cooper, 2010; Prakash et al., 2016). Previous research suggests a positive effect of personal gains on consumer preferences for product longevity, while the impact of environmental gains is less straightforward (e.g. Brook Lyndhurst, 2011; Cooper and Evans, 2010). On the one hand, Cooper and Evans (2010) conclude that positive environmental attitudes are only weakly translated into product lifetime optimising behaviour. Wilhelm (2012) even finds that such attitudes do not affect the importance consumers ascribe to lifetime information of mobile phones. On the other hand, consumer research on voluntary simplicity and frugal lifestyles indicates that environmental motives

⁵ Following the modelling principle of parsimony, the subsequent conceptual model is limited to the positive attitude towards purchasing long-lasting electrical home appliances.

stimulate simplified consumption practices such as using products for a long time (e.g. Craig-Lees and Hill, 2002; Pepper et al., 2009). Ultimately, even if environmental gains tend to play a lesser role, it is argued that both types of attitude strengthen the preference as hypothesised below:

Hypothesis H3a The positive attitude towards purchasing long-lasting electrical home appliances based on personal gains positively influences the preference for a long lifetime of electrical home appliances.

Hypothesis H3b The positive attitude towards purchasing long-lasting electrical home appliances based on environmental gains positively influences the preference for a long lifetime of electrical home appliances.

Subjective norm refers to the perceived social pressure to perform or not to perform a behaviour (Ajzen, 2019).⁶ Research on sustainable consumption has already shown that social norms towards purchasing specific products or services can enhance respective behavioural intentions. Nevertheless, the need for further research in this respect is stressed (e.g. Demarque et al., 2015; Phipps et al., 2013; Vermeir and Verbeke, 2008). In addition, Cooper and Evans (2010) indicate that pressure exerted by important others such as family members and friends is crucial for explaining consumption behaviours related to product lifetime. Another hypothesis is thus phrased as follows:

Hypothesis H4 The subjective norm towards purchasing long-lasting electrical home appliances positively influences the preference for a long lifetime of electrical home appliances.

To gain deeper insights into the underlying motivational structure of consumers' preference for a long lifetime of electrical home appliances, the values of consumers are also examined. Values define relatively stable guiding principles in a person's life (e.g. Rokeach, 1973; Schwartz, 1994; Stern, 2000) and are often conceptualised as direct antecedents of attitudes (e.g. Ajzen, 2012a; Homer and Kahle, 1988). Based on Schwartz's (1994, 1992) theory of basic human values, studies on pro-environmental and prosocial behaviour commonly distinguish between self-enhancement values (reflecting one's own interests) and self-transcendence values (reflecting collective interests). They predominantly conclude that self-enhancement values inhibit, whereas self-transcendence values enhance pro-environmental and prosocial attitudes (e.g. Jacobs et al., 2018; Schwartz, 2010; Steg et al., 2014b). Jacobs et al. (2018), for instance, find a negative influence of self-enhancement values, and a positive influence of self-transcendence values, on consumers' positive attitude towards sustainable clothing. In contrast to that, it can be reasoned that the positive attitude towards the specific pro-environmental behaviour of purchasing long-lasting products is fostered by both types of

⁶ Following the modelling principle of parsimony, the subsequent conceptual model is limited to the subjective norm towards purchasing long-lasting electrical home appliances, i.e. towards performing the behaviour.

values. As explained above, the attitude may be driven by personal and environmental gains, which reflect similar individual interests as self-enhancement and self-transcendence values, respectively. The study by Jacobs et al. (2018) already provides an empirical indication in this regard, since the authors also observe that consumers' affinity for durable clothing is strengthened by both value types. Furthermore, the following hypotheses account for Steg et al.'s (2014b) empirical distinction between two value clusters each for self-enhancement values (egoistic and hedonic values) and self-transcendence values (biospheric and altruistic values). Steg et al. (2014b, p. 187) stress the importance of including all four value dimensions in environmental research "to better understand individual attitudes, preferences, and choices". Consequently, two sets of hypotheses are formulated:

Hypothesis H5a Egoistic values positively influence the positive attitude towards purchasing long-lasting electrical home appliances based on personal gains.

Hypothesis H5b Hedonic values positively influence the positive attitude towards purchasing long-lasting electrical home appliances based on personal gains.

Hypothesis H6a Biospheric values positively influence the positive attitude towards purchasing long-lasting electrical home appliances based on environmental gains.

Hypothesis H6b Altruistic values positively influence the positive attitude towards purchasing long-lasting electrical home appliances based on environmental gains.

Furthermore, due to the specific nature of the environmental consumption behaviour in question, it is reasoned that stimulation values also have explanatory power. Stimulation values are a form of openness-to-change values and reflect consumer needs for novelty and variety (Schwartz, 1994, 1992). Such values are by nature likely to undermine activities that aim for a long product life. Consumer studies have emphasised that stimulation values trigger variety-seeking tendencies in purchase behaviour (e.g. Sharma et al., 2010; Steenkamp and Baumgartner, 1995). In addition, it has been shown that consumers prematurely replace products due to a desire for variety (e.g. Cooper and Evans, 2010; Cox et al., 2013). It is therefore hypothesised that stimulation values inhibit a positive attitude towards purchasing long-lasting electrical home appliances regardless of whether it is motivated by personal or environmental gains:

Hypothesis H7a Stimulation values negatively influence the positive attitude towards purchasing long-lasting electrical home appliances based on personal gains.

Hypothesis H7b Stimulation values negatively influence the positive attitude towards purchasing long-lasting electrical home appliances based on environmental gains.

Figure 4.1 summarises the hypothesised relationships within a conceptual model developed to explain consumers' preference for a long lifetime of electrical home appliances. All hypotheses of this study are tested empirically by means of choice-based conjoint analysis and structural equation modelling as described in the subsequent sections.

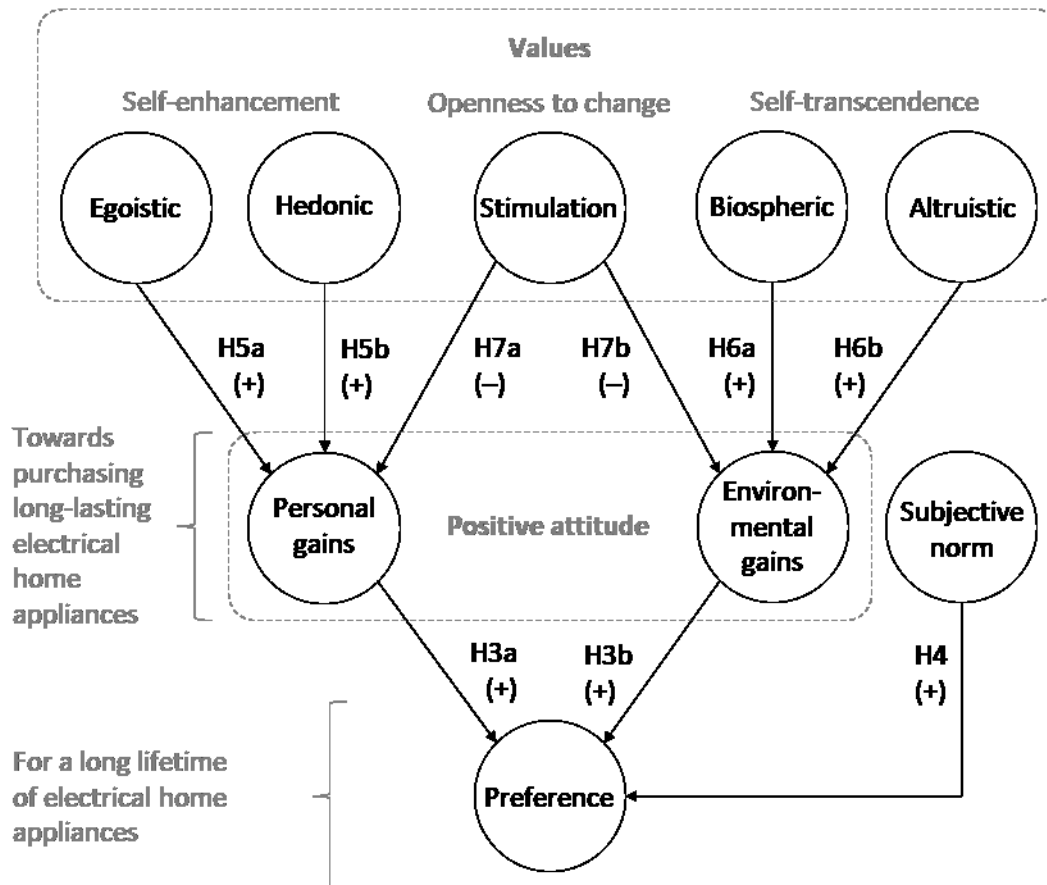


Figure 4.1 Conceptual model of consumers' preference for a long lifetime of electrical home appliances

4.3 Methods

4.3.1 Data collection and sample characteristics

Data was gathered through an experimental online survey administered to German consumers, who were recruited via an online panel. 571 questionnaires were completed during a seven-day survey period in May 2019. After the deletion of speeders, a total of 499 usable questionnaires remained for subsequent analyses. A representative sample of the German population was drawn to enable population-based conclusions. This also takes into account the demand for samples better reflecting the general population, as set out in Wilhelm's (2012) study which itself is only based on a student

sample. Quota sampling was used with quota targets for gender, age and highest educational achievement derived from micro-census data of the German adult population (Statistisches Bundesamt, 2018). In order to verify population representativeness, chi-square tests were performed to test the marginal distributions of the final sample for homogeneity with those of the German adult population regarding the aforementioned socio-demographic characteristics (see, e.g., Krause and Battenfeld, 2019, for a similar approach). An overview of the input and output factors of all chi-square tests is given in table 4.1. No statistically significant differences are found between the sample's and the population's composition in terms of gender, age and highest educational achievement. In the subsequent analyses, these categorical variables are used as covariates⁷ represented by dummy variables.

Table 4.1 Socio-demographic composition of the sample compared to the German adult population

Socio-demographic characteristic	German population ^{ab}	Sample			Chi-square test		
		%	Observed n	Expected n	χ^2	df ^c	p-value
	100.0	100.0	499	499			
Gender							
Female	50.7	50.7	253	253	0.000	1	0.996
Male	49.3	49.3	246	246			
Age							
15–29 years old	19.5	19.4	97	97	4.072	4	0.396
30–39 years old	14.8	12.0	60	74			
40–49 years old	15.5	15.2	76	78			
50–59 years old	18.8	18.8	94	94			
60 years and older	31.4	34.5	172	157			
Highest educational achievement							
No school-leaving qualification	7.8	6.6	33	39	1.056	4	0.901
Secondary modern school qualification	33.8	33.9	169	168			
Secondary school certificate	26.5	27.3	136	132			
University entrance qualification	14.4	14.8	74	72			
University degree	17.6	17.4	87	88			

^a Figures based on micro-census data projected to year 2017 (Statistisches Bundesamt, 2018)

^b Adult population of Germany aged 15 years and above

^c df = degrees of freedom

⁷ In addition, socio-demographic data on the financial situation as well as the number of persons and the number of children in the household was collected. Since these potential covariates did not significantly improve the fit of the structural equation model presented in section 4.4.3, they were removed from the subsequent analyses.

4.3.2 Choice-based conjoint analysis

Preliminary considerations

In consumer research, conjoint analysis refers to a bundle of multivariate methods used to examine the structure of consumer preferences for combinations of attributes that form products or services (Rao, 2014). The consumer theory of Lancaster (1966), which was introduced in section 4.2.1, provides a theoretical framework for conjoint analysis. The fundamental principle of traditional conjoint analysis is to decompose a consumer's overall preference judgments for multi-attributed alternatives into separate attribute-specific utility values (Green and Rao, 1971). Instead of analysing preferences expressed by rating product or service profiles, the more recent choice-based conjoint (CBC) analysis examines stated choice data collected under hypothetical purchase decision scenarios. CBC analysis is considered more realistic than rating-based techniques. The process of making trade-offs among competing attribute level combinations and of choosing the most preferred alternative is closer to actual market activity (Rao, 2014). Based on the theory of random utility maximization (McFadden, 1974), CBC analysis has its roots in discrete choice analysis methods (e.g. Ben-Akiva and Lerman, 1991; Louviere et al., 2000). It is currently considered the most widely used type of conjoint analysis (Sawtooth Software, 2017). Many CBC studies have already been conducted in the context of sustainable consumption (e.g. Nocella et al., 2012; Sammer and Wüstenhagen, 2012; Scherer et al., 2018), but not yet related to product lifetime (Lieder et al., 2018; Wilhelm, 2012). By using CBC analysis, this article differs greatly from the few studies commissioned on product lifetime labelling (Artinger et al., 2018; Prakash et al., 2018; Sircome et al., 2016), which are based on less sophisticated research methods. Moreover, the chosen method corresponds to Gnanapragasam et al.'s (2018, p. 914) recommendation to use choice modelling approaches to "better establish the extent to which reliability and longevity factor into consumers' purchasing decisions".

Questionnaire design

A computer-assisted CBC questionnaire was designed for each of two consecutive CBC exercises to compare consumer preferences before and after the introduction of the product lifetime label. The first CBC exercise involved a series of seven and the second CBC exercise a series of nine choice tasks on purchasing a washing machine. For each choice task, respondents were asked to choose one out of three washing machines that differed in their levels of a number of attributes, including a product lifetime label for the second exercise. They could also indicate that they would not buy any of the presented alternatives (none option) so that the choice tasks appear more realistic (Parker and

Schrift, 2011).⁸ A washing machine was chosen as the object of purchase for the following reasons. First, it is a typically utilitarian product which is primarily purchased for its functional properties (Mugge and Schoormans, 2012). Quality aspects of a washing machine such as durability are therefore important purchase criteria (Cox et al., 2013). Consequently, this type of electrical home appliance provided a suitable basis to start investigating the possible effects of product lifetime labelling. The low importance of design aspects also reduced the number of attributes required to realistically present washing machines in choice tasks. Second, the production of large electrical home appliances is very resource-intensive. As implied in section 4.1, long-lasting washing machines, therefore, have an overall positive effect on the environment, even if further improvements in energy and water efficiency will be achieved in the future (Oeko-Institut, 2018). Third, lifetime tests for washing machines already exist in practice (e.g. Miele, 2019a; Stiftung Warentest, 2018). Fourth, washing machines have already been in the centre of earlier conjoint research (e.g. Sammer and Wüstenhagen, 2006; Shin et al., 2018; Sonnenberg et al., 2014), which could thus serve the experimental design considerations of this study.

The washing machine profiles had to be equipped with the attributes most important to consumers (Rao, 2014). For testing the first two hypotheses on the impact of product lifetime labelling (H1, H2), particularly the product lifetime label and brand had to be considered. Following pertinent recommendations in conjoint literature towards a small number of attributes (e.g. Green and Srinivasan, 1990; Rao, 2014), three more characteristics were chosen, namely energy consumption, equipment version and price. Energy consumption is usually highly purchase relevant in the context of energy-consuming products, especially since it largely determines the regular operating costs of consumers during the product usage phase (e.g. Heinzle and Wüstenhagen, 2012; Sammer and Wüstenhagen, 2006). Equipment version was included to take account of consumer preferences for different equipment features. Although its purchase relevance was considered comparatively low for washing machines, its inclusion made the choice tasks more realistic for the respondents. Price is a fundamental purchase criterion and usually displayed in a CBC questionnaire. The choice of attributes largely corresponds to the attributes most frequently used in previous conjoint studies on washing machines (e.g. Codini et al., 2012; Sammer and Wüstenhagen, 2006; Sonnenberg et al., 2014)⁹. It is also in line with the core features of washing machines highlighted in

⁸ For each CBC exercise, the introduction text and one exemplary choice task are shown in appendix 1.

⁹ Some studies also added water consumption as a product characteristic (e.g. Codini et al., 2012; Shin et al., 2018). Since attributes with overlapping meanings should be avoided in CBC questionnaires (Sawtooth Software, 2019), water consumption was not considered in the present work. Compared to energy consumption, water consumption shares the meaning of resource efficiency but tends to be less relevant for purchase (Codini et al., 2012; Sammer and Wüstenhagen, 2006).

the commissioned studies on product lifetime labelling (e.g. Artinger et al., 2018; Prakash et al., 2018).

Pursuant to conjoint literature (e.g. Green and Srinivasan, 1990; Orme, 2002), not more than five levels per attribute were specified to ensure precision in utility estimation. The levels of brand, energy consumption, equipment version and price were defined so as to largely cover the product spectrum available on the German market.¹⁰ Similar to Codini et al. (2012) and Sammer and Wüstenhagen (2006), the selected brands represent the high-priced (Miele), middle-priced (Siemens) and low-priced (Beko) washing machine segment. Besides, a new brand (new brand) was added due to the special interest in measuring consumer preferences for existing brands compared to new brands. The minimum level of energy consumption was chosen to be slightly lower than the actual industry minimum to account for possible future advances in energy efficiency. Two levels of equipment version seemed sufficient as consumers can principally choose between standard wash programmes and functionalities, as well as extra features. The price levels cover the prices at which washing machines are predominantly sold in Germany (200 to 800 €), as well as two even higher prices. The latter served to realistically reflect washing machines with particularly attractive combinations of attribute levels which, in the second CBC exercise, can also include long product lifetimes. The product lifetime label, defined as a mandatory label indicating the expected number of years a washing machine will function without restriction, spans five levels. The lowest level (5 years) represents the minimum actual life of washing machines often reported in Germany (Hennies and Stamminger, 2016; Prakash et al., 2016). The highest level (25 years) was set above the maximum lifetime currently tested on the German market (20 years by Miele, 2019a), as washing machines have lasted even longer in the past (Hennies and Stamminger, 2016; Prakash et al., 2016). An overview of the final set of attributes and their levels is given in table 4.2¹¹.

¹⁰ For this purpose, data from four German online comparison portals and one major German online retailer was analysed prior to data collection.

¹¹ In order to increase the perceived realism of the experimental setting, all presented washing machines were also characterised by fixed attributes which usually vary little on the market (see, e.g., Sammer and Wüstenhagen, 2006, for a similar approach). For instance, already 81% of sold washing machines in Germany were labelled with the highest energy efficiency class A+++ in 2015 (Michel et al., 2016). When having defined the varying attributes, the fixed attributes were taken into account so that, for example, the selected levels of energy consumption conform to the energy efficiency class A+++.

Table 4.2 Attributes and attribute levels of washing machines in the choice tasks

Attribute	Attribute level	
	1st CBC exercise	2nd CBC exercise
Brand	Miele	Miele
	Siemens	Siemens
	Beko	Beko
	New brand	New brand
Energy consumption ^{ab}	80 kWh/year	80 kWh/year
	120 kWh/year	120 kWh/year
	160 kWh/year	160 kWh/year
	200 kWh/year	200 kWh/year
Equipment version	Standard* with extras**	Standard* with extras**
	Standard*	Standard*
Price	200 €	200 €
	500 €	500 €
	800 €	800 €
	1100 €	1100 €
	1400 €	1400 €
Product lifetime label ^a		25 years
		20 years
		15 years
		10 years
		5 years

* Standard:

Wash programmes: e.g. hot, coloured, mixed, delicates, easy care, wool, eco, quick

Functions: e.g. start time delay, remaining time display, consumption adjustment to load

** Extras:

Wash programmes: e.g. sports, shirts, allergy, baby clothes, bedding, jeans, animal hair

Functions: e.g. smartphone control, consumption display, automatic detergent dosing

Fixed attributes:

Type: Front-loader

Load capacity: 7 kg

Energy efficiency class (EU energy label): A+++

Maximum spin speed: 1400 revolutions per minute

^a Energy consumption and product lifetime tested based on an average use and 220 washes per year

^b kWh = kilowatt hours

The choice tasks were generated according to a controlled random experimental design using the balanced overlap method (Chrzan and Orme, 2000). For each CBC exercise, it was thus ensured that each respondent's questionnaire version was marked by balanced overlap (modest degree of repetitions of attribute levels within choice tasks), level balance (approximately the same number of occurrences of each level belonging to one attribute) and near orthogonality (near proportionality of each joint occurrence of any two levels of different attributes to the product of their marginal

frequencies) (e.g. Rao, 2014; Sawtooth Software, 2017). These properties serve the statistical efficiency of an experimental design in measuring main and interaction effects of utilities (Sawtooth Software, 2017). The design efficiency was successfully tested prior to data collection by performing a logit efficiency test and investigating the resulting standard errors of the estimated effects based on simulated data (Sawtooth Software, 2019). Furthermore, seemingly unrealistic combinations of attribute levels, e.g. a premium brand with a low price or with a low product lifetime, were deliberately kept in the experimental design. According to pertinent literature, prohibitions should generally be avoided as they can lead to inefficient designs. Instead, respondents should be encouraged to respond as if all products were actually available (Orme, 2002), which was the strategy chosen for this study (see appendix 1). All CBC-related data collection and analysis procedures of the present article were carried out by using Sawtooth Software's Lighthouse Studio (version 9.7.0). All other calculations were performed with the statistical software R (version 3.5.2; R Core Team, 2018).

4.3.3 Structural equation modelling

Operationalisation of constructs

Structural equation modelling was used to test the remaining hypotheses on consumer preferences for product longevity (H3a–H7b; see figure 4.1). In addition to the CBC exercises, respondents were therefore confronted with questions revealing their basic values as well as their positive attitudes and subjective norm towards purchasing long-lasting electrical home appliances. All question blocks for the independent latent variables were placed after the last choice task to protect the stated choice data against priming effects. The items of the five value constructs were adopted from validated German translations (European Social Survey, 2016; Schmidt et al., 2007) of the portrait values questionnaire (PVQ) scale (Schwartz et al., 2001). The PVQ is a well-established measure of basic human values derived from the original Schwartz Value Survey (Schwartz, 1992). Since the basic PVQ provides little information on biospheric values, the respective construct was enriched with two items derived from the environmental PVQ scale (Bouman et al., 2018; Schwartz et al., 2012; Steg et al., 2014b), which were translated into German.

The positive attitude and subjective norm constructs were developed in accordance with the specifications of the TRA. Both attitude constructs were measured indirectly by a series of potential behavioural beliefs linking the act of purchasing long-lasting electrical home appliances to personal or environmental gains. Following an expectancy-value approach, ratings on the strength and evaluation of each behavioural belief were queried and then multiplied to generate the attitudinal

items (e.g. Ajzen, 2019; Ajzen, 2012b; Ajzen, 2006). Items on personal gains were generated based on insights of the few previous consumer studies in the context of product lifetimes (e.g. Brook Lyndhurst, 2011; Cox et al., 2013). As a result, they cover the aspects of using a product for a long time (item 1), saving money in the long term (item 2) and avoiding inconvenience related to premature repairs and replacement purchases (item 3). Environmental gains were derived from literature on the environmental benefits of product longevity such as reduction of waste (item 1), protection of resources (item 2) and reduction of ecological footprints (item 3) (e.g. Cooper, 2010; Prakash et al., 2016). The subjective norm construct was queried by direct measures since the research interest was in examining the overall concept of perceived social pressure (e.g. Ajzen, 2019; Ajzen, 2006). In line with ideas on norm formation (e.g. Cialdini et al., 1990; Fishbein and Ajzen, 2010), the items cover not only injunctive aspects (items 1 and 3), referring to what important others want us to do, but also descriptive aspects (items 2 and 4), referring to the observed actions of important others.

Finally, the dependent latent variable which represents consumers' preference for a long lifetime of electrical home appliances was operationalised as a single-item construct. A single-item measurement approach appears to be adequate, as the construct is conceptually relatively narrow and clear-cut (e.g. Hayduk and Littvay, 2012; Petrescu, 2013). More precisely, the construct was supposed to represent the preference for the longest possible lifetime of a washing machine. Consequently, it was operationalised by taking the utility estimate for an expected product lifetime of 25 years derived from the CBC analysis. An overview of the descriptive statistics of each construct's items, including wording and scales, is given in appendix 2. The item sources are summarised in the last column of table 4.3. All questions, including the ones on social demographics, were mandatory so that there is no item non-response.¹²

Validity and reliability of constructs

To assess the validity and reliability of all latent variables, a confirmatory factor analysis (CFA) was performed. Table 4.3 presents the results of the CFA. For each construct, it shows substantial factor loadings and adequate reliabilities in terms of the widely recommended cut-off values (≥ 0.7 for factor loadings; ≥ 0.7 for α and ω ; ≥ 0.5 for AVE; e.g. Fornell and Larcker, 1981; Nunnally and

¹² In the course of a pilot study, large parts of the final questionnaire were pretested among a non-representative sample of German consumers ($n = 316$) in October 2017. The main objectives of the pilot study were to test the functionality of the second CBC exercise (with product lifetime label), as well as the validity and reliability of the self-developed TRA constructs. Overall, the results revealed plausible utility estimates and sufficiently valid and reliable TRA constructs. Based on the pilot study, only a few minor changes have been made towards the final questionnaire such as the deletion of attribute levels and items due to insignificance and redundancy, respectively.

Bernstein, 1994; Shevlin and Miles, 1998). The error variance of the single-item construct was fixed so as to reach a reliability of 0.85, a conservative value chosen according to pertinent literature (e.g. Fuchs and Diamantopoulos, 2009; Petrescu, 2013). Moreover, the CFA model also fits the data well ($\chi^2 / df = 493.942 / 240 = 2.058$; robust CFI = 0.966; robust TLI = 0.957; robust RMSEA = 0.051, 90% confidence interval of [0.045; 0.057]; and SRMR = 0.040; e.g. Hair Jr. et al., 2013; Hu and Bentler, 1999; Kline 2016).

Table 4.3 Factor loadings and reliability measures from the confirmatory factor analysis model as well as item sources

Construct (factor)	Item	Factor loading ^a	(SE)	Reliability ^b			Item source
				α	ω	AVE	
Egoistic values [EV]	ev1	0.773***	(0.024)	0.847	0.851	0.655	European Social Survey (2016); Schmidt et al. (2007)
	ev2	0.877***	(0.022)				
	ev3	0.780***	(0.027)				
Hedonic values [HV]	hv1	0.849***	(0.021)	0.861	0.863	0.678	European Social Survey (2016); Schmidt et al. (2007)
	hv2	0.788***	(0.026)				
	hv3	0.829***	(0.025)				
Biospheric values [BV]	bv1	0.782***	(0.025)	0.857	0.852	0.658	Schmidt et al. (2007) Bouman et al. (2018); Schwartz et al. (2012); Steg et al. (2014b)
	bv2	0.791***	(0.030)				
	bv3	0.864***	(0.023)				
Altruistic values [AV]	av1	0.823***	(0.025)	0.843	0.848	0.651	European Social Survey (2016); Schmidt et al. (2007)
	av2	0.742***	(0.030)				
	av3	0.846***	(0.022)				
Stimulation values [SV]	sv1	0.780***	(0.027)	0.767	0.768	0.623	European Social Survey (2016)
	sv2	0.798***	(0.027)				
Positive attitude, personal gains [APG]	apg1	0.884***	(0.017)	0.926	0.926	0.807	Self-developed indirect measures based on the TRA (e.g. Ajzen, 2019; Ajzen, 2012b; Ajzen, 2006)
	apg2	0.895***	(0.014)				
	apg3	0.915***	(0.013)				
Positive attitude, environmental gains [AEG]	aeg1	0.844***	(0.023)	0.931	0.930	0.816	Self-developed direct measures based on the TRA (e.g. Ajzen, 2019; Ajzen, 2006)
	aeg2	0.939***	(0.010)				
	aeg3	0.937***	(0.011)				
Subjective norm [SN]	sn1	0.864***	(0.019)	0.938	0.938	0.792	Utility for an expected product lifetime of 25 years based on the CBC model of table 4.5
	sn2	0.912***	(0.013)				
	sn3	0.864***	(0.024)				
	sn4	0.917***	(0.011)				
Preference [P]	p1	0.922***	(0.060)	(fixed at 0.850)			
Goodness-of-fit statistics ^c							
Scaled χ^2 / df		2.058 (493.942 / 240)					
Robust CFI		0.966					
Robust TLI		0.957					
Robust RMSEA		0.051 (90% confidence interval: [0.045; 0.057])					
SRMR		0.040					

^a Fully standardised factor loadings based on maximum likelihood estimation with standard errors given in parentheses; statistical significance based on Wald tests; significance level: + $p \leq 0.10$, * $p \leq 0.05$, ** $p \leq 0.01$, *** $p \leq 0.001$

^b α = Cronbach's alpha; ω = McDonald's omega; AVE = average variance extracted

^c df = degrees of freedom; CFI = comparative fit index; TLI = Tucker-Lewis index; RMSEA = root mean square error of approximation; SRMR = standardised root mean square residual

With regard to discriminant validity, the constructs had to be inspected more carefully due to incidents of substantial factor inter-correlations as shown in table 4.4 (above diagonal) (see Farrell, 2010). Following the well-established Fornell-Larcker criterion (Fornell and Larcker, 1981), it was therefore checked whether the shared variance or squared correlation between two constructs (see table 4.4, below diagonal) was smaller than any of the two construct's average variance extracted (see table 4.3). Discriminant validity among all constructs can thus be assumed since the average variance extracted of each construct is greater than its squared correlation with any other construct (Fornell and Larcker, 1981). The same conclusion is reached by the newly developed, more sensitive HTMT⁸⁵ criterion (Henseler et al., 2015). All values of the heterotrait-monotrait ratio of correlations (see table 4.4, below diagonal) are below 0.85.¹³

Table 4.4 Factor correlations in the confirmatory factor analysis model

Correlation ^{ab}	EV	HV	BV	AV	SV	APG	AEG	SN	P
EV	1.000	0.496 ***	0.181 ***	0.173 **	0.692 ***	0.021	0.059	0.186 ***	0.028
HV	0.246 (0.519)	1.000	0.172 **	0.243 ***	0.731 ***	0.103 *	0.075 +	0.170 **	0.158 **
BV	0.033 (0.164)	0.030 (0.171)	1.000	0.777 ***	0.216 ***	0.525 ***	0.623 ***	0.391 ***	0.110 *
AV	0.030 (0.167)	0.059 (0.238)	0.604 (0.771)	1.000	0.263 ***	0.468 ***	0.541 ***	0.364 ***	0.065
SV	0.480 (0.705)	0.534 (0.729)	0.047 (0.218)	0.069 (0.270)	1.000	0.042	0.005	0.180 ***	0.056
APG	0.000 (0.047)	0.011 (0.104)	0.276 (0.528)	0.219 (0.479)	0.002 (0.080)	1.000	0.854 ***	0.524 ***	0.233 ***
AEG	0.003 (0.070)	0.006 (0.086)	0.388 (0.604)	0.293 (0.539)	0.000 (0.066)	0.729 (0.848)	1.000	0.504 ***	0.176 ***
SN	0.035 (0.197)	0.029 (0.178)	0.153 (0.387)	0.133 (0.385)	0.032 (0.187)	0.275 (0.537)	0.254 (0.519)	1.000	0.193 ***
P	0.001 n/a	0.025 n/a	0.012 n/a	0.004 n/a	0.003 n/a	0.054 n/a	0.031 n/a	0.037 n/a	1.000

^a Above diagonal: factor correlation coefficient; significance level: + $p \leq 0.10$; * $p \leq 0.05$; ** $p \leq 0.01$; *** $p \leq 0.001$

^b Below diagonal: squared factor correlation coefficient with heterotrait-monotrait ratio given in parentheses

¹³ Furthermore, the social desirability bias is often mentioned as a serious source of error in survey research, especially in the context of socially sensitive issues such as environmental protection (Grimm, 2010). With the aim of determining the magnitude of potential social desirability tendencies, Kemper et al.'s (2012) three-item scales on overstating positive traits and understating negative traits were queried. A CFA reveals that factor loadings (item 1 = 0.774, 0.840; item 2 = 0.679, 0.647; and item 3 = 0.581, 0.535) and reliabilities ($\alpha = 0.716, 0.698$; $\omega = 0.727, 0.709$; and AVE = 0.478, 0.453) of both scales only partly meet the common standards to support substantive measurement (e.g. Fornell and Larcker, 1981; Nunnally and Bernstein, 1994). These results hint at the absence of a noteworthy social desirability bias in the collected data.

4.4 Results

4.4.1 Hierarchical Bayes utility modelling

Hierarchical Bayes (HB) utility modelling is considered the state-of-the-art approach in analysing CBC data since it accounts for heterogeneity in respondents' preferences by estimating individual-level utilities (e.g. Huber and Train, 2001; Orme and Chrzan, 2017; Rossi and Allenby, 2003). In general, the approach delivers more accurate utility estimates than traditional aggregation techniques (Orme, 2000). An HB model covers two levels. At the upper level (between-respondent) it is assumed that individual utility functions are multivariate normally distributed. This level provides population information on the preferences across respondents, which is used as prior data to estimate utilities for each individual at the lower level. At the lower level (within-respondent) it is assumed that, given an individual's utilities, her or his probability of choosing a particular alternative is described by a multinomial logit model (MNL). Based on an MNL, the probability that an alternative is chosen refers to the proportion of the total utility for that profile relative to the total utility for all profiles of the respective choice task (e.g. Howell, 2009; Rao, 2014; Sawtooth Software, 2019). According to the additive compensatory decision rule, the total utility for each alternative equals the sum of utilities associated with each attribute level of the alternative (Orme, 2013). As a result, HB models require repeated measures per respondent to measure not only between- but also within-respondent variation in preferences (e.g. Howell, 2009; Sawtooth Software, 2019).¹⁴

4.4.2 The influence of a product lifetime label on purchase decisions

This CBC study provides choice data from 7984 hypothetical purchase decisions.¹⁵ Each of the 499 respondents answered seven and nine choice tasks, respectively, within the first and the second CBC exercise. Table 4.5 shows the average utilities of each attribute level for both CBC models based on HB estimation. The average root likelihood (RLH) is used to evaluate whether the choices made by the respondents fit the utility estimates well. The RLH defines the geometric mean of the probabilities predicted for the observed choices (Orme, 2013). Since each choice task in this study involved three alternatives, each alternative would have been chosen at random with a probability of

¹⁴ The HB models were estimated using a Monte Carlo Markov Chain algorithm (e.g. Howell, 2009; Sawtooth Software, 2019). 50.000 iterations ran prior to convergence, which were not used for utility estimation. Another 50.000 iterations were executed and used to estimate each respondent's utilities. Utility estimates across the 50.000 iterations were averaged per respondent to generate point estimates for each attribute level and each respondent (Orme and Chrzan, 2017).

¹⁵ The number of times the none option was chosen relative to all choices made is 22.3% for the first and 25.0% for the second CBC exercise.

33.3%, corresponding to an RLH of 0.333. The reported RLH values (0.627 and 0.677) are around two times higher than the one of the chance model. These substantial differences indicate a good fit of both CBC models (Orme, 2013).

A utility refers to the degree of relative worth, i.e. the higher the utility the more worthwhile the attribute level in relation to other levels of the same attribute (Sawtooth Software, 2019). Utilities thus provide a relative measure of consumer preferences and, overall, indicate the influence each attribute level has on the probability of consumers choosing a product or service (Orme, 2013). The utilities of all dummy-coded attributes (brand, energy consumption, equipment version, and product lifetime label) are also-called part-worths and derived from piecewise linear part-worth functions (Rao, 2014). For the purpose of the subsequent willingness-to-pay (WTP) analysis, price was coded linearly (see, e.g., Orme, 2013; Sammer and Wüstenhagen, 2006) so that its utility coefficient defines the slope of a linear function (Rao, 2014).¹⁶

¹⁶ The underlying assumption of a linear price-utility relationship was inspected by repeating the CBC modelling procedures with price as a dummy-coded attribute. The results reveal that the relationship is indeed approximately linear for both CBC models.

Table 4.5 Hierarchical Bayes utility modelling results of both choice-based conjoint exercises

Attribute level	CBC model of the 1st CBC exercise (n = 499)			CBC model of the 2nd CBC exercise (n = 499)		
	Average utility ^a	(SD)	p-value ^b	Average utility ^a	(SD)	p-value ^b
Brand						
Miele	34.32	(44.73)	***	27.67	(43.52)	***
Siemens	17.04	(18.97)	***	10.39	(15.77)	***
New brand	-24.03	(22.64)	*	-13.97	(23.96)	***
Beko	-27.33	(32.48)	n/a	-24.10	(28.16)	n/a
Energy consumption^c						
80 kWh/year	40.00	(33.85)	***	30.92	(28.33)	***
120 kWh/year	16.26	(12.65)	***	11.55	(12.30)	***
160 kWh/year	-11.54	(13.47)	***	-4.88	(13.67)	***
200 kWh/year	-44.73	(31.60)	n/a	-37.59	(28.37)	n/a
Equipment version^d						
Standard with extras	14.63	(16.33)	***	9.26	(12.95)	***
Standard	-14.63	(16.33)	n/a	-9.26	(12.95)	n/a
Price						
(linear slope)	-14.68 ^e	(8.84)	*** ^f	-13.26 ^e	(8.69)	*** ^f
Product lifetime label						
25 years				45.88	(47.45)	
20 years				44.17	(22.82)	***
15 years				17.89	(16.42)	***
10 years				-11.20	(28.57)	***
5 years				-96.75	(45.82)	n/a
None option	5.25	(96.81)		19.08	(101.95)	
Average root likelihood ^g	0.627	(0.15)		0.677	(0.14)	

^a Averaged across all respondents and scaled as zero-centred differences; based on Hierarchical Bayes estimation with standard deviations given in parentheses

^b Utility increases from one level to the next more preferred level based on paired t-tests; significance level: + $p \leq 0.10$, * $p \leq 0.05$, ** $p \leq 0.01$, *** $p \leq 0.001$

^c kWh = kilowatt hours

^d See table 4.2 for a description of the two different levels of equipment version

^e Hierarchical Bayes estimation based on price levels divided by 100, i.e. a 1 € price increase equals an 0.1468 utility decrease for the first CBC exercise

^f Whether different from zero based on t-test; significance level: + $p \leq 0.10$, * $p \leq 0.05$, ** $p \leq 0.01$, *** $p \leq 0.001$

^g Averaged across all respondents

As shown in table 4.5, utilities are interval data and scaled as zero-centred differences¹⁷, i.e. they are unique up to an arbitrary additive constant within each attribute (e.g. Orme, 2013;

¹⁷ Individual-level utilities were normalised by transforming the zero-centred raw utilities to zero-centred differences, i.e. to a scale wherein, for each individual, the total sum of part-worth differences between the

Sawtooth Software, 2019). Consequently, utilities can be interpreted meaningfully only within rather than across attributes (Orme, 2013). In general, all presented utility estimates appear plausible in terms of the order of preference within each dummy-coded attribute and in terms of the sign of the price coefficient. With one exception, all part-worth increases from one level to the next more preferred one are found to be significant.¹⁸ It can, therefore, be summarised that all dummy-coded attributes (brand, energy consumption, equipment version, and product lifetime label) significantly influence purchase decisions for washing machines. The negative utility coefficient of price is significantly different from zero, indicating a significant negative effect on purchase behaviour. The only non-significant result refers to the additional part-worth consumers would get from an increase in the expected product lifetime from 20 to 25 years. The part-worths for all levels of the product lifetime label exhibit a decreasing positive effect for an increase in expected product lifetime. While the part-worth gain from 20 to 25 years is too small to be significant, the one from 5 to 10 years shows the largest increase within the attribute. This observation was verified by comparing the existing CBC model of the second CBC exercise with a nested model which differed only in that the label entered the estimation as a linear-coded rather than a dummy-coded attribute. A likelihood-ratio test shows that the original model exhibits a significantly better fit than the simpler model ($-2\Delta LL = 294.21$, $\chi^2 = 16.27$, $df = 3$, $p < 0.001$). A decreasing positive effect of the product lifetime label on purchase decisions thus fits the data better than a corresponding linear effect, which supports hypothesis H1.

The arbitrariness in utilities' scaling can be eliminated by expressing them in monetary units. Such transformed utilities are understood as consumers' WTP and enable the comparison of attribute levels' effects on purchase decisions across attributes and even across CBC exercises (e.g. Hensher et al. 2015; Orme, 2013). The latter is particularly relevant for measuring how the inclusion of a product lifetime label affects the influence of the other washing machine attributes. WTP in this context is a relative measure that defines how much monetary value a consumer ascribes to a change from one attribute level to another one (e.g. Hensher et al. 2015; Orme, 2013). According to standard CBC practice (e.g. Orme, 2013; Sammer and Wüstenhagen, 2006), a consumer's WTP for one level compared to a reference level within the same attribute was calculated by dividing the

worst and the best level of each dummy-coded attribute, plus the utility coefficients of price and the none option, is equal to the number of attributes times 100 (Sawtooth Software, 2019).

¹⁸ Moreover, all potential two-way interaction effects between the attributes were tested for each of the CBC models. As recommended by Sawtooth Software (2019), this was done by using the interaction search tool which is based on a modified likelihood-ratio test leveraging individual-level main-effect utilities from HB estimation. Interaction effects identified with this tool are also expected to increase a model's percent certainty measure by at least 1% (Sawtooth Software, 2019). Following this procedure, none of the potential interaction effects is found to substantially improve the CBC models.

part-worth difference between both levels by the absolute value of the average utility coefficient of price. Table 4.6 presents the average WTP for each attribute level and, specifically, the change in average WTP values for brand, energy consumption and equipment version from the first and to the second CBC exercise. In addition, the results of table 4.6 are visualised in figure 4.2.¹⁹

Table 4.6 Change in willingness to pay from the first to the second choice-based conjoint exercise

Attribute level	1st CBC exercise (n = 499)		2nd CBC exercise (n = 499)		Change in WTP		
	Average WTP in € ^a	(SD)	Average WTP in € ^a	(SD)	€	%	p- value ^b
Brand							
Miele	397.36	(419.99)	314.09	(489.10)	-83.27	-21.0	***
Siemens	279.66	(236.79)	183.76	(253.48)	-95.90	-34.3	***
New brand ^c	0.00		0.00				
Beko	-22.51	(211.60)	-76.42	(163.84)	-53.91	-239.5	***
Brand							
Miele	419.87	(508.49)	390.51	(525.64)	-29.36	-7.0	
Siemens	302.17	(272.94)	260.18	(277.39)	-41.99	-13.9	***
New brand	22.51	(211.60)	76.42	(163.84)	53.91	239.5	***
Beko ^c	0.00		0.00				
Energy consumption^d							
80 kWh/year	577.04	(432.60)	516.81	(416.54)	-60.23	-10.4	**
120 kWh/year	415.35	(255.26)	370.66	(286.70)	-44.69	-10.8	**
160 kWh/year	226.02	(219.83)	246.78	(195.52)	20.76	9.2	+
200 kWh/year ^c	0.00		0.00				
Equipment version^e							
Standard with extras	199.25	(222.42)	139.63	(195.37)	-59.62	-29.9	***
Standard ^c	0.00		0.00				
Product lifetime label							
25 years			1075.80	(685.15)			
20 years			1062.89	(504.19)			
15 years			864.65	(407.88)			
10 years			645.28	(214.60)			
5 years ^c			0.00				

^a Averaged across all respondents with standard deviations given in parentheses

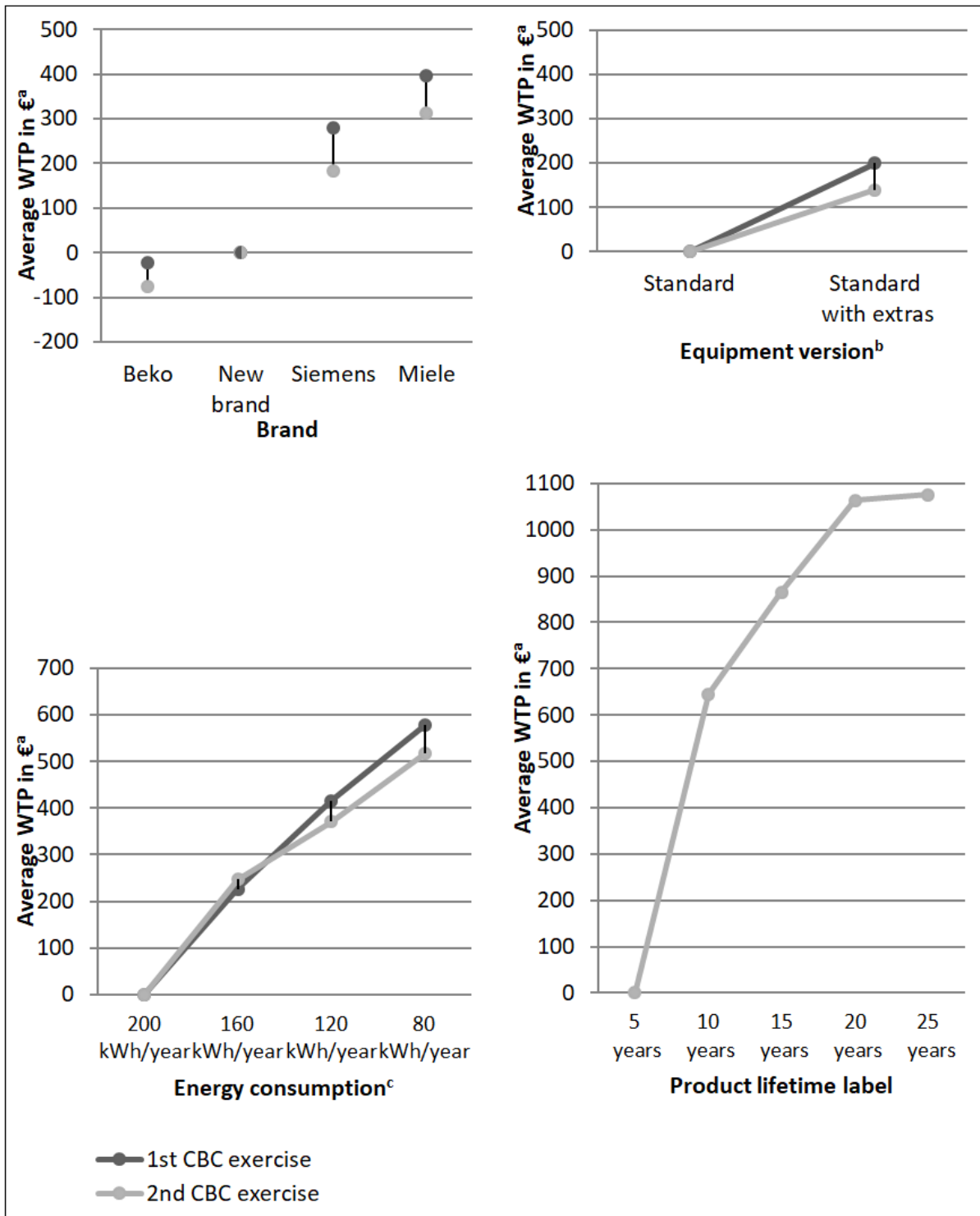
^b Based on paired t-tests; significance level: + $p \leq 0.10$, * $p \leq 0.05$, ** $p \leq 0.01$, *** $p \leq 0.001$

^c Reference level

^d kWh = kilowatt hours

^e See table 4.2 for a description of the two different levels of equipment version

¹⁹ For each attribute, the level with the lowest average utility (see table 4.5) was selected as the reference level. An average WTP value, therefore, reflects the average amount consumers are willing to pay more compared to the reference level – holding all other product attributes equal. To adequately address hypothesis H2, the WTP values for the brand were also calculated in comparison to the new brand.



^a Average willingness to pay compared to reference level (see table 4.6); reference levels: New Brand, Standard, 200 kWh/year, 5 years

^b See table 4.2 for a description of the two different levels of equipment version

^c kWh = kilowatt hours

Figure 4.2 Visualisation of the change in willingness to pay

Compared to the new brand, significant losses of WTP are evident for all existing brands. After the introduction of the product lifetime label, consumers are willing to pay only 314 € more for Miele (reduced by 83 € or 21.0%), only 184 € more for Siemens (reduced by 96 € or 34.3%) and even 76 € less for Beko (a discount increased by 54 € or 239.5%) (see table 4.6). In other words, this analysis shows that the positive impact of Miele and Siemens on purchasing washing machines relative to the new brand has decreased, while the negative impact of Beko has increased. Consequently, the influence of all existing brands on purchase behaviour has become less favourable compared to the new brand. Hypothesis H2 can thus be supported.

Further meaningful insights can be derived from the WTP analysis. First, the introduction of the product lifetime label has significantly reduced the WTP for the two lowest energy consumption values (80 kWh/year and 120 kWh/year). Second, a significant loss of WTP for extra equipment features was also identified. Third, the shape of the piecewise linear WTP function for the product lifetime label (see figure 4.2) further underpins the decreasing positive effect of the label on purchase decisions. A strong increase of WTP from 5 to 10 years (645 €) is followed by two weaker increases (219 € up to 15 years and 198 € up to 20 years). The gain in WTP from 20 to 25 years is not significant resulting from the underlying non-significant utility increase (see table 4.5).

Finally, table 4.7 provides an overview of the average relative importances of each product attribute for both CBC exercises. Relative importances are computed by expressing the respective range of utilities for each attribute as a percentage of the corresponding total over all attributes within each individual (Orme and Chrzan, 2017). The results emphasise the comparatively strong influence the product lifetime label has on purchase decisions. Before the introduction of the label, price was the single most important attribute for consumers. After the introduction, both label and price show the highest relative importance values. Product lifetime label (33.7%) and price (32.8%) are more than twice as important as energy consumption (15.2%) and brand (13.6%). Equipment version (4.7%) appears to play only a minor role when purchasing washing machines.²⁰

²⁰ In principle, relative importances need to be interpreted with caution, as they depend on the chosen attribute levels, i.e. the narrower the level range of an attribute, the lesser important the attribute is (Orme and Chrzan, 2017).

Table 4.7 Relative importances of attributes for both choice-based conjoint exercises

Attribute	Average relative importance (n = 499) ^a	
	1st CBC exercise	2nd CBC exercise
Brand	21.2%	13.6%
Energy consumption	23.9%	15.2%
Equipment version	8.1%	4.7%
Price	46.9%	32.8%
Product lifetime label		33.7%
Totals	100.0%	100.0%

^a Averaged across all respondents

4.4.3 Motivational drivers of consumer preferences for product longevity

For the purpose of testing the conceptual model (see figure 4.1), all constructs from the CFA model were integrated into a full recursive structural equation model (SEM). Table 4.8 presents the structural equation modelling results explaining consumers' preference for a long lifetime of electrical home appliances. The model explains 13.0% of the variation in the preference construct, which can be seen as an effect of medium strength according to Cohen (1988). As with the CFA model, the goodness-of-fit statistics indicate that the SEM model fits the data well ($\chi^2 / df = 740.424 / 384 = 1.928$; robust CFI = 0.956; robust TLI = 0.940; robust RMSEA = 0.046, 90% confidence interval of [0.041; 0.051]; and SRMR = 0.034; e.g. Hair Jr. et al., 2013; Hu and Bentler, 1999; Kline, 2016). The corresponding path diagram with maximum likelihood estimates of the fully standardised path coefficients is shown in figure 4.3. Hypothesised causal relationships were modelled as directed structural paths, as were all other possible regressions of both attitude constructs, the subjective norm construct and the preference construct on each value construct.²¹ Correlations are represented by undirected structural paths and non-significant paths are presented as grey-dotted lines. Non-hypothesised regressions are only displayed if they are significant.

²¹ The non-hypothesised relationships were integrated to test for other possible relationships which appear fundamentally plausible, apart from the hypothesised ones.

Table 4.8 Structural equation modelling results explaining the preference for a long lifetime of electrical home appliances

Construct		Structural equation model (n = 499)			
		β^a	(SE)	p-value ^b	Hypothesis ^c
Regression					
Preference [P] on	Positive attitude [APG]	0.253	(0.052)	*	H3a s.
	Positive attitude [AEG]	-0.081	(0.045)		H3b n. s.
	Subjective norm [SN]	0.119	(0.027)	*	H4 s.
	Egoistic values [EV]	-0.109	(0.047)		
	Hedonic values [HV]	0.192	(0.057)		
	Biospheric values [BV]	0.101	(0.077)		
	Altruistic values [AV]	-0.149	(0.059)		
	Stimulation values [SV]	-0.067	(0.085)		
	Positive attitude [APG] on	Egoistic values [EV]	0.095	(0.100)	
Hedonic values [HV]		0.253	(0.113)	**	H5b s.
Biospheric values [BV]		0.414	(0.143)	***	
Altruistic values [AV]		0.170	(0.130)	+	
Stimulation values [SV]		-0.392	(0.174)	**	H7a s.
Positive attitude [AEG] on	Egoistic values [EV]	0.091	(0.103)		
	Hedonic values [HV]	0.111	(0.124)		
	Biospheric values [BV]	0.533	(0.149)	***	H6a s.
	Altruistic values [AV]	0.168	(0.146)	+	H6b n. s.
	Stimulation values [SV]	-0.292	(0.180)	*	H7b s.
Subjective norm [SN] on	Egoistic values [EV]	0.124	(0.102)		
	Hedonic values [HV]	0.064	(0.111)		
	Biospheric values [BV]	0.252	(0.122)	**	
	Altruistic values [AV]	0.142	(0.128)		

Construct	Structural equation model (n = 499)			
		β^a	(SE)	p-value ^b
	Stimulation values [SV]	-0.008	(0.152)	
Correlation				
Positive attitude [APG] with	Positive attitude [AEG]	0.782	(0.124)	***
	Subjective norm [SN]	0.422	(0.084)	***
Positive attitude [AEG] with	Subjective norm [SN]	0.373	(0.099)	***
Egoistic values [EV] with	Hedonic values [HV]	0.452	(0.071)	***
	Biospheric values [BV]	0.230	(0.058)	***
	Altruistic values [AV]	0.184	(0.065)	**
	Stimulation values [SV]	0.651	(0.077)	***
Hedonic values [HV] with	Biospheric values [BV]	0.237	(0.063)	***
	Altruistic values [AV]	0.277	(0.069)	***
	Stimulation values [SV]	0.701	(0.069)	***
Biospheric values [BV] with	Altruistic values [AV]	0.776	(0.071)	***
	Stimulation values [SV]	0.281	(0.058)	***
Altruistic values [AV] with	Stimulation values [SV]	0.287	(0.059)	***
Explained variance	13.00%			
Goodness-of-fit statistics ^d				
Scaled χ^2 / df	1.928 (740.424 / 384)			
Robust CFI	0.956			
Robust TLI	0.940			
Robust RMSEA	0.046 (90% confidence interval: [0.041; 0.051])			
SRMR	0.034			

^a Fully standardised path coefficients (regression or correlation coefficients) based on maximum likelihood estimation method with standard errors given in parentheses

^b Based on Wald tests; significance level: + $p \leq 0.10$; * $p \leq 0.05$; ** $p \leq 0.01$; *** $p \leq 0.001$

^c s. = supported; n. s. = not supported

^d CFI = comparative fit index; TLI = Tucker-Lewis index; RMSEA = root mean square error of approximation; SRMR = standardised root mean square residual

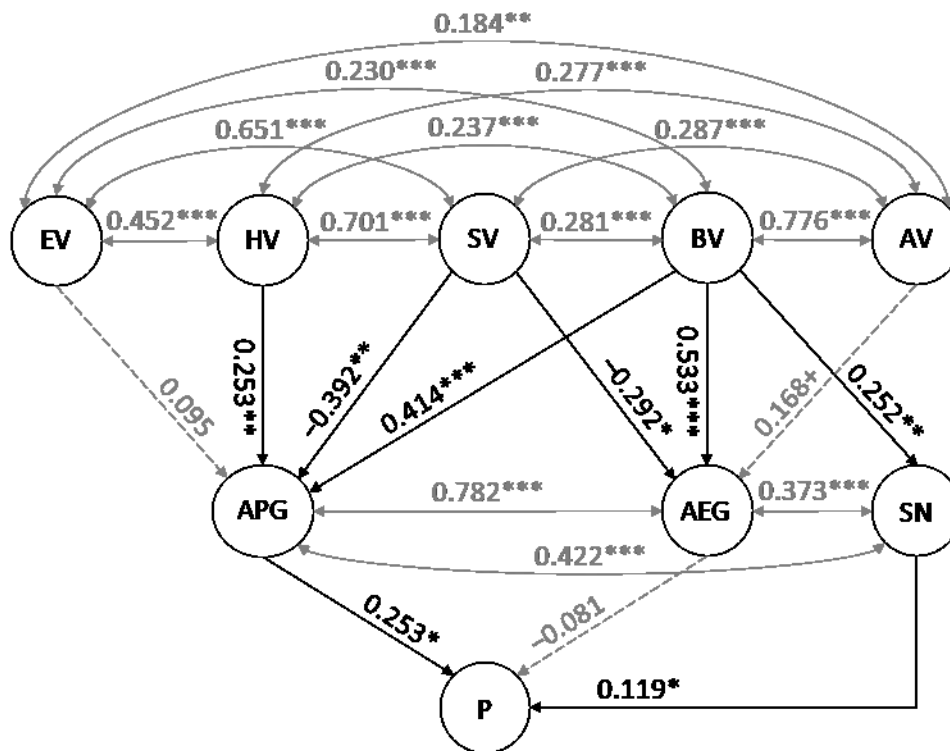


Figure 4.3 Path diagram of the structural equation model explaining the preference for a long lifetime of electrical home appliances (significance of fully standardised path coefficients based on Wald tests; significance level: + $p \leq 0.10$; * $p \leq 0.05$; ** $p \leq 0.01$; *** $p \leq 0.001$)

In the SEM, the positive attitude towards purchasing long-lasting electrical home appliances based on personal gains is found to have a positive significant effect on the preference for a long lifetime of electrical home appliances. Other than expected, the attitude based on environmental gains has no significant impact on the preference. The positive influence of subjective norm towards purchasing long-lasting electrical home appliances on the preference is also significant. Consequently, hypotheses H3a and H4 can be supported, whereas hypothesis H3b cannot. Furthermore, the results indicate that only one type each of self-enhancement and self-transcendence values significantly affects the positive attitude based on personal and environmental gains, respectively. More precisely, only hedonic but not egoistic values enhance the attitude based on personal gains; and only biospheric but not altruistic values enhance the attitude based on environmental gains. The causal effect of biospheric values on the attitude based on environmental gains reveals by far the largest coefficient within the path diagram ($\beta = 0.533^{***}$). Hypotheses H5b and H6a, but not H5a and H6b, are therefore supported. It was also identified that stimulation values have a significant negative influence on both types of attitude, supporting hypotheses H7a and H7b. Apart from the hypothesised causal relationships, two further regressions are found to be significant,

which are the positive effects of biospheric values on the attitude based on personal gains and on the subjective norm. All presented correlations appear plausible. Furthermore, the impacts of the socio-demographic covariates (gender, age, and highest educational achievement) on the various latent variables seem reasonable and are shown in appendix 3. All in all, six out of nine hypotheses are supported by the SEM; the entire study supports eight out of 11 hypotheses.

4.5 Discussion

In line with two of the commissioned studies on product lifetime labelling (Prakash et al., 2018; Sircome et al., 2016), the present article identifies a significant positive effect of a mandatory product lifetime label on purchase decisions for electrical home appliances, specifically washing machines. This overall finding is, however, in opposition to Artinger et al. (2018), who could not prove any significant influence of such a label on washing machine purchases. This contradiction may be explained by the concept of consumer trust, which is an essential prerequisite for the effectiveness of sustainability labelling (e.g. Boström and Klintman, 2008; Nuttavuthisit and Thøgersen, 2017). While the label tested in this study is framed as being issued by a manufacturer-independent testing institute using a standardised test procedure (see appendix 1), the label tested by Artinger et al. (2018) represents a non-binding estimate of the manufacturer. Previous research indicates that consumer trust in sustainability labels is substantially higher when the label is issued by manufacturer- and retailer-independent institutions than by the companies themselves (e.g. Gertz, 2005; Horne, 2009).

Beyond the previously commissioned research, the results of this study also show that the label's positive effect on purchase behaviour decreases with an increase in product lifetime. Strikingly, respondents did not distinguish significantly between a product lifetime of 20 and 25 years in terms of utility and WTP, suggesting that companies would hardly be rewarded for manufacturing washing machines with a lifetime of 25 years. However, an extension of product lifetime from 5 to 10 years would be rewarded with an additional WTP of 645 €, or 129 € for each additional year. Between 10 and 20 years, the additional WTP is only about 40 € for each additional year.²² Overall,

²² In contrast, Prakash et al. (2018) identified substantially lower WTP values. The authors found that consumers of washing machines are willing to pay 151 € more for an increase from 5 to 10 years (present study: 645 €), 46 € more for an increase from 10 to 15 years (present study: 219 €) and 59 € more for an increase from 15 to 20 years (present study: 198 €). One reason for this may be that Prakash et al. (2018), similar to Artinger et al. (2018), provided the label's product lifetime information as an estimate of the manufacturer. Another explanation could be that Prakash et al. (2018) measured WTP values directly as self-reported quantities – a method that has often been criticised (see Breidert et al., 2006, for a discussion on the

this study transfers Wilhelm's (2012) hint at a decreasing positive effect of product lifetime information on mobile phone purchases to the context of electrical home appliances. This may indicate that even with very utilitarian products such as washing machines, consumers have considerable concerns about missing future product updates, for instance on performance or energy efficiency (e.g. Cooper, 2004; Cox et al. 2013). The nonlinearity of the effect could also be explained by the negativity bias, which refers to the psychological tendency of assigning more weight to negative than to positive stimuli compared to a reference point (Rozin and Royzman, 2001). Negativity biases have already been found in settings of sustainability labelling (e.g. Grankvist et al., 2004; Moosmayer, 2012; Van Dam and De Jonge, 2015). Applied to this study, consumers may implicitly consider an average lifetime of washing machines, which lies between 10 and 15 years (Boyano Larriba et al., 2017), as a reference point. In line with the concept of the negativity bias, the results show that the absolute change in consumers' WTP is stronger for losses (from 10 to 5 years) than for gains (from 15 to 20 years or from 20 to 25 years) compared to the reference range (10 to 15 years).

The present article also reveals that introducing a product lifetime label leads to a significant reduction in WTP for existing washing machine brands compared to a new brand. This finding may indicate a weakening of the information asymmetry between consumers and manufacturers towards the durability of electrical home appliances. Quality signals previously sent by existing brands (e.g. Cox et al., 2013; Erdem and Swait, 1998) may decrease due to greater transparency of product lifetime through labelling. As implied by earlier research on sustainability labelling (e.g. Larceneux et al., 2012; Mondelaers et al., 2009), this could lead to the product lifetime label partially replacing the brand's trust-building function.²³ From the perspective of the new brand, it can be stated that its market position has improved as a result of product lifetime labelling. The WTP distance of the new brand to the more preferred brands (Siemens and Miele) has decreased, while the distance to the less preferred brands (Beko) has increased. Based on this observation one could infer that the introduction of a product lifetime label reduces the market entry barriers for new brands in the area of electrical home appliances. Apart from possible labelling costs, which would also have to be paid

shortcomings of direct WTP measurement). In general, the indirect measurement of WTP, for instance via CBC analysis, provides more valid WTP figures (Bredert et al., 2006).

²³ This study's results also show a tendency for existing brands to be less negatively affected by the label (in relative terms) the higher they are positioned in terms of price. One explanation for this may be that premium brands also fulfil other functions such as the prestige function (see Meffert et al., 2018), which could protect them from losing quality signals and trust to some extent. Another reason could be a strong existing reputation for durability, which usually characterises brands from the higher-priced product segment (Park, 2010). Such brands generally provide concrete durability-related information (see, e.g., Miele's, 2019b, information on spare parts and repair services), which – unlike rather vague quality signals – may not be completely substituted by a product lifetime label.

by existing brands, new businesses would have to invest less in the development of their brands in terms of quality signals. Building a brand is usually a very resource-intensive and thus challenging endeavour for small and medium-sized enterprises (e.g. Krake, 2005; Spence and Hamzaoui-Essoussi, 2010).

The study further indicates that the introduction of a product lifetime label significantly reduces the WTP for the two lowest levels of energy consumption (80 kWh/year and 120 kWh/year) compared to the highest level (200 kWh/year). Now that consumers are also weighing energy consumption against product lifetime, they may be willing to sacrifice low levels of energy consumption for certain levels of product lifetime. However, it seems that consumers do not want to fall short of a certain minimum level of energy efficiency (160 kWh/year). This argumentation also corresponds to the observation that the relative importance of the product lifetime label is about twice as large as the relative importance of energy consumption. Overall, the reduced influence of energy consumption on purchase behaviour can be seen as problematic from a sustainability point of view, since energy efficiency constitutes a key strategy for promoting sustainable development (Von Weizsäcker et al., 2009).

Furthermore, the present article examines the underlying motivational drivers of consumer preferences for product longevity. First of all, two types of a positive attitude towards the purchase of long-lasting electrical home appliances could be distinguished empirically. The distinction between positive attitudes based on personal gains on the one hand and based on environmental gains on the other is therefore not only theoretically meaningful, but also recognized by consumers. In line with previous research (e.g. Cox et al., 2013; Grigsby, 2004), the results also reveal that consumers' preference for a long lifetime of electrical home appliances is significantly driven by their attitude based on personal gains such as avoiding inconvenience related to premature repairs and replacement purchases. The latter goes along with Grigsby's (2004) reasoning that some consumers engage in simplified consumption practices because of their desire to 'buy time'. Contrary to expectations, the attitude based on environmental gains does not significantly influence the preference for a long lifetime. This finding supports earlier research indicating that environmental attitudes do not affect consumer behaviour related to product lifetime (e.g. Cooper and Evans, 2010; Wilhelm, 2012); while it contradicts insights from the area of voluntary simplicity and frugal lifestyles (e.g. Pepper et al., 2009; Shaw and Newholm, 2002). Shaw and Newholm (2002), for instance, argue that simplified consumer behaviour can be motivated by concerns about the environmental consequences of consumption. Maybe the environmentally motivated attitude towards purchasing long-lasting electrical home appliances is too weakly pronounced in the population to exert an influence on purchase behaviour. However, a look at the descriptive statistics of both attitude constructs (appendix 2) shows that the items on environmental gains are only slightly less

pronounced, and slightly more dispersed, than the items on personal gains. According to Ajzen's (2012b) comments on the cognitive foundation of attitudes, a better explanatory approach would be that behavioural beliefs about the expected positive environmental outcomes exist but are not readily accessible at the point of purchase. In other words, consumers may not be able to activate them while purchasing electrical home appliances. Ajzen and Fishbein (1980) conclude that thoughts which do not readily come to mind are unlikely to affect behaviour in a specific situation.

The identification of a significant positive effect of the subjective norm towards purchasing long-lasting electrical home appliances on the preference transfers similar insights from previous sustainable consumption research (e.g. Demarque et al., 2015; Phipps et al., 2013) to the specific area of product longevity. This finding concretises the first corresponding indication of Cooper and Evans (2010) and leads to the conclusion that perceived social pressure exerted by important others is also crucial for explaining purchase behaviour for long-lasting electrical home appliances. Consequently, the results of this article verify the causal relationships between the constructs proposed by the TRA, i.e. attitude and subjective norm (Ajzen and Fishbein, 1980; Fishbein and Ajzen, 1975), and the preference for a long product lifetime measured according to Lancaster's (1966) consumer theory.

Remarkably, this article contradicts the predominant research finding that self-enhancement values inhibit and self-transcendence value enhance pro-environmental attitudes (e.g. Schwartz, 2010; Steg et al., 2014b). Both value types significantly enhance a positive attitude towards purchasing long-lasting electrical home appliances. Hedonic values foster the attitude based on personal gains, while biospheric values foster the attitude based on environmental gains. Consequently, each value-attitude pair represents similar individual interests.²⁴ This finding thus supports Jacobs et al. (2018) who identified positive effects of both self-enhancement and self-transcendence values on the affinity for durable clothing. The attitude towards purchasing long-lasting products may differ from many of the previously researched pro-environmental attitudes in that it is more strongly driven by personal interests which, in turn, more strongly address values of self-enhancement. The core of the examined attitude refers to a product's durability which demonstrates a dimension of quality and thus delivers comparatively strong personal advantages for consumers.

²⁴ Other than hypothesised, egoistic and altruistic values have no significant influence on the respective attitude constructs. In contrast to the hedonic values, the specific personal interests reflected by the egoistic values mainly refer to personal success. The egoistic values thus hardly address the personal gains of purchasing long-lasting electrical home appliances. The altruistic values entirely reflect prosocial interests and are, therefore, unsuitable to explain an attitude entirely based on environmental gains. Consequently, only two of the four value clusters proposed by Steg et al. (2014b) seem to be relevant for the specific pro-environmental behaviour of purchasing long-lasting products.

In addition to the hypothesised relationships, it is found that biospheric values also significantly foster a positive attitude based on personal gains. As indicated above, personal gains of purchasing long-lasting electrical home appliances partly correspond to motives of simplified consumption practices (Grigsby, 2004). In this sense, Balderjahn and Hüttel (2019) show that universalism values, which also represent biospheric values, not only foster the consciousness for environmental and social consumption, but also the consciousness for simplified consumption. Likewise, Schultz (2001) has already provided empirical evidence that environmental concerns cover not only concerns for the biosphere and other people, but also concerns for the self. The latter, for instance, refers to consequences resulting from environmental problems for a person's lifestyle and future (Schultz, 2001). Moreover, this study reveals that biospheric values also have a significant positive effect on the subjective norm. This seems plausible as it can be assumed that eco-minded people share values, attitudes etc. with their important others. Consequently, biospheric values constitute a specifically strong indirect antecedent to the preference for a long lifetime of electrical home appliances.

Finally, the present article indicates that stimulation values are also of specific relevance for explaining sustainable purchase behaviour related to product longevity. Stimulation values significantly inhibit both types of attitudes. The latter indicates that associated variety-seeking tendencies (e.g. Sharma et al., 2010; Steenkamp and Baumgartner, 1995) principally narrow a positive attitude towards purchasing long-lasting electrical home appliances – the same reasoning for why consumers prematurely replace products (e.g. Cox et al., 2013; Cooper and Evans, 2010). This finding supports Balderjahn and Hüttel's (2019) study which indicates that stimulation values negatively influence the consciousness for simplified consumption.

4.6 Conclusions and implications

The primary objective of this quantitative, population-representative study was to explore the influence of a mandatory product lifetime label on purchase decisions for electrical home appliances. By testing a conceptual model built on the consumer theory of Lancaster (1966) and the TRA (Ajzen and Fishbein, 1980; Fishbein and Ajzen, 1975), motivational drivers of consumers' preference for a long product lifetime were also investigated. Based on CBC analysis, two HB utility models and an SEM were estimated. The results suggest a strong positive, but decreasing effect of the product lifetime label on purchase behaviour. They also indicate that introducing such a label leads to the purchase influence of existing brands becoming less favourable compared to that of new brands. Furthermore, the findings show that the preference for a long product lifetime is fostered by a positive attitude and a subjective norm towards purchasing long-lasting electrical home appliances.

However, such an attitude only exerts a substantial influence if it is driven by personal rather than environmental gains. It is also documented that biospheric values enhance, while stimulation values inhibit, both types of attitude. Hedonic values are found to only enhance the attitude based on personal gains.

This empirical study contributes to sustainable consumption research by advancing the underdeveloped research area of purchase behaviour related to product longevity (e.g. Evans and Cooper, 2010; Wilhelm, 2012). The article particularly responds to the call for more research on the impact of product lifetime labelling (e.g. Cox et al., 2013; Wilhelm, 2012). To the author's best knowledge, this is the first academic study measuring how a mandatory product lifetime label affects the purchase of electrical home appliances. Insights from earlier commissioned research (e.g. Prakash et al., 2018; Sircome et al., 2016) are enriched by, for instance, CBC utility and WTP analyses as well as a psychographic model explaining the preference for a long product lifetime. The article also contributes to the development of interdisciplinary theoretical approaches in sustainable consumption research (see also Nocella et al., 2012). Moreover, the predominant view that self-enhancement values inhibit, and self-transcendence values enhance, pro-environmental attitudes and behaviours (e.g. Schwartz, 2010; Steg et al., 2014b) is questioned. By providing a counter-example, this study stresses the importance of case-specific analyses of values, especially when the behaviour in question is expected to be strongly driven by self-interests.

In addition to the above-mentioned academic insights, the article provides various practical implications. First, policymakers can be informed about the effectiveness of mandatory product lifetime labelling of electrical home appliances. Consumers express stronger preferences, for example by revealing a higher WTP, the longer the lifetime of a product is. According to Akerlof's (1970) remarks on information asymmetries, greater transparency over product lifetimes enables consumers to distinguish more durable from less durable products. It follows that manufacturers may be more strongly incentivised to produce long-lasting products. Product lifetime labelling could thus stimulate the supply of, and demand for, more durable electrical home appliances. Similarly, the introduction of the EU's energy labelling scheme for electrical appliances has triggered innovations towards more energy-efficient products over time (Heinzle and Wüstenhagen, 2012).

Second, manufacturers in the electrical home appliances sector can learn from the study that it may be more profitable to produce long-lasting products under a product lifetime labelling scheme. However, manufacturers of durable products need to be aware that further increasing already high levels of product lifetime may not be rewarded by consumers' WTP; while manufacturers of less durable products are well-advised to improve their products' lifetime due to considerable gains in WTP.

Third, new businesses are more encouraged to enter the market for electrical home appliances if product lifetime labelling is in place. In comparison to the no-label scenario, i.e. the status quo, start-ups are confronted with lower market entry barriers regarding brand development. This, in turn, could lead to more competition, which would increase the pressure on established companies to adjust their unique selling propositions and competitive advantages. In principle, companies are advised to invest less in developing vague quality signals and more in concrete improvements in product lifetime. Overall, business models for product longevity that also focus on aspects such as upgrading and redesigning (e.g. Lieder et al., 2018; Wilhelm, 2012) should be fostered. Such models would not only provide companies with various opportunities for differentiation but take into account consumers' needs for product up-to-dateness and variety.

Fourth, in order for durability marketing to be most effective, consumers' personal benefits of purchasing long-lasting electrical home appliances should be emphasised first and foremost. In addition, new customers with strongly pronounced, but not yet activated pro-environmental attitudes towards product longevity may be addressed by also communicating the environmental benefits, e.g. at the point of sale.

Fifth, by means of educational and promotional campaigns, policymakers and business practitioners alike are called upon to strengthen biospheric values in general as well as positive attitudes and social norms towards purchasing long-lasting products in particular. Measures could include concrete information about the negative environmental impact of declining product lifetimes. Importantly, any campaign should link environmental knowledge to people's personal consumption behaviours to not only foster but activate pro-environmental attitudes. In order to attract more people, messages may also be framed in a hedonic way. For instance, marketers could translate aspects such as 'saving money' or 'avoiding inconvenience' into the possibility of 'investing more of one's personal time and money in the joys of life' (e.g. Grigsby, 2004).

Furthermore, this study is not free of limitations. At first, the average WTP values appear to be somewhat too high, especially the additional WTP for a 10-year washing machine compared to a 5-year washing machine. Even though indirect WTP measurement based on CBC analysis is more realistic than a direct measurement approach (Braidert et al., 2006), respondents tend to exaggerate their purchase intent in experimental settings without real financial transactions (Nagle and Holden, 2002). According to pertinent literature, the examination of average values and the lacking competitive environment could also lead to inflated WTP values (Orme, 2013). Future CBC studies should consider the use of the dual-response 'none' option and/or market simulations to generate more realistic WTP measures (e.g. Orme, 2013; Sawtooth Software, 2019). Besides, although the self-developed TRA constructs show sufficient validity and reliability, external validation by further research is recommended. Potential for improvement lies in particular in the differentiation between

the attitude constructs. Moreover, the individual-level utilities were estimated with Bayesian techniques while classical significance tests were performed using frequentist procedures. Such hybrid approaches are very popular. Nevertheless, entirely Bayesian approaches, including tests of main and interaction effects, are considered to be more correct (Orme and Chrzan, 2017) and should, therefore, be used in future studies. This is supported by the fact that none of the tested interactions was found to be significant, although several interaction effects involving the product lifetime label are conceivable. Finally, despite the reasonable explanatory power of the SEM, a large part of the variation in the preference for a long product lifetime remains unexplained. Further potential determinants should thus be investigated. According to the TRA framework (e.g. Ajzen, 2019), also negative attitudes towards, and subjective norms not to engage in, the purchase behaviour in question can be potential factors. Regarding the missing link between the environmentally motivated attitude and the preference, possible confounders such as a lack of perceived consumer effectiveness may also be worth studying (e.g. Ellen et al., 1991; Hanss and Böhm, 2010).

In addition to overcoming the limitations, further avenues of research are identified. First, experimental studies comparing different types of labelling schemes (e.g. voluntary vs. mandatory), different types of information (e.g. expected product lifetime vs. repairability information) and different product categories (e.g. utilitarian vs. hedonic) are recommended (e.g. Artinger et al., 2018; IFIXIT, 2019). For example, consumers may face greater trade-offs between product lifetime and other attributes such as performance or design when purchasing more hedonic products (e.g. Dhar and Wertenbroch, 2000; Wilhelm, 2012). Moreover, it has been emphasised that consumers tend to have more confidence in labels issued by third parties than by the respective companies (e.g. Gertz, 2005; Horne, 2009). While the concept of consumer trust was not explicitly touched in this study, it offers great research potential in the context of product lifetime labelling. Overall, new studies should generally consider the use of samples from different countries to explore potential cross-country differences in the impact of product lifetime labelling (e.g. Sircome et al., 2016). Second, it is recommended to investigate how consumers who are strongly guided by stimulation values can also be motivated to purchase long-lasting products. In this context, business models for product longevity (e.g. Bocken and Short, 2016), which also take into account consumers' variety-seeking tendencies, should be further developed and tested for consumer acceptance. Product and service design should consider strategies such as upgrading and redesigning as well as other forms of ownership such as renting or leasing (e.g. Bressanelli et al., 2017; Lieder et al., 2018; Proske and Jaeger-Erben, 2019). Third, a market shift towards product longevity could provide new opportunities for second-hand retailers (Maitre-Ekern and Dalhammer, 2016). Future studies should thus shed light on the impact of product lifetime labelling on secondary markets. Fourth, the adverse effects of the label on consumer preferences for existing brands and low levels of energy

consumption should be further investigated. Fifth, in order to ensure the feasibility of product lifetime labelling, future research on standardised durability tests (Stamminger et al., 2018) need to be carried out. Finally, considering that modern economies are marked by widespread disposal of products before they break (Cox et al., 2013), research on the factors affecting the premature replacement of products is crucial in terms of product lifetime extension. It would be particularly interesting to investigate whether the preference for a long product lifetime at purchase is based on the same motivations as the willingness to keep a product in use for a long time.

In conclusion, the extension of product lifetimes should receive more attention in research and practice due to its considerable potential for limiting negative environmental impacts. Product lifetime labelling could stop or even reverse the ongoing trend of declining product lifetimes in the electrical appliance sector. Nevertheless, in order to truly decouple profitability from the throughput of goods for consumption, regulatory measures must be accompanied by appropriate business models.

4.7 Appendices

Appendix 1 See figure 4.4.

Introduction text of the first CBC exercise:

"In the following you will be offered **three washing machines in each of several purchase situations**. All washing machines are front-loaders with a load capacity of 7 kg, the energy efficiency class A++ and a maximum spin speed of 1,400 revolutions per minute.

The washing machines **differ only** in the features **brand, annual energy consumption, price and equipment version**. The annual energy consumption is calculated on the basis of average use and 220 washes per year.

It is important that you choose **as if you were actually buying a washing machine**. If you would not buy any of the washing machines offered, you can also indicate this.

You may see washing machines that are not currently available on the market or that seem unrealistic to you.

Nevertheless, we would ask you to assume that all washing machines shown are actually offered in this way."

Figure 4.4 Introduction texts and exemplary choice tasks (original in German)

Exemplary choice task of the first CBC exercise:

Assuming you can only choose between these three washing machines, which one would you buy?

	Standard*	Standard* with extras**	Standard*
Equipment version:	Standard*	Standard* with extras**	Standard*
Price:	500 €	800 €	200 €
Energy consumption:	160 kWh/year	80 kWh/year	120 kWh/year
Brand:	New brand	Miele	Siemens
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

I wouldn't buy any of these washing machines.

*** Standard:**
Wash programmes: e.g. hot, coloured, mixed, delicates, easy care, wool, eco, quick
Functions: e.g. start time delay, remaining time display, consumption adjustment to load

**** Extras:**
Wash programmes: e.g. sports, shirts, allergy, baby clothes, bedding, jeans, animal hair
Functions: e.g. smartphone control, consumption display, automatic detergent dosing

Figure 4.4 (continued)

Introduction text of the second CBC exercise:

In the following you will again be offered three washing machines in each of several purchase situations. Please imagine that due to a new law all washing machines on the market are from now on marked with the **label "Expected product lifetime"**.

The label indicates the **expected number of years** a washing machine will function **without restriction** at average use and 220 washes per year.

The label is issued by a **manufacturer-independent testing institute** using a standardised test procedure. The label is **not a guarantee promise**.

The only difference to the previous purchase situations is that the washing machines now also differ in the expected product lifetime label.

You may again see washing machines that are not currently available on the market or that seem unrealistic to you.

Nevertheless, we ask you to continue assuming that all washing machines shown are actually offered in this way.

Figure 4.4 (continued)

Exemplary choice task of the second CBC exercise:

Assuming you can only choose between these three washing machines, which one would you buy?

Energy consumption:	Brand:	Equipment version:	Expected product lifetime:	Price:
80 kWh/year	Siemens	Standard* with extras**	25 years	1,100 €
120 kWh/year	Miele	Standard*	20 years	1,400 €
160 kWh/year	Beko	Standard*	10 years	500 €

I wouldn't buy any of these washing machines.

*** Standard:**
Wash programmes: e.g. hot, coloured, mixed, delicates, easy care, wool, eco, quick
Functions: e.g. start time delay, remaining time display, consumption adjustment to load

**** Extras:**
Wash programmes: e.g. sports, shirts, allergy, baby clothes, bedding, jeans, animal hair
Functions: e.g. smartphone control, consumption display, automatic detergent dosing

Figure 4.4 (continued)

Appendix 2 See table 4.9.**Table 4.9** Descriptive statistics of each construct's items

Items ^a	Sample (n = 499)	
	Mean	SD ^b
Egoistic values [EV]^c		
Item 1 [ev1] ("It's important to her/him to show her/his abilities. She/he wants people to admire what she/he does.")	3.289	1.466
Item 2 [ev2] ("It's important to her/him to be very successful. She/he hopes that people will recognize her/his achievements.")	3.391	1.380
Item 3 [ev3] ("It's important to her/him to move forward in life. She/he strives to be better than others.")	3.473	1.394
Hedonic values [HV]^c		
Item 1 [hv1] ("She/he wants to really enjoy life. It is important to her/him to have fun.")	4.074	1.317
Item 2 [hv2] ("It's important to her/him to have fun. She/he likes to indulge herself/himself.")	3.878	1.262
Item 3 [hv3] ("She/he never misses a chance to have fun. It is important to her/him to do things that give her/him pleasure.")	3.405	1.377
Biospheric values [BV]^c		
Item 1 [bv1] ("It is important to her/him to adapt to nature and to fit in with it. She/he believes that people should not change nature.")	4.796	1.193
Item 2 [bv2] ("She/he thinks that people should live in harmony with nature. It is important to her/him to respect nature.")	4.697	1.235
Item 3 [bv3] ("It is important to her/him to avoid environmental pollution. She/he would like to protect nature from pollution and destruction.")	4.798	1.167
Altruistic values [AV]^c		
Item 1 [av1] ("She/he considers it important that all people in the world should be treated equally. She/he believes that everyone should have equal opportunities in life.")	4.729	1.244
Item 2 [av2] ("It is important to her/him to listen to people who are different from her/him. Even if she/he disagrees with others, she/he still wants to understand them.")	4.507	1.150

Items ^a	Sample (n = 499)	
	Mean	SD ^b
Item 3 [av3] ("She/he wants everyone to be treated justly, even people she/he does not know. It is important to her/him to protect the weak in society.")	4.739	1.242
Stimulation values [SV] ^c		
Item 1 [sv1] ("She/he likes surprises and is always on the lookout for new activities. She/he thinks that variety is important in life.")	3.373	1.343
Item 2 [sv2] ("She/he seeks adventure and likes to take risks. She/he wants to have an exciting life.")	2.772	1.401
Positive attitude towards purchasing long-lasting electrical home appliances based on ...		
... personal gains [APG] ^d		
Item 1 [apg1] ("By purchasing long-lasting home appliances I <u>get the opportunity to use high-quality home appliances for a long time.</u> /How important is the aspect of using high-quality home appliances for a long time to you?")	5.526	1.642
Item 2 [apg2] ("... <u>save money in the long term...</u> ")	5.545	1.613
Item 3 [apg3] ("... <u>avoid stress and annoyance with early repairs and replacement purchases ...</u> ")	5.381	1.689
... environmental gains [AEG] ^d		
Item 1 [aeg1] ("By purchasing long-lasting home appliances I <u>contribute to the reduction of waste.</u> /How important is the aspect of contributing to waste reduction to you?")	5.443	1.714
Item 2 [aeg2] ("... <u>contribute to the protection of finite resources ...</u> ")	5.288	1.750
Item 3 [aeg3] ("... <u>reduce my ecological footprint in the long term ...</u> ")	4.881	1.914
Subjective norm towards purchasing long-lasting electrical home appliances [SN] ^e		
Item 1 [sn1] ("Most people who are important to me would be in favour of me buying long-lasting home appliances.")	5.665	1.461
Item 2 [sn2] ("Most people who are important to me purchase long-lasting home appliances.")	5.337	1.491

Items ^a	Sample (n = 499)	
	Mean	SD ^b
Item 3 [sn3] ("Most people who are important to me think that I should buy long-lasting home appliances.")	5.343	1.585
Item 4 [sn4] ("Most people who are important to me pay attention to the longevity of household appliances when purchasing them.")	5.234	1.557
Preference for a long lifetime of electrical home appliances [P]^f		
Item 1 [p1] (utility estimate for an expected product lifetime of 25 years)	4.925	0.676

^a Items translated from German

^b Standard deviation

^c Six-point Likert scale anchored by 1 (= not at all similar) and 6 (= very similar)

^d Two questions per item; item = strength (likelihood) x evaluation (importance) of behavioural belief; likelihood and importance measured on seven-point Likert scales anchored by 1 (= very unlikely/very unimportant) and 7 (= very likely/very important); items rescaled to cover a range from 1 to 7

^e Seven-point Likert scale anchored by 1 (= disagree at all) and 7 (= fully agree)

^f All utilities of the expected product lifetime label were rescaled from zero-centred differences (table 4.5) to cover a range from 1 to 7; new range of utility for 25 years: minimum = 2.313 and maximum = 7

Appendix 3 See figure 4.5.

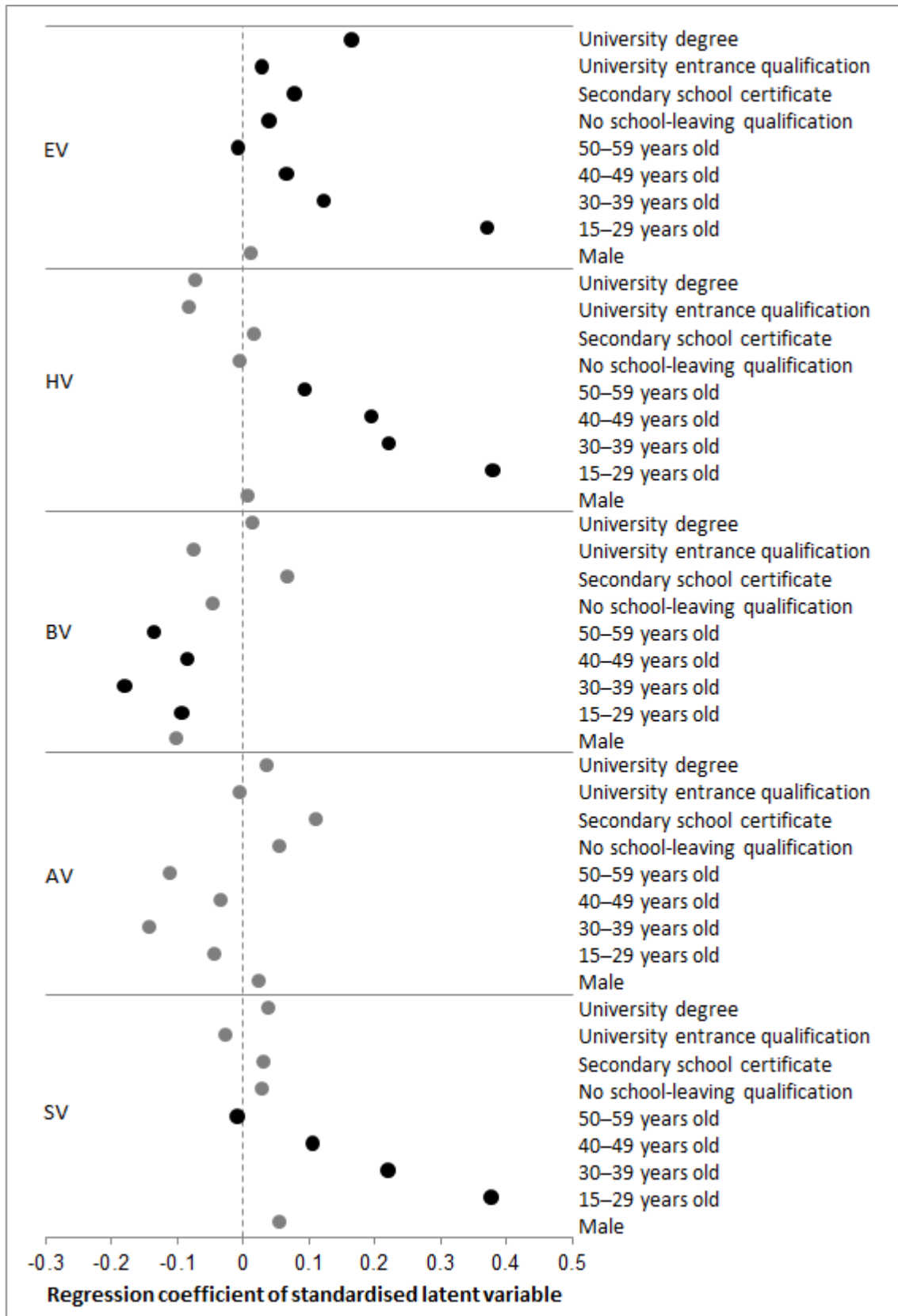


Figure 4.5 Impact of socio-demographic covariates on the constructs in the structural equation model (point estimates; reference categories [female, 60 years and older, secondary modern school

qualification]; joint significance of fully standardised regression coefficients for each covariate based on omnibus Wald tests; black = significant ($p \leq 0.05$); grey = insignificant ($p > 0.05$)

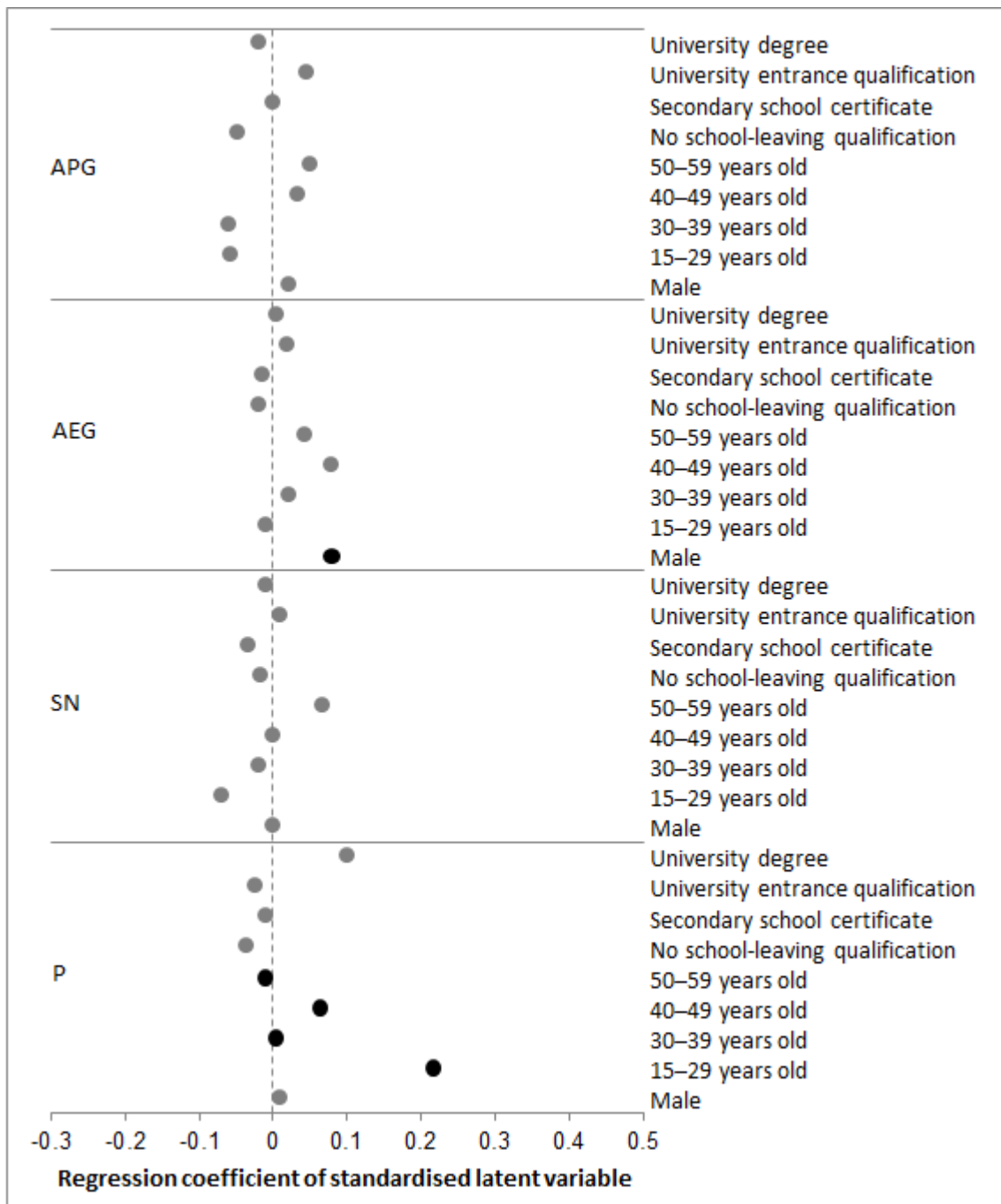


Figure 4.5 (continued)

Chapter 5

Article IV – The effects of favourable and unfavourable environmental information on consumers' willingness to pay

Contextual transition

The following chapter presents the fourth article on the determinants of sustainable purchase behaviour using the example of a low-involvement utilitarian product category, namely batteries. Compared to the previous studies of the doctoral thesis, this article is not intended to draw industry-specific conclusions. It develops a conceptual model mapping the effects of favourable and unfavourable environmental product information on consumers' willingness to pay. More precisely, alternative hypotheses derived from two behavioural economic theories are tested. Similar to the third study of the doctoral thesis, this article thus combines economic and psychological considerations in one framework. Prospect theory (Kahneman et al., 1991; Kahneman and Tversky, 1979; Tversky and Kahneman, 1991) and disappointment theory (Loomes and Sugden, 1986) are chosen as they offer competing explanations and predictions of how consumers react to positive and negative information on a product's environmental performance. Based on prospect theory, it is expected that negative deviations of a product's environmental performance from a given reference point have a stronger effect on willingness to pay than quantitatively corresponding positive deviations. Moreover, while prospect theory supports the argument that deviations of a product's environmental performance from a given reference point have a continually declining concordant effect on willingness to pay, disappointment theory supports the reasoning that such deviations have a continually increasing concordant effect on willingness to pay. The analysis draws on data gained from a survey-based online experiment conducted among a population-representative sample of 524 German consumers. The conceptual model was tested by using a two-level, within and between-subjects structural equation model. The multilevel modelling approach is useful due to the repeated measures design of the experiment (Snijders and Bosker, 2012). Each respondent went through a series of three hypothetical purchase scenarios and reported his/her willingness to pay for a pack of batteries which only varied in its product carbon footprint information. This is why the purchase occasion was integrated as a control variable at the within-subjects level of the structural equation model. At the between-subjects level, it was also controlled for the influence of concern about climate change, social desirability bias and social demographics. Respondents' attitude towards climate change is included because environmental attitudes are acknowledged to impact purchase decisions (e.g. Daziano et al., 2017; Harms and Linton, 2016). To mitigate the potential bias of stated willingness to pay, it was explicitly controlled for the individual social desirability tendency.

Abstract

Prospect theory and disappointment theory offer competing explanations and predictions of how consumers react to favourable and unfavourable product carbon footprint information. Alternative hypotheses derived from said theories are tested using a two-level, within and between-subjects structural equations model. The analysis draws on empirical data gained from a survey-based experiment conducted among a representative sample of the German population. Overall, the results document a strong orientation of consumers on given reference points, such as an industry average, and confirm key assertions of prospect theory. The negative effect caused by unfavourable product carbon footprint information on consumers' willingness to pay is stronger than the positive effect caused by respective favourable information. Furthermore, consumers tend to not substantially differentiate between different high-range degrees of positive or negative environmental information; they rather generally reward or punish deviations from an industry average instead of consistently accounting for the size of these deviations. From a sustainable development perspective, the observed patterns thus highlight a problematic contrast between the need for substantial improvements in products' environmental performance and current market incentives for companies. Policymakers can learn from the analysis that providing consumers also with negative information, raising consumers' reference points, setting minimum industry standards, and subsidizing companies for radical improvements are of utmost importance.

Keywords

Disappointment theory, Negativity bias, Product carbon footprint information, Prospect theory, Willingness to pay

5.1 Introduction

More and more consumers consider environmental benefits and burdens caused by products along their life cycles as purchase-relevant. Willingness to pay (WTP) for certain products increasingly depends on the associated environmental performance (e.g. Harms and Linton, 2016; Mai, 2014; Sammer and Wüstenhagen, 2006). Nevertheless, the translation of consumer information on environmental performance into actual environmental purchase behaviour is anything but straightforward (e.g. Noblet and Teisl, 2015; O'Rourke and Ringer, 2016; Thøgersen et al., 2010). In order to effectively provide consumers with information conducive to environmental purchase behaviour, it is important to attain a deeper understanding of the impact of such information on behaviour by going beyond merely establishing a qualitative link between the two. In pursuit of this goal, we investigate *how the effect of positive and negative environmental information increases or decreases with progressively higher (or lower) levels of a product's environmental performance*.

To address this research question, we build on the alternatives of prospect theory and disappointment theory to identify the general shape of the reaction function of WTP for a given product with respect to its environmental performance. The analysis is conducted using environmental information related to carbon dioxide (CO₂) emissions, for the following reasons. First, CO₂ is the most significant contributor to climate change, one of the most pressing environmental issues (e.g. Rockström et al., 2009; Steffen et al., 2015). Second, the issue of climate change is particularly worth studying in the context of environmental consumer behaviour because climate stability is a public good, so that higher levels of environmental performance with regard to slowing climate change do not primarily lead to private benefits (Finus and Rübbelke, 2013). In contrast to other kinds of environmental information, such as life cycle costing measures or organic labels, which explicitly address personal cost savings (e.g. Deutsch, 2010; Kaenzig and Wüstenhagen, 2010) or health benefits (e.g. Cagalj et al., 2016; Mondelaers et al., 2009), this ensures the desired focus on the effects of environmental product performance. The generalizability to other contexts of environmental consumption also dealing with public benefits is thus enhanced. Third, with product carbon footprints (PCFs) a tool has been developed in the field of industrial ecology which provides consumers with practical guidance for judging climate change-related impacts of products (e.g. Draucker et al., 2011; Lehmann et al., 2017; Lenzen, 2014). Drawing on Alvarez et al. (2018), the PCF can be defined as an indicator measuring the direct and indirect greenhouse gas (GHG) emissions caused by a specific product. Like the information provided on the basis of life cycle assessments (LCAs) (Saunders et al., 2013), PCFs consider all GHG emissions caused during the product's entire life

cycle. As another difference to most environmental labels, PCFs provide quantitative information, not only qualitative information on obeying specific standards.

The present article contributes to the discourse on industrial ecology in multiple ways: First, for the first time prospect theory and disappointment theory are applied in the context of industrial ecology, linking PCF information to WTP. Second, using PCF information, as opposed to qualitative environmental labels, allows for a nuanced quantitative analysis of WTP for widely varying degrees of positive or negative environmental performance. Third, the analysis reveals which levels of environmental performance companies are incentivised to reach (such as catching up with or just slightly exceeding the industry average) and for which kinds of improvements no substantial incentives exist (such as only partially reducing a strong negative deviation from industry average or taking a lead position in the industry). Fourth, on this basis, the analysis highlights the importance of regulation for environmental consumption such as providing consumers with negative environmental information, raising consumers' reference points, setting minimum industry standards, and subsidizing companies for radical environmental improvements.

5.2 Theoretical background and research hypotheses

Various researchers have investigated the influence of products' environmental performance on consumption behaviour. Multiple studies find that positive environmental information can stimulate purchase behaviour in specific contexts, such as foods for professional and end consumers (e.g. Biel and Grankvist, 2010; Vanclay et al., 2011), refurbished products (Harms and Linton, 2016), or consumer electronics (Moosmayer, 2012). In general, previous studies suggest that while consumers do prefer to buy more environmentally friendly products, they need to trade off a product's higher environmental performance against its potentially higher price (e.g. Brécard et al., 2009; Vanclay et al., 2011). In contrast, O'Rourke and Ringer (2016), who analyse the impact of product ratings on consumers' purchase intentions, conclude "that many consumers are unaffected by sustainability information" (O'Rourke and Ringer, 2016, p. 8). Nevertheless, they also report the effects of specific kinds of sustainability-related information, primarily concerning health issues.

Other authors focus on the means of communicating environmental product performance and, among others, analyse the effects of communicating quantitative LCA and PCF information. Molina-Murillo and Smith (2009), for example, show that disclosing LCA information of personal care products can positively influence consumers' purchase intentions as well as the credibility consumers ascribe to environmental product performance. In contrast, Hartikainen et al. (2014) indicate that consumers attach low importance to PCF information in the food context. Consequently, O'Rourke

and Ringer (2016) identify a need for further research on how the quantitative information provided by industrial ecology research influences consumer decisions. Similarly, Hartikainen et al. (2014) call for studies measuring the impact of PCF information on consumer behaviour. In conclusion, it still remains largely unclear how the reaction function of consumers' WTP is shaped with respect to a product's quantified environmental performance.

Many studies implicitly assume a linear relationship between environmental product performance and WTP (e.g. Ha-Brookshire and Norum, 2011; Loureiro and Lotade, 2005; Zander and Hamm, 2010). Empirical findings from experimental research, in contrast, give reason to expect nonlinear effects in consumers' reactions to the environmental information of products (e.g. Grankvist et al., 2004; Moosmayer, 2012; Van Dam and De Jonge, 2015). One such effect is the negativity bias, which refers to a widely observed general psychological tendency to attribute greater weight to negative than to positive stimuli (Rozin and Royzman, 2001). Multiple theoretical explanations for negativity biases exist based on, for instance, expectancy-contrast theories, frequency-weight theories, range theories, category diagnosticity theory, self-regulation theories or prospect theory (Grankvist et al., 2004; Skowronski and Carlston, 1989; Van Dam and De Jonge, 2015). Negativity biases have been found in many different settings (e.g. Ito et al., 1998; Baumeister et al., 2001; Siegrist and Cvetkovich, 2001), and notably also in environmental consumption (e.g. Grankvist et al., 2004; Mohr and Webb, 2005; Moosmayer, 2012; Van Dam and De Jonge, 2015). An overview of pertinent literature on nonlinear effects of environmental information on consumer behaviour is summarized in table 5.1.

Table 5.1 Nonlinear effects of environmental information on consumer behaviour

Author(s)	O'Rourke and Ringer (2016)	Van Dam and De Jonge (2015)	Moosmayer (2012)
Theory base	None	Prospect theory; Regulatory focus theory	Category diagnosticity theory
Data collection	Online field observation of product page views (n = 41,398) Fast-moving consumer goods	Three experiments among Dutch students (n = 81; 170; 177) Computer hardware; foods	Survey-based experiment among German students (n = 315) Consumer electronics
Data analysis	DV: Purchase intention IV: Quantitative environmental-, social- and health-related sustainability information about products and companies (interval scaled ratings without explicit reference point and related to indicators from industrial ecology)	DV: Attitude towards product; preference for product IV: Qualitative environmental label (positive, neutral or negative compared to industry average; positive or negative without explicit reference point); price Mod: Regulatory focus; environmental concern Med: Personal sustainable norms ED: Between-subjects; within-subjects	DV: Price response (based willingness to pay and price expectations) IV: Qualitative environmental information on corporate performance based on newspaper excerpt (positive or negative without explicit reference point) (social information of sportswear also tested) ED: Between-subjects
Key findings (focus: environmental information)	<ul style="list-style-type: none"> - Positive influence of sustainability information on purchase intention among users interested in sustainability - Positive influence of environmental ratings only for pet food - Changes in sustainability scores at the low end of the ratings do not influence purchase intention, whereas changes at the high end strongly positively and negatively influence purchase intention 	<ul style="list-style-type: none"> - Support for negativity bias only if positively labelled products offered at price premium - Effect of positive (negative) labelling enhanced by promotion (prevention) focus - Strong positive relationship between environmental concern and preference for positively labelled product - Effect of negative labelling mediated by personal sustainable norms - Effect of environmental concern on preference for positively labelled product fully mediated by personal sustainable norms 	<ul style="list-style-type: none"> - Effect of product-related environmental information on price response - Support for negativity bias - For negative environmental information, some respondents reported a willingness to pay of 0 € (boycotting)
Limitation(s)	<ul style="list-style-type: none"> - R² generally below 0.1 - Actual purchases not measured - Data collected retrospectively - 'Brick-and-mortar' shopping not considered 	<ul style="list-style-type: none"> - None mentioned 	<ul style="list-style-type: none"> - Quoting absolute prices might be difficult and unrealistic - Constructed product value does not account for hygiene factors - Evaluating price responses before and after informational stimulus could lead to modified price responses - Social desirability bias
Further research	<ul style="list-style-type: none"> - Usage of sustainability information from industrial ecology research - Design of sustainability information - Controlled experiments - More reliable, statistically powerful hypothesis testing 	<ul style="list-style-type: none"> - Moderating effect of environmental concern on relationship between type of labelling and purchase behaviour 	<ul style="list-style-type: none"> - Further validation of new approach measuring individual negativity bias (price response quotient) - Consideration of confounding information - Individual roots and consequences of negativity bias

(DV = dependent variable(s); IV = independent variable(s); Mod = moderator(s); Med = mediator(s); ED = experimental design)

Table 5.1 (continued)

Author(s)	Mohr and Webb (2005)	Grankvist et al. (2004)
Theory base	Stakeholder theory; Shareholder theory	Prospect theory; Self-discrepancy theory
Data collection	Survey-based experiment among random sample of US-American adults (n = 194) Sportswear	Incentivised experiment among Swedish students (n = 40) Foods and non-foods
Data analysis	DV: Evaluation of company; purchase intent IV: Qualitative environmental and philanthropic corporate social responsibility (CSR) information (positive or negative compared to industry); price; socially responsible consumer behaviour; support for environmental and philanthropic CSR (attitude) ED: Between-subjects	DV: Preference for product IV: Qualitative environmental label (positive, neutral or negative compared to average product); environmental concern ED: Between-subjects
Key findings (focus: environmental information)	- Positive influence of CSR information on evaluation of company and purchase intent - Support for negativity bias - CSR information influences purchase intent more strongly than price - Price influences purchase intent slightly stronger in case of negative CSR information - Effect of environmental CSR information on evaluation of company (and purchase intent) stronger for highly socially responsible (highly supportive) consumers	- Respondents with weak or no environmental concern unaffected by either kind of label - Support for negativity bias for respondents with intermediate environmental concern - Respondents with strong environmental concern equally affected by positive and negative label
Limitation(s)	- Effect of CSR information on respondents might be inflated due to hypothetical shopping situation and, specifically, presentation of informational stimulus immediately before evaluating company and purchase intent - Sample not population-representative	- Only proxy (environmental concern) used as measure of self-guides
Further research	- Replication study as field experiment	- Stricter theory testing - Effects of other non-environmental types of information - Linkage between promotion and prevention focus, and personal and social norms

(DV = dependent variable(s); IV = independent variable(s); Mod = moderator(s); Med = mediator(s); ED = experimental design)

Table 5.1 shows that little attention has yet been paid to the explanation of nonlinearities in environmental consumption. Remarkably, except for O'Rourke and Ringer (2016), all listed studies test the influence of product-related environmental information which, unlike LCA or PCF information, does not stem from the industrial ecology discourse and which is qualitative by nature. O'Rourke and Ringer (2016), however, merely observe nonlinear effects of sustainability information and do not refer to a specific theoretical basis. In fact, only three studies explicitly build their research design on theoretical ground, with two of them (Grankvist et al., 2004; Van Dam and De Jonge, 2015) referring to prospect theory. Moreover, apart from Moosmayer (2012), all presented studies examine dependent variables other than WTP, such as attitudes, preferences and purchase intentions. However, investigating WTP appears more meaningful, since this measure accounts for a consumer's price consciousness which is of great importance given the fact that environmentally friendly products are usually more expensive than their environmentally harmful equivalents (e.g. Brécard et al., 2009; Vanclay et al., 2011). Finally, none of the previous studies uses population-representative samples. As a consequence, the present study addresses this multitude of research gaps by examining nonlinear effects in consumers' WTP reaction functions with respect to a product's quantitative environmental performance information derived from industrial ecology, namely PCF information. Based on a population-representative sample, conflicting theories are tested systematically.

According to prospect theory, it can be expected that consumers do not evaluate the absolute level of a product's environmental performance, but rather its deviations from a reference point. Options which positively deviate are perceived as gains, negative deviations are perceived as losses (Tversky and Kahneman, 1991). Within the framework of prospect theory (Kahneman and Tversky, 1979), the negativity bias has been introduced as loss aversion (Kahneman et al., 1991; Tversky and Kahneman, 1991), assuming that decision makers prefer avoiding a loss over achieving a gain of the same nominal amount. However, prospect theory has so far only been applied in contexts where qualitative labels were used to explain the negativity bias in environmental consumption. Based on prospect theory, Van Dam and De Jonge (2015), for instance, show that qualitative negative labelling of environmental product performance has a stronger effect on consumer attitudes and preferences than positive labelling in the context of computer hardware and foods. Building on category diagnosticity theory, Moosmayer (2012) confirms that qualitative negative environmental information results in stronger changes in WTP than positive information in the context of consumer electronics. Based on these earlier empirical insights and the theoretical background of negativity bias, we formulate hypothesis H1 as follows:

Hypothesis H1 Negative (unfavourable) deviations of a product's environmental performance from a given reference point have a stronger effect on WTP than quantitatively corresponding positive (favourable) deviations.

Beyond the negativity bias, other forms of nonlinearity of consumers' WTP reaction functions can be explained by different theories. Prospect theory, for instance, posits an S-shaped utility function, which takes a value of zero at the reference point, rises above zero with increasing gains, and falls below zero with increasing losses. Its slope, initially higher for losses than for gains due to the above-mentioned loss aversion, in both cases flattens for increasing absolute distances from the reference point (Kahneman et al., 1991; Kahneman and Tversky, 1979). Whereas prospect theory originally models utility as a function of change in monetary wealth, its implication of a decreasing effect of departures from a reference point has been generalized to other domains such as consumer satisfaction and purchase intentions (Mittal et al., 1998). Grankvist et al. (2004) transfer the reference dependence and loss aversion assumptions of prospect theory to the study of positive and negative qualitative labels on a product's environmental performance, but explicitly leave aside the assumption of diminishing sensitivity. The present research addresses this gap. Building also on this third core assumption of prospect theory, one can expect an S-shaped reaction of consumers' WTP to a product's environmental performance information (see figure 5.1 (a)).

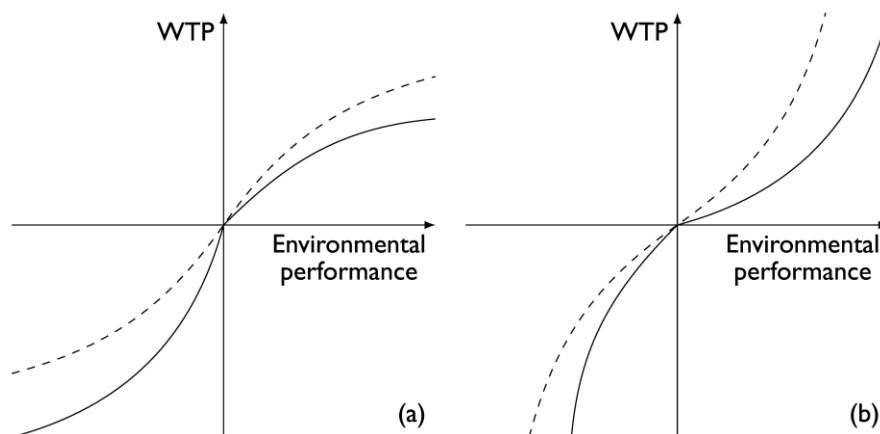


Figure 5.1 Alternative hypothesised shapes of the willingness-to-pay reaction function with (a – prospect theory) declining or (b – disappointment theory) increasing effects of deviating environmental performance and with (solid lines) or without (dashed lines) negativity bias

Contrasting with prospect theory, disappointment theory (Loomes and Sugden, 1986) offers a justification for an inversely S-shaped pattern of consumers' WTP reaction functions (see figure 5.1 (b)). Disappointment theory shares the assumption of reference dependence with prospect theory and assumes that negative deviations from the reference point cause disappointment and positive

deviations cause elation. Unlike prospect theory, the effects of disappointment and elation are hypothesised to grow progressively with the amount of deviation from expectations, inducing the inverse S-shape of the utility function. In accordance with disappointment theory, O'Rourke and Ringer (2016) find that a piecewise linear function of purchase intention for products with high health-related sustainability ratings increases progressively with the health score. In contrast, the response to environmental sustainability ratings appears irregular, with alternating slopes for above-average environmental scores, indicating a need for clarification. In the context of conventional consumer behaviour, Homburg et al. (2005) show that disappointment theory can explain consumers' perceived utility in response to product quality, with WTP following an inverse S-shape. Consequently, the question arises whether this finding can be transferred to environmental consumption.

Neither prospect theory nor disappointment theory have yet been applied to the question of how WTP reacts to quantitative variations in a product's environmental performance. Translating the competing theoretical foundations for explaining consumers' WTP reaction functions with respect to quantitative environmental product performance, we set up the following alternative hypotheses:

Hypothesis H2a Deviations of a product's environmental performance from a given reference point have a continually declining concordant effect on WTP.

Hypothesis H2b Deviations of a product's environmental performance from a given reference point have a continually increasing concordant effect on WTP.

5.3 Method

5.3.1 Sample and experimental design

Our analysis builds on a survey-based experiment drawing on a population-representative sample of 524 consumers from Germany. Consequently, we pick up the need for experimental research (O'Rourke and Ringer, 2016) and particularly for controlled and population-based experiments (Harms and Linton, 2016). Quota targets for gender, age, and formal education are based on micro-census data for the adult population in Germany (Statistisches Bundesamt, 2017). Quota targets and actual sampling frequencies are shown in appendix 1.

Respondents were presented with an online questionnaire (see appendix 2), in the course of which they were confronted with three subsequent purchase decisions¹. In each instance, the participants were asked to state their WTP for a pack of batteries in a hypothetical purchase

¹ Exemplary purchase scenarios are shown in appendix 3.

situation. Environmental performance in terms of CO₂ emissions relative to the industry average was stated for the batteries on offer, and invariant prices of five unavailable packs of functionally equivalent batteries were indicated so as to reduce the response variance attributable purely to inhomogeneous market knowledge. The industry average of CO₂ emissions served as a salient reference point, as suggested by earlier literature (e.g. Van Dam and De Jonge, 2015). The purchase scenarios were built on batteries for three reasons. First, batteries are low-involvement products purchased by almost all consumers from time to time, thus allowing for a common product understanding among consumers. Second, the current battery market does not advertise environmental product benefits so that the potential influence of some consumers' prior knowledge about environmentally friendly batteries could be ruled out. Also, product categories with established sustainable markets, such as coffee, have already been in the centre of earlier research (e.g. Basu and Hicks, 2008; Loureiro and Lotade, 2005). Third, choosing a utilitarian product enabled us to plausibly focus on environmental information and price as purchase-relevant product attributes. Non-functional characteristics mainly serving hedonic motives, such as design, were expected to be of only minor importance to consumers. Two pre-tests, one primarily among researchers ($n = 30$) and another among students ($n = 141$) in the fields of sustainability and business, confirmed that the scenarios were comprehensible and perceived as sufficiently plausible, and that the manipulation was successful.

The environmental performance stimulus was varied for each purchase decision. For one of the three occasions, a relative performance of 100% of the industry average CO₂ emissions was fixed. For each of the other two occasions, the relative performance was randomly chosen from a lognormal distribution censored between 0.01 (i.e., a hundredth or 1% of the industry average CO₂ emissions) and 100 (i.e., the hundredfold or 10,000% of industry average CO₂ emissions). Values below (above) unity, or 100% of the industry average CO₂ emissions, hence represent favourable (unfavourable) environmental performance. The parameters of the respective distributions have been chosen so that in 75% of cases, one of the purchase occasions refers to an above-average, another to a below-average, and the remaining one to an average environmental performance product. In the remaining 25% of cases, two of the three purchase situations refer to products with the same tendency as compared to the industry average. The sequence of the three scenarios was randomised in each case to prevent order effects.

Two question blocks on attitudes were interspersed between the purchase decisions to generate measurements of common method variance and, specifically, of social desirability bias. These at the same time helped to mitigate anchoring effects between successive WTP reports. To safeguard against context effects on WTP self-reports, measurement occasion dummies were included as control variables in the analysis. A third question block, placed after the last purchase

situation, elicited consumers' environmental attitudes. All questions were mandatory so that there is no item non-response.

5.3.2 Measurements

The dependent variable of the present analysis is the consumer's WTP for a given product. Respondents were asked to enter their individual WTP as a euro amount in each purchase occasion. Despite its known limitations (e.g. Breidert et al., 2006), this direct approach of WTP elicitation is used in many related studies (e.g. Ha-Brookshire and Norum, 2011; Harms and Linton, 2016; Homburg et al., 2005). It is the method of choice for the present research design, as the latter requires repeated measurements from a large, population-representative sample (e.g. Breidert et al., 2006) and focuses on the shape, rather than on the precise location, of the WTP reaction function. For this purpose, the open-ended question method has proven to be suitable (Miller et al., 2011). To mitigate the potential bias of stated WTP, we not only capture but explicitly control for individual social desirability tendency.

The independent variable of interest is the environmental performance of the product offered for sale, operationalized by the product's PCF in the form of CO₂ emissions relative to the corresponding industry average. In our model, this relative measure enters on a reversed base-10 logarithmic scale, with zero representing industry average and negative (positive) numbers representing unfavourable (favourable) environmental performance, for instance -1 for a tenfold PCF.

As a control variable, we include respondents' attitude towards climate change, because environmental attitudes are acknowledged to impact purchase decisions (e.g. Brécard et al., 2009; Daziano et al., 2017; Harms and Linton, 2016). Therefore, we also need to account for a possible moderating effect of such an attitude on the WTP reaction to environmental performance. For the purpose of operationalisation, we used Metag et al.'s (2017) 'Concern about Climate Change' (CaCC) scale. The CaCC items, as well as the items on social desirability (Kemper et al., 2012) and markers for common method variance (e.g. Podsakoff et al., 2003; Podsakoff et al., 2012), were measured on five-point rating scales ranging from 'completely agree' to 'completely disagree'. We assessed the internal consistency of the CaCC scale with a confirmatory factor analysis (CFA; e.g. Hair Jr. et al., 2013; Kline, 2016), at the same time controlling for common method bias in general and social desirability bias in particular (see figure 5.2)².

² Common method variance is captured by a latent method factor loading on all observed indicators including non-substantive marker variables. Social desirability is conceptualized as Paulhus's (2002) gamma factor and,

measured as a second-order factor by two polar sub-scales, overstatement of positive traits and understatement of negative traits, with three items each (Kemper et al., 2012).

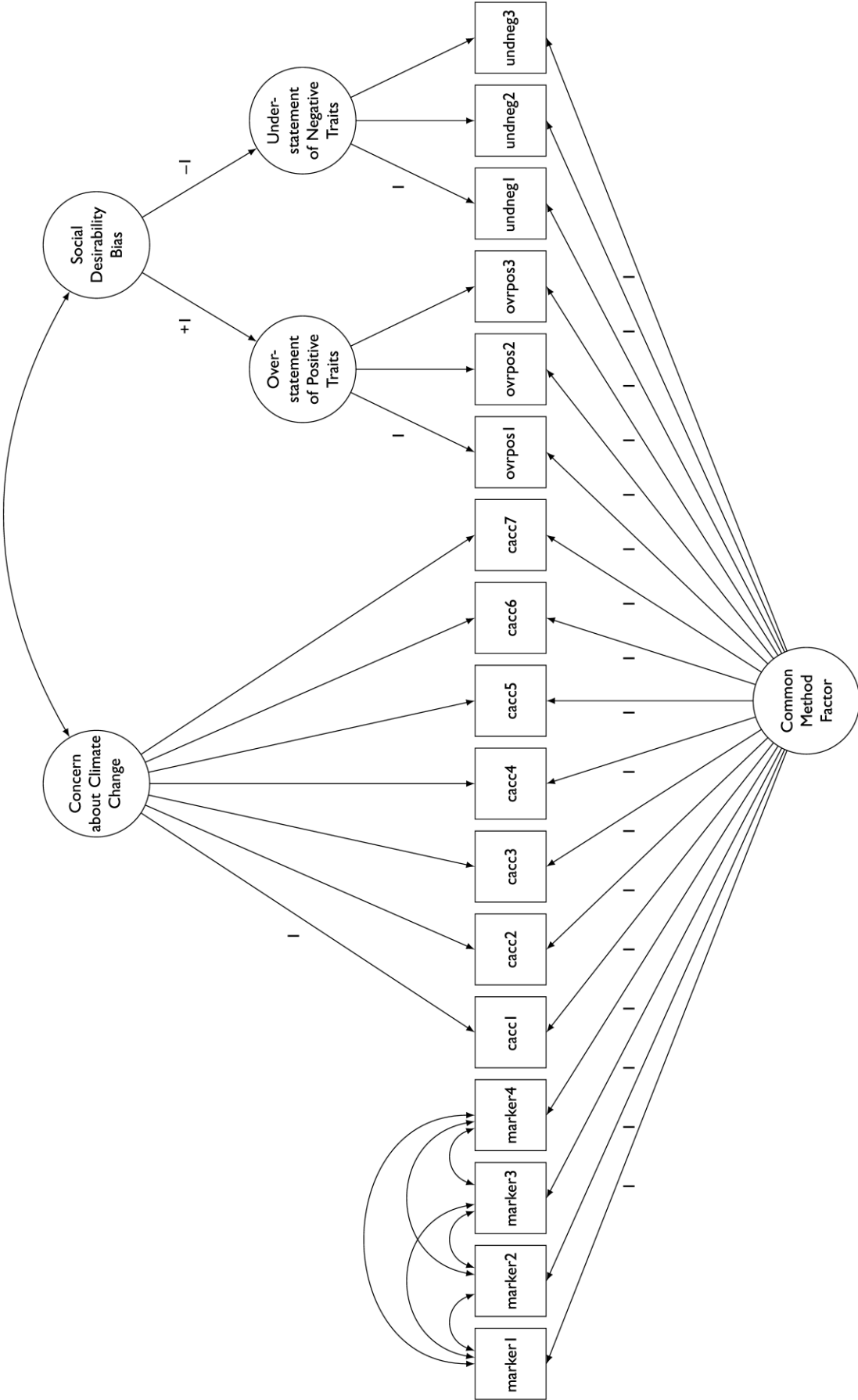


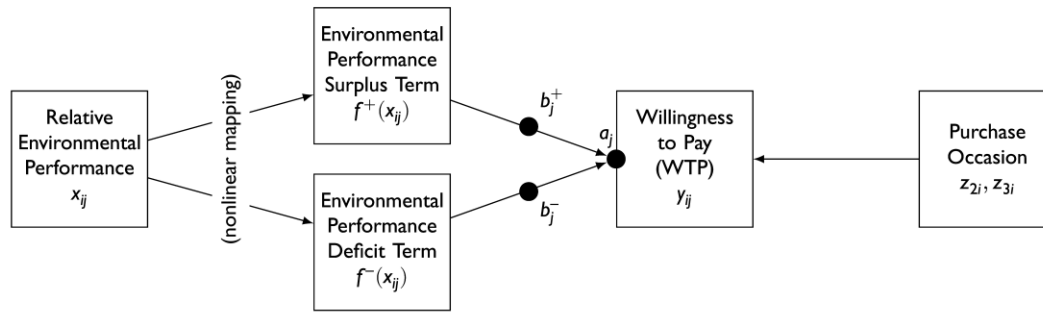
Figure 5.2 Confirmatory factor analysis

The CFA model, estimated with Mplus 8 (Muthén and Muthén, 2017), fits the data well ($\chi^2 / df = 257.0 / 106 = 2.42$, CFI = 0.941, TLI = 0.924, RMSEA = 0.052, $p(\text{RMSEA} < 0.05) = 0.324$, SRMR = 0.049; e.g. Hair Jr. et al., 2013; Kline 2016; detailed results are reported in appendix 4). The CaCC construct is measured with a congeneric reliability of 0.906 and an average variance extracted of 0.644. The method factor extracts only 0.018 of the CaCC items' variance on average, clearly indicating the absence of a method bias.³

5.3.3 Model and analysis

To estimate intersubjectively varying, potentially nonlinear reaction functions based on three individual WTP measurements, we resort to the two-level, repeated measurements structural equations model (e.g. Du Toit and du Toit, 2008; Heck and Thomas, 2015) shown in figure 5.3. The first, within-subjects level explains the variation of WTP between measurements, i.e. the three purchase occasions, for each individual. The second, between-subjects level captures the variation between different respondents. On that level, CaCC and social desirability are measured by the same (sub-)model as used for the CFA. A formal model specification is given in appendix 5.

³ The social desirability subscales attain congeneric reliabilities of 0.644 (overstatement of positive traits; average variance extracted: 0.396) and 0.624 (understatement of negative traits; average variance extracted: 0.367) and a second-order factor hierarchical omega of 0.380 (Cho, 2016). The fact that these reliabilities are barely satisfactory to support substantive measurement of individual social desirability ratings by common standards (e.g. Fornell and Larcker, 1981; Nunnally and Bernstein, 1994) hints at the absence of a noteworthy social desirability bias in our data.



Within subjects

Between subjects

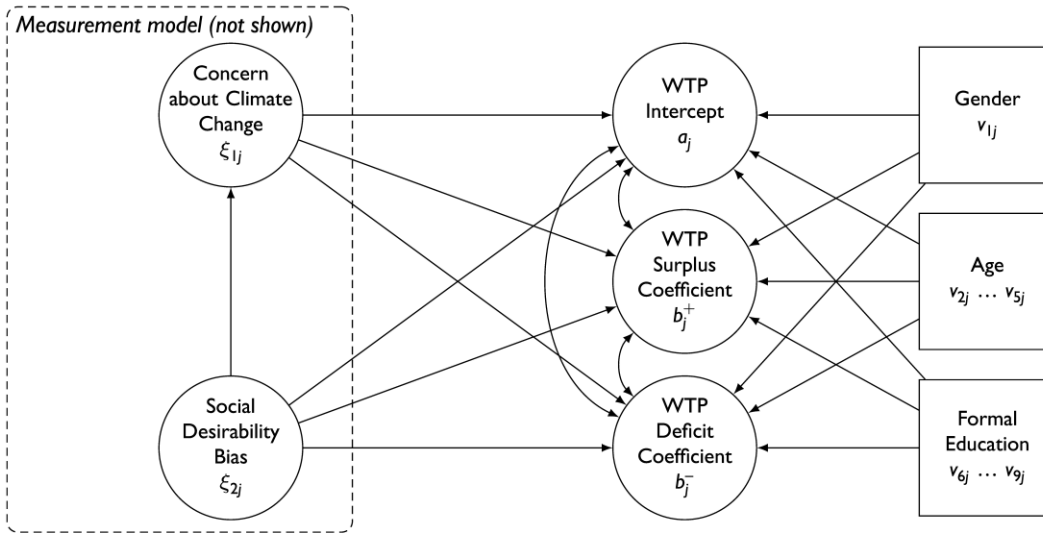


Figure 5.3 Path diagram of two-level repeated measurements structural equations model (random intercept and slopes shown as solid circles on within-subjects level)

At the within-subjects level, WTP y_{ij} is regressed on a transform of the relative environmental performance x_{ij} , as well as on the purchase occasion dummy control variables z_{ij} . More specifically, the measure of performance x_{ij} is presented as the negative logarithm to base ten of the relative CO₂ emission factor⁴. It enters the regression via a piecewise power function composed of a term for environmental performance surplus $f^+(x_{ij})$ and another for environmental performance deficit $f^-(x_{ij})$, both in comparison to the industry average (see within-subjects part of figure 5.3). At the between-subjects level, the intercept a_j , i.e. the WTP for a product with industry average environmental performance, and the slopes b_j^+ and b_j^- , i.e. the WTP surplus and deficit coefficients, of the resultant individual WTP reaction function are modelled as latent variables. They are regressed on the latent control variables CaCC and social desirability bias, and on the manifest

⁴ A logarithmic scale seems appropriate for the relative measurement of a quantity spanning several orders of magnitude. The choice of base ten is arbitrary and without influence on model results. An alternative model based on a linear-scale measure of relative performance was also analysed, but yielded slightly inferior model fit and no substantially different results.

socio-demographic control variables gender, age, and formal education (see between-subjects part of figure 5.3). This two-level model structure with random intercept and random slopes as outcomes (Preacher et al., 2016; Snijders and Bosker, 2012) implicitly allows controlling for respondents' varying price consciousness, reflected in the WTP intercept parameter.⁵

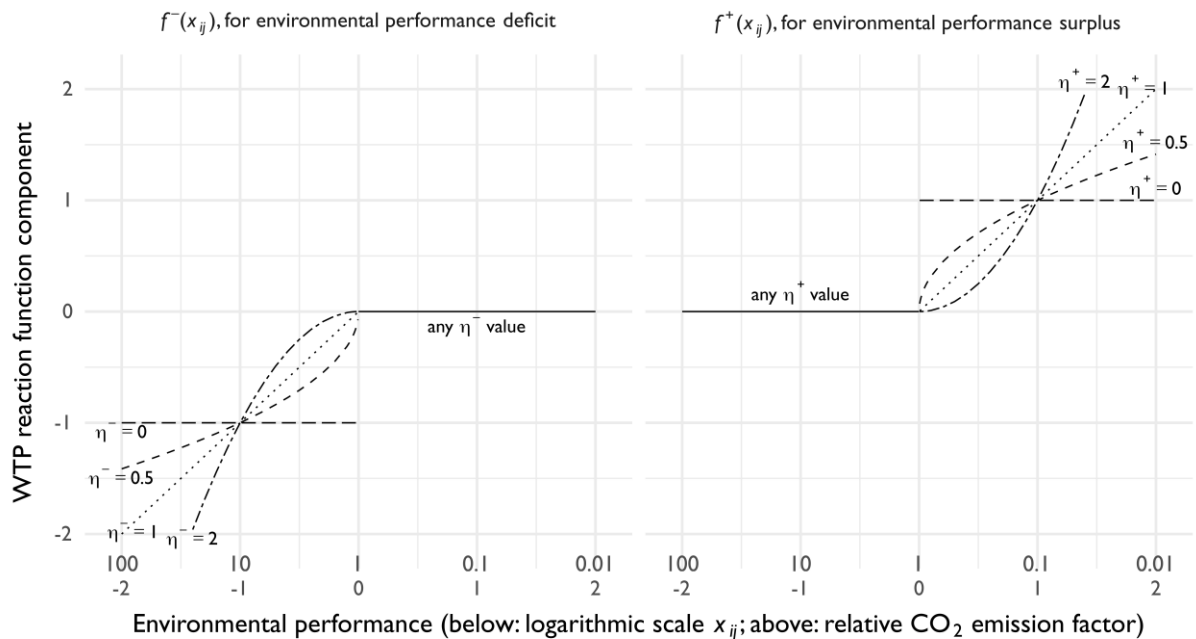


Figure 5.4 Positive and negative components of willingness-to-pay reaction function for different parameterisations (exponents η^+ and η^- of power function)

The environmental performance surplus and deficit terms are parameterised by the real-valued exponents η^+ and η^- , respectively, which allow to independently adapt the curvatures as shown in figure 5.4. An exponent equal to one would thus give rise to a linear effect, exponents less than one to declining effects as suggested by prospect theory, and exponents greater than one to increasing effects⁶ as suggested by disappointment theory. The special case of a zero exponent would imply a constant offset depending only on the sign of the deviation from the reference point.

The piecewise definition of the WTP reaction function permits to differentiate the respective surplus and deficit coefficients, b_j^+ and b_j^- , based on which we can test hypothesis H1. Comparing

⁵ If, for instance, consumers with lower WTP for the reference product were systematically less willing to pay a price premium for an environmentally friendly product, this would show in a significant positive correlation between the WTP intercept a_j and the WTP surplus coefficient b_j^+ (i.e., a significantly positive value of the model parameter symbolised by the small curved arrow between the two corresponding circles in the between-subjects part in figure 5.3).

⁶ This includes special cases of, for instance, quadratic or cubic functions with exponents equal to two or three, respectively.

different curvatures of the reaction function, modelled by varying the exponents, η^+ and η^- , enables us to test the competing hypotheses H2a and H2b. Specifically, we consider the following model variants:

- Model (0): η^+ and η^- fixed to zero, so that b_j^+ (b_j^-) is a subject-specific constant premium (discount) on WTP for a more (less) environmentally friendly product independent of the amount of environmental performance surplus (deficit);
- Model (1): η^+ and η^- fixed to unity, so that b_j^+ and b_j^- are the slopes of piecewise linear WTP reaction functions to the left and right of the reference point of the environmental performance variable;
- Model (2): η^+ and η^- fixed to a common value, so that the shapes of the reaction functions to the left and right of the reference point are given by identical exponents (common value could be above or below unity, thus supporting either H2a or H2b);
- Model (3): η^+ and η^- chosen freely so as to permit different curvatures on both sides of the reference point (the two values could fall on different sides of unity, thus contradicting both H2a and H2b).

For the given values of η^+ and η^- , maximum likelihood estimates and Satorra-Bentler corrected robust standard errors were computed with Mplus 8 (Muthén and Muthén, 2017). The endogenous estimates for η^+ and η^- in models (2) and (3) were gained by maximising the resulting profile-likelihood function over the permissible parameter space.

5.4 Results

All considered models are shown in table 5.2. The preferred model is model (2), with equal exponents for both branches of the WTP reaction function, which minimises both information criteria (AIC = 29,026.55; BIC = 29,616.16). Based on robust likelihood-ratio tests (Satorra and Bentler, 2001), model (2) exhibits a significantly better fit than both simpler models (0) ($-2\Delta LL = 31.42$, scaled $\chi^2 = 15.61$, $df = 1$, $p < 0.001$) and (1) ($-2\Delta LL = 56.68$, scaled $\chi^2 = 11.16$, $df = 1$, $p < 0.001$), but does not significantly fall behind the slightly better fitting, but less parsimonious, model (3) ($-2\Delta LL = 0.02$, scaled $\chi^2 = 0.01$, $df = 1$, $p = 0.92$).

Table 5.2 Parameter estimates (and standard errors) for alternative analysis models

Model	(0)	(1)	(2)	(3)
Shape parameters of WTP reaction function				
Exponent of environmental performance surplus	0.00	1.00	0.33	0.22
Exponent of environmental performance	0.00	1.00	0.33	0.34

Model	(0)	(1)	(2)	(3)
deficit				
Fixed main effects on WTP				
Intercept	2.93 *** (0.17)	2.88 *** (0.16)	2.89 *** (0.16)	2.90 *** (0.16)
Environmental performance surplus	0.08 (0.14)	0.28 (0.22)	0.20 (0.19)	0.17 (0.17)
Environmental performance deficit	0.26 (0.18)	0.43 (0.43)	0.34 (0.23)	0.35 (0.23)
Concern about climate change	0.14 (0.07)	0.10 (0.08)	0.12 (0.08)	0.12 (0.08)
Social desirability bias	0.00 (0.24)	0.08 (0.24)	0.07 (0.24)	0.06 (0.24)
Female	0.09 (0.12)	0.12 (0.12)	0.09 (0.12)	0.09 (0.12)
15–29 years old	0.26 (0.22)	0.34 (0.21)	0.33 (0.22)	0.32 (0.22)
30–39 years old	–0.08 (0.20)	0.02 (0.19)	–0.02 (0.19)	–0.03 (0.20)
50–59 years old	–0.09 (0.19)	0.04 (0.19)	–0.01 (0.19)	–0.04 (0.19)
Age 60 years old and above	–0.09 (0.17)	–0.03 (0.16)	–0.03 (0.16)	–0.04 (0.16)
No school-leaving qualification	0.53 (0.38)	0.42 (0.39)	0.49 (0.40)	0.50 (0.39)
Secondary general school qualification	0.05 (0.13)	0.02 (0.14)	0.03 (0.14)	0.04 (0.14)
University entrance qualification	0.18 (0.23)	0.14 (0.22)	0.16 (0.23)	0.17 (0.23)
University degree	0.12 (0.16)	0.06 (0.15)	0.08 (0.15)	0.09 (0.16)
Purchase occasion 2	–0.06 (0.05)	–0.06 (0.05)	–0.05 (0.05)	–0.05 (0.05)
Purchase occasion 3	–0.08 (0.06)	–0.08 (0.06)	–0.07 (0.06)	–0.07 (0.06)
Interaction effects on WTP				
Environmental performance surplus × ...				
Concern about climate change	0.14 * (0.06)	0.28 ** (0.09)	0.21 ** (0.08)	0.20 * (0.08)
Social desirability bias	–0.13 (0.18)	–0.46 (0.30)	–0.31 (0.26)	–0.26 (0.23)
Female	0.27 ** (0.10)	0.39 * (0.15)	0.34 ** (0.12)	0.32 ** (0.11)
15–29 years old	0.06 (0.17)	–0.14 (0.25)	–0.06 (0.22)	–0.03 (0.20)
30–39 years old	0.20 (0.17)	–0.03 (0.26)	0.10 (0.21)	0.13 (0.19)
50–59 years old	0.25 (0.17)	–0.14 (0.26)	0.10 (0.21)	0.16 (0.19)

Model	(0)	(1)	(2)	(3)
	(0.17)	(0.26)	(0.22)	(0.20)
60 years old and above	0.11 (0.14)	-0.11 (0.20)	-0.02 (0.18)	0.01 (0.16)
No school-leaving qualification	-0.41 (0.30)	-0.42 (0.53)	-0.48 (0.42)	-0.46 (0.38)
Secondary general school qualification	-0.02 (0.13)	0.08 (0.20)	0.00 (0.16)	-0.00 (0.15)
University entrance qualification	0.02 (0.17)	0.11 (0.26)	0.08 (0.22)	0.07 (0.20)
University degree	0.25 (0.15)	0.56 ** (0.21)	0.39 * (0.18)	0.35 * (0.17)
Environmental performance deficit × ...				
Concern about climate change	0.31 *** (0.08)	0.39 ** (0.12)	0.36 *** (0.09)	0.36 *** (0.09)
Social desirability bias	-0.22 (0.26)	-0.10 (0.41)	-0.14 (0.32)	-0.14 (0.32)
Female	-0.06 (0.12)	-0.21 (0.20)	-0.13 (0.16)	-0.13 (0.16)
15–29 years old	0.11 (0.21)	0.29 (0.32)	0.18 (0.26)	0.18 (0.26)
30–39 years old	0.40 (0.22)	0.63 (0.34)	0.52 (0.27)	0.51 (0.27)
50–59 years old	0.33 (0.23)	0.56 (0.36)	0.45 (0.29)	0.43 (0.29)
60 years old and above	0.30 (0.18)	0.57 * (0.28)	0.46 * (0.23)	0.45 (0.23)
No school-leaving qualification	0.58 (0.46)	0.73 (0.69)	0.67 (0.56)	0.68 (0.56)
Secondary general school qualification	0.00 (0.14)	0.02 (0.23)	-0.01 (0.18)	-0.01 (0.18)
University entrance qualification	0.47 * (0.19)	0.92 ** (0.31)	0.67 ** (0.25)	0.68 ** (0.25)
University degree	0.25 (0.19)	0.25 (0.28)	0.24 (0.24)	0.25 (0.24)
Fixed main effect on concern about climate change				
Social desirability bias	0.46 (0.24)	0.46 * (0.23)	0.46 (0.23)	0.46 (0.24)
Random effects on WTP				
Residual variances				
Between-subjects random intercept	1.26 *** (0.33)	1.34 *** (0.25)	1.31 *** (0.29)	1.32 *** (0.31)
Random slope environmental performance surplus	0.08 (0.26)	0.14 (0.22)	0.08 (0.29)	0.13 (0.32)
Random slope environmental performance	0.67	1.12	0.94	1.00

Model	(0)	(1)	(2)	(3)
deficit	*	*	*	*
	(0.34)	(0.56)	(0.44)	(0.46)
Within-subjects residual	0.58 ***	0.65 ***	0.58 ***	0.56 ***
	(0.13)	(0.09)	(0.13)	(0.13)
Covariances				
Intercept and slope environmental performance surplus	0.09 (0.21)	-0.00 (0.19)	0.07 (0.20)	0.05 (0.22)
Intercept and slope environmental performance deficit	0.17 (0.22)	0.30 (0.25)	0.23 (0.23)	0.25 (0.24)
Slopes environmental performance surplus and environmental performance deficit	0.19 (0.20)	0.22 (0.29)	0.28 (0.24)	0.24 (0.25)
Model fit				
Natural Logarithm of Likelihood (LL)	-14,418.98	-14,431.61	-14,403.27	-14,403.28
Akaike Information Criterion (AIC)	29,055.96	29,081.23	29,026.55	29,028.56
Bayesian Information Criterion (BIC)	29,640.21	29,665.48	29,616.16	29,623.53
Likelihood-ratio tests against model (2)				
-2ΔLL	31.42 ***	56.68 ***		0.02
Scaled χ^2 ; df	15.61; 1	11.16; 1		0.01; 1
Hypothesis H1 (supported)				
Likelihood-ratio test of nested model against model (2)^a				
-2ΔLL			24.02 *	
Scaled χ^2 ; df			22.28; 12	
Interaction effects on WTP				
Environmental performance surplus × concern about climate change			0.21 ** (0.08)	
Environmental performance deficit × concern about climate change			0.36 *** (0.09)	
Fixed main effects on WTP				
Environmental performance surplus			0.20 (0.19)	
Environmental performance deficit			0.34 (0.23)	
Hypothesis H2a (supported) vs. H2b (not supported)				
Likelihood-ratio test with model (2)				
-2ΔLL		56.68 ***		
Scaled χ^2 ; df		11.16; 1		

Significance level of estimates: * $p \leq 0.05$; ** $p \leq 0.01$; *** $p \leq 0.001$

^a Pairs of corresponding fixed main and interaction effects for positive and negative environmental performance constrained to be equal

Hypothesis H1 is tested with a nested model derived from model (2) by constraining each pair of corresponding fixed main and interaction effects for positive and negative environmental performance to be equal. The constrained model has a significantly worse fit ($-2\Delta LL = 24.02$, scaled $\chi^2 = 22.28$, $df = 12$, $p = 0.034$), allowing to reject the null hypothesis of a point-symmetric WTP reaction function. As both the interaction effects of environmental product performance with CaCC ($0.21^{**} < 0.36^{***}$) and the fixed main effects of environmental performance ($0.20 < 0.34$) are stronger for deficits than for surpluses, the asymmetry takes a form compatible with hypothesis H1.

As the cross-level-interactions of environmental performance with CaCC (0.21^{**} and 0.36^{***}) are significant, there is a significant impact of environmental performance overall (e.g. Snijders and Bosker, 2012), although not specifically for individuals with average CaCC. This finding is detailed in the floodlight analysis (Spiller et al., 2013) shown in figure 5.5, which displays the conditional point estimates and confidence intervals of the environmental performance surplus and deficit effects on WTP for varying CaCC scores. The deficit effect becomes significant only for the top 34%, and the surplus effect even only for the top 10% of individuals ranked by CaCC. For both effects, point estimates are positive for all but the least concerned 13% of individuals. The close proximity of the respective zeroes at the same time shows that the reaction to negative and positive deviations develops in proportion to each other. The relative effect of negativity bias is thus homogeneous across the entire CaCC range.

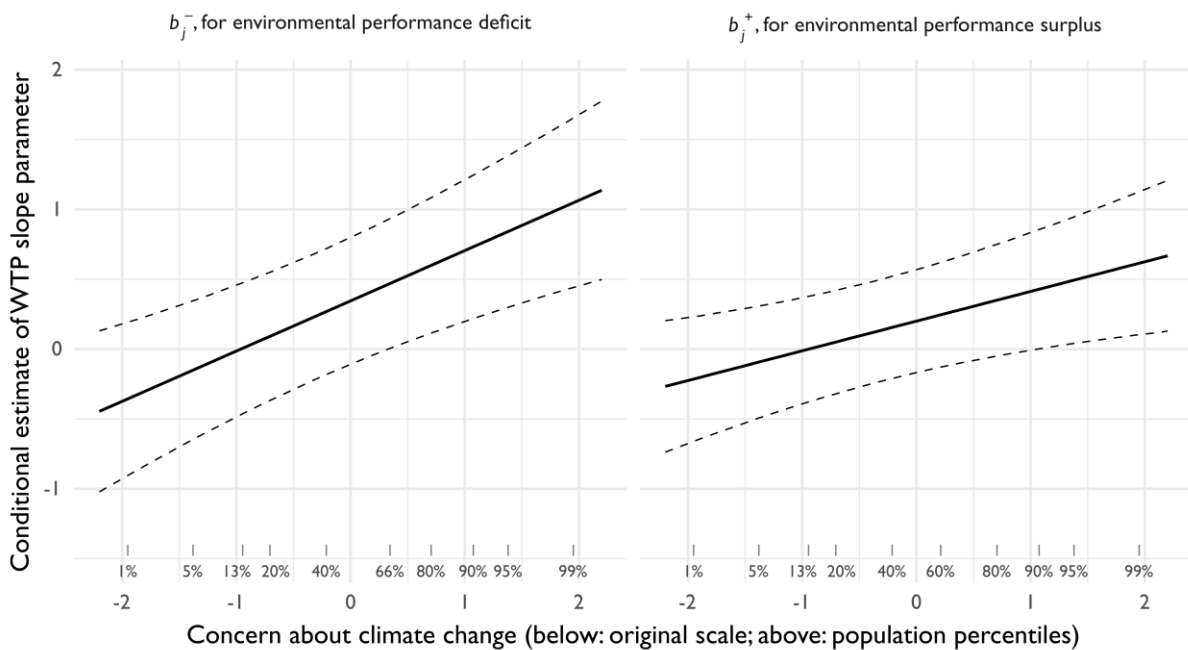


Figure 5.5 Floodlight analysis of willingness-to-pay surplus and deficit coefficients for varying values of concern about climate change (point estimates and 95%-confidence intervals)

Evidence in favour of hypothesis H2a against H2b can be found in the significantly ($p < 0.001$) better fit of model (2) with respect to model (1) reported above, supporting exponents η^+ and η^- of less than one. Hence, positive (negative) deviations of a product's environmental performance from a reference point indeed result in a WTP increasing (decreasing) at a diminishing rate, as suggested by prospect theory. Figure 5.6 shows the differential WTP reaction function for a reference subject under model (2), clearly illustrating the hypothesised S-shape in addition to the negativity bias.

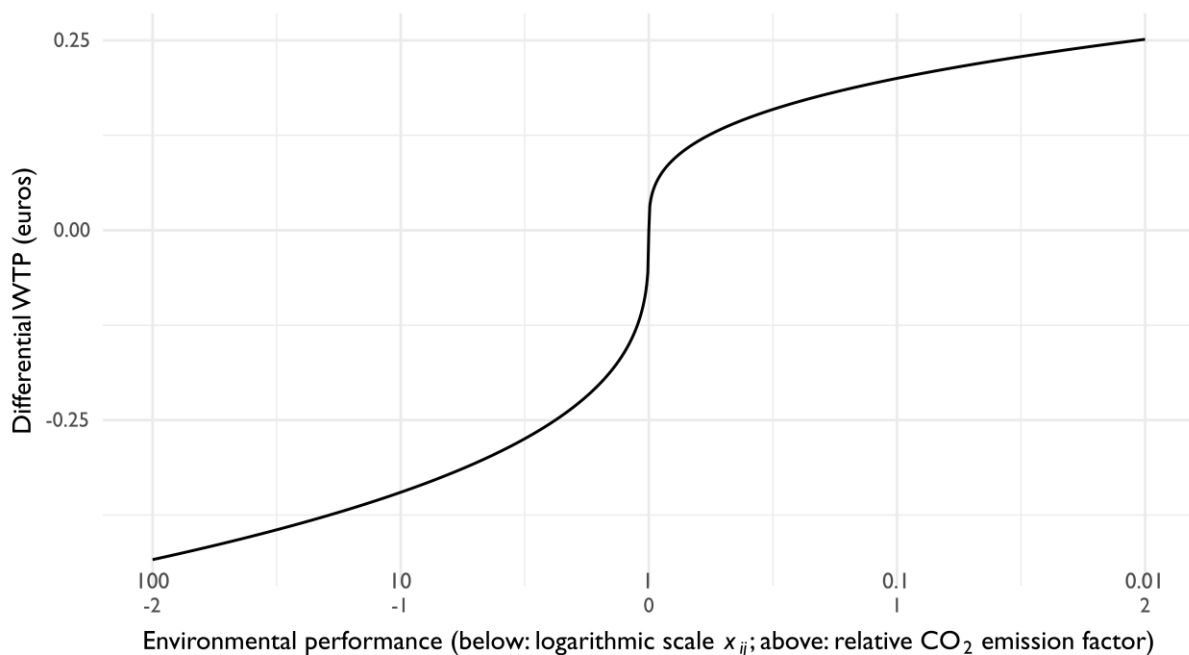


Figure 5.6 Differential willingness-to-pay reaction function for a reference subject under model (2)⁷

For positive deviations of environmental performance, the only further significant variable influencing WTP is gender, such that women's WTP increases substantially more with environmental performance (0.34**) than men's.⁸ To rule out context or fatigue effects, we controlled for the WTP

⁷ The graph shown in figure 5.6 represents the estimated differential WTP reaction function for a male respondent in the age range of 40 to 49 years, with a middle school diploma, average CaCC and average social desirability bias. The vertical axis' scale is relative to an intercept (2.89***) with significant random variation between subjects (1.31***), none of which significantly attributable to any of the control variables, namely, gender, age, formal education, CaCC, or social desirability bias.

⁸ Although the interaction of having a university degree with environmental performance surplus is also shown as significant, an omnibus test of the impact of education yields no significant result ($-2\Delta LL = 9.40$, scaled $\chi^2 = 7.76$, $df = 4$, $p = 0.101$). Negative variations of environmental performance do not significantly interact with gender, and the omnibus tests for interactions with age ($-2\Delta LL = 5.40$, scaled $\chi^2 = 5.24$, $df = 4$, $p = 0.264$) and education ($-2\Delta LL = 10.71$, scaled $\chi^2 = 8.51$, $df = 4$, $p = 0.075$) show no significant results either, notwithstanding the significant single coefficients for the age group of 60 years and above and for respondents with a university entrance qualification. There is, however, a strong and significant random slope estimate

impact of different measurement occasions, which proved insignificant ($-2\Delta LL = 0.942$, scaled $\chi^2 = 2.22$, $df = 2$, $p = 0.330$). A summary of all hypothesis tests can be found at the end of table 5.2.

5.5 Discussion

This article highlights the nonlinear reaction of consumers' WTP to quantitative information provided on a product's environmental performance by means of PCF. The results go beyond earlier studies, most of which only tested the influence of qualitative environmental labels, unrelated to the industrial ecology discourse, on behavioural constructs other than WTP (e.g. Grankvist et al., 2004; Mohr and Webb, 2005; Moosmayer, 2012; Van Dam and De Jonge, 2015). Our findings not only show that positive industrial ecology indicators can stimulate purchase behaviour (Hartikainen et al., 2014; Molina-Murillo and Smith, 2009; Vanclay et al., 2011), but also how different quantitative levels of PCF information influence WTP.

One key finding is that WTP does not change uniformly (see figure 5.6), but exhibits a diminishing sensitivity to environmental information for large deviations from a given reference point, illustrated by the industry average in this study. Companies are thereby incentivised to catch up with or just slightly exceed the industry average. In contrast, no substantial incentives exist for improvements which only partially reduce a strong negative deviation from industry average or imply taking a lead position in the industry. As a result, we are able to generalize the S-shaped utility function posited by prospect theory (Kahneman et al., 1991; Kahneman and Tversky, 1979) to the context of environmental consumption.

At the same time, our results are in opposition to studies supporting disappointment theory (Homburg et al., 2005; O'Rourke and Ringer, 2016). O'Rourke and Ringer (2016), for instance, show that for products with above-average health-related sustainability ratings small improvements in the ratings trigger progressively increasing effects on purchase intentions. The discrepancy to our findings might be explicable by the fact that health benefits deal primarily with private gains, whereas CO₂ reductions measured in the present study reflect public gains. Moreover, instead of purchase intentions, which O'Rourke and Ringer (2016) measured before the price was communicated to consumers, we have chosen WTP as independent variable. WTP is more closely related to actual purchase behaviour by reflecting consumers' readiness to pay a certain price instead of their mere interest in purchasing a product. Besides, the inconclusive finding of O'Rourke

(0.94*). This means that consumers vary considerably in their WTP response to environmental performance deficit for reasons exogenous to our model.

and Ringer (2016) for the case of environmental ratings already demonstrates the need for explanatory approaches other than disappointment theory.

Furthermore, the present analysis reveals that the WTP of consumers with low CaCC is mostly unchanged by quantitative variations in a product's environmental performance. Our results hence offer an explanation for O'Rourke and Ringer's (2016) observation that many consumers are unaffected by sustainability-related information, and Hartikainen et al.'s (2014) finding that consumers report a low influence of PCF information on their buying behaviour. Additionally, the relationship between the asymmetric effects of positive and negative environmental information, in fact, does not change with increasing CaCC. Overall, we satisfy the need for deeper insights into the moderating effect of environmental concern on the relationship between type of labelling and purchase behaviour, as formulated by Van Dam and De Jonge (2015).

Last, in accordance with previous related research (e.g. Grankvist et al., 2004; Mohr and Webb, 2005; Moosmayer, 2012; Van Dam and De Jonge, 2015), this study confirms that environmental consumption behaviour is subject to a negativity bias, because unfavourable deviations of a product's environmental performance from a given reference point have a stronger impact on WTP than corresponding favourable deviations. Going beyond many of the earlier studies, this research is based on an explicit theoretical basis drawing on loss aversion offered by prospect theory (Kahneman et al., 1991; Tversky and Kahneman, 1991). Additionally, an earlier explanation for the negativity bias suggested by Moosmayer (2012) can be backed by our data. Moosmayer (2012) argues that some consumers outright boycott products which are labelled with negative environmental information. In fact, in nearly 11% of relevant cases, participants reported a WTP of zero for products with below-average environmental performance.

By building on all three core assumptions of prospect theory, i.e. reference dependence, loss aversion, and diminishing sensitivity, this study is not only the first to apply prospect theory (e.g. Kahneman and Tversky, 1979) to the question of how consumers' WTP reacts to quantitative variations in PCF information. It also confirms all the key assumptions of prospect theory in the context of industrial ecology and, conversely, refutes the assumption of increasing sensitivity suggested by disappointment theory.

5.6 Conclusions and limitations

Besides the above-mentioned academic insights, this study also provides several practical implications. First, policymakers can be informed about the general importance of providing consumers with transparency not only about positive but also about negative environmental product performance (Grankvist et al., 2004; Van Dam and De Jonge, 2015). Taking advantage of the

negativity bias, a mandatory labelling system including negative labels could push environmentally harmful products out of the market. Apart from the EU's energy labelling scheme of electrical appliances (Heinzle and Wüstenhagen, 2012; Ölander and Thøgersen, 2014), practical examples of negative labelling are still rare.

Second, in light of the reference dependence of consumers' WTP reactions, political measures aiming at raising consumers' reference points for a product's environmental performance might be worthwhile. Reference points could, for instance, be influenced by setting the labelling scale. Heinzle and Wüstenhagen (2012) as well as Ölander and Thøgersen (2014), indeed, show that consumer behaviour can be greatly influenced by scale changes of the energy label.

Third, the S-shape of the WTP reaction function reveals that companies are not substantially rewarded by consumers' WTP for the first steps towards improving highly environmentally harmful products as well as for performing far better than the industry average. From a sustainability science perspective, this is alarming because earlier research on planetary boundaries (e.g. Rockström et al., 2009; Steffen et al., 2015; Whiteman et al., 2012) or resource productivity (Von Weizsäcker et al., 2009; Von Weizsäcker et al., 1997) has shown that sustainable development requires not only marginal but rather breakthrough advances. Consequently, political interventions such as mandatory minimum standards not too far below the industry's state of the art as well as subsidies for companies' radical improvements in terms of environmental product performance are needed.

Fourth, given that consumers are equipped with full transparency, below-average performing companies are well-advised to improve their products' environmental performance up to or even slightly above the industry average due to considerable gains in consumers' WTP. Moreover, marketers can be guided by the fact that female consumers are more likely than male consumers to reward above-average environmental performance.

This research comes along with some limitations and leaves opportunities for further research. First, the dependent variable reflects the WTP stated in a survey-based experiment rather than revealed in a real purchase decision. Although we are aware of the potential problems associated with a direct elicitation of WTP (Auger and Devinney, 2007; Breidert et al., 2006), this approach better allows to avoid anchoring and framing effects and seems appropriate for our focus on capturing the general functional form of WTP. To overcome this limitation, further research could replicate the findings using real choice experiments. Second, we tested only one possible mechanism of communicating environmental product performance to consumers, namely, by presenting the relative amount of CO₂ emissions caused. Further research should investigate the effects of different kinds of communicating such information, for instance as absolute figures (Daziano et al., 2017; Tukker et al., 2010).

Apart from addressing these limitations, future research could test whether and how the results change when different types of products and sustainability information are used and, hence, further product attributes and sustainability benefits gain importance for consumers' WTP (e.g. O'Rourke and Ringer, 2016). In this vein, the focus should be expanded to aspects of environmental information which contribute not only to public but also to private gains, such as health benefits (e.g. Mondelaers et al., 2009; O'Rourke and Ringer, 2016). Similarly, subsequent research could follow up on further moderators with a potential effect on the nonlinearity of the WTP reaction function, such as promotion and prevention foci (Codini et al., 2018; Zou and Chan, 2019), and personal sustainable norms (Grankvist et al., 2004; Van Dam and De Jonge, 2015).

In conclusion, our results provide partial support for the claim that 'worse is worse and better doesn't matter'. We confirm that negative deviations from a reference point have a stronger effect than positive deviations. Although we do not find that 'better doesn't matter', we do maintain that it may matter too little because companies are not sufficiently incentivised to substantially improve the environmental performance of their products based on consumers' WTP.

5.7 Appendices

Appendix 1 See table 5.3.

Table 5.3 Survey sampling quotas and frequencies

Socio-demographic variable	Quota target	Sampling frequency	
		Absolute	Relative
Gender			
Female	51.0%	259	49.4%
Male ^a	49.0%	265	50.6%
Age			
15–29 years old	19.5%	101	19.3%
30–39 years old	14.4%	70	13.4%
40–49 years old ^a	16.0%	85	16.2%
50–59 years old	18.4%	101	19.3%
60 years old and above	31.7%	167	31.9%
Formal education			
No school-leaving qualification	7.9%	26	5.0%
Secondary general school qualification	35.0%	186	35.5%
Middle school diploma ^a	26.2%	144	27.5%
University entrance qualification	13.9%	75	14.3%
University degree	17.1%	93	17.7%
Totals	100.0%	524	100.0%

^a Categories are subsequently used as reference categories of control variables

Appendix 2 See figure 5.7.

Social demographics

Please indicate your gender.

Please select one of the following answers:

- Female
- Male
- Other

Please state your year of birth.

Please state the year in four digits.

Please enter your answer here:

Please indicate your highest level of education.

Please select one of the following answers:

- No school-leaving qualification (or still in school education)
- Secondary modern school qualification with completion of 8th or 9th grade
- Secondary modern school qualification with completion of 10th grade
- High-school diploma/A level
- University degree (Bachelor, Master, Diploma)
- PhD or further post-doctoral qualification

If you hold an educational qualification which is not indicated or foreign, please select the best fitting answer.

Figure 5.7 Survey questionnaire (original in German)

Purchase decision I

Please imagine you are shopping in a supermarket and on your shopping list you have – among other things – a four-pack of alkaline batteries type AA ('Mignon cells').

The supermarket normally offers six different articles meeting your requirements which do not differ in technical criteria such as charge capacity, leak protection and durability. But currently, only one of these six product alternatives is available.

The sold-out alternatives would have each cost 2.59 €, 4.79 €, 1.99 €, 5.49 € and 3.99 € for the four-pack; you do not have information about the environmental compatibility of these products.

From a reliable source you know that from the production, distribution and utilisation throughout the whole product life cycle of the available product CO₂ emissions arise which are XXX times the sector average, so XXX% more/less than for average batteries of this type. CO₂ emissions are a major cause of climate change.

How much would you be willing to pay at most for the four-pack of batteries of this product? Please state the maximal price in €. This price can be higher or lower than the prices of the other products indicated above.

Only numbers can be entered in this box.

Please enter your answer here:

Attitudes I

Please indicate for each of the following statements how much these apply from your point of view.

Please select the applicable answer for each item.

	Does not apply at all	1	2	3	4	5	Applies completely
I think it is very convenient that thanks to batteries, it is possible to take electricity everywhere.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I think it is annoying when the batteries of one of my battery-powered appliances have to be changed.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I like to play computer games.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My living and sleeping areas are secured with battery-powered smoke detectors.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Figure 5.7 (continued)

Purchase decision II

Please imagine you are shopping in a supermarket again and once more, you have a four-pack of alkaline batteries type AA ('Mignon cells') on your shopping list.

Also, this supermarket only has one type of batteries available which meets your performance requirements. You can remember that technically equivalent alternatives are elsewhere sold for prices of 2.59 €, 4.79 €, 1.99 €, 5.49 € and 3.99 € for a four-pack.

From a reliable source you know that from the production, distribution and utilisation throughout the whole product life cycle of the available product CO₂ emissions arise which are XXX times the sector average, so XXX% more/less than for average batteries of this type. CO₂ emissions are a major cause of climate change.

How much would you be willing to pay at most for the four-pack of this product? Please state the maximal price in €. This price can be higher or lower than the prices of the other products indicated above.

Only numbers can be entered in this box.

Please enter your answer here:

Attitudes II

Please indicate for each of the following statements how much these apply to you.

Please select the applicable answer for each item.

	Does not apply at all			Applies completely	
	1	2	3	4	5
In an argument, I always remain objective and stick to the facts.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Even if I am feeling stressed, I am always friendly and polite to others.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
When talking to someone I always listen carefully to what the other person says.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
It has happened that I have taken advantage of someone in the past.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I have occasionally thrown litter away in the countryside or onto the road.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Sometimes I only help people if I expect to get something in return.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Figure 5.7 (continued)

Purchase decision III

Please imagine one last time that you are shopping in a supermarket and once again, you have a four-pack of alkaline batteries type AA ('Mignon cells') on your shopping list.

Also, this supermarket only has one type of batteries available which meets your performance requirements. You can remember that technically equivalent alternatives are elsewhere sold for prices of 2.59 €, 4.79 €, 1.99 €, 5.49 € and 3.99 € for a four-pack.

From a reliable source you know that from the production, distribution and utilisation throughout the whole product life cycle of the available product CO₂ emissions arise which are XXX times the sector average, so XXX% more/less than for average batteries of this type. CO₂ emissions are a major cause of climate change.

How much would you be willing to pay at most for the four-pack of this product? Please state the maximal price in €. This price can be higher or lower than the prices of the other products indicated above.

Only numbers can be entered in this box.

Please enter your answer here:

Attitudes III

Please indicate for each of the following statements how much these apply from your point of view.

Please select the applicable answer for each item.

	Does not apply at all			Applies completely	
	1	2	3	4	5
Climate change is a serious problem.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Climate change causes an increase in extreme weather events.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
It is important to take measures against climate change as soon as possible.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am seriously worried about climate change.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Climate change is man-made.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Climate research is of the unanimous opinion that global warming is real.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Climate change is currently happening.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Figure 5.7 (continued)

Appendix 3 See figure 5.8.

Exemplary purchase decision I

Please imagine you are shopping in a supermarket and on your shopping list you have – among other things – a four-pack of alkaline batteries type AA ('Mignon cells').

The supermarket normally offers six different articles meeting your requirements which do not differ in technical criteria such as charge capacity, leak protection and durability. But currently, only one of these six product alternatives is available.

The sold-out alternatives would have each cost 2.59 €, 4.79 €, 1.99 €, 5.49 € and 3.99 € for the four-pack; you do not have information about the environmental compatibility of these products.

From a reliable source you know that from the production, distribution and utilisation throughout the whole product life cycle of the available product CO₂ emissions arise which are 1.8 times the sector average, so 80% more than for average batteries of this type. CO₂ emissions are a major cause of climate change.

How much would you be willing to pay at most for the four-pack of batteries of this product? Please state the maximal price in €. This price can be higher or lower than the prices of the other products indicated above.

Only numbers can be entered in this box.

Please enter your answer here:

Purchase decision II

Please imagine you are shopping in a supermarket again and once more, you have a four-pack of alkaline batteries type AA ('Mignon cells') on your shopping list.

Also, this supermarket only has one type of batteries available which meets your performance requirements. You can remember that technically equivalent alternatives are elsewhere sold for prices of 2.59 €, 4.79 €, 1.99 €, 5.49 € and 3.99 € for a four-pack.

From a reliable source you know that from the production, distribution and utilisation throughout the whole product life cycle of the available product CO₂ emissions arise which are 0.54 times the sector average, so 46% less than for average batteries of this type. CO₂ emissions are a major cause of climate change.

How much would you be willing to pay at most for the four-pack of this product? Please state the maximal price in €. This price can be higher or lower than the prices of the other products indicated above.

Only numbers can be entered in this box.

Please enter your answer here:

Figure 5.8 Exemplary purchase scenarios (original in German)

Purchase decision III

Please imagine one last time that you are shopping in a supermarket and once again, you have a four-pack of alkaline batteries type AA ('Mignon cells') on your shopping list.

Also, this supermarket only has one type of batteries available which meets your performance requirements. You can remember that technically equivalent alternatives are elsewhere sold for prices of 2.59 €, 4.79 €, 1.99 €, 5.49 € and 3.99 € for a four-pack.

From a reliable source you know that from the production, distribution and utilisation throughout the whole product life cycle of the available product CO₂ emissions arise which are equal to the sector average, so as much as for average batteries of this type. CO₂ emissions are a major cause of climate change.

How much would you be willing to pay at most for the four-pack of this product? Please state the maximal price in €. This price can be higher or lower than the prices of the other products indicated above.

Only numbers can be entered in this box.

Please enter your answer here:

Figure 5.8 (continued)

Appendix 4 See table 5.4, table 5.5 and table 5.6.

Table 5.4 Factor loadings from the confirmatory factor analysis model

Fully standardised factor loadings (standard errors given in parentheses below)	Content factor	Method factor
Concern about climate change		
Concern about climate change item 1 <i>("Climate change is a serious problem.")</i>	0.886*** (0.021)	0.146* (0.066)
Concern about climate change item 2 <i>("Climate change causes an increase in extreme weather events.")</i>	0.820*** (0.028)	0.140* (0.064)
Concern about climate change item 3 <i>("It is important to take measures against climate change as soon as possible.")</i>	0.794*** (0.023)	0.127* (0.058)
Concern about climate change item 4 <i>("I am seriously worried about climate change.")</i>	0.882*** (0.019)	0.138* (0.063)
Concern about climate change item 5 <i>("Climate change is man-made.")</i>	0.735*** (0.032)	0.127* (0.057)
Concern about climate change item 6 <i>("Climate research is of the unanimous opinion that global warming is real.")</i>	0.723*** (0.033)	0.134* (0.061)
Concern about climate change item 7 <i>("Climate change is currently happening.")</i>	0.759*** (0.033)	0.132* (0.060)
Overstatement of positive traits		
Overstatement of positive traits item 1 <i>("In an argument, I always remain objective and stick to the facts.")</i>	0.649*** (0.046)	0.138* (0.063)
Overstatement of positive traits item 2 <i>("Even if I am feeling stressed, I am always friendly and polite to others.")</i>	0.699*** (0.043)	0.145* (0.067)
Overstatement of positive traits item 3 <i>("When talking to someone I always listen carefully to what the other person says.")</i>	0.527*** (0.050)	0.160* (0.073)
Understatement of negative traits		
Understatement of negative traits item 1 <i>("It has happened that I have taken advantage of someone in the past.")</i>	0.609*** (0.071)	0.116* (0.053)
Understatement of negative traits item 2 <i>("I have occasionally thrown litter away in the countryside or on the road.")</i>	0.639*** (0.055)	0.110* (0.050)
Understatement of negative traits item 3 <i>("Sometimes I only help people if I expect to get something in return.")</i>	0.566*** (0.058)	0.125* (0.057)
Social desirability bias (second order factor)		
Overstatement of positive traits (subfactor)	0.632*** (0.090)	
Understatement of negative traits (subfactor)	-0.568*** (0.073)	
Common method variance marker items		
Marker item 1 <i>("I think it is very convenient that thanks to batteries, it is possible to take electricity everywhere.")</i>		0.102* (0.047)

Fully standardised factor loadings (standard errors given in parentheses below)	Content factor	Method factor
Marker item 2 (<i>"I think it is annoying when the batteries of one of my battery-powered appliances have to be changed."</i>)		0.088* (0.040)
Marker item 3 (<i>"I like to play computer games."</i>)		0.142* (0.065)
Marker item 4 (<i>"My living and sleeping areas are secured with battery-powered smoke detectors."</i>)		0.089* (0.041)

Significance level of estimates: * $p \leq 0.05$; ** $p \leq 0.01$; *** $p \leq 0.001$

Table 5.5 Correlation coefficients from the confirmatory factor analysis model

Correlation coefficients	Social desirability bias	Marker item 1	Marker item 2	Marker item 3	Marker item 4
Marker item 1	-0.181 *				
Marker item 2	0.213 **	-0.003			
Marker item 3	0.229 **	-0.103 *	0.106 *		
Marker item 4	-0.167	-0.034	0.019	0.120 **	
Concern about climate change	0.249 *	-0.045	0.044	0.088	-0.064

Significance level of estimates: * $p \leq 0.05$; ** $p \leq 0.01$; *** $p \leq 0.001$

Table 5.6 Residual variances from the confirmatory factor analysis model

Subfactors or items	Fully standardised residual variance
Overstatement of positive traits	0.601*** (0.114)
Understatement of negative traits	0.677*** (0.083)
Concern about climate change item 1 (<i>"Climate change is a serious problem."</i>)	0.194*** (0.034)
Concern about climate change item 2 (<i>"Climate change causes an increase in extreme weather events."</i>)	0.308*** (0.045)
Concern about climate change item 3 (<i>"It is important to take measures against climate change as soon as possible."</i>)	0.354*** (0.035)
Concern about climate change item 4 (<i>"I am seriously worried about climate change."</i>)	0.204*** (0.029)
Concern about climate change item 5 (<i>"Climate change is man-made."</i>)	0.444*** (0.047)
Concern about climate change item 6 (<i>"Climate research is of the unanimous opinion that global warming is real."</i>)	0.459*** (0.047)

Subfactors or items	Fully standardised residual variance
Concern about climate change item 7 (<i>"Climate change is currently happening."</i>)	0.406*** (0.049)
Overstatement of positive traits item 1 (<i>"In an argument, I always remain objective and stick to the facts."</i>)	0.560*** (0.059)
Overstatement of positive traits item 2 (<i>"Even if I am feeling stressed, I am always friendly and polite to others."</i>)	0.490*** (0.058)
Overstatement of positive traits item 3 (<i>"When talking to someone I always listen carefully to what the other person says."</i>)	0.697*** (0.054)
Understatement of negative traits item 1 (<i>"It has happened that I have taken advantage of someone in the past."</i>)	0.616*** (0.086)
Understatement of negative traits item 2 (<i>"I have occasionally thrown litter away in the countryside or onto the road."</i>)	0.580*** (0.069)
Understatement of negative traits item 3 (<i>"Sometimes I only help people if I expect to get something in return."</i>)	0.664*** (0.065)
Marker item 1 (<i>"I think it is very convenient that thanks to batteries, it is possible to take electricity everywhere."</i>)	0.990*** (0.010)
Marker item 2 (<i>"I think it is annoying when the batteries of one of my battery-powered appliances have to be changed."</i>)	0.992*** (0.007)
Marker item 3 (<i>"I like to play computer games."</i>)	0.980*** (0.019)
Marker item 4 (<i>"My living and sleeping areas are secured with battery-powered smoke detectors."</i>)	0.992*** (0.007)

Appendix 5 See figure 5.9.

The within-subjects level of the analysis model is formally specified as follows (see below for a list of all symbols used):

$$\begin{aligned}
 y_{ij} &= a_j + b_j^+ f^+(x_{ij}) + b_j^- f^-(x_{ij}) + c_2 z_{2i} + c_3 z_{3i} + R_{ij} \\
 f^+(x_{ij}) &= \begin{cases} (x_{ij})^{\eta^+}, & x_{ij} > 0, \\ 0, & x_{ij} \leq 0 \end{cases} \\
 f^-(x_{ij}) &= \begin{cases} 0, & x_{ij} \geq 0 \\ -(-x_{ij})^{\eta^-}, & x_{ij} < 0 \end{cases} \\
 R_{ij} &\sim N(0; \sigma^2)
 \end{aligned}$$

The between-subjects level is modelled by the following specifications:

$$\begin{aligned}
 a_j &= \alpha_0 + \alpha_1 \xi_j + \alpha_2 v_j + U_{0j} \\
 b_j^+ &= \beta_0^+ + \beta_1^+ \xi_j + \beta_2^+ v_j + U_{1j}^+ \\
 b_j^- &= \beta_0^- + \beta_1^- \xi_j + \beta_2^- v_j + U_{1j}^- \\
 \xi_j &= \mu + \Gamma \xi_j + \delta_j \\
 w_j &= \omega + \Lambda \xi_j + \varepsilon_j \\
 (U_{0j}, U_{1j}^+, U_{1j}^-)^\top &\sim N(0; T) \\
 \delta_j &\sim N(0; \Phi) \\
 \varepsilon_j &\sim N(0; \Psi)
 \end{aligned}$$

- with the following observed variables:

y_{ij} :	observed WTP (in €) of subject j for the product offered at purchase occasion i ;
x_{ij} :	negative logarithm to base ten of the CO ₂ emission factor of the product offered to subject j at purchase occasion i , with negative values (between $-2 = -\log_{10} 100$ and $0 = -\log_{10} 1$) signifying worse than industry average (larger PCF) and positive values (between $0 = -\log_{10} 1$ and $+2 = -\log_{10} 0.01$) representing better than industry average environmental performance (smaller PCF); in a linear-scale variant of the model, x_{ij} would instead be specified as one minus the CO ₂ emission factor, so that a positive (negative) sign again means better (worse) than average environmental performance.
z_{2i}, z_{3i} :	dummy variables identifying the second and third purchase occasions for each subject;
v_j :	vector of observed covariates (dummy variables for gender, age group, and formal education) for subject j ;
w_j :	vector of observed indicators of latent covariates for subject j ;

Figure 5.9 Formal specification of two-level repeated measurements structural equation model

- with the following latent variables:
 - a_j : WTP of subject j for a product of average environmental performance (i.e., with $x_{ij} = 0$) at the first purchase occasion (random intercept);
 - b_j^+ : regression coefficient of WTP on positive deviations of environmental performance (i. e., $x_{ij} > 0$, hence $f^+(x_{ij}) > 0$) for subject j (random surplus slope);
 - b_j^- : regression coefficient of WTP on negative deviations of environmental performance (i.e. $x_{ij} < 0$, hence $f^-(x_{ij}) < 0$) for subject j (random deficit slope);
 - ξ_j : vector of latent covariates (concern for climate change, social desirability, and common method factor) for subject j ;
 - R_{ij} : within-level residual of WTP for purchase occasion i of subject j ;
 - U_{0j} : between-level residual of random WTP intercept for subject j ;
 - U_{1j}^+, U_{1j}^- : between-level residuals of random slopes of WTP with respect to environmental performance surplus or deficit for subject j ;
 - ε_j : vector of residuals of observed indicators of latent covariates for subject j ;
 - δ_j : vector of residuals of latent control variable regressions for subject j ;
- and the following parameters:
 - c_2, c_3 : differential WTP at second and third purchase occasions (context effects);
 - η^+, η^- : exponents in reaction function for WTP (shape parameters);
 - σ^2 : within-level residual variance of WTP;
 - α_0 : expected WTP for a product of average environmental performance at the first purchase occasion for a reference subject (expected value of random intercept for all zero covariates);
 - α_1 : vector of regression parameters of random intercept on latent covariates;
 - α_2 : vector of regression parameters of random intercept on observed covariates;
 - β_0^+, β_0^- : intercepts of regression parameters of WTP on negative or positive deviations of environmental performance (surplus and deficit slope coefficients for a reference subject);
 - β_1^+, β_1^- : vector of regression parameters of surplus and deficit slope coefficients on latent covariates;
 - β_2^+, β_2^- : vector of regression parameters of surplus and deficit slope coefficients on observed covariates;

Figure 5.9 (continued)

- ω : vector of observed indicator intercepts;
 μ : vector of latent variable intercepts;
 Λ : matrix of factor loadings of observed indicators on latent covariates;
 Γ : matrix of regression coefficients of dependent latent covariates, fixed to zero except for γ_{21} , the regression coefficient of concern for climate change on the social desirability factor;
 T : variance-covariance matrix $T = \begin{pmatrix} \tau_0^2 & \tau_{01}^+ & \tau_{01}^- \\ \tau_{01}^+ & (\tau_1^+)^2 & \tau_{11}^\pm \\ \tau_{01}^- & \tau_{11}^\pm & (\tau_1^-)^2 \end{pmatrix}$ of between-level residuals and random slopes;
 Φ : residual variance-covariance matrix of latent covariates;
 Ψ : residual variance-covariance matrix of observed indicators of latent covariates.

$N(0; \Sigma)$ denotes a centred multivariate normal distribution with covariance matrix (or simply, variance) Σ .

Figure 5.9 (continued)

Chapter 6

Conclusion

6.1 Summary

The findings from this doctoral thesis deepen the knowledge of researchers and practitioners about sustainable consumption and in particular about sustainable purchase behaviour. With their different research questions, thematic foci and theoretical bases all presented articles contribute independently but complementarily to the overarching research objective of better understanding the determinants of sustainable purchase behaviour. Based on the micro-level, the present work focused on investigating consumer-specific factors that promote or impede individual behaviour. The analysis of psychographic antecedents of behaviour such as values, attitudes, preferences and willingness to pay (WTP) was placed in the centre of attention. The third and fourth study of this work also examined the purchase influence of factors that do not belong to a consumer's characteristic profile, namely specific types of sustainability information.

The overall research goal of the doctoral thesis was addressed by approaching several context-specific subgoals in a series of four quantitative empirical studies. The close professional connection of the studies thus lies in the fact that each of them tested a conceptual model on the determinants of sustainable purchase behaviour using various quantitative empirical techniques as research methods. Consequently, determinants could not only be identified but also be explained regarding their respective influential power as well as their causal relationships among each other. The usage of experimental surveys based on conjoint analysis (article I and III) allowed to adequately map complex purchase decision-making processes. In general, the application of experimental research designs enabled the investigation of consumer reactions to sustainability information not yet available on the market. More precisely, the effects of a product lifetime label (article III) as well as of favourable and unfavourable product carbon footprint (PCF) information (article IV) were examined. Moreover, the generation of large and – except for the second article – population-representative samples allowed generalising conclusions to be drawn about the influence of certain behavioural antecedents.

With reference to the single articles, influencing factors of sustainable purchase behaviour were analysed by setting the thematic foci of consumer characteristics and market size (article I, context: social banking), the attitude-behaviour gap (ABG) (article II, context: sustainable clothing), product lifetime labelling and consumer preferences for product longevity (article III, context: electrical appliances) as well as favourable and unfavourable environmental product information (article IV, context: low-involvement, utilitarian product). The key findings of each study are summarised below.

The first article provides an empirical indication that social banking customers differ significantly from their conventional counterparts regarding several socio-demographic, behavioural

and psychographic factors. In comparison with conventional banking customers, social banking customers tend to be younger, higher educated and located in larger places of residence. Contrary to existing research on social responsible investors (SR investors), they are male to a higher proportion than female. Moreover, social banking customers demonstrate stronger sustainable buying patterns and weaker preferences for financial, but stronger preferences for social return than conventional banking customers. The results further indicate a considerable untapped growth potential for social banks by uncovering a market size ranging between 10 and 26% of the German adult population in 2011.

Apart from a considerable ABG, the second article indicates that a positive attitude towards social-ecological clothing standards, biospheric and altruistic values, as well as an affinity to online and catalogue shopping, enhance sustainable clothing purchases. Egoistic and hedonic values and, remarkably, a preference for durable clothing hinder sustainable clothing purchase behaviour. No significant effects of the suspected barriers – fashion consciousness and price sensitivity – have been identified.

The third article suggests a decreasing positive effect of the product lifetime label on purchase decisions and a deterioration of the purchase influence of existing brands compared to new brands. It further indicates that the preference for a long product lifetime is fostered by the positive attitude and the subjective norm towards purchasing long-lasting electrical home appliances. However, the attitude only exerts a significant influence if it is driven by personal rather than environmental gains. It is further documented that biospheric values enhance, while stimulation values inhibit, both attitude types. Hedonic values only enhance the attitude based on personal gains.

The results of the fourth article document a strong orientation of consumers on given reference points, such as an industry average, and confirm key assertions of prospect theory. The negative effect caused by unfavourable PCF information on consumers' WTP is significantly stronger than the positive effect caused by respective favourable information. Furthermore, consumers tend to not substantially differentiate between different high-range degrees of positive or negative environmental product information; they rather generally reward or punish deviations from an industry average instead of consistently accounting for the size of these deviations. From a sustainable development perspective, the observed patterns thus highlight a problematic contrast between the need for substantial improvements in products' environmental performance and current market incentives for companies.

Having presented the context-specific insights of each article on sustainable purchase behaviour, the following section illustrates how the studies contribute to various literature streams

related to sustainable consumption. In particular, it is shown which research gaps are addressed and how the studies' major findings relate to earlier research.

6.2 Contribution to literature

All four articles of the doctoral thesis contribute collectively and individually to the emerging field of sustainable consumption research. From a collective perspective, the present work responds to the need for more interdisciplinary theoretical approaches in the research area concerned (Jackson, 2006). While previous literature on sustainable consumption mainly consists of discipline-oriented research strands (e.g. Reisch and Thøgersen, 2015; White et al., 2019), this thesis applies, extends and combines theories from areas such as marketing, economics, social psychology and behavioural economics as described below.

The first article applies market segmentation theory (e.g. Kotler and Keller, 2006; Wedel and Kamakura, 2000) according to which social banking customers should be characterised by a mixture of socio-demographic, behavioural and psychographic characteristics. The analysis indicates that each of the three characteristic types plays a considerable role in the profiling of social banking customers, which supports the suitability of the theoretical approach.

The second article extends the value-attitude-behaviour hierarchy (VABH) (Homer and Kahle, 1988) by further psychographic factors and thus responds to a corresponding research call (e.g. Do Paço et al., 2013; Milfont et al., 2010). To the best knowledge of the authors, the VABH is applied to the context of sustainable clothing purchases for the first time. The conceptual design proves effective since the analysis reveals an adequate explanatory power of the VABH. Moreover, the additional variables substantially sharpen the direct effect of attitude on behaviour and thus bridge the ABG.

The third article combines the consumer theory of Lancaster (1966) with the theory of reasoned action (TRA) (Ajzen and Fishbein, 1980; Fishbein and Ajzen, 1975) – two complementary frameworks from economics and social psychology. In addition, values are also accounted for to gain deeper insights into the motivational structure. The usefulness of the theoretical approach is shown by the reasonable explanatory power of the conceptual model. The analysis further verifies the causal relationships between values, the constructs proposed by the TRA, i.e. attitude and subjective norm, and the preference for a long product lifetime of electrical home appliances measured according to Lancaster's consumer theory.

Similar to the third article, the fourth article combines economic and psychological considerations by applying two behavioural economic theories: prospect theory (e.g. Kahneman et

al., 1991; Kahneman and Tversky, 1979) and disappointment theory (Loomes and Sugden, 1986). Both theories offer competing explanations and predictions of how consumers respond to favourable and unfavourable information on a product's environmental performance. Overall, this study is not only the first to apply prospect theory to the question of how consumers' WTP reacts to quantitative variations in PCF information. It also confirms all the key assumptions of prospect theory and, conversely, refutes the assumption suggested by disappointment theory.

The four studies also jointly serve the methodological subgoal of this doctoral thesis, namely to provide more quantitative empirical evidence in the research field of sustainable purchase behaviour. As already mentioned, each article's conceptual model is tested by means of quantitative empirical methods (see table 1.1 for the specific methods used). The present work thus complements the numerous conceptual and qualitative empirical approaches (e.g. Fuchs and Lorek, 2005; Longo et al., 2017) and addresses the recent call for more quantitative empirical studies in sustainable consumption research (Hassan, 2016). The first and the third article, for instance, apply conjoint analysis – a multivariate technique well suited to estimate the structure of an individual's preferences (Rao, 2014). Many conjoint studies on sustainable consumption have already been conducted (e.g. Sammer and Wüstenhagen, 2012; Scherer et al., 2018), but not yet in the context of social banking (article I) and hardly any related to product lifetime (Lieder et al., 2018; Wilhelm, 2012) (article III).

Taken together, three of the four articles deal with the major research challenge of covering a broader spectrum of industries by going beyond the well-researched low-involvement packaged product categories (Prothero et al., 2011). Expanding the scope of research is critical since consumer behaviour varies strongly across different product and service contexts (e.g. Johnstone and Tan, 2015a, 2015b). Several researchers have stressed the necessity for investigating fields of application that have a relatively high social-ecological impact (e.g. Gatersleben, 2013; Geiger et al., 2018). The present work addresses this research gap by analysing sustainable purchase behaviour in the sectors of banking (article I), clothing (article II) and electrical appliances (article III). Each of these sectors demonstrates a high-impact area of sustainable consumption and therefore plays a key role in positively contributing to sustainable development (Geiger et al., 2018; Prothero et al., 2011; Weber et al., 2014).

Furthermore, each of the four studies also individually stimulates the scientific discourses on sustainable consumption. The individual academic insights are presented in their entirety in the discussion and conclusion sections of the corresponding articles. The main contributions to literature are outlined below.

Article I

The first article advances the understanding of purchase behaviour in the context of social banking which is considered a relatively new field of scientific research. Due to the paucity of research on social banking customers, major empirical findings regarding consumer characteristics and market size are still lacking. Research on sustainable consumer behaviour in the banking sector has, so far, mainly focused on SR investors (e.g. Junkus and Berry, 2010; Nilsson, 2009) and thus failed to incorporate the conceptually distinct social banking perspective. Consequently, this article generates the first scientific insights into the German social banking market by identifying the typical characteristics of social banking customers and estimating the size of the social banking market. The study therefore also responds to Prothero et al.'s (2011) call to analyse comparatively unexplored industries in sustainable consumption research.

Except for the gender effect, the findings on the consumer characteristics are fairly consistent with those of a large part of the literature on SRI (e.g. Nilsson, 2009; Pasewark and Riley, 2010) and sustainable consumption in general (e.g. Diamantopoulos et al., 2003; Koos, 2011). However, without population-representative empirical data, it would have been impossible to decide whether the transfer of findings from these literature streams to the field of social banking is permissible. Moreover, the present study goes beyond what could have been inferred by extrapolating from the literature: measurement of preferences, indication of the differentiators' strength and estimation of market size.

Article II

The second article generates knowledge of purchase behaviour in the context of sustainable clothing. It specifically studies the ABG – one of the main challenges in fostering sustainable consumption and one of the key areas of future sustainable consumption research (Prothero et al., 2011). Despite the generally vast research attention behavioural gaps have received (e.g. Aschemann-Witzel and Niebuhr Aagaard, 2014; Johnstone and Tan, 2015a), many contributions identify a need for further research (e.g. Blok et al., 2015; Moser, 2015). A relatively limited amount of attention has been paid to behavioural gaps in sustainable clothing although the ABG seems to be particularly evident in this context (e.g. Ha-Brookshire and Norum, 2011; Reimers et al., 2016). As a result, the present work picks up on this major opportunity of research by examining the ABG in sustainable clothing as well as further factors possibly influencing sustainable clothing purchases.

Based on the findings of the present study, many conclusions from sustainable consumption research can be transferred to the context of sustainable clothing. Despite the identified considerable ABG, attitude and values are found to be key antecedents of behaviour in sustainable clothing which is in line with much of the literature on sustainable consumption (e.g. Do Paço et al.,

Chapter 6: Conclusion

2013; Ladhari and Tchegnà, 2015). In line with earlier studies on pro-environmental and prosocial behaviour (e.g. Schwartz, 2010; Steg et al., 2014), self-transcendence values seem to enhance, where self-enhancement values seem to hinder, a positive attitude towards sustainable clothing, as well as sustainable clothing purchase behaviour. With regard to the further psychographic factors it can be stressed that, in contrast to earlier research on sustainable clothing consumption (e.g. Hassan et al., 2016; Joergens, 2006), the durability of sustainable clothing may have replaced fashionability as a purchase barrier. Similarly, recent work (e.g. Dickenbrok and Martinez, 2018; Laitala et al., 2015) indicates that poor fashionability used to be a major driver for disposing of clothing but, recently, other factors such as poor durability have become more important.

Article III

The third and fourth article of this doctoral thesis foster a deeper understanding of the impact of different types of sustainability information on purchase behaviour. Due to the prevalence of information asymmetries in markets for sustainable products and services, the provision of sustainability information represents a key instrument for promoting sustainable consumption. Many studies on this topic have therefore already been carried out (e.g. Sammer and Wüstenhagen, 2006; Thøgersen et al., 2010). However, both articles address major research gaps and strongly advance existing literature as described in the following.

The third article contributes to sustainable consumption research by advancing the underdeveloped research stream of consumer behaviour related to product longevity (e.g. Evans and Cooper, 2010; Wilhelm, 2012). It particularly responds to the call for more research on how product lifetime labelling affects purchase behaviour (e.g. Cox et al., 2013; Wilhelm, 2012). To the author's best knowledge, this is the first academic study measuring how a mandatory product lifetime label affects the purchase of electrical home appliances. Insights from earlier commissioned research (e.g. Prakash et al., 2018; Sircome et al., 2016) are enriched by, for instance, choice-based conjoint (CBC) utility and WTP analyses as well as a psychographic model explaining the preference for a long product lifetime.

Similar to the second article of the doctoral thesis, this article also confirms the often cited key role of positive attitudes in predicting sustainable consumption practices. However, this study's findings question the predominant view that self-enhancement values inhibit and self-transcendence values enhance pro-environmental attitudes (e.g. Schwartz, 2010; Steg et al., 2014b) and thus contradict the corresponding finding of the second article. More precisely, the third article indicates that both value types enhance a positive attitude towards purchasing long-lasting electrical home appliances. Hedonic values foster the attitude based on personal gains, while biospheric values foster the attitude based on environmental gains. As an explanation, a positive attitude related to product

longevity may differ from many of the previously researched pro-environmental attitudes in that it is more strongly driven by personal interests which are rather reflected by values of self-enhancement. The present article also indicates that stimulation values, which belong to the class of openness-to-change values, should be considered as a potential barrier when investigating simplified consumption practices. The findings thus stress the necessity of case-specific analyses of values in sustainable consumption research.

In addition, the study reacts to the research call of shifting the focus from 'consuming differently' to 'consuming less' (e.g. Lorek and Fuchs, 2013; Seyfang, 2011). Strategies to reduce consumption such as extending the product lifetime have received relatively little attention in research and practice so far (e.g. Bakker et al., 2014; Van Nes and Cramer, 2005). In contrast to all other articles of the doctoral thesis, this article puts emphasis on purchasing fewer products and therefore comes closest to a narrow understanding of sustainable consumption (e.g. Fuchs and Lorek, 2005; Seyfang, 2011).

Finally, the product focus is set on electrical appliances. Consequently, the study also contributes to the need for analysing more unexplored product and service contexts in sustainable consumption research (McDonald et al., 2009; Prothero et al. 2011).

Article IV

The fourth article picks up on the research gap of investigating nonlinear effects of favourable and unfavourable environmental product information on purchase behaviour (Hartikainen et al., 2014; O'Rourke and Ringer, 2016). In fact, little attention has yet been paid to this area in sustainable consumption research (e.g. Grankvist et al., 2004; Moosmayer, 2012). The study's findings go far beyond the ones of the few earlier studies, most of which only tested the influence of qualitative environmental labels – unrelated to the industrial ecology discourse – on behavioural constructs other than WTP (e.g. Mohr and Webb, 2005; Van Dam and De Jonge, 2015). Overall, this article not only indicates that positive industrial ecology indicators can stimulate purchase behaviour (e.g. Molina-Murillo and Smith, 2009; Vanclay et al., 2011), but also how different quantitative levels of positive and negative PCF information influence consumers' WTP.

Furthermore, going beyond some of the earlier studies (Mohr and Webb, 2005; O'Rourke and Ringer, 2016), the present investigation is based on an explicit theoretical framework. One key finding of the article is that WTP does not change uniformly, but exhibits a diminishing sensitivity to PCF information for large deviations from a given reference point, illustrated by the industry average. As a result, the S-shaped utility function posited by prospect theory (e.g. Kahneman et al., 1991; Kahneman and Tversky, 1979) can be generalised to the context of environmental consumption. The study thus partly confirms and refines findings of the third article of the doctoral thesis. More

precisely, the decreasing positive effect of the product lifetime label on consumers' WTP (article III) corresponds to the diminishing sensitivity of consumers' WTP to positive PCF information (article IV).

Moreover, in accordance with previous related research (e.g. Grankvist et al., 2004; Van Dam and De Jonge, 2015), this study confirms that environmental consumption behaviour is subject to a negativity bias, because unfavourable deviations of a product's PCF from a given reference point have a stronger impact on WTP than corresponding favourable deviations. This finding draws on the concept of loss aversion, also offered by prospect theory (e.g. Kahneman et al., 1991; Tversky and Kahneman, 1991).

Overall, the doctoral thesis contributes to the general research objective of sustainable consumption which is not only to better understand sustainable consumption practices but also to strengthen them (Reisch and Thøgersen, 2015). The latter is done by providing recommendations for practitioners as described in the following section.

6.3 Practical implications

As proposed by Tukker et al. (2008), consumers, businesses and policymakers each play a key role in achieving change towards sustainable consumption and production. They are therefore supposed to create the so-called 'triangle of change' (Tukker et al., 2008). The doctoral thesis deepens the knowledge about sustainable purchase behaviour and indicates how consumers can make sustainable purchase decisions. In practice, however, consumers often face great difficulties in promoting change through their consumption choices which is why sustainable purchases need to be adequately stimulated by businesses and policymakers (Tukker et al., 2008). Consequently, recommendations for decision makers from industry and politics are given below in order to support them in strengthening the demand for sustainable products and services.¹ Here it is particularly important to not generalise across product and services contexts as sustainable consumer behaviour can vary strongly across contexts (e.g. Johnstone and Tan, 2015a, 2015b). This is why the practical implications are drawn separately for each article.

Article I

The first article's findings enable recommendations for marketers of social banks to increase the presence of social banking in the German banking market. First, targeting activities of marketers should consider a mixture of consumer characteristics such as age, educational level, general

¹ Non-governmental organisations are also important actors for stimulating sustainable consumption but are not explicitly referred to in this section. Similar to policymakers, they are, for instance, able to influence attitudes and values through educational measures.

sustainable buying patterns and preferences for a social-ecological placement of assets. By focusing on certain variable levels such as high educational achievements, particularly wealthy customers can be addressed.

Second, marketing cooperation between social banks and suppliers in other more established sustainable sectors such as the organic food sector (Bölow, 2016) is recommended. Synergy effects can be generated by addressing a mutual customer base.

Third, strong preferences for social return indicate that social banks should continuously develop their core business by following a transparent and participative social-ecological investing and lending policy (San-Jose et al., 2011). Besides certain product attributes, social commitment and non-gambling are highly valued by social banking customers and should, therefore, be pursued consequently.

In fact, this study is also relevant to conventional banks. On the one hand, results indicate a serious danger of customer loss. On the other hand, the findings signal a great chance of selling sustainable products in addition to the conventional product range and thereby increasing sales. If social banks soon reach their structural limits, the latter option might become true. Social banking products could then increasingly enter the conventional banking market in the future.

Article II

Based on the insights of the second article, various practical implications can be derived for marketing and policy making aiming at stimulating sustainable clothing consumption. First, policymakers should further develop educational measures for sustainable development to strengthen a positive attitude towards sustainable clothing, as well as self-transcendence rather than self-enhancement values, in society. While values are usually hard to change in the short run (e.g. Rokeach, 1973; Stern, 2000), such a context-specific attitude could be established more quickly by providing concrete information about sustainability issues in clothing. A contribution of marketers to an attitude and value change is also recommended – for instance, by improving transparency about the companies' sustainability efforts in general, and their products' social-ecological benefits in particular. In order to address consumers who are strongly guided by self-enhancement values as well, marketing communication could better account for the personal benefits of sustainable clothing, such as skin tolerance and self-esteem.

Second, the availability of sustainable clothing in retail stores should be increased to also attract the consumers less willing to shop online and via catalogues. As captive retail stores may be too costly for sustainable clothing enterprises (see Arnold, 2009), alliances with established retailers could be a feasible alternative. Furthermore, as there may be consumers who are unaware of the already existing offerings (Goworek et al., 2012), better information on where to purchase

Chapter 6: Conclusion

sustainable clothing, such as via shopping guides, could increase the perceived availability to some extent.

Third, all actors in sustainable clothing should understand durability as an important dimension of product sustainability. Integrating this aspect into sustainability marketing practice is highly recommended to improve the perception of sustainable clothing brands in terms of durability. This can be done, for instance, by offering longer lasting clothing based on durable designs and respective services. Communicating better consumer information on the clothing's durability is another viable approach, which could also involve the work of policymakers. By targeting particularly durability-oriented consumers, sustainable clothing companies could activate unused market potential. Likewise, conventional clothing companies specialising in durability may be well-advised to offer more sustainability benefits, such as organic fabrics, in order to expand their customer group.

Article III

The third article offers various practical recommendations derived from the academic findings. First, policymakers can be informed about the effectiveness of mandatory product lifetime labelling of electrical home appliances. Consumers express stronger preferences, for example by revealing a higher WTP, the longer the lifetime of a product is. According to Akerlof's (1970) remarks on information asymmetries, greater transparency over product lifetimes enables consumers to distinguish more durable from less durable products. It follows that manufacturers may be more strongly incentivised to produce long-lasting products. Product lifetime labelling could thus stimulate the supply of, and demand for, more durable electrical home appliances. Similarly, the introduction of the European Union (EU)'s energy labelling scheme for electrical appliances has triggered innovations towards more energy-efficient products over time (Heinze and Wüstenhagen, 2012).

Second, manufacturers in the electrical home appliances sector can learn from the study that it may be more profitable to produce long-lasting products under a product lifetime labelling scheme. However, manufacturers of durable products need to be aware that further increasing already high levels of product lifetime may not be rewarded by consumers' WTP; while manufacturers of less durable products are well-advised to improve their products' lifetime due to considerable gains in WTP.

Third, new businesses are more encouraged to enter the market for electrical home appliances if product lifetime labelling is in place. In comparison to the no-label scenario, i.e. the status quo, start-ups are confronted with lower market entry barriers regarding brand development. This, in turn, could lead to more competition, which would increase the pressure on established companies to adjust their unique selling propositions and competitive advantages. In principle, companies are advised to invest less in developing vague quality signals and more in concrete

improvements in product lifetime. Overall, business models for product longevity that also focus on aspects such as upgrading and redesigning (e.g. Lieder et al., 2018; Wilhelm, 2012) should be fostered. Such models would not only provide companies with various opportunities for differentiation but take into account consumers' needs for product up-to-dateness and variety.

Fourth, in order for durability marketing to be most effective, consumers' personal benefits of purchasing long-lasting electrical home appliances should be emphasised first and foremost. In addition, new customers with strongly pronounced, but not yet activated pro-environmental attitudes towards product longevity may be addressed by also communicating the environmental benefits, e.g. at the point of sale.

Fifth, by means of educational and promotional campaigns, policymakers and business practitioners alike are called upon to strengthen biospheric values in general as well as positive attitudes and social norms towards purchasing long-lasting products in particular. Measures could include concrete information about the negative environmental impact of declining product lifetimes. Importantly, any campaign should link environmental knowledge to people's personal consumption behaviours to not only foster but activate pro-environmental attitudes. In order to attract more people, messages may also be framed in a hedonic way. For instance, marketers could translate aspects such as 'saving money' or 'avoiding inconvenience' into the possibility of 'investing more of one's personal time and money in the joys of life' (e.g. Grigsby, 2004).

Article IV

The fourth article also leads to several implications for practitioners.² First, policymakers can be informed about the general importance of providing consumers with transparency not only about positive but also about negative environmental product performance (Grankvist et al., 2004; Van Dam and De Jonge, 2015). Taking advantage of the negativity bias, a mandatory labelling system including negative labels could push environmentally harmful products out of the market. Apart from the EU's energy labelling scheme of electrical appliances (Heinzle and Wüstenhagen, 2012; Ölander and Thøgersen, 2014), practical examples of negative labelling are still rare.

Second, in light of the reference dependence of consumers' WTP reactions, political measures aiming at raising consumers' reference points for a product's environmental performance might be worthwhile. Reference points could, for instance, be influenced by setting the labelling scale. Heinzle and Wüstenhagen (2012) as well as Ölander and Thøgersen (2014), indeed, show that consumer behaviour can be greatly influenced by scale changes of the energy label.

² Compared to the previous articles of the doctoral thesis, the fourth article is not intended to draw industry-specific conclusions.

Third, the S-shape of the WTP reaction function reveals that companies are not substantially rewarded by consumers' WTP for the first steps towards improving highly environmentally harmful products as well as for performing far better than the industry average. From a sustainability science perspective, this is alarming because earlier research on planetary boundaries (e.g. Rockström et al., 2009; Steffen et al., 2015) or resource productivity (Von Weizsäcker et al., 2009; Von Weizsäcker et al., 1997) has shown that sustainable development requires not only marginal but rather breakthrough advances. Consequently, political interventions such as mandatory minimum standards not too far below the industry's state of the art as well as subsidies for companies' radical improvements in terms of environmental product performance are needed.

Fourth, given that consumers are equipped with full transparency, below-average performing companies are well-advised to improve their products' environmental performance up to or even slightly above the industry average due to considerable gains in consumers' WTP.

Common practical implications

Finally, despite the context specificity of the doctoral thesis, it can be noted that certain articles share some findings and thus practical recommendations. The second and the third article share the advice on strengthening sustainable attitudes and values, communicating sustainable products' personal benefits, considering durability as a sustainable and purchase-relevant product attribute, and on developing business models with a focus on product longevity. Both the third and fourth article emphasise the fundamental effectiveness of a labelling obligation for the entire range of products' environmental performance, i.e. also for unfavourable environmental performance. They also imply that improving high levels of products' environmental performance is not substantially rewarded by consumers' WTP.

So far, chapter 6 has summarised the results of the doctoral thesis, presented the contribution to literature and provided practical implications. The final section below addresses the limitations of the present work as well as ways for future research.

6.4 Limitations and future research

The findings reported in this doctoral thesis are subject to several constraints which suggest various opportunities for future research. At first, the article-specific limitations and research prospects are presented, and then those affecting the entire work are shown.

Article I

The first article which examines consumer characteristics and market size in the context of social banking is subject to the following critical aspects. First, the data collection of this cross-sectional study took place at the end of 2011. As consumption patterns can change over time, the market size might not reflect recent changes in the economic conditions. Considering the current low-interest phase in Europe (European Central Bank, 2019), the market size of social banking could now be different due to changes in consumer preferences as a reaction to lower interest rates. Future research studies should, therefore, employ longitudinal research designs to better account for possible time effects.

Second, research findings on the market size do not provide further information on how much of their assets potential social banking customers would invest in social banks. Future research is therefore challenged to provide a differentiated view on the expected asset distribution of potential social banking customers among social and conventional banks. Based on enhanced data and further analyses, for example, a distinction between weak, moderate and strong potential users of social banking could lead to more sophisticated customer profiles and market size estimates of greater practical relevance.

Third, limitations result from the main assumption that the market size estimate depends on the selected consumer characteristics. There might be further relevant aspects influencing the market size. As demand forecasts in economics often incorporate macroeconomic figures such as economic growth or company-specific aspects such as advertisement (Waheeduzzaman, 2008), future research could consider an interplay of these variables.

Fourth, the underlying rationale of identifying potential social banking customers based on the actual social banking customer profile neglects the fact that there might be potential buyers who are different from the status quo. Thus, future research should account for this aspect, for instance by developing market segments independent of the status quo.

Fifth, measuring preferences brings up the discussion of their relevance for purchase behaviour. An ACA already offers advantages compared to traditional conjoint analysis (Johnson, 1987; Rao, 2014). In future studies, however, one could think of applying CBC analysis, which is often seen as the more realistic approach (Rao, 2014).³

Sixth, market size estimation by means of the classification function of the logistic regression, more specifically the misclassification rates, appears to be a novel approach, which could not be

³ The third article picks up on this limitation by applying CBC.

directly supported by previous studies. Future research should discuss this approach by comparing it to other methods of market size estimation.

In addition to overcoming the limitations, future consumer research on social banking is especially challenged to investigate the purchase barriers, in particular the switching costs, of potential social banking customers. As markets are imperfect in reality, the market potential for social banking has not been realised yet. Customers may not switch to social banks because of inertia, cynicism or just the lack of awareness concerning their existence (Bray et al., 2011; Escrig-Olmedo et al., 2013). Furthermore, besides social and financial return, future research studies could benefit from an integration of further investment criteria such as account management fees, liquidity and risk. This goes along with an analysis of different banking products, apart from savings accounts alone.

Article II

The second article which investigates the ABG in the context of sustainable clothing can be viewed critically for the reasons below. First, the results may be subject to error due to the self-reported nature of all answers recorded. Social desirability bias, for example, could have led to an over-reporting of socially desired concepts (Auger and Devinney, 2007) such as sustainable clothing purchase behaviour, the positive attitude towards sustainable clothing and self-transcendence values. As a consequence, the estimate of the ABG may be distorted. Future research is challenged to better account for such sources of error – for instance, by using multi-dimensional scales to quantify the degree of social desirability (Kemper et al., 2012).

Second, the construct of self-enhancement values shows relatively low levels of validity and reliability. It is therefore advisable for future studies to measure values by using well-established scales (see, e.g., Bouman et al., 2018; Schwartz et al., 2001).⁴ Likewise, the measurement of other constructs could be enhanced with additional items.

Third, only a few enablers and barriers with respect to sustainable clothing purchases have been identified. Despite the reasonable explanatory power of the structural equation model (SEM), a large part of the variation in purchase behaviour remains unexplained. Future research should address further potential determinants, such as a consumer's knowledge, trust and social norms (e.g. Eifler, 2014; Hiller Connell, 2010), in order to investigate which ones further narrow the ABG in sustainable clothing. For those factors with no significant behavioural effect, i.e. fashion consciousness and price sensitivity, it may be worthwhile trying to identify yet undiscovered confounders which could mask an actual causal effect.

⁴ The third article picks up on this limitation by measuring values based on well-established scales.

Fourth, as the sample contains only German women, this study's findings cannot be extrapolated to the entire clothing market. For generalising the results, future replication and extension studies should draw on larger samples including men.

Apart from the limitations, future consumer research should further examine the indication of unmet consumer needs for durability in the sustainable clothing niche. In line with the research call to further reduce the throughput of resources and thus consumption (e.g. Lorek and Fuchs, 2013; Prothero et al., 2011), it may be worthwhile to investigate the acceptance of business models that focus on extending the lifetime of clothing such as redesign and renting (e.g. Armstrong et al., 2015; Piscicelli et al., 2015).

Article III

The third article on product lifetime labelling and consumer preferences for product longevity in the context of electrical appliances is marked by the following limitations.

Besides addressing the shortcomings, further avenues of consumer research related to product lifetime labelling are identified. First of all, experimental studies comparing different types of labelling schemes (e.g. voluntary vs. mandatory), different types of information (e.g. expected product lifetime vs. repairability information) and different product categories (e.g. utilitarian vs. hedonic) are recommended (e.g. Artinger et al., 2018; IFIXIT, 2019). Furthermore, it is recommended to investigate how consumers who are strongly guided by stimulation values can also be motivated to purchase long-lasting products. In this context, business models for product longevity (e.g. Bocken and Short, 2016), which also take into account consumers' variety-seeking tendencies, should be further developed and tested for consumer acceptance. Product and service design should consider strategies such as upgrading and leasing (e.g. Bressanelli et al., 2017; Proske and Jaeger-Erben, 2019). Moreover, a market shift towards product longevity could provide new opportunities for second-hand retailers (Maitre-Ekern and Dalhammer, 2016). Future studies should thus shed light on the impact of product lifetime labelling on secondary markets. In addition, the adverse effects of the label on consumer preferences for existing brands and low levels of energy consumption should be further investigated. In order to ensure the feasibility of product lifetime labelling, future research on standardised durability tests (Stamminger et al., 2018) needs to be carried out as well. Finally, considering that modern economies are marked by widespread disposal of products before they break (Cox et al., 2013), research on the factors affecting the premature replacement of products is crucial in terms of product lifetime extension. It would be particularly interesting to investigate whether the preference for a long product lifetime at purchase is based on the same motivations as the willingness to keep a product in use for a long time.

Article IV

The fourth article favourable and unfavourable environmental product information raises the subsequent issues of concern. First, the dependent variable reflects the WTP stated in a survey-based experiment rather than revealed in a real purchase decision. Although the authors are aware of the potential problems associated with a direct elicitation of WTP (Auger and Devinney, 2007; Breidert et al., 2006), this approach better allows to avoid anchoring and framing effects and seems appropriate for the research focus on capturing the general functional form of WTP. To overcome this limitation, further research could replicate the findings using real choice experiments.

Second, only one possible mechanism of communicating environmental product performance to consumers was tested, namely, by presenting the relative amount of CO₂ emissions caused. Further research should investigate the effects of different kinds of communicating such information, for instance as absolute figures (Daziano et al., 2017; Tukker et al., 2010).

In addition to overcoming the limitations, future consumer research on positive and negative sustainability information could test whether and how the results change when different types of products and sustainability information are used and, hence, further product attributes and sustainability benefits gain importance for consumers' WTP. In this vein, the focus should be expanded to aspects of environmental information which contribute not only to public but also to private gains, such as health benefits (e.g. Mondelaers et al., 2009; O'Rourke and Ringer, 2016). Similarly, subsequent research could follow up on further moderators with a potential effect on the nonlinearity of the WTP reaction function, such as promotion and prevention foci (Codini et al., 2018; Zou and Chan, 2019), and personal sustainable norms (Grankvist et al., 2004; Van Dam and De Jonge, 2015).

Common limitations and research prospects

Hereinafter, the aspects affecting the entire doctoral thesis are critically appraised. First, in line with the research goal, all articles of the present work examine different facets of sustainable purchase behaviour. Considering consumption as the process of purchasing, using and disposing of products and services, only the first consumption phase has thus been investigated. Although consumers can strongly contribute to sustainable development by deciding for the more sustainable consumption option at the point of purchase, the subsequent consumption phases may also be of key relevance regarding their socio-ecological impact (Geiger et al., 2018). Furthermore, substantial differences in behaviour are expected across the different stages of consumption (Evans and Cooper, 2010). Researchers increasingly complain about the limited focus of previous sustainable consumer research on purchase behaviour and call for a broader consideration of the entire consumption cycle (e.g. Geiger et al., 2018; Prothero et al., 2011). Future research should, therefore, relate the issues raised

in this thesis to the use and disposal phase of consumption. For example, it would be very valuable to check whether consumers who purchase the more durable products will actually keep them in use for a long time.

Second, the determinants of sustainable purchase behaviour mainly examined in this doctoral thesis are values, attitudes, preferences, WTP and sustainability information. The goal of the thesis was not to provide a complete model of the factors influencing sustainable purchase behaviour. Nevertheless, the presented SEMs leave a large part of the variations in the dependent variables unexplained. It is thus recommended to test further possible key determinants of sustainable purchase behaviour in future replication and extension studies. With reference to White et al.'s (2019) recent and comprehensive framework on sustainable consumption, these may be discontinuities to change bad habits, feelings of guilt or self-efficacy. Regarding the latter, future research could examine whether consumers lack confidence in the fact that purchasing sustainable clothing will actually make a difference towards a more sustainable clothing industry. White et al. (2019) have also identified key challenges that distinguish sustainable consumption from typical consumer behaviour such as the self-other trade-off. Likewise, the value and attitude analyses carried out in the present work also indicate that consumers make context-dependent trade-offs between individual and collective interests. In order to address sustainable consumers as effectively as possible, future studies should systematically examine the conditions under which sustainable purchase decisions are more strongly driven by selfish or self-less motives.

Third, the methodological approach of the doctoral thesis led to the research questions being addressed using quantitative empirical methods because of the advantages already mentioned in chapter 1. However, survey-based techniques can generally be criticised as susceptible to potential biases due to the self-reported nature of all answers collected (Auger and Devinney, 2007). Hypothetical purchase scenarios can also be flawed since respondents tend to exaggerate their purchase intentions in experimental settings without real financial transactions (Nagle and Holden, 2002). Consequently, generated measurements on sustainable attitudes or WTP reports on environmentally friendly products could be overestimated due to social desirability bias (Auger and Devinney, 2007; Breidert et al., 2006). The third and the fourth article of the present work account for a potential social desirability tendency by using respective scales (Kemper et al., 2012). To mitigate the potential bias of stated WTP, the fourth article explicitly controlled for the individual social desirability tendency. Nevertheless, future research should more strongly consider the application of real choice experiments (e.g. Vanclay et al., 2011) – for instance, to replicate this thesis' study on the effects of positive and negative environmental product information.

Fourth, all articles of the present work have examined sustainable purchase behaviour based on samples of German consumers. For generalising the results, future replication and extension

studies should draw on samples from different countries. For instance, comparing sustainable consumer behaviour in the banking sector of Germany with that of other European countries could add valuable insights into the generalisability of the first study's findings across Europe.

Fifth, the doctoral thesis is generally based on a broad understanding of sustainable consumption by focusing on the purchase of more sustainable products and services, i.e. on relative improvements in terms of the socio-ecological impact (see chapter 1). However, taking into account influences such as global population growth and the economic strengthening of emerging countries, it is likely that the negative social and environmental consequences of consumption will increase worldwide (e.g. Mont and Plepys, 2008; Nguyen et al., 2018). Advocates of the narrow understanding of sustainable consumption thus consider the current research focus on developing more sustainable consumption options to be insufficient. They call for more radical, systemic changes, including the questioning of the current economic growth model (e.g. Fuchs and Lorek, 2005; Seyfang, 2011). Jackson (2009), for example, stresses that the present market economy is dominated by the economic growth paradigm which results in increasingly unsustainable production and consumption patterns. Likewise, Fuchs and Lorek (2005) indicate the necessity of changes in not only patterns and but levels of consumption. Vergragt et al. (2014) argues that consumption is part of a larger system of investments, production, trade etc., i.e. changing consumption entails changing the entire system including the economic system, infrastructures, culture and lifestyles. Consequently, in terms of reaching true progress towards sustainable development, future sustainable consumption research should more strongly focus on systemic changes such as sufficiency-based business models and policies (e.g. Bocken and Short, 2016; Bocken et al., 2014).

In conclusion, the doctoral thesis advances the understanding of sustainable purchase behaviour which is a key prerequisite in promoting sustainable consumption. The findings of this work will assist researchers in conceptualizing different means of influencing sustainable purchase behaviour and will spur further research in the respective domains. Furthermore, the insights are inevitable for companies to generate business cases for sustainability and for policymakers to develop effective policies promoting sustainable consumption. Via sustainability labelling, for instance, policymakers can set strong market incentives for companies to offer more sustainable products and services.

References

- Aertsens, J., Mondelaers, K., Verbeke, W., Buysse, J., & van Huylenbroeck, G. (2011). The influence of subjective and objective knowledge on attitude, motivations and consumption of organic food. *British Food Journal*, 113(11), 1353–1378.
- Ajzen, I. (2019). Theory of planned behavior diagram. <https://people.umass.edu/~ajzen/tpb.diag.html>. Accessed 25 Jun 2019.
- Ajzen I. (2012a). Values, attitudes, and behavior. In S. Salzborn, E. Davidov, & J. Reinecke (Eds.), *Methods, theories, and empirical applications in the social sciences: Festschrift for Peter Schmidt* (pp. 33–38). Wiesbaden: VS Verlag für Sozialwissenschaften | Springer Fachmedien.
- Ajzen, I. (2012b). The theory of planned behaviour. In P. A. M. van Lange, A. W. Kruglanski, & E. T. Higgins (Eds.), *Handbook of theories of social psychology: Volume 1* (pp. 438–459). London, Thousand Oak CA, New Delhi, Singapore: SAGE Publications.
- Ajzen, I. (2006). Constructing a TPB questionnaire: Conceptual and methodological considerations. https://pdfs.semanticscholar.org/0574/b20bd58130dd5a961f1a2db10fd1fcb9e95d.pdf?_ga=2.122007755.1956573413.1561833841-1997909480.1561732611. Accessed on 25 Jun 2019.
- Ajzen, I. (2005). *Attitudes, personality, and behaviour* (2nd ed.). Maidenhead: Open University Press.
- Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes*, 50(2), 179–211.
- Ajzen, I. (1985). From intentions to actions: A theory of planned behavior. In J. Kuhl, & J. Beckmann (Eds.), *Action-control: From cognition to behavior* (pp. 11–39). Berlin: Springer.
- Ajzen, I., & Fishbein, M. (1980). *Understanding attitudes and predicting social behaviour*. Englewood Cliffs NJ: Prentice-Hall.
- Akenji, L. (2014). Consumer scapegoatism and limits to green consumerism. *Journal of Cleaner Production*, 63, 13–23.

- Akerlof, G. A. (1970). The market for "Lemons": Quality uncertainty and the market mechanism. *The Quarterly Journal of Economics*, 84(3), 488–500.
- Allison, P. D. (1999). *Logistic regression using the SAS® system: Theory and application*. Cary NC: SAS Institute Inc.
- Alvarez, S., Tobarra, M.-A., & Zafrilla, J.-E. (2018). Corporate and product carbon footprint under compound hybrid analysis: Application to a Spanish timber company. *Journal of Industrial Ecology*, 23(2), 496–507.
- Anderson Jr., W. T., & Cunningham, W. H. (1972). The socially conscious consumer. *Journal of Marketing*, 36(3), 23–31.
- Antil, J. H. (1984). Socially responsible consumers: Profile and implications for public policy. *Journal of Macromarketing*, 4(2), 18–39.
- Ardente, F., & Mathieux, F. (2014). Environmental assessment of the durability of energy-using products: Method and application. *Journal of Cleaner Production*, 74, 62–73.
- Armitage, C. J., & Conner, M. (2001). Efficacy of the theory of planned behaviour: A meta-analytic review. *British Journal of Social Psychology*, 40(4), 471–499.
- Armstrong, C. M., Niinimäki, K., Kujala, S., Karell, E., & Lang, C. (2015). Sustainable product-service systems for clothing: Exploring consumer perceptions of consumption alternatives in Finland. *Journal of Cleaner Production*, 97, 30–39.
- Arnold, C. (2009). *Ethical marketing and the new consumer*. Chichester: John Wiley and Sons.
- Artinger, S., Baltes, S., Jarchow, C., Petersen, M., & Schneider, A. M. (2018). Lifespan label for electrical products: Study on the effect of lifespan information for electrical products on the purchasing decision – On behalf of the Federal Ministry for Environment, Nature Conservation, Construction and Nuclear Safety (3716 37 311 2). <https://www.bundesregierung.de/resource/blob/975272/323454/046091a8ccdc126cdf3e827ed0c27c2/download-produktlabel-lebensdauer-eng-data.pdf>. Accessed 18 Jun 2019.
- Aschemann-Witzel, J., & Niebuhr Aagaard, E. M. (2014). Elaborating on the attitude-behaviour gap regarding organic products: Young Danish consumers and instore food choice. *International Journal of Consumer Studies*, 38(5), 550–558.
- Atkinson, G., Dietz, S., & Neumayer, E. (2007). *Handbook of sustainable development*. Cheltenham, Northampton MA: Edward Elgar.

References

- Auger, P., & Devinney, T. M. (2007). Do what consumers say matter? The misalignment of preferences with unconstrained ethical intentions. *Journal of Business Ethics*, 76(4), 361–383.
- Axel Springer and Bauer Media Group. (2011). *VerbraucherAnalyse 2011 Klassik III Märkte – Strukturanalyse*. <http://online.mdsmediaplanung.de/vakm>. Accessed 14 Apr 2016.
- Bagozzi, R. P., & Yi, Y. (2012). Specification, evaluation, and interpretation of structural equation models. *Journal of the Academy of Marketing Science*, 40(1), 8–34.
- Bakker, C., Wang, F., Huisman, J., & den Hollander, M. (2014). Products that go round: Exploring product life extension through design. *Journal of Cleaner Production*, 69, 10–16.
- Balderjahn, I., Buerke, A., Kirchgeorg, M., Peyer, M., Seegebarth, B., & Wiedmann, K. P. (2013). Consciousness for sustainable consumption: Scale development and new insights in the economic dimension of consumers' sustainability. *AMS Review*, 3(4), 181–192.
- Balderjahn, I., & Hüttel, A. (2019). Why consumers buy sustainably: The role of personal values. *Marketing ZFP*, 41(1), 24–38.
- Banerjee, S. B., Iyer, E. S., & Kashyap, R. K. (2003). Corporate environmentalism: Antecedents and influence of industry type. *Journal of Marketing*, 67(2), 106–122.
- Basu, A. K., & Hicks, R. L. (2008). Label performance and the willingness to pay for Fair Trade coffee: A cross-national perspective. *International Journal of Consumer Studies*, 32(5), 470–478.
- Bauer, R., & Smeets, P. (2015). Social identification and investment decisions. *Journal of Economic Behavior & Organization*, 117, 121–134.
- Baumeister, R. F., Bratslavsky, E., Finkenauer, C., & Vohs, K. D. (2001). Bad is stronger than good. *Review of General Psychology*, 5(4), 323–370.
- Baumeister, R. F., & Finkel, E. J. (2010). *Advanced social psychology: The state of the science*. Oxford: Oxford University Press.
- BBMG, GlobeScan and SustainAbility. (2012). *Re: Thinking consumption – Consumers and the future of sustainability. Report of the regeneration consumer study*. <http://www.globescan.com/component/edocman/?task=document.viewdoc&id=51&Itemid=0>. Accessed 26 Jun 2016.
- Beal, D. J., Goyen, M., & Phillips, P. (2005). Why do we invest ethically? *Journal of Investing*, 14(3), 66–78.
- Becker, J. (2012). *Marketing-Konzeption – Grundlagen des zielstrategischen und operativen Marketing-Managements* (10th ed.). München: Vahlen.

- Belz, F.-M., & Bilharz, M. (2007). Nachhaltiger Konsum, geteilte Verantwortung und Verbraucherpolitik: Grundlagen. In F.-M. Belz, G. Karg, & D. Witt (Eds.), *Nachhaltiger Konsum und Verbraucherpolitik im 21. Jahrhundert* (pp. 21–52). Marburg: Metropolis.
- Belz, F.-M., Karg, G., & Witt, D. (2007). *Nachhaltiger Konsum und Verbraucherpolitik im 21. Jahrhundert*. Marburg: Metropolis
- Belz, F.-M., & Peattie, K. J. (2012). *Sustainability marketing: A global perspective* (2nd ed.). Chichester: John Wiley and Sons.
- Ben-Akiva, M., & Lerman, S. R. (1991). *Discrete choice analysis*. Cambridge MA: The MIT Press.
- Benedikter, R. (2011). *Social banking and social finance*. New York: Springer.
- Bentler, P. M., & Bonett, D. G. (1980). Significance tests and goodness of fit in the analysis of covariance structures. *Psychological Bulletin*, 88(3), 588–606.
- Berns, M., Townend, A., Khayat, Z., Balagopal, B., Reeves, M., Hopkins, M. S., & Kruschwitz, N. (2009). Sustainability and competitive advantage. *MIT Sloan Management Review*, 51(1), 19–26.
- Biel, A., & Grankvist, G. (2010). The effect of environmental information on professional purchasers' preference for food products. *British Food Journal*, 112(3), 251–260.
- Black, I. R., & Cherrier, H. (2010). Anti-consumption as part of living a sustainable lifestyle: Daily practices, contextual motivations and subjective values. *Journal of Consumer Behaviour*, 9(6), 437–453.
- Blok, V., Long, T. B., Gaziulusoy, A. I., Ciliz, N., Lozano, R., Huisingh, D., Csutora, M., & Boks, C. (2015). From best practices to bridges for a more sustainable future: Advances and challenges in the transition to global sustainable production and consumption. Introduction to the ERSCP stream of the special volume. *Journal of Cleaner Production*, 108(Part A), 19–30.
- Bundesministerium für Umwelt, Naturschutz und nukleare Sicherheit. (2017). *Nachhaltiger Konsum*. <https://www.bmu.de/themen/wirtschaft-produkte-ressourcen-tourismus/produkte-und-konsum/nachhaltiger-konsum/>. Accessed 25 Sep 2019.
- Boatright, J. R. (2014). *Ethics in finance* (3rd ed.). West Sussex: Wiley Blackwell.
- Bobba, S., Ardente, F., & Mathieux, F. (2016). Environmental and economic assessment of durability of energy-using products: Method and application to a case-study vacuum cleaner. *Journal of Cleaner Production*, 137, 762–776.
- Bocken, N., & Short, S. W. (2016). Towards a sufficiency-driven business model: Experiences and opportunities. *Environmental Innovation and Societal Transitions*, 18, 41–61.

References

- Bocken, N., Short, S. W., Rana, P., & Evans, S. (2014). A literature and practice review to develop sustainable business model archetypes. *Journal of Cleaner Production*, 65, 42–56.
- Boström, M., & Klintman, M. (2008). *Eco-standards, product labelling and green consumerism*. Basingstoke: Palgrave Macmillan.
- Boulstridge, E., & Carrigan, M. (2000). Do consumers really care about corporate responsibility? Highlighting the attitude-behaviour gap. *Journal of Communication Management*, 4(4), 355–368.
- Bouman, T., Steg, L., & Kiers, H. A. (2018). Measuring values in environmental research: A test of an environmental portrait value questionnaire. *Frontiers in Psychology*, 9, 1–15.
- Boyano Larriba, A., Cordella, M., Espinosa Martinez, M., Villanueva Krzyzaniak, A., Graulich, K., Rüdinauer, I., Alborzi, F., Hook, I., & Stamminger, R. (2017). Ecodesign and energy label for household washing machines and household washer-dryers. <https://publications.europa.eu/en/publication-detail/-/publication/533fa096-d971-11e7-a506-01aa75ed71a1/language-en>. Accessed 7 Jul 2019.
- Bund Ökologische Lebensmittelwirtschaft e.V. (2016). Umsatz mit Bio-Lebensmitteln in Deutschland in den Jahren 2000 bis 2016 (in Milliarden Euro). <https://de.statista.com/statistik/daten/studie/4109/umfrage/bio-lebensmittelumsatz-zeitreihe/>. Accessed 18 Feb 2017.
- Braun, H. I., Jackson, D. N., & Wiley, D. E. (2002). *The role of constructs in psychological and educational measurement*. Mahwah NJ: Erlbaum.
- Bray, J., Johns, N., & Kilburn, D. (2011). An exploratory study into the factors impeding ethical consumption. *Journal of Business Ethics*, 98(4), 597–608.
- Brécard, D., Hlaimi, B., Lucas, S., Perraudeau, Y., & Salladarré, F. (2009). Determinants of demand for green products: An application to eco-label demand for fish in Europe. *Ecological Economics*, 69(1), 115–125.
- Breidert, C., Hahsler, M., & Reutterer, T. (2006). A review of methods for measuring willingness-to-pay. *Innovative Marketing*, 2(4), 8–32.
- Bressanelli, G., Perona, M., & Saccani, N. (2017). Reshaping the washing machine industry through circular economy and product-service system business models. *Procedia CIRP*, 64, 43–48.
- Bronnmann, J., & Asche, F. (2017). Sustainable seafood from aquaculture and wild fisheries: Insights from a discrete choice experiment in Germany. *Ecological Economics*, 142, 113–119.

- Brook Lyndhurst. (2011). Public understanding of product lifetimes and durability (1) – On behalf of the Department for Environment, Food and Rural Affairs. http://www.brooklyndhurst.co.uk/public-understanding-of-product-lifetimes-and-durability-_156.html. Accessed 29 Jun 2019.
- Bruce, M., Moore, C. M. & Birtwistle, G. (2004). International retail marketing: A case study approach. Oxford, Burlington MA: Elsevier Butterworth-Heinemann.
- Brucks, M., Zeithaml, V. A., & Naylor, G. (2000). Price and brand name as indicators of quality dimensions for consumer durables. *Journal of the Academy of Marketing Science*, 28(3), 359–374.
- Butler, S. M., & Francis, S. (1997). The effects of environmental attitudes on apparel purchasing behavior. *Clothing and Textiles Research Journal*, 15(2), 76–85.
- Cagalj, M., Haas, R., & Morawetz, U. B. (2016). Effects of quality claims on willingness to pay for organic food. *British Food Journal*, 118(9), 2218–2233.
- Carrigan, M., & Attalla, A. (2001). The myth of the ethical consumer – Do ethics matter in purchase behaviour? *Journal of Consumer Marketing*, 18(7), 560–578.
- Carrington, M. J., Neville, B. A., & Whitwell, G. J. (2010). Why ethical consumers don't walk their talk: Towards a framework for understanding the gap between the ethical purchase intentions and actual buying behaviour of ethically minded consumers. *Journal of Business Ethics*, 97(1), 139–158.
- Chatzidakis, A., Kastanakis, M., & Stathopoulou, A. (2016). Socio-cognitive determinants of consumers' support for the fair trade movement. *Journal of Business Ethics*, 133(1), 95–109.
- Chekima, B., Oswald, A. I., Wafa, S. A. W. S. K., & Chekima, K. (2017). Narrowing the gap: Factors driving organic food consumption. *Journal of Cleaner Production*, 166, 1438–1447.
- Chekima, B., Wafa, S. A. W. S. K., Igau, O. A., Chekima, S., & Sondoh, S. L. (2016). Examining green consumerism motivational drivers: Does premium price and demographics matter to green purchasing? *Journal of Cleaner Production*, 112, 3436–3450.
- Chowdhury, R. (2017). The Rana Plaza disaster and the complicit behavior of elite NGOs. *Organization*, 24(6), 938–949.
- Chrzan, K., & Orme, B. (2000). An overview and comparison of design strategies for choice-based conjoint analysis. <https://www.sawtoothsoftware.com/download/techpap/desgncbc.pdf>. Accessed 21 Jun 2019.

References

- Cialdini, R. B., Reno, R. R., & Kallgren, C. A. (1990). A focus theory of normative conduct: Recycling the concept of norms to reduce littering in public places. *Journal of Personality and Social Psychology*, 58(6), 1015–1026.
- Clark, C. F., Kotchen, M. J., & Moore, M. R. (2003). Internal and external influences on pro-environmental behavior: Participation in a green electricity program. *Journal of Environmental Psychology*, 23(3), 237–246.
- Codini, A. P., Miniero, G., & Bonera, M. (2018). Why not promote promotion for green consumption? *European Business Review*, 30(5), 554–570.
- Codini, A., Saccani, N., & Sicco, A. (2012). The relationship between customer value and pricing strategies: An empirical test. *Journal of Product & Brand Management*, 21(7), 538–546.
- Cohen, J. (1990). Things I have learned (so far). *American Psychologist*, 45(12), 1304–1312.
- Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). New York: Lawrence Erlbaum Associates.
- Conn, W. D. (1983). *Energy and material resources: Attitudes, values, and public policy*. Boulder CO: Westview Press.
- Connell, K. Y. H. (2010). Internal and external barriers to eco-conscious apparel acquisition. *International Journal of Consumer Studies*, 34(3), 279–286.
- Cooper, T. (2010). *Longer lasting products: Alternatives to the throwaway society*. Surrey, Burlington NJ: Gower.
- Cooper, T. (2010). The significance of product longevity. In T. Cooper (Ed.), *Longer lasting products: Alternatives to the throwaway society* (pp. 3–38). Surrey, Burlington NJ: Gower.
- Cooper, T. (2005). Slower consumption. Reflections on product life spans and the “throwaway society”. *Journal of Industrial Ecology*, 9(1–2), 51–67.
- Cooper, T. (2004). Inadequate life: Evidence of consumer attitudes to product obsolescence. *Journal of Consumer Policy*, 27(4), 421–49.
- Cooper, T., & Christer, K. (2010). Marketing durability. In T. Cooper (Ed.), *Longer lasting products: Alternatives to the throwaway society* (pp. 273–296). Surrey, Burlington NJ: Gower.
- Cornée, S., Kalmi, P., & Szafarz, A. (2016). Selectivity and transparency in social banking: Evidence from Europe. *Journal of Economic Issues*, 50(2), 494–502.

- Cox, J., Griffith, S., Giorgi, S., & King, G. (2013). Consumer understanding of product lifetimes. *Resources, Conservation and Recycling*, 79, 21–29.
- Craig-Lees, M., & Hill, C. (2002). Understanding voluntary simplifiers. *Psychology & Marketing*, 19(2), 187–210.
- Darby, M. R., & Karni, E. (1973). Free competition and the optimal amount of fraud. *The Journal of Law and Economics*, 16(1), 67–88.
- Davies, I. A., & Gutsche, S. (2016). Consumer motivations for mainstream “ethical” consumption. *European Journal of Marketing*, 50(7/8), 1326–1347.
- Daziano, R. A., Waygood, E. O. D., Patterson, Z., & Braun Kohlová, M. (2017). Increasing the influence of CO₂ emissions information on car purchase. *Journal of Cleaner Production*, 164, 861–871.
- Defila, R., Giulio, A. Di & Kaufmann-Hayoz, R. (2012). The nature of sustainable consumption and how to achieve it: Results from the focal topic ‘From Knowledge to Action - New Paths Towards Sustainable Consumption’. Munich: Oekom.
- De Groot, J. I. M., & Steg, L. (2010). Relationships between value orientations, self-determined motivational types and pro-environmental behavioural intentions. *Journal of Environmental Psychology*, 30(4), 368–378.
- De Groot, J. I. M., & Steg, L. (2008). Value orientations to explain beliefs related to environmental significant behavior. How to measure egoistic, altruistic, and biospheric value orientations. *Environment and Behavior*, 40(3), 330–354.
- De Leeuw, J., & Meijer, E. (2008). *Handbook of multilevel analysis*. New York: Springer.
- Demarque, C., Charalambides, L., Hilton, D. J., & Waroquier, L. (2015). Nudging sustainable consumption: The use of descriptive norms to promote a minority behavior in a realistic online shopping environment. *Journal of Environmental Psychology*, 43, 166–174.
- De Pelsmacker, P., Driesen, L., & Rayp, G. (2005). Do consumers care about ethics? Willingness to pay for fair-trade coffee. *Journal of Consumer Affairs*, 39(2), 363–385.
- Deutsch, M. (2010). Life cycle cost disclosure, consumer behavior, and business implications. *Journal of Industrial Ecology*, 14(1), 103–120.
- Dhar, R., & Wertenbroch, K. (2000). Consumer choice between hedonic and utilitarian goods. *Journal of Marketing Research*, 37(1), 60–71.

References

- Diamantopoulos, A., Schlegelmilch, B. B., Sinkovics, R. R., & Bohlen, G. M. (2003). Can socio-demographics still play a role in profiling green consumers? A review of the evidence and an empirical investigation. *Journal of Business Research*, 56(6), 465–480.
- Dickenbrok, C., & Martinez, L. F. (2018). Communicating green fashion across different cultures and geographical regions. *International Review on Public and Nonprofit Marketing*, 15(2), 127–141.
- Dickson, M. A. (2001). Utility of no sweat labels for apparel consumers: Profiling label users and predicting their purchases. *Journal of Consumer Affairs*, 35(1), 96–119.
- Dickson, M. A. (2000). Personal values, beliefs, knowledge, and attitudes relating to intentions to purchase apparel from socially responsible businesses. *Clothing and Textiles Research Journal*, 18(1), 19–30.
- Doluca, H., Wagner, M., & Block, J. (2018). Sustainability and environmental behaviour in family firms: A longitudinal analysis of environment-related activities, innovation and performance. *Business Strategy and the Environment*, 27(1), 152–172.
- Do Paço, A., Alves, H., Shiel, C., & Leal Filho, W. (2013). Development of a green consumer behaviour model. *International Journal of Consumer Studies*, 37(4), 414–421.
- Dorfleitner, G., & Utz, S. (2014). Profiling German-speaking socially responsible investors. *Qualitative Research in Financial Markets*, 6(2), 118–156.
- Draucker, L., Kaufman, S., ter Kuile, R., & Meinrenken, C. (2011). Moving forward on product carbon footprint standards. *Journal of Industrial Ecology*, 15(2), 169–171.
- Dunlap, R. E., Grieneeks, J. K., & Rokeach, M. (1983). Human values and pro-environmental behavior. In W. D. Conn (Ed.), *Energy and material resources: Attitudes, values, and public policy* (pp. 145–168). Boulder CO: Westview Press.
- Du Toit, S. H. C., & du Toit, M. (2008). Multilevel structural equation modeling. In J. de Leeuw, & E. Meijer (Eds.), *Handbook of multilevel analysis* (pp. 435–478). New York: Springer.
- Eckhardt, G. M., Belk, R., & Devinney, T. M. (2010). Why don't consumers consume ethically? *Journal of Consumer Behaviour*, 9(6), 426–436.
- Eifler, C. (2014). Professional women's thoughts about sustainable clothing: Eco-fashion goes business? *International Journal of Fashion Studies*, 1(2), 149–163.
- Elkington, J. (1997). *Cannibals with forks: The triple bottom line of 21st century business*. Oxford: Capstone Publishing Limited.

- Ellen, P. S., Wiener, J. L., & Cobb-Walgren, C. (1991). The role of perceived consumer effectiveness in motivating environmentally conscious behaviors. *Journal of Public Policy & Marketing*, 10(2), 102–117.
- Emerson, J. (2003). The blended value proposition: Integrating social and financial returns. *California Management Review*, 45(4), 35–51.
- Escrig-Olmedo, E., Muñoz-Torres, M. J., & Fernández-Izquierdo, M. Á. (2013). Sustainable development and the financial system: Society's perceptions about socially responsible investing. *Business Strategy and the Environment*, 22(6), 410–428.
- European Central Bank. (2019). Press release: Monetary policy decisions. <https://www.ecb.europa.eu/press/pr/date/2019/html/ecb.mp190912~08de50b4d2.en.html>. Accessed 15 Oct 2019.
- European Commission. (2010). Commission delegated regulation (EU) No. 1061/2010 of 28 September 2010 supplementing directive 2010/30/EU of the European Parliament and of the Council with regard to energy labelling of household washing machines. *Official Journal of the European Union*.
- European Economic and Social Committee. (2013). Towards more sustainable consumption: Industrial product lifetimes and restoring trust through consumer information. <http://www.eesc.europa.eu/?i=portal.en.ccmi-opinions.26788>. Accessed 5 Jul 2019.
- European Social Survey. (2016). Gesellschaft und Demokratie in Europa: Deutsche Teilstudie im Projekt „European Social Survey“ (Welle 8). https://www.europeansocialsurvey.org/docs/round8/fieldwork/germany/ESS8_questionnaires_DE.pdf. Accessed 24 Jun 2019.
- Erdem, T., & Swait, J. (1998). Brand equity as a signaling phenomenon. *Journal of Consumer Psychology*, 7(2), 131–157.
- Ethische-banken.de. (2017). Kundenanzahl der ethischen Banken in Deutschland. <https://ethische-banken.de/groesste-gruene-bank/>. Accessed 19 Nov 2019.
- Evans, S., & Cooper, T. (2010). Consumer influences on product life-spans. In T. Cooper (Ed.), *Longer lasting products: Alternatives to the throwaway society* (pp. 319–350). Surrey, Burlington NJ: Gower.
- Fabrigar, L. R., & Wegener, D. T. (2010). Attitude structure. In R. F. Baumeister, & E. J. Finkel (Eds.), *Advanced social psychology: The state of the science* (pp. 177–216). Oxford: Oxford University Press.

References

- Farrell, A. M. (2010). Insufficient discriminant validity: A comment on Bove, Pervan, Beatty, and Shiu (2009). *Journal of Business Research*, 63(3), 324–327.
- Finus, M., & Rübhelke, D. T. (2013). Public good provision and ancillary benefits: The case of climate agreements. *Environmental and Resource Economics*, 56(2), 211–226.
- Fischer, D., Michelsen, G., Blättel-Mink, B., & Di Giulio, A. (2012). Sustainable consumption: How to evaluate sustainability in consumption acts. In R. Defila, A. Di Giulio, & R. Kaufmann-Hayoz (Eds.), *The nature of sustainable consumption and how to achieve it: Results from the focal topic 'From Knowledge to Action - New Paths Towards Sustainable Consumption'* (pp. 67–80). Munich: Oekom.
- Fishbein, M., & Ajzen, I. (2010). *Prediction and change of behavior: The reasoned action approach*. New York: Psychology Press.
- Fishbein, M., & Ajzen, I. (1975). *Belief, attitude, intention and behaviour: An introduction to theory and research*. Reading MA: Addison-Wesley.
- Fletcher, K. (2012). Durability, fashion, sustainability: The processes and practices of use. *Fashion Practice*, 4(2), 221–238.
- Flynn, R., Bellaby, P., & Ricci, M. (2009). The 'value-action gap' in public attitudes towards sustainable energy: The case of hydrogen energy. *The Sociological Review*, 57(2_suppl.), 159–180.
- Fornell, C., & Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. *Journal of Marketing Research*, 18(1), 39–50.
- Fraj, E., & Martinez, E. (2007). Ecological consumer behaviour: An empirical analysis. *International Journal of Consumer Studies*, 31(1), 26–33.
- Franke-Media.net. (2015). Zinsentwicklung von Tagesgeld im Monatsvergleich. <http://www.tagesgeldvergleich.net/statistiken/zinsentwicklung-tagesgeld-monatsvergleich.html>. Accessed 26 Jun 2015.
- Freestone, O. M., & McGoldrick, P. J. (2008). Motivations of the ethical consumer. *Journal of Business Ethics*, 79(4), 445–467.
- Fuchs, C., & Diamantopoulos, A. (2009). Using single-item measures for construct measurement in management research. *DBW Die Betriebswirtschaft*, 69(2), 195–210.
- Fuchs, D. A., & Lorek, S. (2005). Sustainable consumption governance: A history of promises and failures. *Journal of Consumer Policy*, 28(3), 261–288.

- Gatersleben, B. (2013). Measuring environmental behavior. In L. Steg (Ed.), *Environmental psychology: An Introduction* (pp. 131–140). Chichester: BPS Blackwell.
- German Institute for Economic Research. (2012). German socio-economic panel study (SOEP).
- Gertz, R. (2005). Eco-labelling: A case for deregulation? *Law, Probability and Risk*, 4(3), 127–141.
- Gilg, A., Barr, S., & Ford, N. (2005). Green consumption or sustainable lifestyles? Identifying the sustainable consumer. *Futures*, 37(6), 481–504.
- Geiger, S. M., Fischer, D., & Schrader, U. (2018). Measuring what matters in sustainable consumption: An integrative framework for the selection of relevant behaviors. *Sustainable Development*, 26(1), 18–33.
- Gesellschaft für integrierte Kommunikationsforschung. (2016). Best for Planning 2016 III Märkte – Strukturanalyse. <https://gik.media/best-4-planning/#b4ponlineauswertung>. Accessed 24 Apr 2017.
- Gleim, M., & Lawson, S. J. (2014). Spanning the gap: An examination of the factors leading to the green gap. *Journal of Consumer Marketing*, 31(6/7), 503–514.
- Gnanapragasam, A., Cole, C., Singh, J., & Cooper, T. (2018). Consumer perspectives on longevity and reliability: A national study of purchasing factors across eighteen product categories. *Procedia CIRP*, 69, 910–915.
- Goworek, H., Fisher, T., Cooper, T., Woodward, S., & Hiller, A. (2012). The sustainable clothing market: An evaluation of potential strategies for UK retailers. *International Journal of Retail & Distribution Management*, 40(12), 935–955.
- Grankvist, G., Dahlstrand, U., & Biel, A. (2004). The impact of environmental labelling on consumer preference: Negative vs. positive labels. *Journal of Consumer Policy*, 27(2), 213–230.
- Green, P. E., & Rao, V. R. (1971). Conjoint measurement of quantifying judgmental data. *Journal of Marketing Research*, 8(3), 355–363.
- Green, P. E., & Srinivasan, V. (1990). Conjoint analysis in marketing: New developments with implications for research and practice. *Journal of Marketing*, 54(4), 3–19.
- Grigsby, M. (2004). *Buying time and getting by: The voluntary simplicity movement*. Albany NY: State University of New York Press.
- Grimm, P. (2010). Social desirability bias. *Wiley International Encyclopedia of Marketing*. <https://onlinelibrary.wiley.com/doi/abs/10.1002/9781444316568.wiem02057>.

References

- Grob, A. (1995). A structural model of environmental attitudes and behaviour. *Journal of Environmental Psychology*, 15(3), 209–220.
- Grønhoj, A., & Thøgersen, J. (2009). Like father, like son? Intergenerational transmission of values, attitudes, and behaviours in the environmental domain. *Journal of Environmental Psychology*, 29(4), 414–421.
- Gupta, S., & Ogden, D. T. (2009). To buy or not to buy? A social dilemma perspective on green buying. *Journal of Consumer Marketing*, 26(6), 376–391.
- Ha-Brookshire, J. E., & Norum, P. S. (2011). Willingness to pay for socially responsible products: Case of cotton apparel. *Journal of Consumer Marketing*, 28(5), 344–353.
- Haigh, M. (2007). What counts in social managed investments: Evidence from an international survey. *Advances in Public Interest Accounting*, 13, 35–62.
- Hair Jr., J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2013). *Multivariate data analysis: Pearson new international edition (7th ed.)*. Harlow: Pearson.
- Hampf, N., & Loock, M. (2013). Sustainable development in retailing: What is the impact on store choice? *Business Strategy and the Environment*, 22(3), 202–216.
- Handelsblatt. (2010). Anzahl der Kunden von ethischen Banken in Deutschland von 2007 bis zum 1. Halbjahr 2010. <http://de.statista.com/statistik/daten/studie/164031/umfrage/kundenentwicklung-ethische-banken-in-deutschland/>. Accessed 26 Feb 2016.
- Hansen, E. G., & Schaltegger, S. (2013). 100 per cent organic? A sustainable entrepreneurship perspective on the diffusion of organic clothing. *Corporate Governance*, 13(5), 583–598.
- Hanss, D., & Böhm, G. (2010). Can I make a difference? The role of general and domain-specific self-efficacy in sustainable consumption decisions. *Umweltpsychologie*, 14(2), 46–74.
- Harms, R., & Linton, J. D. (2016). Willingness to pay for eco-certified refurbished products: The effects of environmental attitudes and knowledge. *Journal of Industrial Ecology*, 20(4), 893–904.
- Harris, F., Roby, H., & Dibb, S. (2016). Sustainable clothing: Challenges, barriers and interventions for encouraging more sustainable consumer behaviour. *International Journal of Consumer Studies*, 40(3), 309–318.

- Hartikainen, H., Roininen, T., Katajajuuri, J. M., & Pulkkinen, H. (2014). Finnish consumer perceptions of carbon footprints and carbon labelling of food products. *Journal of Cleaner Production*, 73, 285–293.
- Hassan, L. M., Shiu, E., & Shaw, D. (2016). Who says there is an intention-behaviour gap? Assessing the empirical evidence of an intention-behaviour gap in ethical consumption. *Journal of Business Ethics*, 136(2), 219–236.
- Hayduk, L. A., & Littvay, L. (2012). Should researchers use single indicators, best indicators, or multiple indicators in structural equation models? *BMC Medical Research Methodology*, 12(159). <https://doi.org/10.1186/1471-2288-12-159>.
- Heck, R. H., & Thomas, S. L. (2015). *An introduction to multilevel modeling techniques: MLM and SEM approaches using Mplus*. New York, London: Routledge.
- Heinzle, S. L., & Wüstenhagen, R. (2012). Dynamic adjustment of eco-labeling schemes and consumer choice – The revision of the EU energy label as a missed opportunity? *Business Strategy and the Environment*, 21(1), 60–70.
- Hennies, L., & Stamminger, R. (2016). An empirical survey on the obsolescence of appliances in German households. *Resources, Conservation and Recycling*, 112, 73–82.
- Henninger, C. E., Alevizou, P. J., & Oates, C. J. (2016). What is sustainable fashion? *Journal of Fashion Marketing and Management*, 20(4), 400–416.
- Henseler, J., Ringle, C. M., & Sarstedt, M. (2015). A new criterion for assessing discriminant validity in variance-based structural equation modeling. *Journal of the Academy of Marketing Science*, 43(1), 115–135.
- Hensher, D. A., Rose, J. M., & Greene, W. H. (2015). *Applied choice analysis* (2nd ed.). Cambridge: Cambridge University Press.
- Hiller Connell, K. Y. (2010). Internal and external barriers to eco-conscious apparel acquisition. *International Journal of Consumer Studies*, 34(3), 279–286.
- Hofmann, E., Hoelzl, E., & Kirchler, E. (2008). A comparison of models describing the impact of moral decision making on investment decisions. *Journal of Business Ethics*, 82(1), 171–187.
- Homburg, C., & Baumgartner, H. (1995). Beurteilung von Kausalmodellen: Bestandsaufnahme und Anwendungsempfehlungen. *Marketing ZFP*, 17(3), 162–176.
- Homburg, C., Koschate, N., & Hoyer, W. D. (2005). Do satisfied customers really pay more? A study of the relationship between customer satisfaction and WTP. *Journal of Marketing*, 69(2), 84–96.

References

- Homer, P. M., & Kahle, L. R. (1988). A structural equation test of the value-attitude-behavior hierarchy. *Journal of Personality and Social Psychology*, 54(4), 638–646.
- Horne, R. E. (2009). Limits to labels: The role of eco-labels in the assessment of product sustainability and routes to sustainable consumption. *International Journal of Consumer Studies*, 33(2), 175–182.
- Howell, J. (2009). CBC/HB for beginners. <https://www.sawtoothsoftware.com/support/technical-papers/hierarchical-bayes-estimation/cbc-hb-for-beginners-2009>. Accessed 25 Aug 2019.
- Hu, L., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling: A Multidisciplinary Journal*, 6(1), 1–55.
- Huber, J., & Train, K. (2001). On the similarity of classical and Bayesian estimates of individual mean partworths. *Marketing Letters*, 12(3), 259–269.
- Hustvedt, G., & Dickson, M. A. (2009). Consumer likelihood of purchasing organic cotton apparel. *Journal of Fashion Marketing and Management*, 13(1), 49–65.
- Intergovernmental Panel on Climate Change. (2014). Climate change 2014 synthesis report: Summary for policymakers. https://www.ipcc.ch/site/assets/uploads/2018/02/AR5_SYR_FINAL_SPM.pdf. Accessed 25 Sep 2019.
- IFIXIT. (2019). Smartphone Reparierbarkeits-Index. <https://de.ifixit.com/smartphone-repairability>. Accessed 18 Sep 2019.
- It Fits. (2013). 3,7% Textilien mit Öko-Label: Die Nachfrage nach Textilien mit Öko-Label in Deutschland ist stabil. http://www.it-fits.de/07_13_gfk_studie_de.html. Accessed 27 Jul 2017.
- Ito, T. A., Larsen, J. T., Smith, N. K., & Cacioppo, J. T. (1998). Negative information weighs more heavily on the brain: The negativity bias in evaluative categorizations. *Journal of Personality and Social Psychology*, 75(4), 887–900.
- Iwanow, H., McEachern, M. G., & Jeffrey, A. (2005). The influence of ethical trading policies on consumer apparel purchase decisions. *International Journal of Retail & Distribution Management*, 33(5), 371–387.
- Jackson, T. (2007). Sustainable consumption. In G. Atkinson, S. Dietz, & E. Neumayer (Eds.), *Handbook of sustainable development* (pp. 254–268). Cheltenham, Northampton MA: Edward Elgar.

- Jackson, T. (2006). *The Earthscan reader in sustainable consumption*. London: Earthscan.
- Jacobs, K., Petersen, L., Hörisch, J., & Battenfeld, D. (2018). Green thinking but thoughtless buying? An empirical extension of the value-attitude-behaviour hierarchy in sustainable clothing. *Journal of Cleaner Production*, 203, 1155–1169.
- Jaffry, S., Pickering, H., Ghulam, Y., Whitmarsh, D., & Wattage, P. (2004). Consumer choices for quality and sustainability labelled seafood products in the UK. *Food Policy*, 29(3), 215–228.
- Jägel, T., Keeling, K., Reppel, A., & Gruber, T. (2012). Individual values and motivational complexities in ethical clothing consumption: A means-end approach. *Journal of Marketing Management*, 28(3–4), 373–396.
- Joergens, C. (2006). Ethical fashion: Myth or future trend? *Journal of Fashion Marketing and Management*, 10(3), 360–371.
- Johnson, R. M. (1987). Adaptive conjoint analysis. In M. Metegrano (Ed.), *Proceedings of the Sawtooth Software conference on perceptual mapping, conjoint analysis, and computer interviewing* (pp. 253–265). Ketchum ID: Sawtooth Software.
- Johnstone, M.-L., & Tan, L. P. (2015a). An exploration of environmentally-conscious consumers and the reasons why they do not buy green products. *Marketing Intelligence & Planning*, 33(5), 804–825.
- Johnstone, M.-L., & Tan, L. P. (2015b). Exploring the gap between consumers' green rhetoric and purchasing behaviour. *Journal of Business Ethics*, 132(2), 311–328.
- Joshi, Y., & Rahman, Z. (2015). Factors affecting green purchase behaviour and future research directions. *International Strategic Management Review*, 3(1–2), 128–143.
- Junkus, J. C., & Berry, T. C. (2010). The demographic profile of socially responsible investors. *Managerial Finance*, 36(6), 474–481.
- Kaenzig, J., & Wüstenhagen, R. (2010). The effect of life cycle cost information on consumer investment decisions regarding eco-innovation. *Journal of Industrial Ecology*, 14(1), 121–136.
- Kahneman, D., Knetsch, J. L., & Thaler, R. H. (1991). Anomalies: The endowment effect, loss aversion, and status quo bias. *Journal of Economic Perspectives*, 5(1), 193–206.
- Kahneman, D., & Tversky, A. (1979). Prospect theory: An analysis of decision under risk. *Econometrica*, 47(2), 263–291.
- Kara, A., Kaynak, E., & Kucukemiroglu, O. (1994). Credit card development strategies for the youth market. *International Journal of Bank Marketing*, 12(6), 30–36.

References

- Kemper, C. J., Beierlein, C., Bensch, D., Kovaleva, A., & Rammstedt, B. (2012). Eine Kurzsкала zur Erfassung des Gamma-Faktors sozial erwünschten Antwortverhaltens: Die Kurzsкала Soziale Erwünschtheit-Gamma (KSE-G). https://www.gesis.org/fileadmin/_migrated/content_uploads/KSE_G_Workingpaper_01.pdf. Accessed 27 Jun 2019.
- Kilbourne, W. E., & Beckmann, S. C. (1998). Review and critical assessment of research on marketing and the environment. *Journal of Marketing Management*, 14(6), 513–532.
- Kline, R. B. (2016). *Principles and practice of structural equation modeling* (4th ed.). New York, London: The Guilford Press.
- Koellner, T., Weber, O., Fenchel, M., & Scholz, R. (2005). Principles for sustainability rating of investment funds. *Business Strategy and the Environment*, 14(1), 54–70.
- Koos, S. (2011). Varieties of environmental labelling, market structures, and sustainable consumption across Europe: A comparative analysis of organizational and market supply determinants of environmental-labelled goods. *Journal of Consumer Policy*, 34(1), 127–151.
- Kostakis, I., & Sardianou, E. (2012). Which factors affect the willingness of tourists to pay for renewable energy? *Renewable Energy*, 38(1), 169–172.
- Kotler, P., & Keller, K. L. (2006). *Marketing management* (12th ed.). Upper Saddle River NJ: Pearson Education.
- Krake, F. B. (2005). Successful brand management in SMEs: A new theory and practical hints. *Journal of Product & Brand Management*, 14(4), 228–238.
- Krause, K., & Battenfeld, D. (2019). Coming out of the niche? Social banking in Germany: An empirical analysis of consumer characteristics and market size. *Journal of Business Ethics*, 155(3), 889–911.
- Kuhl, J., & Beckmann, J. (1985). *Action-control: From cognition to behavior*. Berlin: Springer.
- Ladhari, R., & Tchetgna, N. M. (2015). The influence of personal values on fair trade consumption. *Journal of Cleaner Production*, 87, 469–477.
- Laitala, K., Boks, C., & Klepp, I. G. (2015). Making clothing last: A design approach for reducing the environmental impacts. *International Journal of Design*, 9(2), 93–107.
- Lancaster, K. J. (1966). A new approach to consumer theory. *The Journal of Political Economy*, 74(2), 132–157.
- Lane, B., & Potter, S. (2007). The adoption of cleaner vehicles in the UK: Exploring the consumer attitude-action gap. *Journal of Cleaner Production*, 15, 1085–1092.

- Larceneux, F., Benoit-Moreau, F., & Renaudin, V. (2012). Why might organic labels fail to influence consumer choices? Marginal labelling and brand equity effects. *Journal of Consumer Policy*, 35(1), 85–104.
- Laroche, M., Bergeron, J., & Barbaro-Forleo, G. (2001). Targeting consumers who are willing to pay more for environmentally friendly products. *Journal of Consumer Marketing*, 18(6), 503–520.
- Larson, B. A. (2003). Eco-labels for credence attributes: The case of shade-grown coffee. *Environment and Development Economics*, 8(3), 529–547.
- Laukkanen, T. (2007). Customer preferred channel attributes in multichannel electronic banking. *International Journal of Retail & Distribution Management*, 35(5), 393–412.
- Laukkanen, T., & Pasanen, M. (2008). Mobile banking innovators and early adopters: How they differ from other online users. *Journal of Financial Services Marketing*, 13(2), 86–94.
- Lebeau, K., van Mierlo, J., Lebeau, P., Mairesse, O., & Macharis, C. (2012). The market potential for plug-in hybrid and battery electric vehicles in Flanders: A choice-based conjoint analysis. *Transportation Research Part D: Transport and Environment*, 17(8), 592–597.
- Lehmann, A., Berger, M., & Finkbeiner, M. (2017). Life cycle based CO₂ emission credits: Options for improving the efficiency and effectiveness of current tailpipe emissions regulation in the automotive industry. *Journal of Industrial Ecology*, 22(5), 1066–1079.
- Lenzen, M. (2014). An outlook into a possible future of footprint research. *Journal of Industrial Ecology*, 18(1), 4–6.
- Lewis, A. (2001). A focus group study of the motivation to invest: ‘ethical/green’ and ‘ordinary’ investors compared. *Journal of Socio-Economics*, 30(4), 331–341.
- Lewis, A., & Mackenzie, C. (2000). Morals, money, ethical investing and economic psychology. *Human Relations*, 53(2), 179–191.
- Lieder, M., Asif, F. M. A., Rashid, A., Mihelič, A., & Kotnik, S. (2018). A conjoint analysis of circular economy value propositions for consumers: Using “washing machines in Stockholm” as a case study. *Journal of Cleaner Production*, 172, 264–273.
- Ling, C. Y. (2013). Consumers’ purchase intention of green products: An investigation of the drivers and moderating variable. *Marketing Management*, 57(1), 14503–14509.
- Liobikienė, G., & Bernatoniene, J. (2017). Why determinants of green purchase cannot be treated equally? The case of green cosmetics: Literature review. *Journal of Cleaner Production*, 162, 109–120.

References

- Liobikienė, G., & Juknys, R. (2016). The role of values, environmental risk perception, awareness of consequences, and willingness to assume responsibility for environmentally-friendly behaviour: The Lithuanian case. *Journal of Cleaner Production*, 112, 3413–3422.
- Liobikienė, G., Mandravickaitė, J., & Bernatoniene, J. (2016). Theory of planned behavior approach to understand the green purchasing behavior in the EU: A cross-cultural study. *Ecological Economics*, 125, 38–46.
- Longo, C., Shankar, A., & Nuttall, P. (2019). “It's not easy living a sustainable lifestyle”: How greater knowledge leads to dilemmas, tensions and paralysis. *Journal of Business Ethics*, 50(3), 759–779.
- Loomes, G., & Sugden, R. (1986). Disappointment and dynamic consistency in choice under uncertainty. *The Review of Economic Studies*, 53(2), 271–282.
- Lorek, S., & Fuchs, D. (2013). Strong sustainable consumption governance—precondition for a degrowth path? *Journal of Cleaner Production*, 38, 36–43.
- Lorek, S., & Vergragt, P. J. (2015). Sustainable consumption as a systemic challenge: Inter- and transdisciplinary research and research questions. In L. A. Reisch, & J. Thøgersen (Eds.), *Handbook of research on sustainable consumption* (pp. 19–32). Cheltenham: Edward Elgar.
- Loureiro, M. L., & Lotade, J. (2005). Do fair trade and eco-labels in coffee wake up the consumer conscience? *Ecological Economics*, 53(1), 129–138.
- Louviere, J. J., Hensher, D. A., & Swait, J. D. (2000). *Stated choice methods: Analysis and applications*. Cambridge: Cambridge University Press.
- Lönnqvist, J.-E., Verkasalo, M., Wichardt, P. C., & Walkowitz, G. (2013). Personal values and prosocial behaviour in strategic interactions: Distinguishing value-expressive from value-ambivalent behaviours. *European Journal of Social Psychology*, 43(6), 554–569.
- Luchs, M. G., & Mooradian, T. A. (2012). Sex, personality, and sustainable consumer behaviour: Elucidating the gender effect. *Journal of Consumer Policy*, 35(1), 127–144.
- Mackenzie, C., & Lewis, A. (1999). Morals and markets: The case of ethical investing. *Business Ethics Quarterly*, 9(3), 439–452.
- Mai, L.-W. (2014). Consumers' WTP for ethical attributes. *Marketing Intelligence & Planning*, 32(6), 706–721.
- Mair, S., Druckman, A., & Jackson, T. (2016). Global inequities and emissions in Western European textiles and clothing consumption. *Journal of Cleaner Production*, 132, 57–69.

- Maitre-Ekern, E., & Dalhammar, C. (2016). Regulating planned obsolescence: A review of legal approaches to increase product durability and reparability in Europe. *Review of European, Comparative & International Environmental Law*, 25(3), 378–394.
- Maloney, M. P., Ward, M. P., & Braucht, G. N. (1975). A revised scale for the measurement of ecological attitudes and knowledge. *American Psychologist*, 30(7), 787–790.
- Mazman, S. G., Usluel, Y. K., & Çevik, V. (2009). Social influence in the adoption process and usage of innovation: Gender differences. *International Journal of Behavioral, Cognitive, Educational and Psychological Sciences*, 1(4), 229–232.
- McCarty, J. A., & Shrum, L. J. (1994). The recycling of solid wastes: Personal values, value orientations, and attitudes about recycling as antecedents of recycling behavior. *Journal of Business Research*, 30(1), 53–62.
- McDonald, S., Oates, C., Thyne, M., Alevizou, P., & McMorland, L. A. (2009). Comparing sustainable consumption patterns across product sectors. *International Journal of Consumer Studies*, 33(2), 137–145.
- McEachern, M. G., & McClean, P. (2002). Organic purchasing motivations and attitudes: Are they ethical? *International Journal of Consumer Studies*, 26(2), 85–92.
- McFadden, D. (1974). Conditional logit analysis of qualitative choice behavior. In P. Zarembka (Ed.), *Frontiers in econometrics* (pp. 105–142). New York: Academic Press.
- McLachlan, J., & Gardner, J. (2004). A comparison of socially responsible and conventional investors. *Journal of Business Ethics*, 52(1), 11–25.
- Meffert, H., Burmann, C., Kirchgeorg, M., & Eisenbeiß, M. (2018). *Marketing: Grundlagen marktorientierter Unternehmensführung: Konzepte – Instrumente – Praxisbeispiele* (4th ed.). Wiesbaden: Springer Gabler.
- Metag, J., Füchslin, T., & Schäfer, M. S. (2017). Global warming's five Germanys: A typology of Germans' views on climate change and patterns of media use and information. *Public Understanding of Science*, 26(4), 434–451.
- Metegrano, M. (1987). Proceedings of the Sawtooth Software conference on perceptual mapping, conjoint analysis, and computer interviewing. Ketchum ID: Sawtooth Software.
- Michaelidou, N., & Dibb, S. (2006). Product involvement: An application in clothing. *Journal of Consumer Behaviour: An International Research Review*, 5(5), 442–453.

References

- Michel, A., Attali, S., & Bush, E. (2016). Energy efficiency of white goods in Europe: Monitoring the market with sales data – final report – On behalf of ADEME. <https://www.ademe.fr/sites/default/files/assets/documents/market-monitoring-2016-report.pdf>. Accessed 21 Jun 2019.
- Midi, H., Sarkar, S. K., & Rana, S. (2010). Collinearity diagnostics of binary logistic regression model. *Journal of Interdisciplinary Mathematics*, 13(3), 253–267.
- Miele (2019a). Höchste Miele Qualität für eine lange Lebensdauer. <https://www.miele.de/haushalt/1563.htm?info=200003575-ZPV>. Accessed 7 Jul 2019.
- Miele (2019b). Miele Service - Wir sind für Sie da. <https://www.miele.de/haushalt/service-21.htm>. Accessed 30 Aug 2019.
- Mikulincer, M., & Shaver, P. R. (2010). Prosocial motives, emotions, and behaviour: The better angels of our nature. Washington DC: American Psychological Association.
- Milfont, T. L., Duckitt, J., & Wagner, C. (2010). A cross-cultural test of the value-attitude-behavior hierarchy. *Journal of Applied Social Psychology*, 40(11), 2791–2813.
- Miller, K. M., Hofstetter, R., Krohmer, H., & Zhang, Z. J. (2011). How should consumers' willingness to pay be measured? An empirical comparison of state-of-the-art approaches. *Journal of Marketing Research*, 48(1), 172–184.
- Mirjalili, M., Nazarpour, K., & Karimi, L. (2011). Eco-friendly dyeing of wool using natural dye from weld as co-partner with synthetic dye. *Journal of Cleaner Production*, 19, 1045–1051.
- Mittal, V., Ross Jr., W. T., & Baldasare, P. M. (1998). The asymmetric impact of negative and positive attribute-level performance on overall satisfaction and repurchase intentions. *The Journal of Marketing*, 62(1), 33–47.
- Mohr, L. A., & Webb, D. J. (2005). The effects of corporate social responsibility and price on consumer responses. *Journal of Consumer Affairs*, 39(1), 121–147.
- Molina-Murillo, S. A., & Smith, T. M. (2009). Exploring the use and impact of LCA-based information in corporate communications. *The International Journal of Life Cycle Assessment*, 14(2), 184–194.
- Mondelaers, K., Verbeke, W., & van Huylenbroeck, G. (2009). Importance of health and environment as quality traits in the buying decision of organic products. *British Food Journal*, 111(10), 1120–1139.

- Mont, O., & Plepys, A. (2008). Sustainable consumption progress: Should we be proud or alarmed? *Journal of Cleaner Production*, 16(4), 531–537.
- Montalvo, C., Peck, D., & Rietveld, E. (2016). A longer lifetime for products: Benefits for consumers and companies. [http://www.europarl.europa.eu/RegData/etudes/STUD/2016/579000/IPOL_STU\(2016\)579000_EN.pdf](http://www.europarl.europa.eu/RegData/etudes/STUD/2016/579000/IPOL_STU(2016)579000_EN.pdf). Accessed 5 Jul 2019.
- Montiel, I., & Delgado-Ceballos, J. (2014). Defining and measuring corporate sustainability: Are we there yet? *Organization & Environment*, 27(2), 113–139.
- Moosmayer, D. C. (2012). Negativity bias in consumer price response to ethical information. *Business Ethics: A European Review*, 21(2), 198–208.
- Mora, E., Rocamora, A., & Volonté, P. (2014). On the issue of sustainability in fashion studies. *International Journal of Fashion Studies*, 1(2), 139–147.
- Morrison, D. G. (1969). On the interpretation of discriminant analysis. *Journal of Marketing Research*, 6(2), 156–163.
- Moser, A. K. (2016). Consumers' purchasing decisions regarding environmentally friendly products: An empirical analysis of German consumers. *Journal of Retailing and Consumer Services*, 31, 389–397.
- Moser, A. K. (2015). Thinking green, buying green? Drivers of pro-environmental purchasing behavior. *Journal of Consumer Marketing*, 32(3), 167–175.
- Mugge, R., & Schoormans, J. P. L. (2012). Product design and apparent usability: The influence of novelty in product appearance. *Applied Ergonomics*, 43(6), 1081–1088.
- Muthén, B. O., & Muthén, L. K. (2017). *Mplus: Statistical analysis with latent variables: User's guide* (8th ed.). Los Angeles CA: Muthén and Muthén.
- Nagle T. T., & Holden, R. K. (2002). *The strategy and tactics of pricing*. Upper Saddle River NJ: Prentice Hall.
- Nelson, P. (1970). Information and consumer behavior. *Journal of Political Economy*, 78(2), 311–329.
- Newholm, T., & Shaw, D. (2007). Special issue: Studying the ethical consumer: A review of research. *Journal of Consumer Behaviour*, 6(5), 253–348.
- Nguyen, C. P., Nguyen, N. A., Schinckus, C., & Su, T. D. (2018). The ambivalent role of institutions in the CO₂ emissions: The case of emerging countries. *International Journal of Energy Economics and Policy*, 8(5), 7–17.

References

- Nicholls, A., & Lee, N. (2006). Purchase decision-making in fair trade and the ethical purchase 'gap': 'Is there a fair trade twix?'. *Journal of Strategic Marketing*, 14(4), 369–386.
- Nielsen. (2018). It's clear: Transparency is driving FMCG growth. <https://www.nielsen.com/us/en/insights/article/2018/its-clear-transparency-is-driving-fmcg-growth/>. Accessed 25 Sep 2019.
- Nielsen. (2014). Global consumers are willing to put their money where their heart is when it comes to goods and services from companies committed to social responsibility. <http://www.nielsen.com/ca/en/press-room/2014/globalconsumers-are-willing-to-put-their-money-where-their-heart-is.html>. Accessed 13 Feb 2018.
- Niinimäki, K. (2010). Eco-clothing, consumer identity and ideology. *Sustainable Development*, 18(3), 150–162.
- Niinimäki, K., & Hassi, L. (2011). Emerging design strategies in sustainable production and consumption of textiles and clothing. *Journal of Cleaner Production*, 19, 1876–1883.
- Nilsson, J. (2009). Segmenting socially responsible mutual fund investors. *International Journal of Bank Marketing*, 27(1), 5–31.
- Noblet, C. L., & Teisl, M. F. (2015). Eco-labelling as sustainable consumption policy. In L. A. Reisch, & J. Thøgersen (Eds.), *Handbook of research on sustainable consumption* (pp. 300–312). Cheltenham: Edward Elgar.
- Nocella, G., Boecker, A., Hubbard, L., & Scarpa, R. (2012). Eliciting consumer preferences for certified animal-friendly foods: Can elements of the theory of planned behavior improve choice experiment analysis? *Psychology & Marketing*, 29(11), 850–868.
- Nordlund, A. M., & Garvill, J. (2002). Value structures behind proenvironmental behavior. *Environment and Behavior*, 34(6), 740–756.
- Nunnally, J. C., & Bernstein, I. H. (1994). *Psychometric theory* (3rd ed.). New York, London: McGraw-Hill.
- Nuttavuthisit, K., & Thøgersen, J. (2017). The importance of consumer trust for the emergence of a market for green products: The case of organic food. *Journal of Business Ethics*, 140(2), 323–337.
- Oeko-Institut. (2018). Repair or replace? Extending the life-span of your home appliances – FAQs and helpful hints. https://www.oeko.de/fileadmin/oekodoc/FAQ-Extending-life-span-of-home_apps.pdf. Accessed 18 Jun 2019.

- Oppewal, H., & Vriens, M. (2000). Measuring perceived service quality using integrated conjoint experiments. *International Journal of Bank Marketing*, 18(4), 154–169.
- Orme, B. K. (2013). *Getting started with conjoint analysis: Strategies for product design and pricing research* (3rd ed.). Glendale CA: Research Publishers LLC.
- Orme, B. K. (2002). Formulating attributes and levels in conjoint analysis. <https://www.sawtoothsoftware.com/download/techpap/formatt.pdf>. Accessed 21 Jun 2019.
- Orme, B. K. (2000). Hierarchical Bayes: Why all the attention? <https://www.sawtoothsoftware.com/support/technical-papers/hierarchical-bayes-estimation/hierarchical-bayes-why-all-the-attention-2000>. Accessed 25 Aug 2019.
- Orme, B. K., & Chrzan, K. (2017). *Becoming an expert in conjoint analysis: Choice modeling for pros*. Sawtooth Software.
- O'Rourke, D., & Ringer, A. (2016). The impact of sustainability information on consumer decision making. *Journal of Industrial Ecology*, 20(4), 882–892.
- Öko-Test. (2010). Moral oder Masche? <http://presse.oekotest.de/presse/M1003-AlternativeBanken.pdf>. Accessed 14 Apr 2016.
- Ölander, F., & Thøgersen, J. (2014). Informing versus nudging in environmental policy. *Journal of Consumer Policy*, 37(3), 341–356.
- Padel, S., & Foster, C. (2005). Exploring the gap between attitudes and behaviour: Understanding why consumers buy or do not buy organic food. *British Food Journal*, 107(8), 606–625.
- Pampel, F. C. (2000). *Logistic regression: A primer*. Sage University Paper Series on Quantitative Applications in the Social Science, series no. 07–132. Thousand Oaks CA: Sage.
- Panzone, L., Hilton, D., Sale, L., & Cohen, D. (2016). Socio-demographics, implicit attitudes, explicit attitudes, and sustainable consumption in supermarket shopping. *Journal of Economic Psychology*, 55, 77–95.
- Park, M. (2010). Defying obsolescence. In T. Cooper (Ed.), *Longer lasting products: Alternatives to the throwaway society* (pp. 3–38). Surrey, Burlington NJ: Gower.
- Parker, J. R., & Schrift, R. Y. (2011). Rejectable choice sets: How seemingly irrelevant no-choice options affect consumer decision processes. *Journal of Marketing Research*, 48(5), 840–854.
- Pasewark, W. R., & Riley, M. E. (2010). It's a matter of principle: The role of personal values in investment decisions. *Journal of Business Ethics*, 93(2), 237–253.

References

- Paul, J., Modi, A., & Patel, J. (2016). Predicting green product consumption using theory of planned behavior and reasoned action. *Journal of Retailing and Consumer Services*, 29, 123–134.
- Paulet, E., Parnaudeau, M., & Relano, F. (2015). Banking with ethics: Strategic moves and structural changes of the banking industry in the aftermath of the subprime mortgage crisis. *Journal of Business Ethics*, 131(1), 199–207.
- Paulhus, D. L. (2002). Socially desirable responding: The evolution of a construct. In H. I. Braun, D. N. Jackson, & D. E. Wiley (Eds.), *The role of constructs in psychological and educational measurement* (pp. 51–73). Mahwah NJ: Erlbaum.
- Peattie, K. (2010). Green consumption: Behavior and norms. *Annual Review of Environment and Resources*, 35, 195–228.
- Pepper, M., Jackson, T., & Uzzell, D. (2009). An examination of the values that motivate socially conscious and frugal consumer behaviours. *International Journal of Consumer Studies*, 33(2), 126–136.
- Petrescu, M. (2013). Marketing research using single-item indicators in structural equation models. *Journal of Marketing Analytics*, 1(2), 99–117.
- Phipps, M., Ozanne, L. K., Luchs, M. G., Subrahmanyam, S., Kapitan, S., Catlin, J. R., Gau, R., Walker Naylor, R., Rose, R. L., Simpson, B., & Weaver, T. (2013). Understanding the inherent complexity of sustainable consumption: A social cognitive framework. *Journal of Business Research*, 66(8), 1227–1234.
- Piscicelli, L., Cooper, T., & Fisher, T. (2015). The role of values in collaborative consumption: Insights from a product-service system for lending and borrowing in the UK. *Journal of Cleaner Production*, 97, 21–29.
- Podsakoff, P. M., MacKenzie, S. B., Lee, J.-Y., & Podsakoff, N. P. (2003). Common method biases in behavioral research: A critical review of the literature and recommended remedies. *Journal of Applied Psychology*, 88(5), 879–903.
- Podsakoff, P. M., MacKenzie, S. B., & Podsakoff, N. P. (2012). Sources of method bias in social science research and recommendations on how to control it. *Annual Review of Psychology*, 63(1), 539–569.
- Porter, M. E., & Kramer, M. R. (2011). The big idea: Creating shared value, rethinking capitalism. *Harvard Business Review*, 89(1/2), 62–77.

- Porter, M. E., & Kramer, M. R. (2006). The link between competitive advantage and corporate social responsibility. *Harvard Business Review*, 84(12), 78–92.
- Prakash, S., Stamminger, R., Dehoust, G., Gsell, M., Schleicher, T., Gensch, C.-O., Graulich, K., Antony, F., Köhler, A., & Hilbert, I. (2018). Einfluss der Nutzungsdauer von Produkten auf ihre Umweltwirkung: Schaffung einer Informationsgrundlage und Entwicklung von Strategien gegen „Obsoleszenz“ – Verbraucherbefragung – On behalf of the Federal Ministry for Environment, Nature Conservation, Construction and Nuclear Safety (3713 32 315). https://www.umweltbundesamt.de/sites/default/files/medien/1410/publikationen/texte_11_2016_anlage_verbraucherbefragung.pdf. Accessed 18 Jun 2019.
- Prakash, S., Stamminger, R., Dehoust, G., Gsell, M., Schleicher, T., Gensch, C.-O., Graulich, K., Antony, F., Köhler, A., & Hilbert, I. (2016). Einfluss der Nutzungsdauer von Produkten auf ihre Umweltwirkung: Schaffung einer Informationsgrundlage und Entwicklung von Strategien gegen „Obsoleszenz“ – On behalf of the Federal Ministry for Environment, Nature Conservation, Construction and Nuclear Safety (3713 32 315). https://www.umweltbundesamt.de/sites/default/files/medien/378/publikationen/texte_11_2016_einfluss_der_nutzungsdauer_von_produkten_obsoleszenz.pdf. Accessed 18 Jun 2019.
- Preacher, K. J., Zhang, Z., & Zyphur, M. J. (2016). Multilevel structural equation models for assessing moderation within and across levels of analysis. *Psychological Methods*, 21(2), 189–205.
- Proske, M., & Jaeger-Erben, M. (2019). Decreasing obsolescence with modular smartphones?—An interdisciplinary perspective on lifecycles. *Journal of Cleaner Production*, 223, 57–66.
- Prothero, A., Dobscha, S., Freund, J., Kilbourne, W. E., Luchs, M. G., Ozanne, L. K., & Thøgersen, J. (2011). Sustainable consumption: Opportunities for consumer research and public policy. *Journal of Public Policy & Marketing*, 30(1), 31–38.
- Rao, V. R. (2014). *Applied conjoint analysis*. New York: Springer.
- R Core Team. (2018). *R: A language and environment for statistical computing*. Vienna: R Foundation for Statistical Computing. <https://www.R-project.org/>.
- R Core Team. (2016). *R: A language and environment for statistical computing*. Vienna: R Foundation for Statistical Computing. <https://www.R-project.org/>.
- Reimers, V., Magnuson, B., & Chao, F. (2016). The academic conceptualisation of ethical clothing: Could it account for the attitude behaviour gap? *Journal of Fashion Marketing and Management*, 20(4), 383–399.

References

- Reisch, L. A., & Thøgersen, J. (2015). *Handbook of research on sustainable consumption*. Cheltenham, Northampton MA: Edward Elgar Publishing.
- Roberts, J. A. (1996). Green consumers in the 1990s: Profile and implications for advertising. *Journal of Business Research*, 36(3), 217–231.
- Robinson, R., & Smith, C. (2002). Psychosocial and demographic variables associated with consumer intention to purchase sustainably produced foods as defined by the Midwest Food Alliance. *Journal of Nutrition Education and Behavior*, 34(6), 316–325.
- Rockström, J., Steffen, W., Noone, K., Persson, Å., Chapin III, F. S., Lambin, E. F., Lenton, T. M., Scheffer, M., Folke, C., Schellnhuber, H. J., Nykvist, B., de Wit, C. A., Hughes, T., van der Leeuw, S., Rodhe, H., Sörlin, S., Snyder, P. K., Costanza, R., Svedin, U., Falkenmark, M., Karlberg, L., Corell, R. W., Fabry, V. J., Hansen, J., Walker, B., Liverman, D., Richardson, K., Crutzen, P., & Foley, J. A. (2009). A safe operating space for humanity. *Nature*, 461, 472–475.
- Rogers, E. M. (1962). *Diffusion of innovations*. New York: Free Press.
- Rokeach, M. (1973). *The nature of human values*. New York: The Free Press.
- Rosen, B. N., Sandler, D. M., & Shani, D. (1991). Social issues and socially responsible investment behavior: A preliminary empirical investigation. *Journal of Consumer Affairs*, 25(2), 221–234.
- Rosseel, Y. (2012). Lavaan: An R package for structural equation modeling. *Journal of Statistical Software*, 48(2), 1–36.
- Rossi, P. E., & Allenby, G. M. (2003). Bayesian statistics and marketing. *Marketing Science*, 22(3), 304–328.
- Rozin, P., & Royzman, E. B. (2001). Negativity bias, negativity dominance, and contagion. *Personality and Social Psychology Review*, 5(4), 296–320.
- Salzborn, S, Davidov, E., & Reinecke, J. (2012). *Methods, theories, and empirical applications in the social sciences: Festschrift for Peter Schmidt*. Wiesbaden: VS Verlag für Sozialwissenschaften | Springer Fachmedien.
- Sammer, K., & Wüstenhagen, R. (2006). The influence of eco-labelling on consumer behaviour –Results of a discrete choice analysis for washing machines. *Business Strategy and the Environment*, 15(3), 185–199.
- Sandberg, J., Juravle, C., Hedesström, T. M., & Hamilton, I. (2009). The heterogeneity of socially responsible investment. *Journal of Business Ethics*, 87(4), 519–533.

- San-Jose, L., Retolaza, J. L., & Gutierrez-Goiria, J. (2011). Are ethical banks different? A comparative analysis using the radical affinity index. *Journal of Business Ethics*, 100(1), 151–173.
- Satorra, A., & Bentler, P. M. (2001). A scaled difference chi-square test statistic for moment structure analysis. *Psychometrika*, 66(4), 507–514.
- Saunders, C. L., Landis, A. E., Mecca, L. P., Jones, A. K., Schaefer, L. A., & Bilec, M. M. (2013). Analyzing the practice of life cycle assessment. *Journal of Industrial Ecology*, 16(2), 777–789.
- Sawtooth Software. (2019). Lighthouse studio manual. <https://www.sawtoothsoftware.com/help/lighthouse-studio/manual/>. Accessed 19 Jun 2019.
- Sawtooth Software. (2017). The CBC system for choice-based conjoint analysis. <https://www.sawtoothsoftware.com/download/techpap/cbctech.pdf>. Accessed 16 Jun 2019.
- Sawtooth Software. (2007). The ACA/Web v6.0 technical paper: Technical paper series. <http://www.sawtoothsoftware.com/support/technical-papers/aca-related-papers/aca-technical-paper-2007>. Accessed 20 Feb 2016.
- Scaturro, S. (2008). Eco-tech fashion: Rationalizing technology in sustainable fashion. *Fashion Theory*, 12(4), 469–488.
- Schaltegger, S., Lüdeke-Freund, F., & Hansen, E. G. (2012). Business cases for sustainability: The role of business model innovation for corporate sustainability. *International Journal of Innovation and Sustainable Development*, 6(2), 95–119.
- Scherer, C., Emberger-Klein, A., & Menrad, K. (2018). Consumer preferences for outdoor sporting equipment made of bio-based plastics: Results of a choice-based-conjoint experiment in Germany. *Journal of Cleaner Production*, 203, 1085–1094.
- Schmidt, P., Bamberg, S., Davidov, E., Herrmann, J., & Schwartz, S. H. (2007). Die Messung von Werten mit dem “Portraits Value Questionnaire”. *Zeitschrift für Sozialpsychologie*, 38(4), 261–275.
- Schueth, S. (2003). Socially responsible investing in the United States. *Journal of Business Ethics*, 43(3), 189–194.
- Schuhwerk, M. E., & Lefkoff-Hagius, R. (1995). Green or non-green? Does type of appeal matter when advertising a green product? *Journal of Advertising*, 24(2), 45–54.
- Schultz, P. W. (2001). The structure of environmental concern: Concern for self, other people, and the biosphere. *Journal of Environmental Psychology*, 21(4), 327–339.

References

- Schwartz, S. H. (2010). Basic values: How they motivate and inhibit prosocial behavior. In M. Mikulincer, & P. R. Shaver (Eds.), *Prosocial motives, emotions, and behaviour: The better angels of our nature* (pp. 221–241). Washington DC: American Psychological Association.
- Schwartz, S. H. (1994). Are there universal aspects in the structure and contents of human values? *Journal of Social Issues*, 50(4), 19–45.
- Schwartz, S. H. (1992). Universals in the content and structure of values: Theoretical advances and empirical tests in 20 countries. In M. P. Zanna (Ed.), *Advances in experimental social psychology*, vol. 25 (pp. 1–65). San Diego CA, London: Academic Press.
- Schwartz, S. H., Cieciuch, J., Vecchione, M., Davidov, E., Fischer, R., Beierlein, C., Ramos, A., Verkasalo, M., Lönnqvist, J.-E., Demirutku, K., Dirilen-Gumus, O., & Konty, M. (2012). Refining the theory of basic individual values. *Journal of Personality and Social Psychology*, 103(4), 663–688.
- Schwartz, S. H., Melech, G., Lehmann, A., Burgess, S., Harris, M., & Owens, V. (2001). Extending the cross-cultural validity of the theory of basic human values with a different method of measurement. *Journal of Cross-Cultural Psychology*, 32(5), 519–542.
- Scott, A. (2002). Identifying and analysing dominant preferences in discrete choice experiments: An application in health care. *Journal of Economic Psychology*, 23(3), 383–398.
- Seyfang, G. (2011). *The new economics of sustainable consumption: Seeds of change*. Basingstoke: Palgrave Macmillan.
- Sharma, P., Sivakumaran, B., & Marshall, R. (2010). Exploring impulse buying and variety seeking by retail shoppers: Towards a common conceptual framework. *Journal of Marketing Management*, 26(5–6), 473–494.
- Shaw, D., Grehan, E., Shiu, E., Hassan, L., & Thomson, J. (2005). An exploration of values in ethical consumer decision making. *Journal of Consumer Behaviour: An International Research Review*, 4(3), 185–200.
- Shaw, D., Hogg, G., Wilson, E., Shiu, E., & Hassan, L. (2006). Fashion victim: The impact of fair trade concerns on clothing choice. *Journal of Strategic Marketing*, 14(4), 427–440.
- Shaw, D., McMaster, R., & Newholm, T. (2016). Care and commitment in ethical consumption: An exploration of the ‘attitude-behaviour gap’. *Journal of Business Ethics*, 136(2), 251–265.
- Shaw, D., & Newholm, T. (2002). Voluntary simplicity and the ethics of consumption. *Psychology & Marketing*, 19(2), 167–86.

- Shaw, D., & Tomolillo, D. A. C. (2004). Undressing the ethical issues in fashion: A consumer perspective. In M. Bruce, C. M. Moore, & G. Birtwistle (Eds.), *International retail marketing: A case study approach* (pp. 141–154). Oxford, Burlington MA: Elsevier Butterworth-Heinemann.
- Sheppard, B. H., Hartwick, J., & Warshaw, P. R. (1988). The theory of reasoned action: A meta-analysis of past research with recommendations for modifications and future research. *Journal of Consumer Research*, 15(3), 325–343.
- Shevlin, M., & Miles, J. N. (1998). Effects of sample size, model specification and factor loadings on the GFI in confirmatory factor analysis. *Personality and Individual Differences*, 25(1), 85–90.
- Shin, J., Kang, S., Lee, D., & Hong, B. I. I. (2018). Analysing the failure factors of eco-friendly home appliances based on a user-centered approach. *Business Strategy and the Environment*, 27(8), 1399–1408.
- Shrivastava, P., & Hart, S. (1995). Creating sustainable corporations. *Business Strategy and the Environment*, 4(3), 154–165.
- Siegle, L. (2017). The eco guide to fast fashion. <https://www.theguardian.com/environment/2017/apr/23/the-eco-guide-to-fast-fashion>. Accessed 3 Jan 2018.
- Siegrist, M., & Cvetkovich, G. (2001). Better negative than positive? Evidence of a bias for negative information about possible health dangers. *Risk Analysis*, 21(1), 199–206.
- Sircome, University of South Brittany, University of South Bohemia. (2016). ILLC study: The Influence of lifespan labelling on consumers – On behalf of the European Economic and Social Committee (CES/CSS/1/2015). https://www.eesc.europa.eu/resources/docs/16_123_duree-dutilisation-des-produits_complet_en.pdf. Accessed 5 July 2019.
- Skowronski, J. J., & Carlston, D. E. (1989). Negativity and extremity biases in impression formation: A review of explanations. *Psychological Bulletin*, 105(1), 131–142.
- Snijders, T. A. B., & Bosker, R. J. (2012). *Multilevel analysis: An introduction to basic and advanced multilevel modeling* (2nd ed.). Los Angeles CA: Sage.
- Sonnenberg, N. C., Erasmus, A. C., & Schreuder, A. (2014). Consumers' preferences for eco-friendly appliances in an emerging market context. *International Journal of Consumer Studies*, 38(5), 559–569.
- Spence, M., & Hamzaoui-Essoussi, L. (2010). SME brand building and management: An exploratory study. *European Journal of Marketing*, 44(7/8), 1037–1054.

References

- Spiller, S. A., Fitzsimons, G. J., Lynch Jr., J. G., & McClelland, G. H. (2013). Spotlights, floodlights, and the magic number zero: Simple effects tests in moderated regression. *Journal of Marketing Research*, 50(2), 277–288.
- Splendid Research. (2016). Slow fashion monitor 2016. <https://www.splendidresearch.com/de/slowfashion.html>. Accessed 20 Jul 2018.
- Sreejesh, S., Mohaparta, S., & Anusree, M. R. (2014). *Business research methods – An applied orientation*. Cham: Springer.
- Stamminger, R., Tecchio, P., Ardente, F., Mathieux, F., & Niestrath, P. (2018). Towards a durability test for washing-machines. *Resources, Conservation and Recycling*, 131, 206–215.
- Starr, M. A. (2009). The social economics of ethical consumption: Theoretical considerations and empirical evidence. *The Journal of Socio-Economics*, 38(6), 916–925.
- Statistisches Bundesamt. (2019). Statistisches Jahrbuch 2019. https://www.destatis.de/DE/Themen/Querschnitt/Jahrbuch/statistisches-jahrbuch-2019-dl.pdf?__blob=publicationFile. Accessed 19 Nov 2019.
- Statistisches Bundesamt. (2018). Statistisches Jahrbuch 2018. https://www.destatis.de/GPStatistik/servlets/MCRFileNodeServlet/DEAusgabe_derivate_00001636/StatistischesJahrbuch2018.pdf. Accessed 19 Nov 2019.
- Statistisches Bundesamt. (2017). Statistisches Jahrbuch 2017. https://www.destatis.de/GPStatistik/servlets/MCRFileNodeServlet/DEAusgabe_derivate_00001629/StatistischesJahrbuch2017.pdf. Accessed 19 Nov 2019.
- Statistisches Bundesamt. (2011). Statistisches Jahrbuch 2011. https://www.destatis.de/GPStatistik/servlets/MCRFileNodeServlet/DEAusgabe_derivate_00000135/1010110117004.pdf. Accessed 7 Jul 2015.
- Steenkamp, J. B. E., & Baumgartner, H. (1995). Development and cross-cultural validation of a short form of CSI as a measure of optimum stimulation level. *International Journal of Research in Marketing*, 12(2), 97–104.
- Steffen, W., Richardson, K., Rockström, J., Cornell, S. E., Fetzer, I., Bennett, E. M., Biggs, R., Carpenter, S. R., de Vries, W., de Wit, C. A., Folke, C., Gerten, D., Heinke, J., Mace, G. M., Persson, L. M., Ramanathan, V., Reyers, B., & Sörlin, S. (2015). Planetary boundaries: Guiding human development on a changing planet. *Science*, 347(6223), 1259855.
- Steg, L. (2013). *Environmental psychology: An Introduction*. Chichester: BPS Blackwell.

- Steg, L., Bolderdijk, J. W., Keizer, K., & Perlaviciute, G. (2014a). An integrated framework for encouraging pro-environmental behaviour: The role of values, situational factors and goals. *Journal of Environmental Psychology, 38*, 104–115.
- Steg, L., Perlaviciute, G., & van der Werff, E., & Lurvink, J. (2014b). The significance of hedonic values for environmentally relevant attitudes, preferences, and actions. *Environment and Behaviour, 46*(2), 163–192.
- Steg, L., & Vlek, C. (2009). Encouraging pro-environmental behaviour: An integrative review and research agenda. *Journal of Environmental Psychology, 29*(3), 309–317.
- Stern, P. C. (2000). Toward a coherent theory of environmentally significant behavior. *Journal of Social Issues, 56*(3), 407–424.
- Stern, P. C., Dietz, T., & Kalof, L. (1993). Value orientations, gender, and environmental concern. *Environment and Behaviour, 25*(5), 322–348.
- Stiftung Warentest. (2018). Waschmaschinen im Test. https://www.test.de/Waschmaschinen-im-Test-4296800-4296807/?mc=sea.dl.waschmaschinen-im-test&gclid=EAlaIqobChMI0oH37Kui4wIVQsrTCh2ftWdtEAAAYASAAEgIXc_D_BwE. Accessed 7 Jul 2019.
- Straughan, R. D., & Roberts, J. A. (1999). Environmental segmentation alternatives: A look at green consumer behavior in the new millennium. *Journal of Consumer Marketing, 16*(6), 558–575.
- The Manual. (2017). Buy it once, have it forever: The big list of brands with lifetime warranties. <https://www.themanual.com/culture/brands-with-lifetimewarranties/>. Accessed 21 Jul 2018.
- Thøgersen, J., Haugaard, P., & Olesen, A. (2010). Consumer responses to ecolabels. *European Journal of Marketing, 44*(11/12), 1787–1810.
- Thøgersen, J., & Ölander, F. (2002). Human values and the emergence of a sustainable consumption pattern: A panel study. *Journal of Economic Psychology, 23*(5), 605–630.
- Thomas, S. (2008). From “green blur” to ecofashion: Fashioning an eco-lexicon. *Fashion Theory, 12*(4), 525–539.
- Thompson, D. W., Anderson, R. C., Hansen, E. N., & Kahle, L. R. (2010). Green segmentation and environmental certification: Insights from forest products. *Business Strategy and the Environment, 19*(5), 319–334.
- Thompson, P., & Cowton, C. J. (2004). Bringing the environment into bank lending: Implications for environmental reporting. *The British Accounting Review, 36*(2), 197–218.

References

- Tippet, J., & Leung, P. (2001). Defining ethical investment and its demography in Australia. *Australian Accounting Review*, 11(25), 44–55.
- Torgler, B., & Garcia-Valiñas, M. A. (2007). The determinants of individuals' attitudes towards preventing environmental damage. *Ecological Economics*, 63(2–3), 536–552.
- Tukker, A., Emmert, S., Charter, M., Vezzoli, C., Sto, E., Andersen, M. M., Geerken, T., Tischner, U., & Lahlou, S. (2008). Fostering change to sustainable consumption and production: An evidence based view. *Journal of Cleaner Production*, 16(11), 1218–1225.
- Tukker, A., Cohen, M. J., Hubacek, K., & Mont, O. (2010). The impacts of household consumption and options for change. *Journal of Industrial Ecology*, 14(1), 13–30.
- Tversky, A., & Kahneman, D. (1991). Loss aversion in riskless choice: A reference-dependent model. *The Quarterly Journal of Economics*, 106(4), 1039–1061.
- United Nations. (2015). Resolution adopted by the general assembly on 25 September 2015: Transforming our world: The 2030 agenda for sustainable development. https://www.unfpa.org/sites/default/files/resource-pdf/Resolution_A_RES_70_1_EN.pdf. Accessed 25 Sep 2019.
- Urien, B., & Kilbourne, W. (2011). Generativity and self-enhancement values in eco-friendly behavioral intentions and environmentally responsible consumption behavior. *Psychology & Marketing*, 28(1), 69–90.
- Utopia. (2018). Die besten Modelabels für faire Kleidung, faire Mode. <https://utopia.de/bestenlisten/modelabelsefaireemode/>. Accessed 4 Feb 2018.
- Vanclay, J. K., Shortiss, J., Aulsebrook, S., Gillespie, A. M., Howell, B. C., Johanni, R., Maher, M. J., Mitchell, K. M., Stewart M. D., & Yates, J. (2011). Customer response to carbon labelling of groceries. *Journal of Consumer Policy*, 34(1), 153–160.
- Van Dam, Y. K., & De Jonge, J. (2015). The positive side of negative labelling. *Journal of Consumer Policy*, 38(1), 19–38.
- Vandekerckhove, W., Leys, J., Alm, K., Scholtens, B., Signori, S., & Schäfer, H. (2011). *Responsible investment in times of turmoil*. Dordrecht, Heidelberg, London, New York: Springer.
- Van der Velden, N. M., & Vogtländer, J. G. (2017). Monetisation of external socioeconomic costs of industrial production: A social-LCA-based case of clothing production. *Journal of Cleaner Production*, 153, 320–330.

- Van Lange, P. A. M., Kruglanski, A. W. & Higgins, E. T. (2012). Handbook of theories of social psychology: Volume 1. London, Thousand Oak CA, New Delhi, Singapore: SAGE Publications.
- Van Nes, N., & Cramer, J. (2005). Influencing product lifetime through product design. *Business Strategy and the Environment*, 14(5), 286–299.
- Veleva, V., & Ellenbecker, M. (2001). Indicators of sustainable production: Framework and methodology. *Journal of Cleaner Production*, 9(6), 519–549.
- Vergragt, P., Akenji, L., & Dewick, P. (2014). Sustainable production, consumption, and livelihoods: Global and regional research perspectives. *Journal of Cleaner Production*, 63, 1–12.
- Vermeir, I., & Verbeke, W. (2008). Sustainable food consumption among young adults in Belgium: Theory of planned behaviour and the role of confidence and values. *Ecological Economics*, 64(3), 542–553.
- Vermeir, I., & Verbeke, W. (2006). Sustainable food consumption: Exploring the consumer “attitude - behavioral intention” gap. *Journal of Agricultural and Environmental Ethics*, 19(2), 169–194.
- Von Weizsäcker, E., Hargroves, K., Smith, M., Desha, C., & Stasinopoulos, P. (2009). Factor five: Transforming the global economy through 80% increase in resource productivity. London: Earthscan.
- Von Weizsäcker, E., Lovins, A. B., Day, R., & Lovins, L. H. (1997). Factor four: Doubling wealth, halving resource use. London: Earthscan.
- Waheeduzzaman, A. N. M. (2008). Market potential estimation in international markets: A comparison of methods. *Journal of Global Marketing*, 12(4), 307–320.
- World Commission on Environment and Development. (1987). Report of the world commission on environment and development: Our common future. http://netzwerk-n.org/wp-content/uploads/2017/04/0_Brundtland_Report-1987-Our_Common_Future.pdf. Accessed 25 Sep 2019.
- Weber, O. (2014a). The financial sector’s impact on sustainable development. *Journal of Sustainable Finance & Investment*, 4(1), 1–8.
- Weber, O. (2014b). Social banking: Concept, definitions and practice. *Global Social Policy*, 14(2), 265–281.
- Weber, O. (2013). Social banks and their profitability: Is social banking in line with business success? *Prospective Innovation at Ethical Banking and Finance*, 1(1), 1–19.

References

- Weber, O. (2011). Products and services. In O. Weber, & S. Remer (Eds.), *Social banks and the future of sustainable finance* (pp. 96–122). London: Routledge.
- Weber, O., Diaz, M., & Schwegler, R. (2014). Corporate social responsibility of the financial sector – Strengths, weaknesses and the impact on sustainable development. *Sustainable Development*, 22(5), 321–335.
- Weber, O., Mansfeld, M., & Schirrmann, E. (2011). The financial performance of RI funds after 2000. In W. Vandekerckhove, J. Leys, K. Alm, B. Scholtens, S. Signori, & H. Schäfer (Eds.), *Responsible investment in times of turmoil* (pp. 75–91). Dordrecht, Heidelberg, London, New York: Springer.
- Weber, O., & Remer, S. (2011). *Social banks and the future of sustainable finance*. London: Routledge.
- Wedel, M., & Kamakura, W. A. (2000). *Market segmentation: Conceptual and methodological foundations* (2nd ed.). New York: Springer.
- White, K., Habib, R., & Hardisty, D. J. (2019). How to SHIFT consumer behaviors to be more sustainable: A literature review and guiding framework. *Journal of Marketing*, 83(3), 22–49.
- Whiteman, G., Walker, B., & Perego, P. (2012). Planetary boundaries: Ecological foundations for corporate sustainability. *Journal of Management Studies*, 50(2), 307–336.
- Wiek, A., & Weber, O. (2014). Sustainability challenges and the ambivalent role of the financial sector. *Journal of Sustainable Finance & Investment*, 4(1), 9–20.
- Wiel, S., & McMahon, J. E. (2005). *Energy-efficiency labels and standards: A guidebook for appliances, equipment and lighting* (2nd ed.). Washington DC: Collaborative Labeling and Appliance Standards Program (CLASP).
- Wilhelm, W. B. (2012). Encouraging sustainable consumption through product lifetime extension: The case of mobile phones. *International Journal of Business and Social Science*, 3(3), 17–32.
- Wittink, D. R., Krishnamurthi, L., & Nutter, J. B. (1982). Comparing derived importance weights across attributes. *Journal of Consumer Research*, 8(4), 471–474.
- Wittink, D. R., Krishnamurthi, L., & Reibstein, D. J. (1989). The effect of differences in the number of attribute levels on conjoint results. *Marketing Letters*, 1(2), 113–123.
- World Bank. (2017). CO2 emissions per capita. <https://www.economicshelp.org/wp-content/uploads/2014/03/co2-emissions-per-capita.png>. Accessed 25 Sep 2019.

- Wu, M. W., & Shen, C. H. (2013). Corporate social responsibility in the banking industry: Motives and financial performance. *Journal of Banking & Finance*, 37(9), 3529–3547.
- Yadav, R., & Pathak, G. S. (2017). Determinants of consumers' green purchase behavior in a developing nation: Applying and extending the theory of planned behavior. *Ecological Economics*, 134, 114–122.
- Yiu, C. S., Grant, K., & Edgar, D. (2007). Factors affecting the adoption of internet banking in Hong Kong – Implications for the banking sector. *International Journal of Information Management*, 27(5), 336–351.
- Young, W., Hwang, K., McDonald, S., & Oates, C. J. (2010). Sustainable consumption: Green consumer behaviour when purchasing products. *Sustainable Development*, 18(1), 20–31.
- Zander, K., & Hamm, U. (2010). Consumer preferences for additional ethical attributes of organic food. *Food Quality and Preference*, 21(5), 495–503.
- Zanna, M. P. (1992). *Advances in experimental social psychology*, vol. 25. San Diego CA, London: Academic Press.
- Zarembka, P. (1974). *Frontiers in econometrics*. New York: Academic Press.
- Zou, L. W., & Chan, R. Y. K. (2019). Why and when do consumers perform green behaviors? An examination of regulatory focus and ethical ideology. *Journal of Business Research*, 94, 113–127.
- Zuur, A. F., Ieno, E. N., & Elphick, C. S. (2010). A protocol for data exploration to avoid common statistical problems. *Methods in Ecology and Evolution*, 1(1), 3–14.