On the Mobility Budget for Company Car Users in Flanders

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Supervisors: Prof. dr. Ann Verhetsel
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Proefschrift voorgedragen tot het behalen van
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OVER HET MOBILITEITSBUDGET VOOR BEDRIJFSWAGENRIJDERS IN VLAANDEREN

Proefschrift

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PREFACE

At the time I was writing my Master thesis in 2008, I discovered I was inspired by the academic world and wanted more. I decided to become a researcher. With my supervisors from the Technical University of Eindhoven I applied for research funding. The plan failed as the funds I was hoping for were assigned to others and a back-up plan was missing. The vacancy I found four years later at the transport department of the University of Antwerp meant a second chance. I applied with success; now I could finally become a PhD-student and prepare a doctoral thesis.

The subject of my thesis was not readily provided. In return for the funds offered by the Flemish government I needed to conduct multiple research projects and write reports on these projects. For many months I did not know what my thesis should be about. Not because interesting topics were missing; on the contrary, there was too much too choose from. At the end of my first year in Antwerp I was considering a thesis on intermodal travel opportunities, with case studies on bike-and-ride, park-and-ride and the mobility budget. In 2014 I finally decided to write a thesis solely about the mobility budget, a decision prompted by the work I did for the Flemish government on this topic.

This thesis is a doctoral thesis in order to obtain a PhD-degree in the field of applied economics. PhD is the abbreviation for *philosophiae doctor*: a philosophical professional. To me, this implies that one should be able to transcend the traditional borders of a discipline, to search for xenogeny, and to be able to reflect on the theories, methods and outcomes. With this thesis, I demonstrate that I am able to do so.

Along the way I encountered multiple setbacks. Commuting to Antwerp was harder than I anticipated, partly because my expectations and those of others turned out to be false: the high-speed train service from Breda to Antwerp is still not in operation and the northern entrance to the station in Tilburg did not open in 2014. Hence, the expected travel time reduction did not manifest, which implied a 30-minute difference on a one-way trip. The long distance commute did inspire me to look into the issue of long distance commuting and resulted in an interesting project. The burglary at our house in Tilburg in October 2014 was a major shock with practical consequences: I lost my notes on my research projects and thesis, as my notebook was stolen and my laptop was damaged. Finding candidates for my survey was another setback. I spent weeks calling and emailing potentially interested employers. Additionally, by the time I finished an important part of my thesis; other researchers from the Federal Planning Bureau published a very similar study, based on the same data and, luckily, with similar results. I encountered multiple computational issues related to software updates,

computational power and writing the correct codes. Although some of these setbacks are or were serious issues, I cannot image any long-term research project without some kind of setback.

The dominant feeling when thinking of my time in Antwerp as a PhD-candidate is definitely positive. I met inspiring people and encountered new theories and concepts. I discovered and learned research techniques that were previously unknown to me. The library of the university was and still is a beautiful source of knowledge. I was offered sufficient time to explore, try, fail and succeed. I had the opportunity to present my results for an international public and extend my academic network. At the university I met new challenges and I conquered old barriers, doubts and fears. In short, I strengthened my academic skills and I discovered an interesting world.

I am grateful to all those who helped me along the way. First, I would like to mention my wife, family, and friends; their support was essential for my motivation and without them I would not be where I am today. Next, many of my well-respected colleagues helped me with discussions, suggestions or practical assistance, such as making maps or the design of the choice experiment. I am especially grateful to the colleagues from statistics, the supercomputer centre and my direct colleagues at the department of Transport and Regional Economics. Thanks to the organisers and participants of all the conferences, events and courses I attended; the tips and comments I received were often very helpful. I am very glad with the participation of multiple employers and many employees to my survey. Furthermore, I requested the help of multiple proof-readers for drafts, papers and the final manuscript. Their assistance certainly helped to improve the quality of writing and the consistency in this thesis. All members of the doctoral commission provided useful suggestions for further improvements of the manuscript. Due to these suggestions, the final version of this thesis is also the best version. Most of all, I am indebted to my supervisors. The discussions, assistance and corrections they offered have been essential to this dissertation. Although I found it difficult to receive criticism on the material I have been working on for so many hours, I understand now that their comments have indeed improved the quality of the research project, as they often served as a wake-up call. Moreover, it has made me an academic.

Love to my wife and son. I dedicate this thesis to them.

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ABBREVIATIONS

Adj.	Adjusted
Appx.	Appendix
BBL	Bond Beter Leefmilieu
Cat.	Category
CC	Company car, see for definition Chapter One
CF	Car-First, one of the choice models in Ch. Six
Ch.	Chapter
CI	Confidence interval, by default 95 % interval
Coef.	Coefficient
DCE	Discrete choice experiment
Eq.	Equation
Est.	Estimated or estimate
FBP	Flexible benefit plan
Fig.	Figure
GDP	Gross domestic product
GLM	Generalised linear model
HB	Hierarchical Bayes
IEA	International Energy Agency
km	Kilometre(s)
LC	Latent Class
MB	Mobility budget
MCMC	Markov Chain Monte Carlo

mi	million
MMNL	Mixed multinomial logit
MNL	Multinomial logit
MP	Member of parliament
MSL	Maximum Simulated Likelihood
n	number of observations
NA	not available or not applicable, depends on context
Obs.	Observations
OECD	Organisation for Economic Co-operation and Development
PA	Principal-Agent
pp	percentage points
PT	Public Transport
QR	Quantile regression
Ref.	Reference
RLH	Root-likelihood
RSZ	National social security office in Belgium
s.d.	Standard Deviation
s.e.	Standard Error; for Markov chains this is the time-series corrected s.e.
SME	Small and medium sized entreprises

SUMMARY

The concept of the mobility budget (MB) has gained much positive attention in Flanders in less than a decade. Many actors embrace the concept as a solution to the dominance of the company car and the problems associated with it; in particular, the MB is framed as a solution to the 'congestion evil' in Belgium. The claims made by the proponents of the concept are based on hopes and a few anecdotal policy shifts from companies in Belgium and the Netherlands – a thorough academic assessment of the concept is missing. Therefore, this thesis assesses the potential of the MB with respect to its transport related promises and offers a general reflection on the concept.

I use a stepwise assessment to scrutinise the MB. Firstly, I offer an in-depth analysis of the debate in Flanders to understand how the concept was able to generate enthusiasm among key players and which features are most likely institutionalised. Secondly, I examine the voluntary implementation of the MB by employers in Belgium. Thirdly, I look into expected participation rates by employees with a CC. Lastly, I study the choices made by current CC owners within the MB and if these choices enable changes in travel patterns.

The methods used in this stepwise assessment vary from one step to the other. For the first step I studied articles and papers from actors and reporters, as is commonly done in a discourse analysis. The results for the second step, the implementation of the MB, are based on the outcomes of my questionnaire and the research done by others. In the assessment of the participation rates I also relied on my survey, complemented by a large dataset of travel behaviour in Belgium (BELDAM). For the choice behaviour within the MB, I drew from data concerning a mixture-amount stated choice experiment, which was part of my questionnaire. For respondents I approached employers with a request to co-operate in the research project and to provide me with a sample of target group candidates: CC owners within the company. The final response rate was excellent, and I managed to find 817 useful cases in total.

The MB is predominantly presented as a fixed annual budget provided to the employee with a CC by the employer. The amount of budget is based on the current capital and distance costs of the CC. The budget can be used for a range of multimodal transport options including the car. Some regard the concept of the MB to be a technical-juridical issue; the results from my discourse analysis suggests otherwise, mainly due to the inherent different positions regarding the CC. In the dominant version of the MB, the rather beneficial position of the CC is not to be altered; it is used as a point of reference instead. The results of the discourse analysis demonstrate that the concept is in line with the idea of mobility as a service and pragmatic multimodal policies. More general, I observe that the MB is a neoliberal policy concept, as it draws from economic theory, fosters a particular freedom of choice, promotes self-control and it is presented as the only feasible option in contemporary Flanders.

The MB is promoted as the alternative to the CC. Hence, considerations related to the implementation by employers are expected to be a trade-off between the CC and the MB. Arguments in favour of a CC policy are the role of the car as an efficient work tool, the possibilities for economies of scale in the procurement of company vehicles, the corroborative power of the car as status symbol, and the overall image of the company. Relevant institutional factors and potential barriers to change are company culture, the symbolic meaning of the car, and male-dominant workforce in certain sectors. Factors in favour of the MB are employee satisfaction, cost-control, the promotion of self-control among employees, and public relations related arguments. An important institutional aspect here is the performative power of the MB and the discourse associated with it. Implementation rates of flexible benefit plans and the MB suggest an implementation in a minority of the companies in Flanders. These levels are expected to be especially low in small and medium sized companies that account for a majority of employees with a CC.

Participation by target group members is determined by their attitude towards the MB, the current benefit they enjoy from having a CC, and the potential to use other transport modes. The attitudes of CC owners are relatively negative towards the MB in comparison to other employees. Target group members stress the need for a car for professional reasons or their family situation, or they emphasise the lack of alternatives. More degrees of freedom in the make and type of car are welcomed by many. The CC is used intensively for commuting, business trips and private trips. People with a CC cover an additional 6 800 km for private purposes on average, compared to employees without a CC, which suggests that this benefit in kind is eagerly consumed. With respect to the opportunities for mode switching, I conclude that in four out of every five cases the alternative to the CC is a private car.

The results of the choice models suggest that CC owners are willing to waive their CC or that they are willing to select a cheaper model. However, in almost all cases this is in exchange for an end-of-year bonus or additional leave days. Hence, the main competitors for the CC are not transport related. Moreover, these were offered at a beneficial ratio to the CC, which implies extension of the tax benefits for the CC to other spheres.

All in all, I conclude that the contribution of the voluntary MB for CC owners to the transport policy objectives is very small. For example, the reduction in car use for the daily commute is situated in the range of zero to one percent for car commuters, and close to zero for all road users during peak hours. The most significant effects are to be expected near major centres of employment, which are also the most congested areas. The combination of modest implementation rates by employers, low participation rates by employees, and the private car as primary alternative to the CC are the cause of the small impact. In line with this outcome, I suggest that the MB concept allows some actors to reframe the problem of the CC from under-taxation to a lack of choice, the inflexibility of regulation and the administrative burden of the fiscal system. The main contribution of the MB to transport policy objectives might be more indirect, as it can create more awareness regarding the travel behaviour among CC owners and probably will contribute to a revaluation of fringe benefits.

UITGEBREIDE SAMENVATTING

In het hedendaagse Vlaanderen geniet de bedrijfswagen (BW) hoge populariteit in de vorm van alternatieve beloning voor de werknemer. Als gevolg heeft circa 1 op de 10 werkende Vlamingen momenteel een BW. Sinds enkele jaren wordt het mobiliteitsbudget (MB) gepromoot als alternatief voor deze praktijk, mede omdat de BW geassocieerd wordt met excessief gebruik en files. Het MB wordt ook verstrekt vanuit de werkgever aan de werknemer. Met dit virtuele budget kunnen werknemers kiezen uit een pallet van vervoersmiddelen en diensten voor werkgerelateerde verplaatsingen. De wagen blijft een van de mogelijkheden. De hoogte van het budget dient te worden gebaseerd op de huidige kosten voor de BW en tankkaart. Het concept van het MB vertoont duidelijke overeenkomsten met het cafetaria plan.

Vanuit theoretisch perspectief biedt het MB een antwoord op twee problemen die ontleend worden uit de 'agency theory'. In de traditionele situatie is de werknemer geïsoleerd van prijsprikkels omdat zowel de vaste als variabele lasten gedragen worden door de werkgever in België. De werknemer betaalt enkel de voordeel alle aard, welke ongevoelig is voor de afgelegde afstand. Door budgetoverschrijdingen onmogelijk te maken of voor rekening van de werknemer verandert deze situatie. Wanneer ook het restant van het budget kan worden uitgekeerd aan de werknemer in de vorm van een bonus lijkt prijssensitiviteit gegarandeerd. Voorts zijn er in de traditionele situatie gebrekkige mogelijkheden voor de selectie van de techniek. Hetgeen zorgt voor een mogelijke mismatch met de beoogde gebruiksdoeleinden. Er wordt bijvoorbeeld een dieselwagen gereden, daar waar het gebruik van fiets of tram meer voor de hand liggend zou zijn. Het MB biedt gelegenheid tot het selecteren van meer 'rationele' vervoersoplossingen. Een eerste stap in de richting van het MB is het werken met vaste (maandelijkse) budgetten voor de BW. Dit zien we in de praktijk steeds vaker.

Het beperkte aantal studies dat zich tot op heden over het MB gebogen heeft, richt zich voornamelijk op de transporteffecten die het gevolg zijn van aangepast reisgedrag door voormalige en huidige bezitters van een BW. Daarbij genieten voornamelijk de geselecteerde transportmodi de aandacht, andere aspecten zoals het aantal verplaatsingen en afstand worden minder belicht. Veel van de onderzoeksprojecten en praktijkvoorbeelden zijn hoopgevend en bijzonder positief over het MB, wat past bij de algehele positieve stemming rondom het concept. In de voorliggende dissertatie wordt expliciet gekozen voor het verleggen van het blikveld, van veranderingen in het verplaatsingsgedrag naar de stappen in het proces die hieraan voorafgaan. Ondertussen blijft het doel min of meer gelijk, namelijk het vaststellen van de mogelijke transportgerelateerde impact van het MB in Vlaanderen. Daarbij wordt wel aangetekend dat het kennen en begrijpen van de herkomst van het concept essentieel is voor het vaststellen van de levensvatbaarheid en potentiële impact. Er worden vier stappen in het proces geadresseerd: [1] het inkaderen van het concept, [2] implementatie

door werkgevers, [3] participatie door werknemers en [4] keuzegedrag binnen het MB door werknemers. De studie beperkt zich tot de situatie in Vlaanderen en behandelt de meest populaire invulling van het MB, namelijk als alternatief voor de BW.

Een brede waaier aan methodes is gebruikt in deze dissertatie. Voor een beter begrip van de invulling en herkomst van het concept is gebruik gemaakt van een discours analyse. Hierbij is een selectie van primaire bronnen door hoofdrolspelers en secundaire bronnen uit populaire media bestudeerd (n=54). Het overgrote deel van het onderzoek is uitgevoerd middels een vragenlijst aan werknemers met (n=817) en zonder een BW (n=390). Deze werknemers zijn benaderd via hun werkgevers, die hun medewerking aan het onderzoek toezegden. Verder worden er aanvullende studies en datasets ter handen genomen, waarvan het BELDAM-onderzoek, naar het verplaatsingsgedrag van de Belgen de voornaamste dataset is. Om de vergelijking tussen de werknemers met en zonder een BW eerlijker te maken, zijn exact gelijke paren geselecteerd uit de initiële steekproeven. Daarbij mensen met een BW gekoppeld aan een of meerdere evenknieën op basis van dezelfde waarden voor geslacht, hebben van partner, thuiswonende kinderen, inkomen, leeftijd, opleidingsniveau en woonregio. Voor het deelonderzoek naar de voorkeuren binnen het MB is gebruik gemaakt van een mixture-amount keuze experiment. Daarbij kregen de respondenten 16 keer twee mogelijke samenstellingen van het MB gepresenteerd, waarbij de transportmogelijkheden bestonden uit auto, fiets en openbaar vervoer.

Het MB dankt zijn populariteit mede aan de kneedbare definitie. De betrokkenen vinden voldoende ruimte voor het plaatsen van de accenten om het concept van een eigen kleur te voorzien. Het concept flirt met het idee van 'mobility as a service' en haakt in bij de bredere trend richting pragmatische multimodaliteit in het transportbeleid. Dat beleid is expliciet niet tegen de auto, maar benadrukt het belang van integratie van modaliteiten, het hanteren van een systeembenadering en meer vrijheid voor het individu bij de selectie van het transportmiddel. Op een hoger abstractieniveau zien we dat het debat genest is in het neoliberale discours, dat zich voornamelijk sterk maakt voor de uitbreiding van de economische marktrationaliteit op onontgonnen terrein. Er moet een 'shop' opgericht worden voor de multimodale vervoerskeuze van de werknemer voor werkgerelateerde verplaatsingen. Overige aspecten met een duidelijk neoliberaal karakter zijn de frequente verwijzingen naar (keuze)vrijheid, het afgeven op administratieve lasten en hoge inkomensbelastingen, het postuleren van werknemers als consumenten en van de mens als ondernemend individu. Dankzij het MB als oplossing verschuift het voornaamste onderliggende probleem van de BW van het gunstige belastingsregime naar het gebrek aan keuzevrijheid. Al deze verschillende aspecten, ieder op hun eigen niveau, verklaren de populariteit van het concept en de wijze waarop het is ingekaderd. De verwachting is dat de populaire aspecten van het concept weerklank krijgen in de verdere institutionele inbedding en de dagelijkse praktijk.

Aangezien het MB wordt gepresenteerd als een alternatief voor de BW, gaat het voor werkgevers vooral om de voordelen van de BW ten opzichte van het MB. Zes, deels overlappende, redenen om een BW te (blijven) verstrekken aan de werknemer worden geïdentificeerd. Deze redenen zijn: functionele afwegingen, compensatie, loonoptimalisatie,

representatie van het bedrijf, status bevestigende strategieën voor de werkvloer en sectorale of bedrijfscultuur. Het MB biedt daarentegen vooral voordelen op het gebied van kostenbeheersing, immers door te werken met vaste budgetten wordt de werkgever minder gevoelig voor grillen in de markt en wordt excessief gebruik beteugeld of ingecalculeerd. Het MB kan worden ingezet om de eigen verantwoordelijkheid en zelfdiscipline van de werknemers te stimuleren. Andere voordelen zijn efficiëntie winst en het drukken van de indirecte kosten gerelateerd aan de BW. Door de keuzevrijheid van de werknemers zijn de effecten echter lastig in te schatten en gaat met onzekerheid gepaard; de implementatie van het MB op de werkvloer moet het daarom waarschijnlijk vooral hebben van de performatieve kracht van het concept en de allure van marktleiders met een MB voor hun werknemers.

Een vrijwillige implementatie van het concept door de meerderheid van alle werkgevers blijkt onwaarschijnlijk. Het cafetaria plan is doorgaans bij minder dan de helft van alle bedrijven geïmplementeerd en is veelal niet voor alle werknemers binnen dat bedrijf. Ook maatregelen op het gebied van het vergroenen van de bedrijfsgerelateerde personenmobiliteit zijn bij lang niet alle bedrijven gemeengoed. Er is een duidelijk patroon waar te nemen waarbij grotere bedrijven een hogere waarschijnlijkheid van implementatie van maatregelen vertonen. Een verschil van een factor twee tussen grote bedrijven aan de ene kant en middelgrote tot kleine bedrijven aan de andere kant is niet ongebruikelijk. Impact van deze observatie is aanzienlijk, daar grotere bedrijven, met meer dan 500 werknemers, slechts goed zijn voor circa 26 % van de vloot van BWs.

Er zijn vier basis houdingen te verwachten onder werknemers ten aanzien van het MB. Deze attitudes worden ook allen geïdentificeerd in de steekproef. Positieve attitudes richten zich op de keuzevrijheid t.a.v. de transport modi of enkel t.a.v. van de wagen. De negatieve attitudes zien geen mogelijkheid tot het gebruik van andere modi en willen het maximale voor de wagen. In een vergelijking tussen werknemers met en zonder BW zien we ook dat mensen zonder BW over het algemeen positiever zijn richting het MB. Een positievere houding treffen we aan bij vrouwen, jongere mensen, mensen met kortere woon-werkafstand en mensen die momenteel niet met de wagen reizen. Eerder onderzoek toonde aan dat de attitude de beste voorspeller is van daadwerkelijke participatie onder werknemers.

Vanuit een meer functioneel perspectief zien we dat in de huidige situatie gretig gebruik wordt gemaakt van de BW. Gemiddeld genomen vertaalt zich dit in 6 800 additionele voertuigkilometers op jaarbasis. Die kilometers komen vooral voort uit meer en langere privé verplaatsingen. Gekeken naar de andere transportmodi in de pendelverplaatsing zien we dat momenteel al één op de tien of twaalf BW houders nu al een ander vervoersmiddel gebruikt. Qua potentiële verschuiving blijkt dat autogebruik relatief hoog blijft, dankzij langere afstanden, een relatief gunstig parkeerregime op de werkplek en meer zakelijke verplaatsingen voor werknemers met een BW. In de hypothetische situatie van het verlies van de BW is de reductie in verplaatsingen met de wagen 12 tot 23 procentpunt. Gezien het afstaan van de BW binnen het MB vrijwillig is, zal het effect waarschijnlijk minder groot zijn. Deze cijfers bevestigen ook dat de voornaamste concurrent van de BW de private wagen is.

De resultaten van het keuze-experiment laten zien dat veel werknemers met een BW niet verknocht zijn aan de wagen van de baas, maar open staan voor alternatieven. Het zijn echter voornamelijk de niet-transport geboden alternatieven die op interesse kunnen rekenen: additioneel verlof en een financiële bonus. De fiets en het openbaar vervoer kunnen op slechts een magere interesse rekenen. Het aandeel van de werknemers dat meerder modaliteiten opneemt in het pakket varieert van 2 tot 23 %, afhankelijk van het gevolgde keuzemodel. In een aanvullende vraag geeft 28 % van de bevraagden aan interesse te hebben in enige vorm van aanvullend openbaar vervoer, de meest geduchte 'concurrent' voor het gebruik van de wagen. Dat is echter zonder inruil. Wanneer men moet inleveren op de klasse van de BW of het aantal kilometer met de wagen is dit aandeel vermoedelijk lager.

Binnen het MB wordt veel vertrouwen en verantwoordelijkheid weggelegd bij het individu. Het is aan de werknemer om de belofte van het MB waar te maken. Daarbij worden deze mensen geconfronteerd met een afweging tussen de belangen van het bedrijf, de samenleving en zichzelf. Ondertussen schuiven werkgevers en overheden hun verantwoordelijkheden af, terwijl zij bij machte zijn om grenzen te stellen en daar waar excessief autogebruik als onwenselijk wordt beschouwd dit te beteugelen. Zodoende kan het MB ook worden betiteld als een post-politiek concept, waarbij politieke conflicten verruild zijn voor economische instrumenten.

De voornaamste conclusie van het onderzoek is dat de directe bijdrage van het mobiliteitsbudget aan het verminderen van de files in België zeer gering zal zijn, met een vermindering in de piekuren van minder dan 1 % van de voertuigen. Het is vooral de combinatie van de stappen die moeten worden doorlopen, van concept via werkgever naar uiteindelijk gebruik door werknemer, welke aan deze conclusie ten grondslag ligt. Het concept is beperkt tot werknemers en niet van toepassing voor alle mensen met een BW. Het concept voorziet o.a. in het vertalen van de huidige kosten voor aanschaf en gebruik van de BW naar het toekomstige MB. In dat budget zit de mogelijk ook het huidige excessieve gebruik ingesloten. Voorts is te verwachten dat de vrijwillige implementatie van het concept door werknemers gering zal zijn. Voornamelijk bij kleine en middelgrote ondernemingen zal de beschikbaarheid van het MB tegenvallen, terwijl deze goed zijn voor circa driekwart van de BWs. De participatiebereidheid onder werknemers is vervolgens ook beperkt. Veel werknemers hebben juist bewust voor een job met BW gekozen ('adverse selectie'). Veel andere werknemers met een BW hebben of zien weinig alternatieven voor de wagen, bijvoorbeeld vanwege veel zakelijke verplaatsingen. Bovendien, wanneer men afstand doet van de BW is de private wagen veruit de voornaamste vervanger. Alternatieve vervoersmodi kunnen slechts op beperkte belangstelling rekenen en het combineren van modi ligt nog minder voor de hand. Ter correctie hierop dient wel gezegd te worden dat daar waar de filedruk het hoogst is, de voornaamste effecten te verwachten zijn. Echter, daarmee ondergraaft het MB direct een voorwaarde voor succes, namelijk tijdverlies voor autogebruikers.

Meer indirecte aspecten sorteren mogelijk meer effect. Het MB biedt zowel aanknopingspunten om de discussie over het vervoersbeleid op het niveau van overheid en werkgever te verbreden. Het MB is er ook duidelijk op gericht om de betrokkenheid en

verantwoordelijkheid van werknemers met een BW te vergroten. Middels het MB krijgen zij meer inzicht in de kosten die hiermee gemoeid zijn, hetgeen de bewustwording versterkt. Het bestuderen van deze indirecte effecten viel buiten de focus van het voorliggend onderzoek.

CHAPTER ONE: SETTING THE RESEARCH FRAMEWORK

Oh Lord, won't you buy me a Mercedes Benz?

My friends all drive Porsches, I must make amends.

Worked hard all my lifetime, no help from my friends,

So Lord, won't you buy me a Mercedes Benz?

— ***Janis Joplin**, Mercedes Benz (1970)*

1.1 INTRODUCTION

In Belgium and in some neighbouring countries one can observe a culture of work-related travel cost remuneration by the employer (Potter et al., 2006; Vanoutrive et al., 2010). Not only is the employee compensated for business trips, they also receive compensation for commuting. The national government plays an important role in this system, since compensation paid by the employer is often exempt from taxes (Potter, at al., 2006). Moreover, employees can deduct income tax under certain conditions. The current system of remunerations is appointed on the basis of transport modes and types of trips (Vanoutrive et al., 2010).

The roots of this system can be traced back to the 19th century. Back in 1869, cheap weekly train tickets were introduced through a national ministerial decision. The price of train travel decreased by a factor six. Due to this intervention, people from the rural area were now able to work in a city or an industrial site, while continuing to live in their village (Mérenne-Schoumaker et al., 1999; Verhetsel et al., 2009). From the Second World War onward, the commuting costs for employees were reduced 'as they became more and more borne by the employer or were tax deductible' (Mérenne-Schoumaker et al., 1999, p. 12). In 1997 the option of bicycle millage allowance was introduced. Employers now had the option to provide a tax-free allowance of 15 cents per kilometre for a mode that is already cheap. The allowance was indexed every year, to compensate for inflation.

When it comes to the debate on the current system in Belgium and elsewhere, there is one issue that dominates all others: the company car (CC). The CC also plays a central role in this thesis. The CC is associated with many issues in the academic as well as the public debate (§1.2). With regards to the CC here and in the remainder of this dissertation, I follow the definition used by Castaigne et al. (2009), who defined a CC as 'a vehicle whose initial cost is supported by the employer, which is awarded to the employee for his personal, professional and/or private trips, and which can be used by the employee without the authorization of his employer.' It is important to note that a CC is often accompanied by a fuel card in Belgium. In my sample (Ch. 3), 98.9 % of all people with a company vehicle also enjoyed full reimbursement of fuel cost for private trips in Belgium. In my sample I only study people with a fuel card and a passenger car; hence, these conditions can be added to the definition. In 2014 there were approximately 400 000 to 450 000 employees with a CC that fits my definition in Belgium. The remainder of the 1.1 million vehicles owned by companies is either owned by self-employed workers, are not a passenger vehicles or are not to be used for private purposes (FOD Mobiliteit, 2015; KPMG, 2012; Laine & Van Steenbergen, 2016; Venneman & Vanderbeuren, 2012). In this thesis I often use the term CC owner. In all cases this refers to the employee with a car provided by or via the employer. CCs are in fact owned by the lease company or the employer of the employee in question; therefore, technically speaking the employee does not *own* the CC. However, other terms, such as CC user or CC driver, might be confusing as someone other than the employee might also use the car.

The original purpose of a CC is, of course, to conduct business-related trips. The option to use a company vehicle for other trip purposes, such as private trips and commutes, has some logic

to it. Often it is difficult to distinguish between trip purposes, for instance while trip chaining. It might be a waste of resources to have both a private vehicle and a commercial vehicle. Additionally, it is not always evident to drive back to the workplace after a business meeting before travelling homeward. Finally, it might ease the administrative burden of users and employers. However, in Belgium these business trips have become a side issue, according to the perception of many. There is even a name for this phenomenon in Belgium: 'een salariswagen' (*a wage-car*). In other words, employees do not receive a CC because they need one for the job; they receive a car as part of their remuneration package (Ch. 4).

The last decade, the concept of the *mobility budget* (MB) as an alternative to the CC gained positive attention among HRM-professionals, employers, and policy makers in the field of transport. It is believed that an implementation of the MB in Belgium can lower car use and therefore mitigate many of the problems associated with the CC, especially congestion (Ch. 2). Consequently, there is a strong coalition in favour of the MB, a legislative proposal has been launched to promote the implementation, and the Flemish government already financed five studies on the MB. This dissertation is a result of one of these projects.

In the next section I provide an overview of the problems associated with the CC, and the theories that can be used to interpret these problems. In section 1.3, I offer an introduction to the MB. This includes a preliminary definition, links to similar concepts and a disquisition of various versions of the MB. In this section I elucidate the relationship between the problem of the CC and the concept of the MB as a solution with the Agency theory, and I offer an overview of the current knowledge on the effect of the MB. Next, I move on to the research gap, research objective and research questions. I provide a delineation of the research scope in a small subsection. To conclude this introduction, I offer an overview of the remainder of this thesis, chapter by chapter.

1.2 UNDERSTANDING COMPANY CAR ISSUES

1.2.1 PROBLEMS ASSOCIATED WITH THE COMPANY CAR

In the academic debate multiple issues are negatively associated with CCs. On a general level, these issues relate to the type of vehicles purchased and the way these vehicles are used. In this subsection I provide a brief overview of the academic literature.

The primary point of attention in literature on the CC is excessive car use. For overall car use, the effect of the CC is studied by examining the differences in annual vehicle mileage for those with and without a CC, see for instance the studies by Castaigne et al.(2009), Laine and Van Steenbergen (2016) and Shiftan et al. (2012). An overview of multiple studies can be found in Harding (2014). In Chapter Five I provide my own explanatory model for annual mileage of CC owners. My results confirm the findings by others and suggest that access to a CC results in a strong increase in annual mileage.

De Witte et al. (2008) provide evidence for a strong mode choice bias caused by the CC for commuting trips to the capital region of Brussels. They compare mode choice of car and train commuters to this centre of employment in Belgium. According to their model, access to a CC seriously affects commuting decisions. Their estimates suggest that a commuter from a household with two cars, a commuting distance below 30 km, and a monthly income above 2 000 euro has a probability of 79 % to travel by car. This is 99 % in case one of these cars is a CC. Other studies on the excessive use of the car for commuting purposes are, for instance, Frenkel et al. (2014), and Laine and Van Steenbergen (2016). In this thesis I also provide an explanatory model for car use in the daily commute, in order to assess the modal shift potential. My results indicate that car use by CC owners is 12 to 23 percentage points higher and is moving in the direction of a full 100% of the commutes by car (Ch. 5).

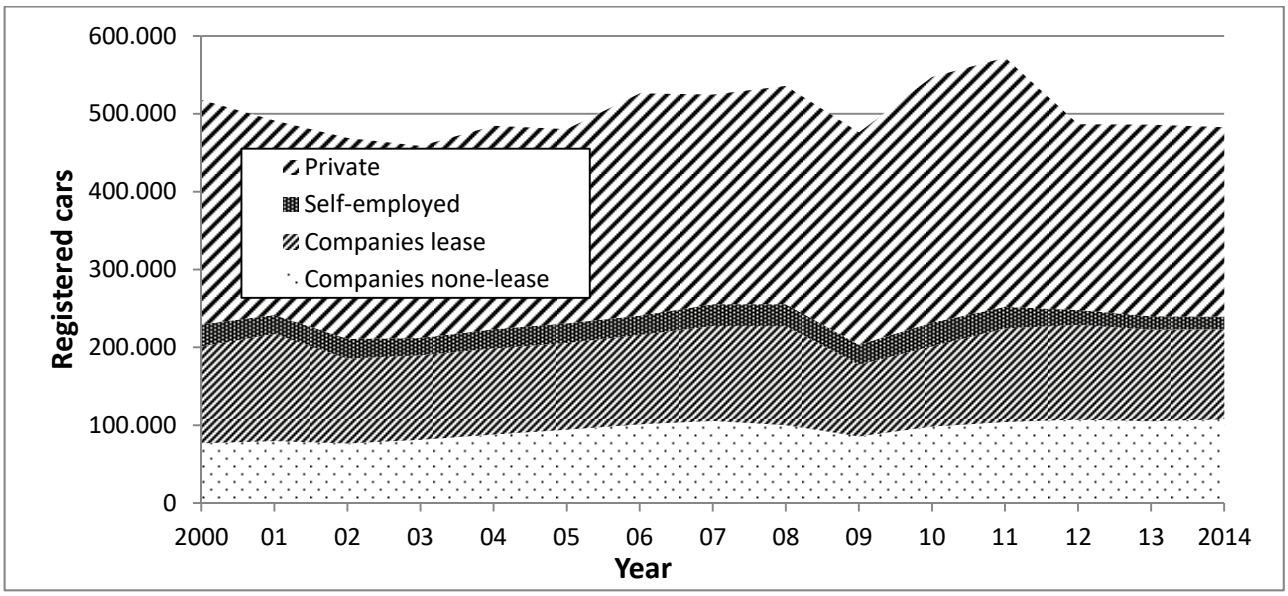
There is some evidence to suggest that CC ownership also induces additional business trips. This evidence can be found in the study by Le Vine et al (2013). They offer a longitudinal study on CC use from the 1990s to 2008 in Britain. In this period, taxation of the CC became more onerous and overall CC usage dropped sharply in Britain, from 20 500 annual miles per car in 1996 to 16 000 miles in 2006. In the same period the number and length of business trips significantly reduced. For male CC owners this is about 600 miles per year on average, or about 10 % less. Meanwhile, the researchers do not see substitution effects for all of these business trips formerly made by car. In relation to train use, the authors find a ratio of 4:1, which implies that for every four miles reduced in car use for business trips, only one mile of train use enters the scene. Based on this observation, the authors question the need and necessity of the business trips conducted in the past (see also Le Vine & Jones, 2012).

Additional evidence indicates that the CC is used more often than privately owned cars for non-work related trips. On a general level, this can already be concluded in some of the annual vehicle mileage studies mentioned above, which take commuting and business trips into consideration (see also Ch. 5). The results from Belgium by Laine and Van Steenbergen suggest an increase in the distance covered for private purposes of 5 800 kilometres per year for CC owners. Frenkel et al. (2014) studied the effect of CC access on the frequency of long distance leisure trips in Israel. As they point out, 'the results clearly show that the tendency to engage in higher frequency of long-distance trips is positively and significantly related to the availability of a company car' (p. 241-2). However, the effect of household income level is stronger than the effect of CC ownership.

Cars provided by the employer tend to result in overall higher levels of car ownership (R. Roy, 2014). Van Ommeren and Gutiérrez-i-Puigarnau (2012) use empirical data from the Central Bank of the Netherlands, with 2 397 observations and 840 households, and conclude that the CC results in higher levels of car ownership in one out of five households. Laine and Van Steenbergen (2016) looked into the effect on car ownership levels for Belgium. They conclude that the probability of owning more than one car increases with 26 percentage points in case a CC is provided to one of the household members. These higher levels of ownership are in turn associated with higher levels of car use, the environmental burden of car production, and parking issues (De Witte et al., 2008; R. Roy, 2014; Zijlstra, Vanoutrive, & Verhetsel, 2014).

In multiple studies, the employer-provided cars and their users are associated with safety issues; an overview is provided by Scott et al. (2012). CC users have approximately 50% more accidents than regular drivers, according to Lynn and Lockwood (1998). In their model, differences in demographic and exposure factor are accounted for. All other studies provided by Scott et al. (2012) also suggest a higher accident rate. Shiftan et al. (2010) confirm their own hypothesis, stating that a high share of CCs on the Israeli roads result in lower road safety levels. Their conclusion is based on three main observations. First, they confirm that CC access results in higher levels of car use, not only for the employee, but also for other household members. Second, they observe that the safety standards and maintenance levels of CCs are relatively poor compared to the private market. Third, the driving behaviour in CCs has more unsafe characteristics. Therefore, they conclude that 'there is no doubt that each one of these characteristics and especially combination of these may have a significant negative influence on safety' (Idem, p. 25).

FIG. 1.1: NEW CAR REGISTRATIONS IN BELGIUM



Data: Febiac (2015)

In the academic literature on the CC, multiple authors refer to the importance of the CC in relation to the composition of the total car fleet (Graus & Worrell, 2008; Harding, 2014; Koetse & Hoen, 2014; Scott, Currie, & Tivendale, 2012). Nearly all CCs are newly purchased and many of them are sold on the second-hand market after just four years of service or 150 000 kilometres. In contrast, many private car owners buy their car on the second-hand market. Moreover, private users tend to use their car for a longer period of time. As a result, the composition of the car fleet is strongly influenced by CCs. 'If the tax treatment of company cars affects the choice of type of car […] the impact of the choice on the overall car stock will continue even after the car ceases to be a company car,' according to Harding (2014, p. 25). In the last fourteen years, the passenger cars registered by companies accounted for about 42 % of the newly registered cars in Belgium (Fig. 1.1). About half of these cars are operational lease, which is about 23 % of the total amount. This also implies that companies have a

serious impact on car sales, car production and the second-hand market (Koetse & Hoen, 2014).

Data from New Zealand demonstrates that CCs have a larger engine capacity than the remainder of the passenger car fleet. The engine size is strongly correlated with fuel consumption and therefore also emissions. About 50 % of all CCs in New Zealand have an engine larger than 2 000 cc, while this is only 36% for other passenger cars (Scott et al., 2012). Likewise, Næss-Schmidt and Winiarczyk (2010), in their analysis on the European Union, estimate an increase of fuel consumption in the range of 4 % to 8 % per driven kilometre. By using data from 2010, Laine and Van Steenbergen (2016) observe that engine size of the primary car in a Belgian household is 5 % larger in case this is a CC. More recent data, however, has cast doubt on some of these conclusions. In her analysis of OECD countries, Harding (2014) does observe some differences in the average CO_2 rating between CC and other passenger cars, although the CC are certainly not always the most polluting category. Furthermore, the weighted total scores for all countries included are the same. The provided explanations relate to a stronger awareness regarding GHG-emissions and recent alterations in the tax-treatment of CCs in multiple countries. Evidence from Belgium, provided by De Mol et al. (2013), supports these assumptions.

Building on Harding (2014), Roy (2014) repeats there is insufficient evidence to conclude that CCs are more polluting. At the same time Roy also concludes that efficiency gains in the steel-and-petroleum car technology are of limited importance with respect to environmental concerns.

> *Self-evidently, technology is a determinant. Improvements in car technology can lead to reductions in fuel consumption, CO_2 emissions, local air pollution and traffic accidents. […]. But it is also evident that all such improvements can indeed be "eaten up" – […] by the continuing increase in total distance driven (R. Roy, 2014, p. 17).*

To support her claim, she provides multiple findings which demonstrate that improvements in fuel efficiency are negated by additional consumption.

In the literature discussed in this subsection, concerning the problems associated with the CC, two dominant explanations for the origin of these issues can be found: distortionary taxation of CCs and the principal-agent problem. I suggest adding a third, more general cause: automobile dependency. These three explanations are discussed in the next three subsections.

1.2.2 Distortionary Taxation

Nearly all academic papers on the issues related to the CC refer to *under-taxation of the employer provided cars* as the main cause of the documented problems: the CC user does not bear the 'appropriate' cost, which results in excessive levels of ownership and use. Harding discusses this issue in a formal, general and quasi-neutral style:

> *Tax settings on company car use and on commuting expenses can create implicit incentives that favour certain modes of transport over others and influence how much employees travel. [..]. The tax treatment of company cars and commuting expenses*

> *therefore has important impacts on the environment and can also contribute to traffic congestion, accidents, noise and other social costs. In particular, tax settings can cause the usage or intensity of usage of various modes of transport to increase beyond the level that would occur if the tax system were neutral in its treatment of the various options (2014, p. 6).*

More explicitly targeted at the CC, Næss-Schmidt and Winiarczyk point out:

> *Providing subsidies to company cars on a scale such as is suggested in this study represents a serious distortions of consumer choice: in essence making it artificially attractive for consumers to take home their remuneration in the form of cars (2010, p. 9).*

In the literature the costs of car usage are divided in a capital and a distance component. The capital component reflects the costs of car ownership, which are more or less fixed. The costs that do vary with use are reflected in the distance component. Most of the criticism targeted at the under-taxation of the CC is related to this distance component, as the tax treatment in many countries 'fails' to address the actual use of the CC (Harding, 2014; R. Roy, 2014; Y. Shiftan, Albert, & Keinan, 2010).

Two recent studies have attempted to estimate the fiscal cost of the under-taxation of CC (Harding, 2014; Næss-Schmidt & Winiarczyk, 2010). Here, fiscal cost refers to missed tax revenues for the state. The first study from 2010 for the European Commission concludes that:

> *[T]he direct fiscal consequences without taking into account any dynamic effects from the company car subsidies are substantial with a total revenue loss in the order of roughly ½ percent of EU GDP as an average for the countries included in the analysis, € 54 billion in total (Næss-Schmidt & Winiarczyk, 2010, p. 8).*

For Belgium this loss has been estimated at 1.2 % of the GDP (Idem, p. 58). Harding (2014) expresses the fiscal loss as annual subsidy per car per year. According to her estimates, this subsidy is on average 1 600 euros for the OECD countries included in the analysis, this amounts to a total of 64 billion of untaxed benefit. For Belgium the annual subsidy per car is 2 763 euro; only 40 % of the benefit received through the CC is taxed, according to Harding (2014). According to both studies and the paper by Laine and Van Steenbergen (2016), the environmental costs surpass the fiscal costs. This is mainly because the under-taxation of CCs results in a disproportional increase in the total distance driven, as pointed out by Roy (2016).

1.2.3 Agent Theory and the Principle-Agent Problem

The principal-agent (PA) problem is the second explanation the literature offers for the issues with the CC (Graus & Worrell, 2008; IEA, 2007; Scott et al., 2012). However, most authors refer to this problem implicitly or use the term-pair 'split incentives' instead. Although the PA-problem receives less attention in the literature, it is highly relevant in the context of this thesis, as it is directly related to both the CC and the concept of the MB.

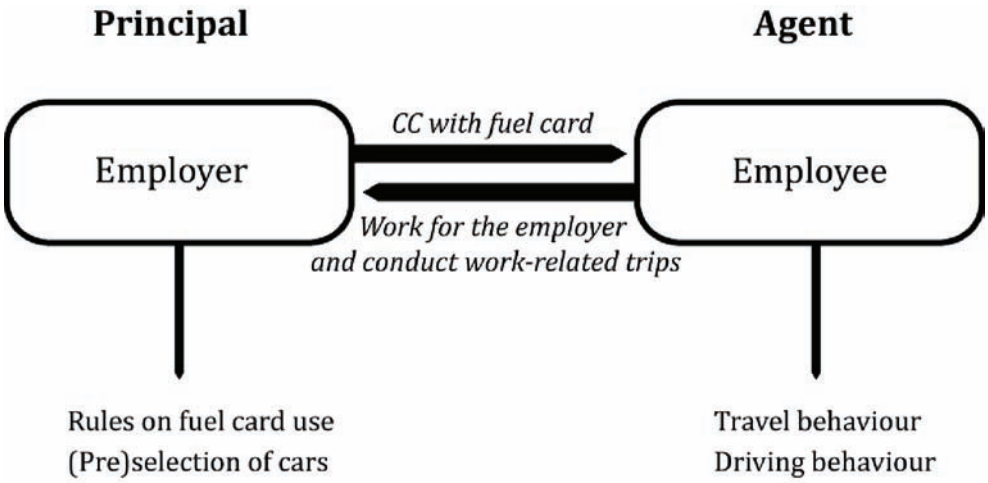
Agency theory is nested in neoclassical economics and applied in fields such as accounting, finance, and marketing (Eisenhardt, 1989). The theory concerns risks that can arise in a cooperative exchange when one party (principal) contracts with another party (agent) to make decisions on behalf of the principal. The risks or threats, known as PA-problems, are considered to be a result of differences in incentives or information (see next paragraph). The theory is also concerned with the monitoring and managing of these threats (Lubatkin, 2005). The latter basically means improvement of the contracts between principal and agent to reduce the potency of these threats. PA-problems are regarded to be examples of market failures, a special kind of market barrier (IEA, 2007).

Two conditions are the fundament of the agency theory. First, agency theory assumes that agents are autonomic actors and are guided by self-interest; they are opportunists. They optimise their own situation, even at the expense of the principal. From this, one can derive a potential conflict: the goals of the agent and the principle are not necessarily in line with one another. Second, there is information asymmetry between the knowledge of the agent and the knowledge of the principal. This asymmetry results from the inability or unwillingness to share information (IEA, 2007). Agency theory recognises the strategic importance of information and suggests that this information is a commodity in itself (Eisenhardt, 1989).

According to the theory, two types of problems can arise in the relationship between an agent and a principal as a consequence of this opportunistic behaviour and the information asymmetry. These PA-problems are *adverse selection* and *moral hazard* (IEA, 2007). Adverse selection refers to opportunistic behaviour of one party involved in a contract with other parties, before signing an agreement or entering a contract (Akerlof, 1995; Greenwald, 1986). Moral hazard occurs when a party acts opportunistically under a contract (Hölmstrom, 1979). Both problems are, for instance, known in the realm of insurance (Pauly, 1974). A person might be more inclined to look for additional insurance when they know they have a higher risk, and individuals might demonstrate riskier behaviour when insured, as the financial risks for the individual are covered by the insurance. Both PA-problems result in a suboptimal situation and both are associated with market failure in neoclassical economic literature.

When the theory is applied to the situation with the CC, the following situation arises (Fig. 1.2). In this scenario, the employers are the principals and the employees are agents. The employers request that the employees act on their behalf. This might be the representation of the company at a client or the procurement of a vehicle. In return, the agent receives wage and a car with a fuel card, which can be used for private trips if the principal allows this by contract. Before entering the contract and whilst under contract, issues might arise in terms of the technology selected and the use of this technology (Graus & Worrell, 2008).

FIG. 1.2: RELATIONSHIP BETWEEN THE PRINCIPAL AND THE AGENT



Adverse selection might result from opportunistic behaviour by job seekers with a strong preference for a car, or in case job seekers extend their geographical search due to the prospect of a CC. In both situations, car use will be above average. Adverse selection might also occur due to opportunistic behaviour of the employer. For instance, if there are no liability issues for employers with regards to the use of the CC, they might be more inclined to offer a car with lower safety standards, as these a simply cheaper (Shiftan et al., 2010). Moral hazard can occur in multiple ways within an employment contract with a car. CC users might be less careful when using a car that is not their own. This might include uncovered or unsecured parking, rough handling and driving, and so on. When the complete distance costs are included in the contract, this will likely result in higher levels of car use, in both the number of trips and distance covered. In case the contract also covers speeding and parking fines, CC users may be more likely to drive recklessly or to park illegally. If employees with a CC no longer bear any of the commuting costs, they might be more inclined to extend their search area for a residential location and move away from the work place. These examples of adverse selection and moral hazard do occur in practice, as I indicated in the previous section (§1.2). Due to the overlap in effects, it is often difficult to establish whether one is dealing with moral hazard or adverse selection. This is especially true for commonly used cross-sectional data in studies.

Graus and Worrell (2008) applied the agency theory to the energy efficiency issues with CCs in the Netherlands. They differentiate four types of contracts between the principal and the agent (Table 1.1). In Case I, the agent is free to choose the type of car and pays the distance costs; there is no PA-problem, as principal and agent are the same. Case II applies when the employee does not choose the technology (the CC), but is obliged to pay for the distance costs. An efficiency problem might arise, as there are clear incentives for the employer to select a cheap, non-efficient car model. These first two cases are expected to be rather uncommon in the Netherlands, according to Graus and Worrell (2008). Far more realistic are cases III and IV. In both of these cases, the employer does not bear the distance costs. In Case III the employee is to some extent free to select the type of car, while in Case IV the car is selected by the employer. In Case III one might expect to see usage as well as technological efficiency

issues, as incentives to limit excessive usage are missing and an inefficient technology can be selected. The risk of excessive usage is also present in Case IV.

TABLE 1.1: FOUR TYPES OF CONTRACTS

	Employee chooses type of car	**Employee does not choose type of car**
Employee pays for fuel	Case I: no PA-problem	Case II: potential efficiency problem
Employee does not pay for fuel	Case III: potential usage and efficiency problem	Case IV: potential usage problem

Based on IEA (2007) and Graus and Worrell (2008)

Based on these four contract types and the dominance of Case III and IV, Graus and Worrell hypothesize that:

> *Company cars are larger, more powerful and less fuel efficient than driver-owned cars, and the distance travelled by company cars is higher than the distance by driver-owned cars, because of more private travel and/or higher travel distance for commuting (2008, p. 3746).*

Their analysis confirms these two hypotheses.

The PA-issue provides an interesting theoretical framework with respect to the purposes of this dissertation. It stresses the importance of the interests of all parties involved and the relationships between these parties. It points at the risks involved with adverse selection and moral hazard and the related reticence for a change in travel behaviour among CC owners. It already offers strong clues for the solution to tackle the problems associated with these risks. The latter is especially true in terms of the concept of the MB, as I demonstrate in the next section (§1.3). First, however, I discuss the final explanation of the problems associated with the CC.

1.2.4 AUTOMOBILE DEPENDENCY

The problems associated with the provision of cars by the employer are dissimilar to the problems associated with the provision of seasonal tickets for train or bus, or the option of a company bicycle. Indeed, the provision or support for these 'alternative' transport modes is hardly questioned. Meanwhile, the diagnosis of a PA-problem can also be applied to the situation of providing e-bikes to the employees, and the distortionary taxation argument can also be used to argue against tax deduction for train tickets. In short, the focus is somewhat arbitrary. To me, this is illustrative for the broad context in which the academic and public debate on the CC and the MB are nested. Critique on the CC system is both possible and viable because it is nested in a wider discussion concerning the impact of car transport. The CC is regarded to be an excess of an already problematic situation. As such, it was able to obtain a symbolic status in the debate.

As discussed above, the unsustainable character of the CC is framed as either a result of under-taxation - which makes car use too cheap - or a systemic contractual error - which hampers the choice by CC users and prevents them from obtaining the price signals. Likewise,

a solution to the first issue is to raise tax levels. A solution to the PA-problem is the MB, as I discuss in the next section. The MB is about more 'freedom of choice' and obtaining the price signals available in the market (Ch. 2 and 4). However, both arguments for more sustainable consumption 'remain within a tradition focussed on individual choice. They obscure how consumer's choices are affected by structural factors in society, such as working life conditions, urban structure and everyday life patterns', as pointed out by Sanne (2002, p. 273). Both 'solutions' are unable to address the more general problem of automobile dependency.

Automobile dependency refers to the situation in which transport mode choice for individuals is impeded by a lack of feasible alternatives to the car for activities beyond the residential location, such as education, groceries, shopping, work or dining (Dupuy, 2008; Kunstler, 1993; Newman & Kenworthy, 1999; Soron, 2009; Zhang, 2006). The lack of alternatives results from long travel distances, missing infrastructures and transport services, unsafe environments, a lack of skills, information and capabilities. The dependency turns into a hegemonic position of the car. Indeed, in automobile dependent societies, the use value of the car is relatively high compared to other modes, which result in a strong preference for the car. The main alternative to the CC is the private car in these societies (Ch. 5). For those without car access, the high level of automobile dependency results in the cancellation or absence of plans and reduced travel possibilities and less freedom. The dominance of the car itself is problematic as it is associated with a wide range of ecological, economic and social problems, including traffic safety, emissions, oil dependency, noise, spatial fragmentation, congestion, and a lack of physical exercise (for an overview see Paterson, 2007; Zijlstra & Avelino, 2011).

There are three types of policies to deal with car dependency: [1] making car use less attractive, [2] making the use of other transport modes more attractive, or [3] 'greening the car'. The first two options alter the relative position of the car, while the latter does not address car dominance, and might actually result in a stronger position of the car. For instance, by improving fuel efficiency of the car, emission levels might drop, but at the same time the use of the car becomes cheaper and its relative position improves. Meanwhile, mitigation of car-related issues is probably the number one objective of most transport policies, followed by attempts to improve the attractiveness of other modes; anti-car measures, however, are not popular at all (Paterson, 2007; Schwanen, Banister, & Anable, 2011; Zijlstra & Vanoutrive, 2013). This is, inter alia, reflected in the White Paper on Transport in 2050 from the European Commission (2011). On the one hand there are ambitious targets on greening the car, while on the other hand the document explicitly states that curbing mobility is not an option (Isaksson, 2014). The dependency on the car results in further investments in the car system, with extra roads, parking facilities and many mobility management schemes especially tailored to reduce congestion, and thus improving the relative position of the car. Meanwhile, car dependency complicates policies aimed at reducing car use; these are even considered to be political suicide, because people depend on their car to get around (Urry, 2004; Walks, 2014, 2015b). In the literature on sustainable transitions this situation is called a 'lock-in' (Avelino, 2011). These are important observations with regards to this dissertation. It explains the reluctance to address problems

associated with the CC, as well as explaining the popularity of other measures aimed at greening the car, the promotion of 'alternatives' or intermodal transport. I return to the issue of automobile dependency in Chapter Seven.

1.3 THE MOBILITY BUDGET

1.3.1 THE CONCEPT OF THE MOBILITY BUDGET

It is difficult to provide a proper description of the MB. Most descriptions in mainstream media are poor and incomplete, mainly because they are very short. Definitions in the academic realm are still missing, as the concept of the MB is relatively new and hardly studied. In the field, one can find a variety of practises all labelled as a MB, but with obvious differences (B50 werkgroep Mobiliteitsbudget, 2012). In Chapter Two I argue that the MB has been able to gain popularity not despite this lack of a proper definition, but due to this void; many actors are receptive to the concept as they can easily place their own accents and stress their own priorities. The current debate mainly concerns the power to define the MB in Flanders. All these observations make a general introduction to the concept somewhat complicated. Therefore, I mainly focus on the dominant interpretation of the concept and highlight main points of contention, which is actually already the result of the study presented in the following chapter (Ch. 2).

The MB is generally understood to be an individual budget provided to the employee by the employer in order to cover travel expenses. With the MB, employees can pay for transport modes or services they can select from a range of options. The MB is presented as a way to promote multimodal travel behaviour: using multiple modes during one single trip or different modes for different trips. The CC is explicitly not excluded as one of the transport modes available to the employee within the MB.

The main target group for the MB are employees with a CC (including fuel card). Two main points in favour of this argument are: [1] the MB is presented as an alternative to the CC, and [2] the MB is presented as a way to reduce congestion levels in Belgium. With respect to the latter, the emphasis is placed on replacing the car by other modes for commutes. This dissertation focuses on the popular interpretation of the concept, and is thus limited to a MB for CC owners. Several actors involved in the debate stress that CC owners are already highly mobile and might not need the MB. Others stress the importance of equality and argue that all employees should get a MB, not only those who currently have a CC.

The concept of the MB is directly, but implicitly, related to Agent theory and the PA-problem, as discussed in the previous section (§1.2.3). In theory, the MB aligns the intentions of the employee to those of the employer, as the barriers between principal and agent diminish. In the current situation, the employee does not have any incentive to conserve fuel or to minimise maintenance costs, according to the theory, as the employee with a CC is insulated from price signals. Under the concept of the MB there is an incentive, as budget overruns are borne by the employee. Moreover, a majority of actors in the debate argue in favour of the

conversion of remaining budget into additional income with a beneficial tax rate. If so, not only overruns, but also budget remainders are of interest to the employee. Since the employees are free to select the preferred transport mode, they can make their own assessment with respect to capital and distance costs. Someone with a high annual mileage might look for a fuel efficient car; while another employee may be more interested in a bicycle next to the CC, as he or she lives close to work. With the MB we move from Case II, III or IV towards Case I in Table 1.1. Observe that some of the theoretical improvements in the contract between principal and agent are already obtained by implementing a monthly CC allowance (§1.3.2), though the MB explicitly includes other transport modes and a cash-out option for any remaining budget. The MB reduces the threats for the principal.

There are clear resemblances between the concept of the MB and Flexible Benefit Plans (FBPs), also known as a cafeteria plans (X. Baeten & Verwaeren, 2012; Barringer & Milkovich, 1998; Hillebrink, 2006). A FBP is an individualized pay system which provides to 'employees some degree of choice in their employment conditions. They may choose to sell a certain quantity of specifics employment conditions ('sources') to buy others ('goals')' (Benders, et al., 2006, p. 1115). Key words here are 'customized' on the one hand, and 'reward package' on the other. Benders et al. (2006, p.1115) continue: 'Allowing certain choices tailors the reward package to meet the diverse employee needs, and is thus an instrument for individualizing employment relationships'. Both the FBP and the MB can be regarded as criticism on one-size-fits-all policies (see also Ch. 4). Generally, it is assumed that the FBP helps to improve employees' satisfaction with the working conditions. An important difference between the MB and the FBP is that the MB is mainly concerned with transport options. Here one can find a link with the idea of 'mobility as a service'. The options are certainly not solely about transport mode ownership. Rather, it is about access to transport and mobility services.

1.3.2 Input equals Output: Sources and Goals

The MB is conceptualised as a closed system: input equals output (Table 1.2). In the dominant version of the MB concept, the current capital and distance costs for the CC are 'liquefied' and determine the total size of the budget. Next to the CC, two other options are sometimes mentioned as potential input: wage and other benefits. By adding these additional sources, more combinations and options within the MB come within reach, as more input equals more output. The option to use primary wage as a source is excluded or neglected in the dominant interpretation of the MB. Meanwhile, the conversion of cash into a CC has been one of the most popular practices in recent years in Belgium ('Cash for a Car'), and is used as wage optimisation (§4.2). The option of using other benefits as input has been observed in the field as well and is also included in the legislative proposal for the MB by the Christian-Democrats (Van den Bergh, 2013a). By using wage and other benefits as input, the MB starts to resemble the FBP even more.

In the instance that all 'output' is limited to car-related options, such as a more or less expensive car, in-car options (gps, park-assist, etc.) or fuel card, I label this a '*company car allowance*'; this is not a fully-fledged version of the MB. The concept of a budget for the car is actually quite common; many CC owners already have a kind of monthly budget for the CC

(Ch. 4). The MB explicitly includes other transport modes and services as output in addition to the car.

It is generally accepted that the MB should also include an end-of-year bonus as a goal. If so, any money saved within the scheme is converted into additional income. This additional income is unlike primary wage, since it is not related to the length of the work week. This also opens up a discussion concerning the taxation of this end-of-year bonus (Ch. 7). In case the bonus is taxed like ordinary wage, the net income will often be modest, since many CC owners have a relatively high income level and progressive income tax applies in Belgium. Because of this, some actors in the debate argue that special beneficial rules should apply, in order to create an additional incentive to lower car use. Note that this also implies a new way to avoid income tax.

TABLE 1.2: OVERVIEW OF INPUT AND OUTPUT IN VARIOUS KINDS OF MOBILITY BUDGETS

Target group	Sources	Goals
Only employees with a CC	***CC and fuel card***	More / ***less expensive car***
	Wage or bonus	More / ***less kilometres***
	Other benefits	***Other modes*** (+ bonus)
		Other benefits
		Bonus
Other or all employees	Current travel reimbursements	CC
	Wage or bonus	Other modes (+ bonus)
	Other benefits	Other benefits
		Bonus

Note: the dominant interpretation of the MB as studied in this thesis is highlighted in ***italics and bold***

There are some exceptions to the principle of the closed system. The most dominant exception is the idea of an additional incentive for more sustainable transport modes. In the proposal from the Green party for a MB, a bicycle bonus has been added for those cycling to work. At Siemens Belgium a bonus was offered to all those switching from the CC to another transport option.

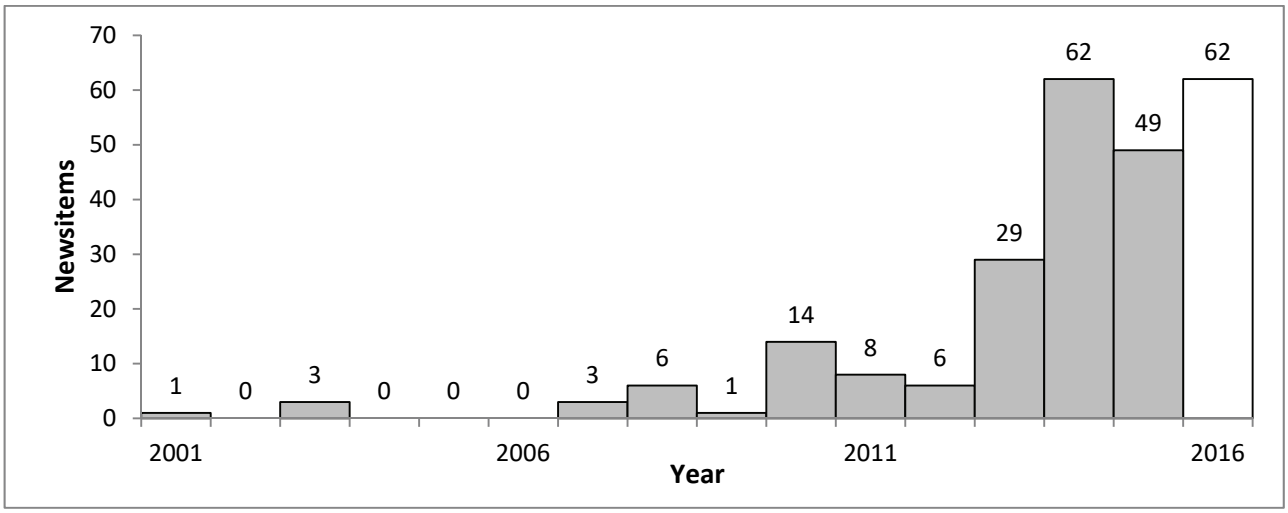
1.3.3 EXPERIENCE WITH THE MOBILITY BUDGET

An academic evaluation of the MB concept is still missing, which is probably due to its regional character and the fact that it is relatively new concept. In Fig. 1.3 I provide an overview of the number of news items in popular Flemish media that include the term 'mobility budget'. The results indicate that the concept was close to absent until 2010 and that the attention was the highest over the last few years, until now. The year 2016 will probably be a new record, since only the first six months have been included in the search and the number of articles already equals the peak of 2014.

There is already some practical experience with MB in Belgium. In 2012 about 2.7 % of the companies in Belgium offered some version of the MB to (a selection of) their employees (Venneman & Vanderbeuren, 2012). Unfortunately, very little is known about the transport effects of the implementation of the MB on a company level, also because the MB was implemented very recently and monitoring of the effects requires time. In both press releases

and media, main aspects are about policies, intentions and the options available to workers. Moreover, many companies stress the need to be an attractive employer; they are not primarily concerned with these transport effects (Van Dyck, 2011).

FIG. 1.3: ITEMS IN FLEMISH NEWSPAPERS WITH THE TERM *'MOBILITY BUDGET'*

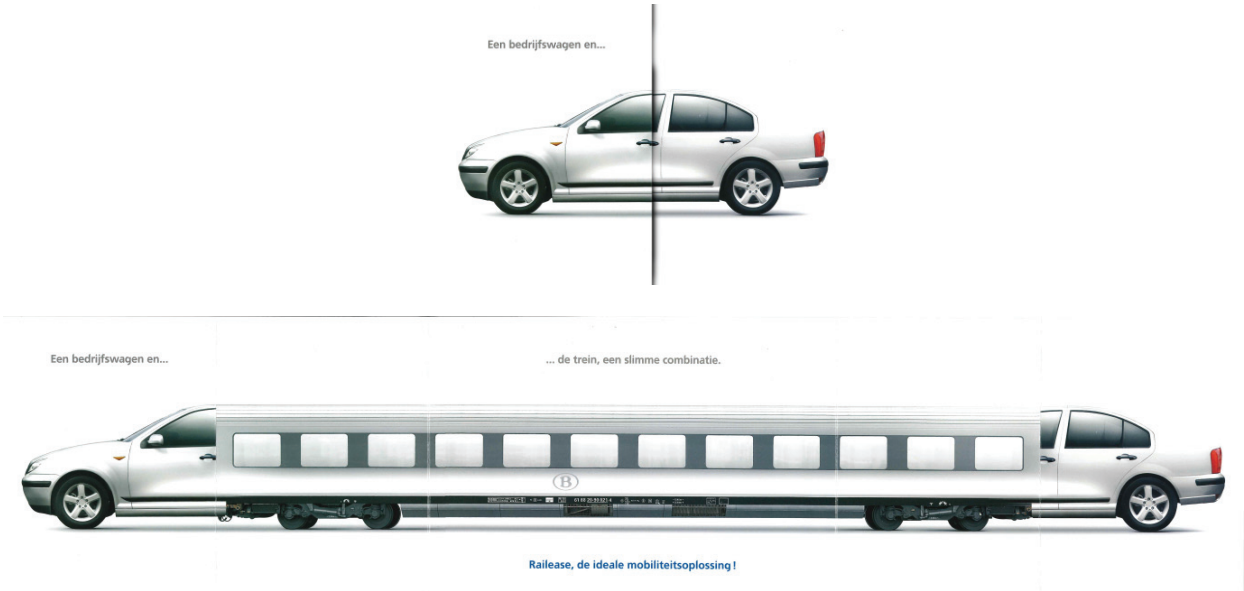


Source: GoPress search with term 'mobiliteitsbudget' on 07/06/2016

In 2008 the national Belgian Railways (NMBS/SNCB) introduced the concept of *Railease* in collaboration with Accenture and Athlon respectively; a professional service company and a car lease companies in Belgium. The central idea of the concept is to offer train tickets to CC drivers; they can opt for 20, 40 or 60 days of travelling by train (Fig. 1.4). The cost of travelling by train is covered by the money the driver saves in fuel and other car use costs. In 2010 the number of companies with a Railease contract was 60; in just four years, this number increased to approximately 240 in 2014 (Davidse, 2015). However, this seems to be fairly modest considering the total of 1 million registered companies in Belgium. Moreover, the number of employees that actually used the train at least once in 2014 is very small, with a total of 3 717 (Davidse, 2015); in all cases just a fraction of the total number of CC owners (§1.1).

Siemens Belgium introduced a version of the MB in September 2012. This alteration of the corporate mobility and wage policy coincided with a relocation of their headquarters. At the end of the lease contract, employees are now offered a choice: they can continue to drive the same class of CC, or they can select a cheaper class in exchange for alternative transport options. The alternative transport options are a bicycle, an electric bicycle, a seasonal ticket for train or regional PT, or access to the shared car service. An extra incentive is provided to those who opt for a less expensive car: they receive an additional bonus of € 20 each month. In early 2014, about 250 people were already subject to a choice moment. While many of them spent hours exploring the options in the online choice assistance application, only about 10 out of 250 people altered their class of their CC and saved money for other options (Zijlstra et al., 2014).

FIG. 1.4: PROMOTION MATERIAL FOR RAILEASE; IN THE UNFOLDED FLYER THE CAR BECOMES A TRAIN



Source: flyer from the NMBS group

The Belgacom Group, with brands like Proximus, Scarlet and Skynet, is one of early adopters of the MB. The Belgacom Group has many vehicles: 3 800 passenger cars and 3 500 other company vehicles, on a total of 16 000 employees. Because these numbers were expected to increase, management decided to alter the corporate mobility policy. The introduction of the MB was one of the elements of this new integral policy. In the new situation there were better opportunities for teleworking, mobile communication tools were extended, full compensation for public transport and parking fees were introduced. In total 1 519 people were eligible for the MB (9.5 % of all employees), 527 of them decided to participate and combine the CC with PT (Zijlstra et al., 2014; original source no longer available).

The energy company Engie of Electrabel is often mentioned as one of the success stories of the MB in Belgium. Before the introduction of the MB, called the *Let's Choose* programme, about 70 % of the employees came to work with a car. Since implementing the system, nearly 70 % of the employees now commute by train. In the same period, the main office was relocated to one of the main train stations of Belgium (Brussels-North). At the new location the number of private parking spaces is limited to 370 for a total of 3 000 employees (Moens, 2016; Rasking, 2016).

The project *Mobiliteitsbudget werkt!* is probably the best known source when it comes to the effects of the MB (Ch. 2). During the experiment, the travel behaviour of the participants was closely monitored. In the experiment a version of the MB was introduced at five companies. In this version of the MB, employees were able to choose between seasonal or single tickets for train, regional PT, and a bicycle. A budget of € 150 per month came on top of the CC; the use of the CC was not restricted through financial measures. In total, 55 employees participated. They joined the experiment for the duration of 1 to 24 weeks (J. Christiaens, De Witte, & Vanderbeuren, 2013).

The results of the project were impressive. About 80 % of the participants used their private or company car for the commute prior to the experiment; during and after the experiment, this share dropped to 50 %. Meanwhile, the share of cyclists increased from 10 % to 22 % and the use of the train grew from 8 % to 24 % in the modal split. The MB also affected other trips of the participants. In general, the daily car use decreased from 70 % to 39 %. The respondents indicated they gained a more positive attitude towards other transport modes (Christiaens et al., 2013). The impact of this study was not only important because of these numbers, but also because of the considerable media attention (Ch. 2). However, a critical examination of the project by Zijlstra et al. (2014) reveals multiple issues and sheds a different light on the research results.

Mid-2016, the Flemish Institute for Mobility (VIM) presented the first results of the project *Slim Mobiliteitsbudget* in a press release (VIM, 2016). The MB was tested over a period of six to twelve months at twelve companies in Belgium. In total 123 employees were offered an experimental budget.

> *About 45 % of the participants in the project altered their travel behaviour to some extent, though the car remains to be the most important transport mode. [...]. 39 % of the respondents state that caching out the remaining budget would alter their travel behaviour. This number increases to 56 % in case this is a net bonus (p 1).*

The final report on this project was unfortunately not jet available at the time this thesis was printed.

In the Netherlands there is more and longer experience with the MB (Fig. 2.1). Many actors in the MB debate in Flanders refer to the success of the MB in the Netherlands:

> *From foreign (Dutch) research we learn that if one is able to make his own choices in the field of sustainability and in the field of benefits, this will result in a higher utility for those involved, those involved will in fact opt for the most sustainable alternative. A policy based on positive stimuli will be able to achieve more objectives, than a negative sanctioning policy (for instance a system which would totally erase the company car through taxation)' (Van den Bergh, 2013b, p. 3).*

For an overview of experiences in the Netherlands and their results, I kindly refer to the final report from the working group on the MB in the Netherlands (B50 werkgroep Mobiliteitsbudget, 2012). Some of the results presented by the B50 work group are impressive; they offer hope for improved traffic conditions. Conversely, there are other figures from the Netherlands that question the overall impact of the MB. These figures concern implementation and participation. Anno 2016 only 4.3 % of Dutch CC drivers used a MB, according to a large-scale study (n=3 500). Only 11 % of those without a MB were interested in the concept (VNA, 2016).

The companies mentioned in and beyond this short overview are hardly representative for the average Flemish or Belgian company. Mainly they are large companies with over a thousand employees. Moreover, there is a striking similarity to be noted in many of the anecdotal examples on the actual implementation of the MB, as there is a compelling need to

alter the mobility policy of the company. The pressure to modify originates from problems related to accessibility and mobility: there were high levels of congestion, there was a shortage in parking spaces, or the company moved from one location to another. In some cases, there was a combination of transport-related issues. This observation has serious implications for the assessment of the likelihood of implementation of the MB by employers and the effect of the concept on employees. Furthermore, in many cases the introduction of the MB is accompanied by other new mobility policies, e.g. paid parking facilities.

On top of this, I have observed low participation rates by employers and employees in the experiments and in practice. In the project by VIM 50 companies showed a serious interest in participating, yet in the end only 12 companies actually provided participants, with an average of 10 people per company. Likewise, in the project *Mobiliteitsbudget werkt!* 55 people participated from the initial sample of 22 companies. At Siemens many employees were interested in the concept, but only few of them actually joined. In in the Netherlands only 1 out of 24 CC owners has a MB and only 1 out of 8 is interested in the concept.

The effects of the experiments are probably seriously biased due to self-selection. In both experiments – from Mobiel21 and from VIM – companies voluntarily applied to participate after a call by the researchers. In this scenario one might expect that companies with transport issues are more likely to respond. Within these companies the participants were not randomly selected either, as they also responded to an internal call. Again, one might anticipate that those with options and willingness to alter their travel behaviour are more likely to answer the call. Therefore the choices made by the participants are useful and insightful, but probably not representative for employees of the company or other employees in Flanders.

This section on the current knowledge about the effects of the MB clearly indicates that there is a research gap with respect to the conditions that need to be fulfilled before any change in travel behaviour due to the MB can occur. Indeed, I argue that the actual changes in travel behaviour are of limited relevance in terms of transport effects as long as it is unclear what the MB is and as long as the number of employers offering a MB, the number of employees participating and the share of choices within the MB by employees that enable this more sustainable travel behaviour are unknown. The goal of this thesis is to fill this research gap.

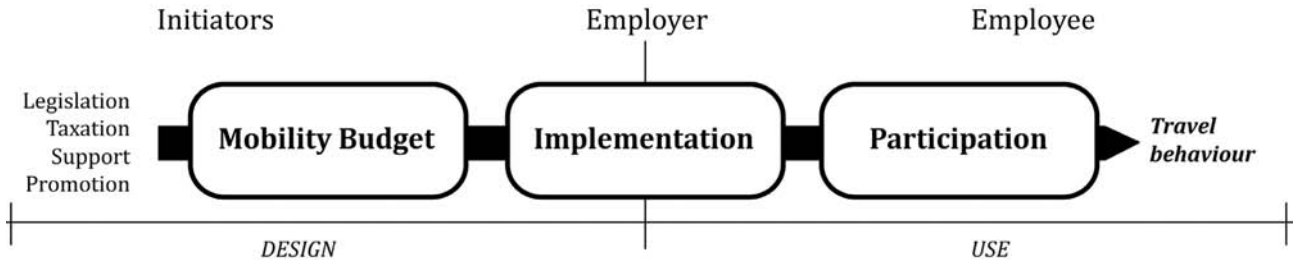
1.4 Outline of the Research Project

1.4.1 Research Objective and Questions

The goal of my research project is to scrutinise the concept of the MB with an emphasis on the transport-related objectives of the concept. I want to enhance the current understanding of the MB, including an understanding of its origins, aspirations, and its potential to live up to this. Unlike other projects, for example *Slim mobiliteitsbudget* and *Mobiliteitsbudget werkt!*, I do not study the actual or direct effects of the MB on travel behaviour of individuals with a MB, as these effects are of limited relevance as long as the preconditions are not fulfilled.

Travel behaviour is the final step in a series of barriers to overcome or choices to be made. My thesis explores the steps necessary before change in actual travel behaviour can occur due to the MB. The main steps I identified are provided in Fig. 1.5, they are reflected in the research questions (Table 1.3) and in the chapters of this thesis, in which they are addressed one by one (§1.4.3).

FIG. 1.5: BASIC FLOWCHART OF THIS DISSERTATION



First, there is the design of the MB. This step concerns the practical definition of the MB. It is about questions such as who is eligible for the MB, what options are available, what are the relative prices, what is the size of the budget, and so on. This does not start from a tabula rasa; it is nested in the current legislation, government subsidies and corporate mobility policies. Meanwhile, new legislation for the promotion of the MB is forthcoming. The design is crucial to the implementation levels by employers and participation levels by employees. Here I need to stress that the purpose of my research in this part is not to find the optimal condition for the MB to flourish. On the contrary, I study the MB as it is popularised and I use this dominant interpretation for the remainder of this thesis. The operationalisation of the concept is based on an assessment of the attractive power of the concept. This assessment concerns the appealing features, the norms and values reflected in the concept, and the way the MB offers hope for a better tomorrow.

The issue of implementation by the employer is the second step under scrutiny. In order for employees to participate in the MB, it simply needs to be available to them. The chances of implementation improve when a positive cost-benefit analysis is conducted by the employer. In this analysis, the current situation will be compared to the promise of the MB. Here I also argue that companies are not economic and efficient machines, but are actually run by humans with a bounded rationality and sensitivity for social-psychological pressures. Therefore, I will also consider more institutional factors in the assessment of implementation levels.

Third, I study expected participation rates of employees. I argue that participation is a trade-off between the costs and benefits of the current arrangements versus these of the future options within the MB. However, the current options do have a head start, as there are no transaction costs, employees do not suffer from uncertainties, are much of the alternative options might be unknown. In order to gain insight in the participation rates, I look into the attitude towards the MB, the extent to which the current benefit-in-kind is consumed, and the prospects for mode switching for the CC user.

In the last step, I study the choice behaviour of employees when offered a MB. This is not jet about the travel behaviour, but about the choices that enable new travel patterns. In this part I study the likelihood of handing in the CC or selecting a smaller and cheaper CC in exchange for other options. Furthermore, I look into the appreciation of multimodal transport options by employees, as the MB is presented as a boost for multimodal travel behaviour. Choice behaviour within the MB is, of course, linked to participation. If people select the same option within the MB as they did without it, there is not really a true participation as the new options are not being used.

An overview of the research project can be found in Table 1.3. The sub-questions provided in this table are primarily illustrative; they serve as a further disquisition of the question. This list of detailed questions is not necessarily complete. In multiple cases there are many other relevant questions eligible for further study in order to answer the overarching question.

TABLE 1.3: OVERVIEW OF THE RESEARCH QUESTIONS

Research Question	Ch.	Method
1 **How was the MB able to become popular in recent years?**	2	Discourse analysis
What is the origin of the MB?		
What kind of values and norms are reflected in the concept of the MB?		
Who defines the MB?		
What are the aims, hopes and dreams of the MB?		
2 **How likely are employers to implement the MB?**	4	Surveys
Why would employers implement the MB?		
Why would employers stick with the CC?		
What are the implementation rates of similar concepts?		
3 **How likely are employees to participate in the MB?**	5	Surveys
What is the attitude of target group members towards the MB?		
To what extent is the CC consumed as a benefit-in-kind?		
What are the possibilities for alternative travel behaviour?		
4 **What are the preferences of employees within the MB?**	6	Choice experiment
Are people willing to renounce the CC?		
Are people willing to select a smaller / cheaper model?		
To what extent do employees appreciate multimodal travel options?		

1.4.2 SCOPE OF THE RESEARCH PROJECT

The main focus with respect to the potential of the MB lies on the transport related effects, as I indicated earlier. The potential contribution of the MB to general transport policy objectives is commonly stressed by the proponents of the concept in support for new legislation, assistance from the government for popularisation, and the development of tools and research. This makes the transport effects a socially relevant dimension. There are also internal considerations mentioned by for instance company representatives, for example, the MB as bait in the war for talent. I will not study the potential of the MB to attract new talent. Furthermore, I mainly 'ignore' the fiscal aspects, the pros and cons of progressive taxes, and the administrative complexity. Nevertheless, the clear links with other fields and disciplines cannot be denied. One evident example is the employment-relationship, as the MB is

unmistakeably a new element in this relationship (Ch. 2). When relevant to my thesis, I will involve other disciplines and fields of knowledge.

Another limitation of the research scope is the examination of merely one version of the MB. There are many versions of the MB available, as I argued in §1.3 and demonstrate in Chapter Two. Since finding the best version of the MB is not one of my objectives, I will only study the dominant version of the MB in the debate in Flanders (Table 1.2). I will reflect on this dominant interpretation at the end of this thesis, in Chapter Seven and Chapter Eight.

Regarding the previous remark, I need to stress that the debate about the MB is still active: there are new developments and new studies. An evident example is the tax-shift as proposed by the current federal administration (Table 2.2). Moreover, the Christian-democrats (CD&V) already somewhat altered their position towards the MB. It is not the aim of this thesis to provide the most up-to-date information. Most of the research work has been conducted in the period from end of 2013 to summer 2015. For all used data-sets and sources I will be clear about the relevant period.

The version of the MB in this dissertation is for employees with a CC in the current situation (Table 1.2). This limitation in scope is mainly driven by the fact that CC owners are primarily targeted for the MB (§2.5). I ignore the participation rates and choice behaviour of other potentially interesting groups, though I will reflect on this decision in the discussion chapter of this thesis (Ch. 7). This also includes a more general reflection on the concept of the MB.

This thesis concerns the MB in Belgium, with the main focus on Flanders. This means that many of the findings are only valid or applicable to the Belgian or Flemish situation and the knowledge transfer to other countries or regions is not always evident. The focus on the Flemish region results from the fact that this thesis is financed within the framework of the Research Centre on Commodity and Passenger Flows, supported by the Flemish government. The debate on the MB is a typically Flemish phenomenon; it is initiated by Flemish companies and NGOs and the share of employees with CC in Flanders is twice the share of employees with a CC in Wallonia. Indeed, many people from Wallonia that I spoke to during the project were completely unaware of the concept of the MB. There was also a practical consideration, as Belgium is a bilingual country with a French speaking and a Flemish speaking part. Since my French language skills are rather poor, I was forced to limit most of the data gathering to the Flemish parts, people and sources. In case the whole country is covered by certain data, I have added dummy variables to the models to reveal regional differences. A clear cut between Belgium and Flanders is not always evident; for instance, the discussion on the MB is about altering legislation and taxation, which is situated at the Federal level.

1.4.3 Structure of the Thesis

To conclude this first chapter, I offer an overview of the content chapter by chapter (Fig. 1.6). In total there are eight chapters in this thesis, including this first chapter. After these chapters, a full bibliography and multiple appendices can be found. On the first page of these appendices, there is a table of contents for the appendices, which will not be discussed in this section, though reference to the appendices are made throughout the chapters.

Chapter Two offers a detailed account of a discourse analysis that was performed to scrutinise the concept of the MB. In this chapter one can find the answers to the first set of research questions in relation to the raison-d'être of the MB and its appealing characteristics. The former concerns the objectives related to the MB, its origins, and the general contextualisation. The latter is primarily used to operationalise the concept in the remainder of the thesis. Of course an introduction to discourse analysis and an overview on the data used is also included.

I used a variety of research methods to obtain the answers to my research questions, as the final column in Table 1.3 already reveals. In Chapter Three these methods and corresponding data are introduced, except for the method and data of Chapter Two, which is discussed there. The knowledge used in this thesis comes from international academic literature, datasets from previous research projects, and my questionnaire. The origin and quality of the literature is not discussed; I simply provide a full bibliography at the end of this thesis. In Chapter Three I discuss the most important additional datasets in a separate section. Special attention is devoted to the design of a mixture amount stated choice experiment (Ch. 6) and the matching technique used for data pre-processing (Ch. 5).

Chapter Four concerns the likelihood of implementation of the MB by the employers in Belgium. The decision to implement is regarded to be a trade-off between the CC and the MB. In this chapter I start with the discussion about the appealing features of the CC from the perspective of the employer. Then I continue to the appealing features of the MB and I offer an overview of barriers for implementation. I conclude with an assessment of the implementation rate by studying these rates for similar concepts, like FBPs. All the results are summarised in the concluding section.

The likelihood of participation in the MB by employees is the main topic of Chapter Five. In this chapter I first offer insights into the attitudes of CC owners towards the concept of the MB. Previous research indicates that these attitudes offer the best clue for future participation rates. Next, I study the consumption of the CC as benefit in kind, by looking into the annual mileage. In Chapter Five one can also find a detailed study on the potential for mode switching for by CC owners in the daily commute. Finally, I offer a conclusion to this chapter.

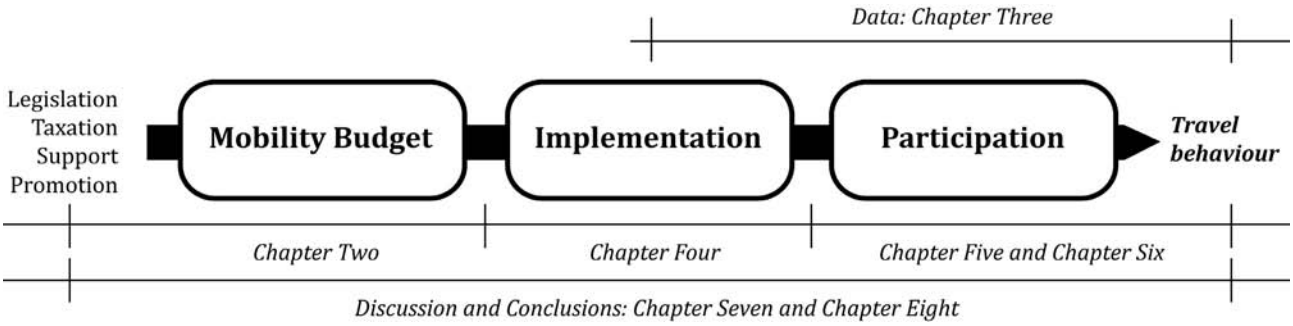
In Chapter Six I provide important insights regarding the choice behaviour of employees when offered a MB. The insights presented are obtained from a stated choice experiment. I provide an introduction to the three choice models used. I offer details on the estimation procedures and utility function and an analysis of the results. The results themselves are divided into three parts; each part addresses one of the objectives of the MB, namely waiving the CC, selecting a smaller CC and the appreciation of multimodal transport options. After these results I offer an internal and external validation of the outcomes, as well as a final conclusion.

In Chapter Seven I offer a discussion of the concept plus a reflection on the results in relation to the methods used. I start with a critical assessment of the concept of the MB by, on the one hand, discussing effect, efficiency and equity issues and, on the other hand, by looking beyond

the MB. With respect to the methods I reflect on the discourse analysis, questionnaire, choice experiment and matching techniques used.

Finally, in Chapter Eight I provide an overview of the most important conclusions. In order to structure this chapter, I address the research questions from Table 1.3 one by one. I conclude with the main research question. In Chapter Eight I also provide policy recommendations and suggestions for further research.

FIG. 1.6: CHAPTERS OF THIS THESIS IN RELATION TO THE FLOWCHART



CHAPTER TWO: A QUALITATIVE ANALYSIS OF THE MOBILITY BUDGET

You got a fast car

I got a plan to get us out of here

— ***Tracy Chapman****, Fast car (1988)*

2.1 INTRODUCTION

This chapter offers a qualitative exploration and contextualisation of the concept of the *Mobility Budget* (MB). More specifically, my goal is to understand how and why the MB was able to generate so much enthusiasm in Flanders in the recent years. One significant outcome of this exercise is the disclosure of the constitutive rules of the MB (see next paragraph). By revealing the appealing features of the concept, one can point out a version of the MB that is most likely institutionalised through new practices and alternations legislation or taxation. These results are also the main ingredients for the remainder of the study (§2.6). Some of these conclusions have already been discussed in the introduction of the concept (§1.3).

Currently, the MB is ill defined and the meaning of the term is reshaped on a regular basis. There is space to manoeuvre, since unlike mass, velocity, or acceleration, the MB is not a 'scientific' concept. Various actors in the debate actually use different definitions of the MB, which are often rather poorly delineated. As I demonstrate in this chapter, it is not *despite*, but *due to* this ambiguity that the rudimentary concept was able to gain its popularity. The concept of the MB depends on a set of constitutive rules (Searle, 1964). Constitutive rules are rules that determine what the MB is and what it ought to achieve. Without these rules there would not be a MB at all. Examples of concepts with constitutive rules are, for instance, a game of chess or a football match. This implies an important difference from scientific concepts such as velocity. Velocity would still be out there, even if we were to alter its name or the rules of the game.

The simple fact that the MB depends on a set of constitutive rules implies that *it is not a neutral concept*. The concept of the MB is rooted in a particular discourse: *the neoliberal discourse*, as I demonstrate in this chapter. This discourse determines good and bad, the possibilities and impossibilities of the concept, what can and cannot be said , and so on (Hajer, 1995; Mayr, 2008). There is a certain purpose attached to the concept of the MB: a set of objectives that it ought to achieve. Hence, one can only fully understand the concept of the MB and its popularity if one is able to understand the genealogy of the concept. In order to decipher the popular characteristics and the genealogy of the concept, I performed a discourse analysis of publications in popular media, policy documents, and studies concerning the MB.

This chapter has the following structure. After this short introduction, I start with a brief contextualisation of the MB concept in *the era of self-control.* I argue that this current era is significantly different from the post-war period, when the employee was depicted as a rational man with one primary incentive: wage. Nowadays we use work in order 'to become who we are'. After this introduction, I discuss the basic elements of policy discourse analysis, with some appropriate examples and useful sources for further reading. Next, the data used in the analysis is presented. The most important data comes from the actors of the debate themselves, although I also used quotes and definitions from newspapers and web pages. The procedures for data gathering and processing are discussed in the same section. The main part of this chapter consists of the results of the discourse analysis, where central as well as contested aspects of the MB concept are discussed. In the elaboration that follows, I briefly

reflect on the most striking elements. The last paragraph provides the main conclusions for the research questions and the constitutive rules of the MB.

2.2 THE EMPLOYEE OF THE FUTURE

The MB is part of a new phase in the employment relationship. As expressed by key actors in the debate in the quotes below, and as I demonstrate in this chapter, the MB is regarded to be an exciting and promising feature in this relationship: it is beneficial for both parties involved. On the one hand, the employee regains autonomy; he or she enjoys the freedom of choice and can optimize the daily commute according to his or her wishes. The employer, on the other hand, generates higher employee satisfaction, competes in 'the war for talent', can improve the accessibility of the workplace, and by doing so, will reduce time loss for products, customers and employees. The whole idea of mutual gains contrasts the way work was depicted in the past (Rose, 1999). Work was associated with control, coercion, exploitation and discipline. Workers were regarded to be disposable and anonymous production factors. Nowadays we seem to be talking about 'freedom', 'choice', and 'flexibility' for the individual employee. Indeed, a new vocabulary has entered the field.

> *The employee of the future has to be able to support his daily travel needs with a sustainable mobility package, in which multiple transport modes can be combined in an optimal way. – Project team 'Multimodal commuting', BBL et al. (2010, p. 6)*

> *The company empathizes with their employees with respect to [transport needs – TZ], because of various reasons: sustainability, employees as internal customer, and the overall attractiveness of the company (they lose employees due to a lack of transport options). This also relates to a wider sociological evolution, in which the balance of power between the employer and the employee is shifting to the extent that one should now be talking about a labour-provider, being an employee that is willing to offer his services to the company. Hence, the employee is more and more in control over his own remuneration package. For example, the demanded wage might be lower, while the demand for flexible working conditions is higher. – Project team of 'Mobility Budget works!', Christiaens et al. (2013, p 48)*

> *A time comes when we will wake up in the morning and find out how we are able to arrive smoothly at our destination that day. This will not always be by car. We strive for a sustainable transport system, in which we can easily transfer between car, bicycle and public transport. – Former Minister of Transport, Hilde Crevits in Wirix and D'Ours (2014)*

> *Both employer and employee are in need of a mobility budget. – MP Jef Van Den Bergh (CD&V) in De Crom (2013)*

These quotes illustrate a couple of things. First, a new way of multimodal travel is idealised. In the future, trips need to become light, seamless, and smooth. Everything needs to be done in order to support the commuter in the ongoing quest for optimal travel conditions. The MB

seems to be an important condition in this future. Second, the MB is not forced top-down on 'hard working citizens' and entrepreneurs by an omniscient government. Rather, the possibility which was previously withheld from those in need; it should become available in the short term. Third, employees and employers are not counterparts; they share the same needs. There is mutual respect and a shared goal.

Various phases in the employment relationship over the last century were studied by Rose (1992, 1999). He identifies five periods with respect to the dominant perception of 'the productive subject' in the United Kingdom and elsewhere (Table 2.1). My main interest here is the last period, the period of 'self-control', since I am convinced that the concept of the MB is firmly rooted in this period. In order to understand the basic characteristic of the current period, I contrasted it with the previous period (Table 2.1). Back then, good management was about good planning. The cadres were mainly responsible for it, while the employee was to be triggered by the ultimate incentive: money. The paycheque should be in line with the productivity of the worker. Job promotion and the accompanying raise were proper incentives to stimulate productivity in the workplace.

TABLE 2.1: TRENDS IN THE EMPLOYMENT RELATIONSHIP

Period	**Industrial**	**Social capitalism**	**Democratic**	**Technical**	**Self-control**
Decennia	19th century	1900s - '40s	1940s - '50s	1960s - '70s	1980s onward
Dominant knowledge base	Scientific management, engineering	Ergonomic, hygienic, welfare of worker	Human relations, sociology, psychology	Management expertise, scientific	(Neoclassical) economics
Key words	production, units, uniformity, economics of scale	health, welfare, humanization, care, collectivism	peace, deliberation, cooperation, participation	calculation, planning, expertise, rationalization, extrinsic motivation	competition, intrinsic mobilisation, flexibility, reflection, individualization
Dominant presuppositions about employees	Disposable production factors	Persons with physiologic needs and health requirements	Interrelated social human beings with subjective needs	The economic man	The entrepreneurial self

Based on Rose (1999)

Changes in views on management and HRM can be illustrated by using management literature. Boltanski and Chiapello (2005) studied the changes in the management discourse by comparing books for managers in the two relevant periods: the 1990s versus the 1960s. For each period they studied sixty texts. Management books are an interesting source for studying the employment relationship because they are not purely technical or scientific. Authors use a moral tone; therefore it is normative literature stating what should be the case, instead of what actually is the case. Moreover, management books practice the exemplum: anecdotes serve to illustrate and demonstrate the case made by the author.

The changes observed by Rose (1999) are reflected in the corpus studied by Boltanski and Chiapello (2005, p. 62): 'In the 1960s, what concerned our authors was motivating *cadres*, whereas in the 1990s, knowing how to engage them is treated as only one particular instance of the problems involved in mobilizing all employees'. The French term 'cadres' equates *'kaderleden'* in Flemish. The actual use of the word was common practice in the 1960s corpus, while many authors try to avoid the term in the 1990s. Cadres become associated with a cold, calculating administrative rationality; the new proper term is 'manager'.

The central theme of the 1960s is 'the management by objectives'. Cadres are no longer to be told what to do, they should be told what to achieve. As such, the problem of management relay is mitigated and managers gain more autonomy; the cadres are no longer trapped between the owner of the factory and the workers. Making profit is not regarded as a very inspiring goal for neither managers nor other employees, though this conclusion also holds for the corpus of the 1990s. An important issue of the 1960s is the giant size of the firm. The argument of more autonomy for the cadres is generally accompanied with references to the perverse effects of large bureaucratic machines. Next to management by objectives, the authors of the 1960s corpus argue in favour of decentralisation and meritocracy.

The corpus from the 1990s rejects hierarchy. Authors of management books refuse dominant-dominated relations. This is mainly a moral issue, although they also refer to social evolutions and the rise in education levels. In line with this rejection, the authors also discard planning; the literature of the 1990s clearly opposes 'the old methods' as presented in the corpus of the 1960s. The new company is depicted as a network in which employees hop from one project to the other, each time joining a new team. A central theme in the literature of the 1990s is competition: 'In virtually all texts, we find advice on implementing flexible inventive organisation that will be able to 'ride' all 'waves', adapt to all changes, always have a workforce that is up-to-date with the most recent knowledge, and secure a permanent technological advantage over competitors' (p. 71). Meanwhile the boss has to become a leader with vision, an artistic manager and a coach. The new managers are to be intuitive, humanist, inspired, and creative: 'The manager is a networked man. His principal quality is his mobility, his ability to move around without letting himself be impeded by boundaries, [...]' (Boltanski & Chiapello, 2005, pp. 78–9).

The contemporary company is a liberated firm. However, the question of control remains the main concern of the authors of the 1990s corpus. *Controlling the uncontrollable* is not something with an infinite number of solutions, according to Boltanski and Chiapello (2005, p. 80), 'in fact, the only solution is for people to *control themselves*, which involves transferring constrains from external organizational mechanisms to people's internal dispositions, and for the powers of control they exercise to be consistent with the firm's general project.' The researchers conclude that the transition from top-down to self-control is the most significant evolution of management in the last thirty years. 'Why vest control in a hierarchy of *cadres'*, they rhetorically ask, 'if wage-earners can be induced to control themselves?' (Boltanski & Chiapello, 2005, p. 81). Self-control is, however, not the actual term used in the management texts; instead, terms such as 'trust', 'autonomy', and 'responsibility' are used.

In the new era of self-control, from the 1980s onwards, the productive subject becomes primarily framed as a consumer. Through the act of consumption people are to shape their lives. People need to select a lifestyle from the range of options offered to them by commerce, marketing, media and social networks. They need to make sense of existence and enjoy freedom through acts of choice. As such, one is able to assemble, manage and market oneself (Bruckner, 2002; Dardot & Laval, 2013; Rose, 1992, 1999). As Rose writes:

> *The image of the citizen as a choosing self entails a new image of the productive subject. The worker is portrayed neither as an economic actor, rationally pursuing financial advantage, nor a social creature seeking satisfaction of needs for solidarity and security. The worker is an individual in search of meaning, responsibility, a sense of personal achievement, a maximized 'quality of life' and hence of work. Thus the individual is not to be emancipated from work, perceived as merely a task or a means to an end, but to be fulfilled in work, now construed as an activity through which we produce, discover, and experience our selves (1999, p. 104).*

A key argument in this thesis is that the MB concept is firmly nested in this new era described above; the concept of the MB complies with the current discourse and was therefore able to gain popularity in rather a short time. There are many terms used in the field in order to label this new era and its discourse. The terms used by Rose (1999) are 'advanced liberalism' and 'neoliberalism'. Boltanski and Chiapello (2005) call it 'the new spirit of capitalism'. Others, such as Sennett (2000), refer to 'the new culture of capitalism'. Another suitable description is 'the culture of enterprise values' (Heelas & Morris, 1992), since the individual is requested to act according to the values of the ideal type of a company (Rose, 1992). In this thesis I will use the term *neoliberalism*, since it is both commonly used and relatively short. The claim that the MB is a concept firmly based in the neoliberal discourse is hardly bold, as it is the dominant discourse of our time (Anderson, 2000; Harvey, 2005; Ong, 2006; Ward & England, 2007). Moreover, the workplace turns out to have been one of the key sites of change under advanced liberalism (Brenner & Theodore, 2002; Rose, 1999; Sennett, 2000).

In order to demonstrate that the MB concept is indeed nested in the neoliberal discourse, one has to be familiar with some of the relevant key characteristics. For these characteristics I heavily draw from the work of Harvey (2005) and Mirowski (2009), as they both provide a comprehensive overview. Above I already touched upon some of the key features, such as self-control, people as consumers, and freedom of choice. Next I will further elucidate these features and complement them, though for a more elaborate and detailed account, I would kindly refer you to one of many sources used in this overview.

- The neoliberal discourse has a moral tone or even some utopian elements to it (Achterhuis, 2010; Sayers, 1992); it is about the right thing to do, about the way to *create* a perfect world. Therefore, Mirowski (2009) argues that this discourse is an example of constructivism, which also stresses that neoliberalism is inherently different from traditional liberalism, based on laissez-faire policies. Neoliberals frequently stress the need to act.

- The discourse is interwoven with economic theories mainly inspired by the work of Hayek and his applications of economic theories on public issues (Mirowski, 2009). The most renowned example is the introduction of market principles into spheres formally beyond the reach of the market. The importance of economic theory also resonates in the vocabulary: the discourse is rich in economic terms and concepts. However, neoliberalism is not solely about economics. It is also about new kinds of citizenship. Or as Margret Thatcher famously said: 'economics is the method, the goal is to change the soul' (Heelas & Morris, 1992).
- In line with the dominance of micro-economic theories, the individual is primarily depicted as a consumer (Dardot & Laval, 2013; Rose, 2010). Other roles, like family member, citizen, member of society, friend, or human being are overshadowed.
- Entrepreneurs are the new heroes in the neoliberal discourse. This is, for example, displayed in a start-up fetishism (Bouma, 2016). Entrepreneurs are regarded to be the engine of economic growth and innovation. They serve as an role model for both individuals and government institutions (Bruckner, 2002; Heelas & Morris, 1992; Rose, 1999).
- Commercial entities are not to be held accountable for their actions; they are merely rational acting entities trying to maximize profits (Mirowski, 2009). Hence, avoiding taxes, polluting the environment, relocating activities, outsourcing, automatisation, and so on are regarded to be the natural and obvious result of competitive market forces. If these kind of effects are socially undesirable, then their costs need to the 'internalized'.
- Conversely, government becomes a synonym for nuisance in the new discourse. Intervention by the state 'disturbs' the market and can only do harm. Governmental regulations are a burden, and often framed as irrational. In practice, a minimal role for the government turns out to be problematic, because neoliberals rely on the state to execute their projects. Indeed, its mainly a call for the redefinition of shape and function of the state: a new kind of government (Chavannes, 2009; Mirowski, 2009).
- With respect to the employees there is a strong emphasis on self-control, individual responsibility and ingenuity in the discourse (Bauman, 2000; Bruckner, 2002; Dardot & Laval, 2013; Rose, 1999). Self-control is imposed through subtle incentives, and techniques of motivation and stimulation (Dardot & Laval, 2013). The ideal employee is immensely flexible, able to adapt to new technologies, new environments and new work atmospheres, inter alia through a lifelong learning.
- Consent for neoliberal policies are generated by a frequent reference to the *freedom* these policies will offer (Harvey, 2005). In all cases, this freedom is negative freedom: the absence of boundaries or control (Rose, 2010). The option of positive freedom is neglected in the advanced liberal discourse (Mirowski, 2009). Hence, freedom always implies the freedom of choice. Policy goals can be achieved by the market and optimal choice architecture (Dardot & Laval, 2013; Mirowski, 2009; Thaler & Sunstein, 2008).
- The neoliberal discourse embraces new information technologies and infrastructures (Harvey, 2005; Mirowski, 2009). In the 'information society' the role of public authorities consists in providing the information and removing any obstacles for open access. The information is regarded as a precondition for optimal choice (Dardot & Laval, 2013; Morozov, 2013).

Like Boltanski and Chiapello (2005), I conduct a discourse analysis and study texts in order to derive common threads. Unfortunately, it is not possible to compare the concept of the MB to a previous version, as there is none. Arrangements with respect to fringe benefits, travel allowances, and CCs are commonly part of the negotiations on a sector or company level, for instance in collective labour agreements. Therefore I study the differences between the advocates of the MB in more detail. That is, I study the concept and the existence of coalitions and disassociations in detail. The dominant interpretation of the concept is the point of departure for the next steps in this thesis.

2.3 METHOD: POLICY-AS-DISCOURSE ANALYSIS

Discourse analysis is involved with qualitative content analysis; as such, it should not be confused with a literature study. In the latter, the emphasis lies on finding existing knowledge: primary interests are the conclusions from other studies. A literature study often serves as a first step in a larger study on the same subject. Conversely, a discourse analysis covers a range of research strategies to gather or generate new knowledge; it is a study in itself. The aim is to decipher mainstream and anomalous messages in human communication. While the results of one study might be sufficient in a part of the literature study, a discourse analysis always draws on multiple sources in order to study the discourse (Keller, 2011).

There are many approaches used in the broad field of discourse analysis, mainly because discourse analysis is used by many different disciplines, each with their own interests, objects of study and objectives. In *Discourse Studies: a Multidisciplinary Introduction,* van Dijk (2011) offers an overview of the many disciplines involved, from anthropology, sociology, and political studies to linguistics, social and cognitive psychology, and communication studies. In general, discourse analysis 'refers to a research approach in which language material, such as talk or written texts, and sometimes other material altogether, is examined as evidence of phenomena *beyond the individual person'* (Taylor, 2013, p. 2 emphasis in original; Butler, 2010). The approach to discourse analysis in this thesis is closely related to the political approach: policy-as-discourse and the main interest of this school is the political order. Here, discourse is about power and domination (van Dijk, 2011); this school is also known as the Foucauldian school (Feindt & Oels, 2005; Foucault, 1991). The question of dominance is relevant, since I aim to reveal the main interpretation of the MB and want to understand its origins.

In political discourse analysis, language is not understood as a simple neutral means, but rather it is recognized as a medium. Language is a system of signification used by actors not simply to describe the world, but through which they *create the world*. There are many possible realities and through a discourse, a certain reality is re-produced (Foucault, 1991; Hajer, 1995; Keller, 2011). Indeed, within the Foucauldian approach political problems and solutions are considered to be socially constructed.

> *Social constructs [...] can be seen as a way to give meaning to ambiguous social circumstances [like the causes and solutions for 'the congestion problem' in Belgium -*

> *TZ]. Obviously, this process of constructing or framing political problems is a highly significant element of the political process. Actors try to impose their views of reality on others, sometimes through debate and persuasion, but also through manipulation and the exercise of power (Hajer, 1993, p. 45).*

Or as Feindt and Oels (2005, p. 164) summarize: 'A discourse constitutes specific ways of being engaged with the world and of being related to it. A discourse establishes what is true based on socially accepted modes of knowledge production.'

Following Hajer (1993, p. 45), policy-as-discourse is defined here 'as an ensemble of ideas, concepts, and categories through which meaning is given to phenomena'. He continues: 'Discourses frame certain problems; that is to say, they distinguish some aspects of a situation rather than others' (Idem). Therefore, it is not only interesting to see what is said, but also to see what remains unsaid. In the policy-as-discourse approach, a discourse is a somewhat alternative term for schools, approaches, paradigms, or disciplinary matrices (Gasper & Apthorpe, 1996). A discourse is not the same as a discussion, which is the object of analysis for a discourse analysis (Hajer & Versteeg, 2005, p. 175). Especially relevant for the case of the MB is the notion that the articulation of a problem shapes it and how a certain problem is dealt with (Feindt & Oels, 2005).

In the last decade or so, numerous policy discourse studies in the field of transport planning and transport economics have been published (Brink, 2009; Cohen-Blankshtain, 2008; Flyvbjerg, 1998; Henderson, 2009; Smaal, 2012; Vigar, 2002). Most studies in the field examine the rise and fall of a certain discourse, or how discourses succeed each other in their hegemonic status. Van den Brink (2009), for instance, is primarily interested in the transformation of Rijkswaterstaat, the Dutch national agency for water and road works. She studied how this 300-year-old organization with military roots transformed from a 'technocratic institute' to a '21st century network organisation'. Much of the attention is drawn to the 'managerial turn' and New Public Management of the past decades. Vigar (2002) studied transport planning in Britain, more precisely, he studied how two discourses in infrastructure planning succeeded each other; the transition from 'predict and provide' to the 'new realism' (see also §2.5.4). An interesting example of a discourse study about the CC was provided by Cohen-Blankshtain (2008). The strong emphasis on stability and change is in line with most political discourse studies (Hajer, 1995). This results from the insight, by Hajer, Billig and others, that positions can only truly be understood if one studies the conflict of arguments used:

> *To understand the meaning of a sentence or whole discourse in an argumentative context, one should not examine merely the words within that discourse or the images in the speaker's mind at the moment of utterance. One should also consider the positions which are being criticized, or against which a justification is being mounted. Without knowing these counter-positions, the argumentative meaning will be lost (Billig 1989, p 91 in Hajer, 1995).*

An example of three interrelated or conflicting discourses can be found in Bøgelund (2007). This is an interesting example to illustrate the idea of a discourse, also because it relates to

transport economy. Bøgelund juxtaposes three economic discourses on the relationship between transport and environment. In *the neoclassical economic discourse,* more mobility equals more welfare; the ecological impact is disregarded. For *environmental economists,* increasing mobility also equals more welfare. However, they stress the need to 'internalize the external costs'. For the last group, *the ecological economists*, there is a negative relationship between transport and environment, because increased mobility levels are an ecological threat and any ecological threat is by definition a threat to welfare. Notice that the environmental economist's position is a revised version of the neoclassical position. It still draws heavily from the neoclassical position, although it suggests some 'improvements'. The ecological economists actually turn things around; their position is diametrically related to the position of the neoclassical school. Although policy makers might be able to understand the line of reasoning of all discourses, they are not equally amenable for these positions. The arguments from a certain discourse might result in new policies, while another set of arguments is disregarded (Bøgelund, 2007); there one encounters the question of power. What should be clear from the example provided is that multiple discourses can co-exist. Moreover, not all discourses are represented equally in everyday life or reflected in policies. Once a certain discourse comes to dominate the way in which society conceptualises the world, there is a 'discourse structuration' (Hajer, 1993, 1995). This is currently the case for the neoliberal discourse, as stated above (§2.2).

A relevant concept from the field of discourse analysis with respect to this study is *the storyline*. 'A storyline is a generative sort of narrative that allows actors to draw upon various discursive categories to give meaning to specific physical or social phenomena. The key function of a storyline is to suggest unity' (Hajer, 1995, p. 56). They are an essential device to overcome fragmentation and allow for the closure of a discourse. A very simple and short version of a storyline is a metaphor. Once many actors draw from the same storyline, it becomes a sort of ritual. One of the rituals spotted in the discourse analysis presented below was the omnipresent reference to 'the congestion problem': this seems to be a problem accepted and shared by all parties involved. The storyline of the MB is about offering freedom of choice to the individual employee, which they will use to optimise the work-related trips, which in turn will result in more rational travel patterns and less congestion.

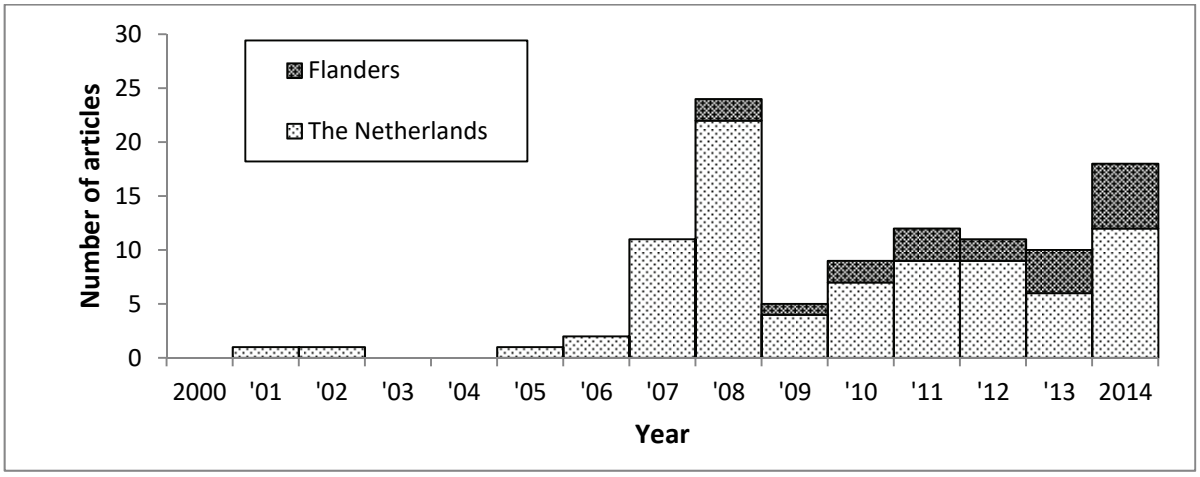
Discourses do not exist in isolation. They are entwined and co-evolve with practices, techniques and concepts. Or as Rose (1992) argues: thinking, acting and judging are interrelated. In the analysis that follows, the MB is understood as a concept nested in a certain discourse, which I reveal; there is not a MB discourse in itself.

2.4 Data Gathering and Processing

The data for the analysis are written texts from a wide range of sources. The process of data gathering was structured through three channels. These three primary sources are: the Lexis Nexis archive, Google Alert service, and the key publications. *LexisNexis* covers over 37 000 international news sources, including news journals, magazines, blogs and other sources

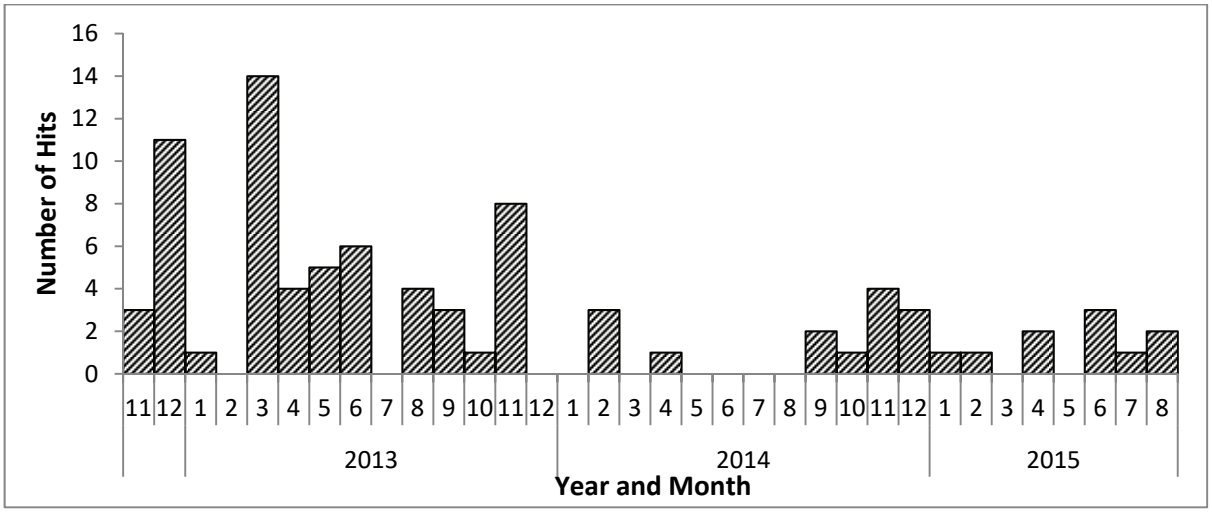
(www.lexisnexis.nl, 21/04/15). The Lexis Nexis academic search engine was used on April 21th 2015 with just one single search word, namely *mobiliteitsbudget* [MB in Dutch]. This search resulted in over 100 results, before cleaning (Fig. 2.1). *Google Alert* provides a periodical update on websites were new content with a certain search word is found (www.google.be/alerts). Again, the term used was *mobiliteitsbudget*, while the frequency of alerts was set to one week. In the period from October 26th 2012 to September 18th 2015, I received 45 alerts with a total of 86 hits (Fig. 2.2), meaning that some alerts contained multiple hits. The data from Google and Lexis Nexis is complemented with ten essential additional documents. These documents are key publications in the debate. Either these publications are from primary sources, written by central actors in the debate, or they are the main report on one of the projects on the MB in Belgium. In multiple cases the articles from Google Alerts and Lexis Nexis actually refer to these key documents. Examples of these primary sources are the legislative proposal by Van den Bergh and the final report on the project *Mobiliteitsbudget werkt!* (both discussed below).

FIG. 2.1: NEWS ARTICLES FROM LEXISNEXIS WITH THE TERM *'MOBILITEITSBUDGET'*



Source: processed data from LexisNexis search on 21/4/2015 with term: 'mobiliteitsbudget'

FIG. 2.2: HITS WITH GOOGLE ALERTS



All results were filtered based on four criteria. First, a source should be open access, easy access or well distributed. Since the main interest of the analysis is the framing of the MB to the general public, this fictive 'general public' should at least be able to obtain the same data. Second, since I am primarily interested in the Belgian or Flemish situation with all of its particularities, the text should at least cover the situation in Belgium. Third, the source needs a minimum length. Very short newspaper articles are not very helpful, because there is not much space for setting the scene and using quotes. Therefore, a minimum of 100 words was used. And finally, I removed all doubles or articles with striking similarities. This actually resulted in the most radical reduction in the number of sources, although the overlap between the Lexis Nexis and Google Alert hits was modest.

For the actual analysis of the texts I used *NVivo 10*. This is popular qualitative data analysis software by QSR international. The main function of NVivo is to help researchers organise and analyse weakly structured and non-numerical data. NVivo allows for the analysis of a wide range of sources, such as text, audio and video, although I conducted text analysis only. Unfortunately, NVivo does not provide a Dutch dictionary. This means that quantitative analysis of the qualitative data is complicated, because I was not able to easily filter out commonly used Dutch words, such as determiners ('de', 'het' and 'een') and prefixes.

In the analysis I especially looked into attempts to define the MB, positions of stakeholders and actors regarding the MB, elaborations on the need for a MB, and the (societal) problems the concept tackles: if the MB is the solution, then what is the problem? Useful phrases and quotes were coded and added to a so-called node. During the analysis I added additional nodes (key issues) to record striking or relevant observations. Note that coding the text is not always straightforward; it mainly helps to identify common threads in the corpus. In addition to this analysis, I performed a more quantitative analysis, like a correlation in wording or the frequency of hits for actors involved. Details on the sources and details about the analysis used can be found in Appx. I.

The results from the analysis, as presented in the next section, have been validated by rerunning the analysis with a second corpus. This dataset is based on a search on June 7th 2016 with GoPress (www.gopress.be) in Flemish newspapers and magazines. Again, only one search word was used, namely 'mobiliteitsbudget'. This search resulted in a final set of 244 articles, after removal of doubles and off-topic results. The dataset from GoPress is dominated by (short) newspaper articles, as 204 out of these 244 articles come from newspapers. The average length is 646 words per article. The results from this validation process are discussed in the final section of this chapter (§2.6).

Some minor comments before I present the results. First, all original texts are in Flemish-Dutch. All quotes included in this chapter are translated by the author. This is not individually indicated for every single quote for practical reasons. Sometimes I added words to the original quote for illustrative or explanatory purposes. These extra terms are placed between straight brackets […]. Second, for many of the articles found there are no page numbers available, mainly because I used a digital version of the newspaper article or a web based article. In case there is no page number to refer to, I will refer to the paragraph number, counted from the

title downwards, as suggested by the APA publication manual (American Psychological Association, 2010).

2.5 RESULTS AND DISCUSSION

2.5.1 ACTORS

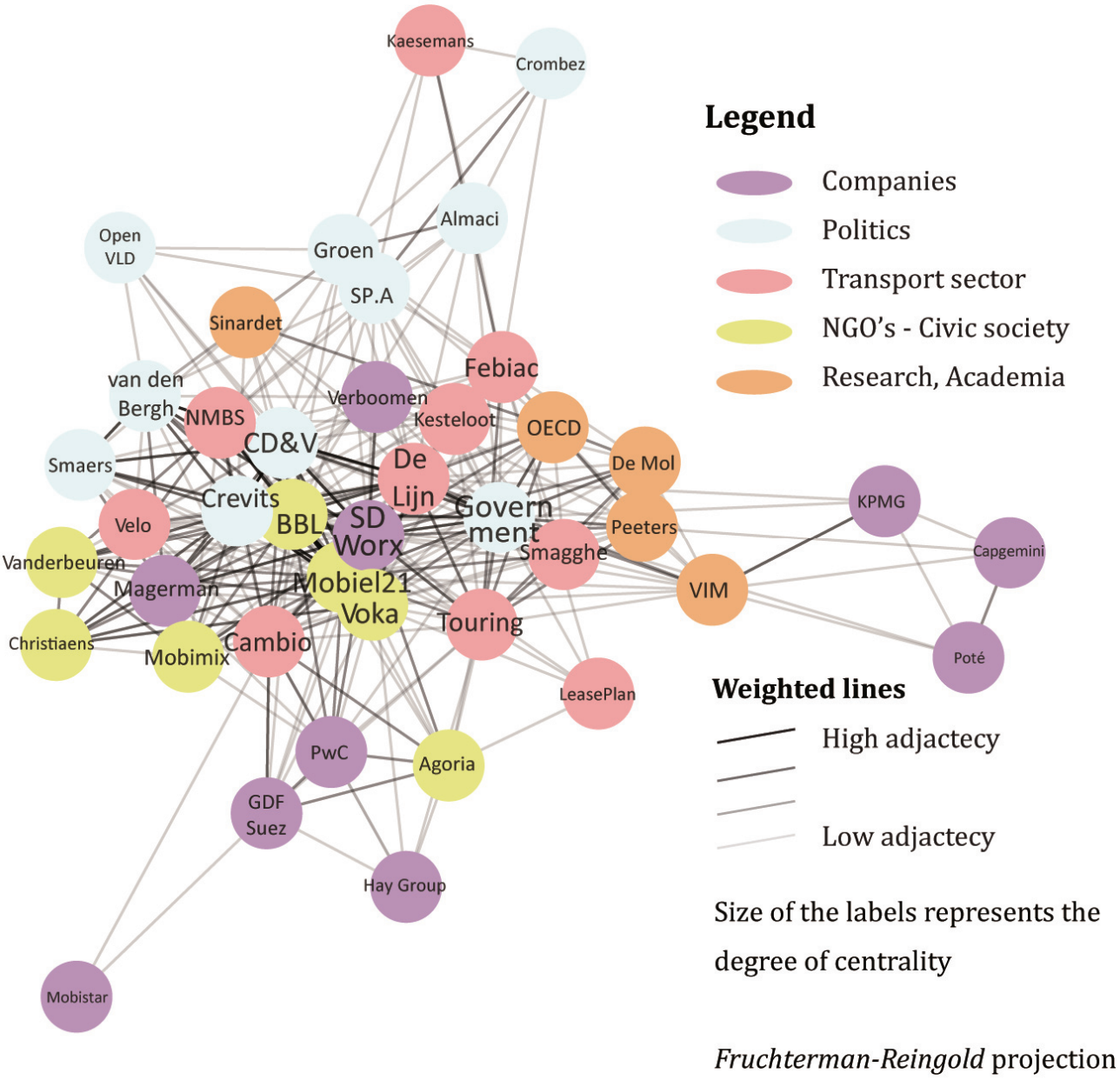
The actors are of central importance if one aims to understand the MB debate and the discourse it draws from. To some extent this contradicts my statement above, as I stated elsewhere that discourses are not glued to people and transcend the individual level (Hajer, 1995; Taylor, 2013). Moreover, the research questions of this chapter are not concerned with the actors in the MB debate. The main reason to pay extra attention to the actors in this case is their limited number: just a few actors dominate the debate. Moreover, actors and their affiliation might also reveal something about their agenda. In a simplified version of this world, politicians are looking for attention and positive media coverage, companies are looking for a profit, and NGOs are looking for opportunities to change things in line with the central interest of their NGO.

The relative importance of actors in the debate is revealed through a social network analysis (Fruchterman & Reingold, 1991; Wasserman & Faust, 1994). In this analysis I only included news items and the sources found through Lexis Nexis and Google Alerts. The key publications are excluded in this part, since these are much longer, more technical, and less familiar to the general public. All actors that are mentioned in two items or more are included in the network. Actors can either be persons or organisations, as the distinction is not always made in the original text (see below). The number of observations in a single source is discarded. The result, therefore, is a table of all sources crossed with all actors, with a dummy indicating the presence of an actor. The calculations and graphical translation were carried out in *"R"* with the package 'igraph' (Csardi, 2014). Key terms for the output of the analysis are 'degree centrality' and 'adjacency'. The network is plotted according to the Fruchterman and Reingold projection (1991), the default projection type in social network analysis. In this plot I integrated the degree centrality, the adjacency and I coloured categories for companies, politicians, transport services, NGO's, and others.

The results of the network analysis are provided in Fig. 2.3. Actors involved in politics are mainly located in the upper left quadrant of the network plot. Companies are primarily located in the lower half of the plot. NGOs are situated on the left, between politics and companies. And, finally, research institutes and researchers are mainly found on the right side. These 'clusters' show that most of the articles in the corpus have a certain focus. If a politician is mentioned in an article, one is more likely to find other politicians instead of companies in the same article. However, actors in close proximity to each other do not necessarily have to be 'friends', in the sense that they use the same line of reasoning or that they like to refer to each other. Sometime actors are positioned close to each other due to mutual rejection of viewpoints. Examples in my data are the differences in opinion between

Almaci from the Green Party (Groen) and Joost Kaesemans from the automobile federation (Febiac) or the differences in opinion between the environmentalists (BBL) and the Christian-democrats (CD&V).

FIG. 2.3: NETWORK OF ACTORS IN MB DEBATE



The central actors in the MB debate are positioned in the middle of the graph (Fig. 2.3). The highest score for degree centrality is found for *Government* and *SD Worx*; both score 31 points. SD Worx is a multinational in human resource management, pay-rolling and taxation. Over 2 000 people work for SD Worx and the headquarters are located in Belgium (www.sdworx.be; 28/09/15). This company is actively involved in the MB discussion in many ways. They present studies on the necessity of the MB, they volunteered to participate in the MB experiment, they publish discussion papers, send out press-releases, are represented on conferences, and they developed a MB-tool. Two experts from SD Worx, Kathelijne Verboomen and Koen Magerman, have strong network connectivity, respectively their degree

of centrality is 12 and 15. They often represent SD Worx in the field on MB issues. In my dataset, SD Worx is the most prominent actor.

The government, the other 'actor' with 31 points for centrality in the network, is ill-defined. I was unable to make a clear distinction between Federal and Regional government or one of the other governments in Belgium, as it is not always clear what 'government' is meant in a certain article. Moreover, most references to the actor 'government' are passive. They include statements from others about what the government did, will do or should do. The only actor in the network related to the actual 'government' is former Minister of Transport in Flanders, Hilde Crevits. She certainly has a central position in the network, as she is actively involved in the discussion (degree centrality: 22).

Another vital role is dedicated to a consortium of an environmental NGO (BBL), a mobility platform (Mobiel21), and the Flemish association for entrepreneurs (Voka – Halle-Vilvoorde). They were responsible for the most important project in the dataset, the project called *Mobiliteitsbudget werkt!*. This second project out of three, is frequently mentioned in the sources of my dataset. In 2012 there was the announcement that there will be an experiment, financed by the Flemish Minister of Transport, Crevits. In March 2013 the results were presented during a conference, in a report (J. Christiaens et al., 2013) and in the media. From then on many proponents referred to the results of this experiment, as they were regarded to be promising for the MB (see also Ch.1). The actors Jan Christiaens and Roel Vanderbeuren, also included in the network (Fig. 2.3), were project members. SD Worx was also actively involved in the project: they volunteered to participate in the experiment, they developed an online tool and they co-authored the final report. BBL and Mobiel21 were also responsible for the first project on 'a multimodal travel package for employees', which started in 2009 (BBL et al., 2010). This work was explorative and set out the contours of the debate that followed; it can be regarded as the start of the MB debate in Belgium. Next to these two projects from the consortium, there is a third and last project included in the dataset. This project is called *Slim Mobiliteitsbudget* [Smart MB], with the involvement of the Flemish Institute for Mobility (VIM) and KPMG consultants. The impact of this third project is limited in this study, as the final results were still unknown at the time the data was collected.

There are four political parties involved in the MB debate (Table 2.2): the Christian-democrats (CD&V), the environmentalists (Groen), the social-democrats (SP.a), and the liberal party (Open VLD). Other parties are only mentioned once or are not mentioned at all. The Christian-democratic party in Flanders (CD&V) has a strong track record of governmental responsibilities in both the Flemish and Federal level, as they were represented in the vast majority of coalitions since the Second World War. Hilde Crevits, the former Flemish Minister of Transport, is a Christian-democrat. The Greens are the smallest party in this list of four. They are usually part of the opposition. Almaci, included in the network (Fig 2.3), is chairman of Groen. The social-democrats (SP.a) are well represented in the federal government, with assistance from the socialists from the Walloon region, and have a good track-record in the Flemish government, as they were part of many coalitions in the last decades. Crombez was elected as new group leader in 2015. The liberal party of Flanders (Open VLD) often participates in coalitions on both regional and federal level. Guido de Padt, present in the

network, is member of Open VLD. The new Minister of Transport in Flanders, Ben Weyts from the relative new right-wing and nationalistic party N-VA, had only one hit, probably due to the fact that most articles stem from the period before the new Flemish cabinet was installed on July 25th 2014. In contrast, in the secondary corpus from 07/06/2016 the NVA is represented (§2.6).

TABLE 2.2: DEMOCRATIC REPRESENTATIONS OF FIVE POLITICAL PARTIES IN RELEVANT PERIOD

	Federal parliament		Flemish parliament	
Political Party	'10 – '14	'14 –	'09 – '14	'14 –
CD&V	**17**	**18**	**31**	**27**
Groen!	5	6	7	10
SP.a	**13**	13	**19**	18
Open VLD	**13**	**14**	21	**19**
N-VA	27	**33**	**16**	**43**

Note: bold and black is representation in government, regular and grey is not represented

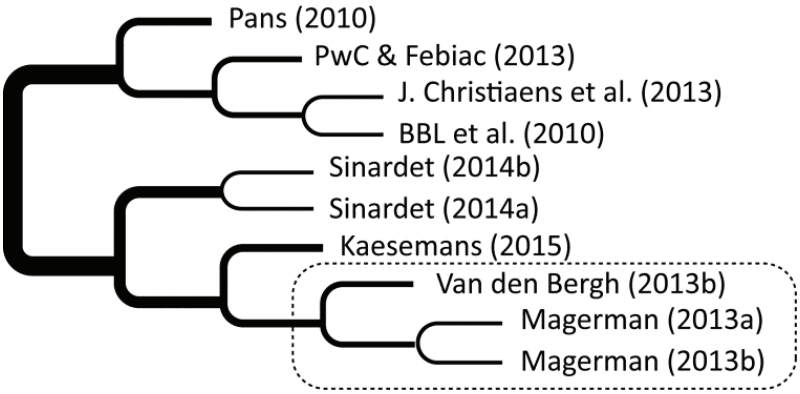
A central figure in the MB debate is Member of Parliament (MP) Jef van den Bergh from the Christian-democratic party. He submitted a legislative proposal for the implementation and popularisation of the MB in Belgium in November 2013 (Van den Bergh, 2013a, 2013b). Van den Bergh has been in the Federal parliament for CD&V since 2004 and has been involved in transport issues for many years, for example as a member of the commission for infrastructure, transport and public corporations. The bill was officially co-authored by another Christian-democrat, Griet Smaers, though Van den Bergh also declared that he received some assistance from SD Worx.

From my detailed analysis of all the texts in the dataset, I observed some striking similarities between the legislative proposal and the ideas promoted by Koen Magerman (2013a, b) from SD Worx. This raises questions about the meaning of 'some help'. It is well-known that lobby groups are able to alter the content of proposed legislation, though actually writing the bill is more serious, and can cause public indignation, as we have seen in the Netherlands and the US with respect to the financial sector (Driessen, 2015; Lipton & Protess, 2013). Here the influence of SD Worx is relevant since this company already 'owns' about 20 to 25 % of the market, as they already take care of the pay-roll for this part of the employees with a CC (Ch. 4). One way to assess the influence of Magerman is to compare the wording of documents (Klüver, 2009). Therefore I conducted a hierarchical cluster analysis based on word similarity on the full key documents by primary actors (n = 10).

The results of this analysis suggest that Magerman was indeed actively involved in the process, meaning that his influence exceeds simple advice; his work and the legislative proposal are situated in the same branch when it comes to the words used (Fig. 2.4). The correlation coefficient used is Jaccards' coefficient, though other correlation measures available within NVivo result in the same hierarchy, in which Magerman and Van den Bergh are clustered together. The comparison of full, unfiltered documents is a relatively quick and basic approach (cf. Takale & Nandgaonkar, 2010), though based on the results, remarks made by the actors themselves and other observations, it is safe to conclude that SD Worx was also

at work here: the legislative proposal is strongly influenced by the position of SD Worx and Koen Magerman.

FIG. 2.4: HIERARCHICAL CLUSTER ANALYSIS OF SIMILARITY IN WORDS OF PRIMARY SOURCES



2.5.2 A FLEXIBLE BENEFIT PLAN FOR TRANSPORT OPTIONS

The MB is presented as a budget provided by the employer to the individual employee in order to cover the travel expenses. The employee is responsible for the management of the budget. He or she is able to choose a travel mode from a wide range of multimodal travel options within the budget. The budget is in most cases not actual money, but a virtual budget or a series of vouchers. Descriptions or definitions of the MB like these can be found in 40 of the 52 sources used. In the remaining 12 sources I did not find an explicit description of the MB. All these sources with a description are more or less in line with each other. The controversy starts when more details enter the discussion.

The resemblance between the MB and FBPs (Ch. 1) is widely acknowledged and regarded to be a positive aspect; 'it is in line with the trend towards more flexible work and remuneration,' says Van den Bergh (Knop, 2013, para. 5). Or, as stated by Pourcq (2012), while referring to research results from SD Worx: 'The company car is not for all employees a pleasant extra, especially not because of the additional congestion and a lack of parking facilities'. A popular phrase for the promotion of FBPs was *'Collective labour agreement à la carte'* (Delsen et al., 2006; Hillebrink, 2006); this was refined and reworked to *'Mobility à la carte'* (e.g. Knop, 2013). Most frequently mentioned transport options within the MB are the CC, bicycle, bus and train. For both car and bicycle the option of short-term rental with public access is sometimes included, such as the bicycle sharing scheme in Antwerp ('Velo') and car-sharing schemes ('Cambio'); note that these services are included in the network analysis as also provided in Fig. 2.3. In most articles the options remain vague, like 'a pallet of multimodal transport options' (e.g. BBL et al., 2010).

To some, the *Bonus*-option is an essential part of the whole concept: 'Proponents of the MB concept assume that the employee will choose wisely, because at the end of the year the money left over in the budget will be paid to him' (Mouton, 2012). For others, a bonus is regarded as an optional extra. In the legislative proposal the emphasis is place on the MB as a tool for more sustainable mobility. The *Bonus*-option is not presented as a key feature, though

it is included. On the one hand Article 10 states: 'The mobility budget should only be used to satisfy the mobility needs of the employee, in accordance with this law' (Van den Bergh, 2013a, p. 3). Meanwhile, Article 12 states: 'The transformation of any remaining budget into a wage premium should be part of the written agreement [between employer and employee]' (Van den Bergh, 2013a, p. 3).

While the MB is clearly related to the problem of split incentives (§1.2.3), I did not encounter any explicit references to the Principal-Agent problem. What I did encounter, was that car trips by the CC owner are depicted as potentially irrational behaviour as the owner himself does not pay for using the car. Therefore, the need to rationalise travel behaviour was frequently stressed (e.g. PwC & Febiac, 2013).

In the dominant view, the possible input for the total amount of budget consists of *the current transport related costs*: 'The size of the budget is the equivalent of all the transport related costs for the employer, like the company car, fuel card and parking lots' (Van Dyck, 2014, p. 7). In some other references and the legislative proposal, the input for the MB can be enlarged by adding other fringe benefits (De Crom, 2013; Knop, 2013; Van den Bergh, 2013b). Primary income cannot be used as input. 'One is unable to hand in wage in order to buy a nice bicycle' according to MP Van den Bergh (De Crom, 2013, p. 37). In September 2015 Katrien Backx, project manager of the project *Slim Mobiliteitsbudget*, the third project on the MB, suggested to provide additional budget on top of the CC. 'Companies should provide more incentives to their employees in order to change their travel behaviour' she explained. While the author of the article in the newspaper De Standaard qualified this suggestion as 'remarkable', it seems to be the actual practice in some cases: in the project *Mobiliteitsbudget werkt!* participants received money on top of their CC (with no hard restrictions on car use), at Siemens a bonus of € 20 per month is provided to those who 'choose wisely', and GDF Suez reserves an additional € 1 500 per employee per year (J. Christiaens et al., 2013; Mouton, 2012; Zijlstra et al., 2014).

In most versions of the MB the budget is compiled from individual sources and used for individual (transport) needs. This approach is motivated by the suggestion that the implementation of the MB should be (financially) neutral to the individual worker in order to get public support. In other versions the amount of budget is standardised. There were initially 20 companies participating in the *Smart Mobility Budget* experiment of VIM. At some of these companies, all employees receive the same amount of budget. In other companies the budget varies between individuals. The Greens proposes a standardized MB. The amount will be based on the home-to-work distance of the employee. Moreover, they argue in favour of another source; they suggest combining all current costs for the government on work related mobility, like the favourable regime for the CC, the tax cut for the bicycle allowance, and contribution to PT remuneration, into one (collective) fund. This will add up to a total of over 4 billion, according to the green party (Jns & Belga, 2013; Maerevoet, 2015). What is striking is the use of quotation marks around the term MB ('mobiliteitsbudget') in the article on this proposal in the newspaper *Nieuwsblad* (Jns & Belga, 2013). These marks seem to indicate that the MB proposed by the Greens is not considered to be a 'real' MB by the author. Quotation marks were not found for other versions of the MB by other political parties.

There is little consensus regarding the cycle time, that is the frequency of moments for employees to make a choice within the MB. This is mainly because this issue is neglected by the vast majority of the sources. In the limited number of sources that do cover this issue, the duration varies strongly from daily to a maximum of five years. The maximum length is found in the legislative proposal by Van den Bergh et al. (2013). This maximum is probably based on the duration of a car lease contract, which is often four or five years. As far as I am aware, there are no other contracts with transport suppliers in the field that last for five years. The maximum duration of a seasonal ticket for the bus, train, Velo or Velib, Cambio and so on, is one year or even less. The idea to make choices regarding the allocation of the MB for a period of one year is also present in the discussion, mainly motivated by reference to the length of most administrative cycles. In the project *Mobiliteitsbudget werkt!* the participants had one opportunity to choose at the beginning of the experiment. These choices were valid for the remainder of the experiment. Shorter run times are mostly motivated by the perspective of the user: the employee. A new intermodal travel card by XXimo provides some technical support that enables some freedom of choice on a daily basis. This kind of card is tested in the third project regarding the MB.

Many actors in the debate stress the need for an up-to-date and easy-to-use tool. In almost all cases the actors refer to a digital web-based application to be managed by the individual employee and to provide an overview to the employer. It is also referred to as 'the shop'. The most explicit example here is the project *Mobiliteitsbudget werkt!*; during this project a tool was developed and tested by SD Worx. In the final report the need for such a tool was underlined in many phrases, the term 'tool' was mentioned 41 times in total. The project members of *Mobiliteitsbudget werkt!* conclude: 'It is important to have a good management tool which allows employers and employees to gain insight in the financial treatment of each transport option. Such a tool was developed, tested and improved during this project' (J. Christiaens et al., 2013, p. 12). This 'sense of urgency' for a tool was echoed by other parties after the presentation of the results of the experiment (De Cat, 2014; De Crom, 2013).

> *There is need for a management tool by which the employee is able to see the range of opportunities available to him and the implications for his income. This management tool should ease the administrative burden for the employee* (De Cat, 2014, p. 7).

In order to reduce the complexity of the system,

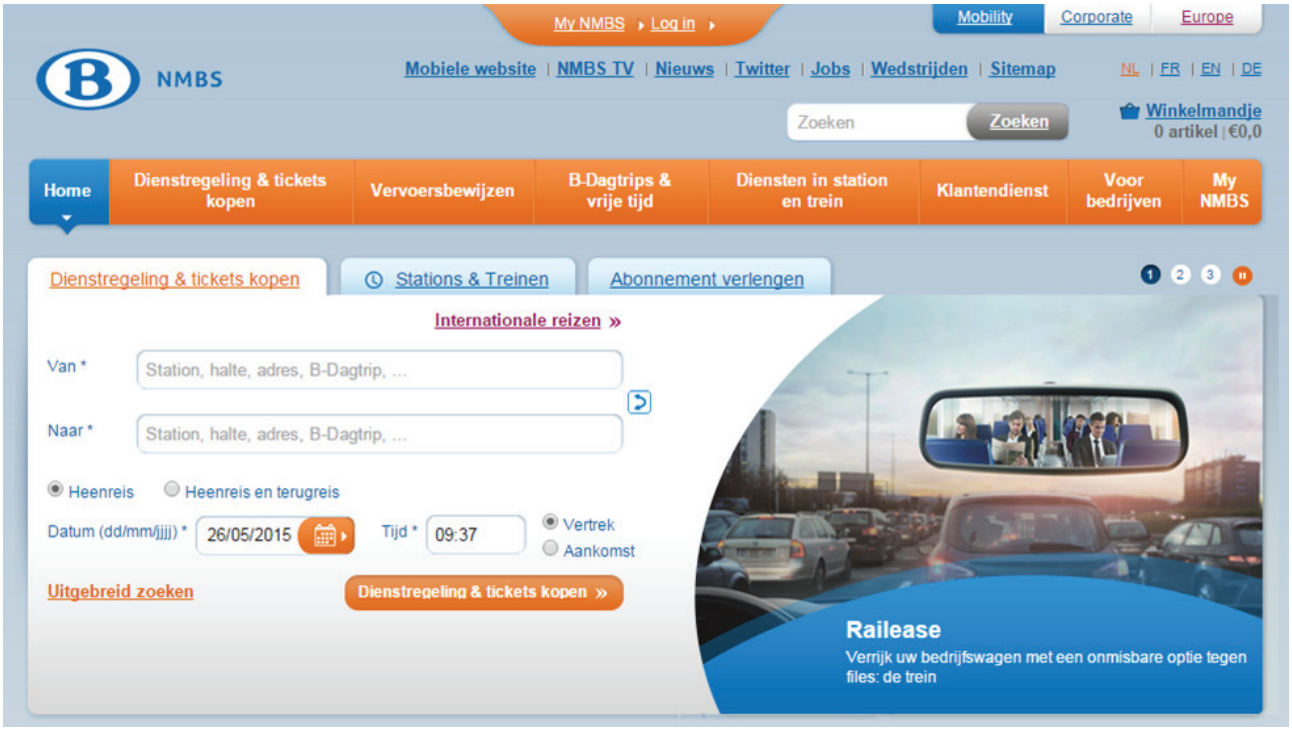
> *[t]he HR-company and some of its competitors developed a tool in which every transport mode has its own fictive value, including the contributions for social security and taxes. As a result budget neutrality is guaranteed. An employee is able to see the impact of each choice on his budget (De Crom, 2013, p. 37).*

Indeed, the tool has to be a source of information and a guide at the same time. A little bit of help is needed for optimal choices.

2.5.3 *The Congestion Problem*

There is a strong problem-solution pattern visible in the corpus, as many sources in my dataset discuss the advantages of the MB or the need for a MB, or the other way around: a problem is discussed and the MB is presented as a solution. The overall message is clear: the MB serves first and foremost to tackle 'the congestion problem' in Belgium (see illustrative example in Fig. 2.5).

Fig. 2.5: Screenshot from the homepage of the NMBS



Translation: 'Railease: enrich your company car with an essential option against congestion: the train' Source: NMBS.be, 26/05/2015

Van den Bergh leaves no doubt when it comes to the necessity to implement the MB: 'There is no other country with a more severe congestion problem than Belgium. The longest traffic jams in the world can be found in Antwerp and Brussels,' he claims in the first sentence of the explanatory memorandum for his legislative proposal. He continues: 'Congestion related problems in Belgium place a heavy burden on mobility and the environment, though also on the well-being of citizens and the Belgian economy. According to the OECD, the economic consequences of congestion and transport issues equate one or two per cent of the Gross Domestic Product, this means 3.7 to 7.4 billion a year' (Van den Bergh, 2013b, p. 1). To support his claim regarding the highest level of congestion, Van den Bergh refers to the INRIX scorecard (INRIX, 2014). The 'heavy burden on the Belgian economy' is substantiated via the OECD (OECD, 2013). Magerman, too, starts his paper about the MB with 'the congestion problem': 'One of the central societal challenges is mobility – or the lack of mobility. A helicopter view above Antwerp or Brussels on a rainy morning is a hallucinatory sight: rows and rows of cueing and stationary cars' (2013, p.1).

The problem analysis and sense of urgency that Van den Bergh and Magerman experience is shared by many others. The majority of the problems, as coded in my text analysis, refer to 'the congestion problem' and 24 out of all 52 items mention 'congestion' as a problem, a challenge, or an incentive to act. Moreover, in case there are challenges included in an item, congestion is always one of them. Finally, to substantiate the severity of 'the congestion problem', there is frequent reference to experts, scientists and knowledge institutes, similar to the example from Van den Bergh above.

The necessity to address 'the congestion problem' is substantiated by many actors in different ways. In a macro-like approach, congestion costs are provided in absolute numbers (in billions) or relative to the GDP (PwC & Febiac, 2013; Van den Bergh, 2013b). '[T]hese costs include the societal cost of congestion, time loss and environmental factors' (PwC & Febiac, 2013, p.3). Actors from the Greens explicitly link congestion to environmental issues, as they frequently talk about 'polluting traffic jams' (Jns & Belga, 2013; Maerevoet, 2015). Chairman of the social-democrats, Crombez, says that congestion needs to be addressed because it now affects all members of society (SPA, 2015). Pans (2010) lists six reasons for reducing the congestion levels in Belgium; by doing so she probably offers the most comprehensive account, and at the same time it is a loud call for action. An evocative style of reasoning is present in the work of Magerman (2013a), especially in the paragraph called *Mobility is a problem*:

> *Behind the title of this paragraph there is no need for a question mark, this would be knocking on an open door. Those who commute to Antwerp or Brussels need to rely on a special type of neural wiring to cope with this situation day in day out, this while knowing that the situation will only get worse (Magerman, 2013a, p. 1).*

The notion that action is needed, because the situation will get worse in the near future, is also present in other sources (PwC & Febiac, 2013; Van den Bergh, 2013b). Congestion is primarily framed as a societal problem because of its perceived and urgent threat for economic growth.

The aspirations of the MB follows from the necessity to implement a MB in Belgium. At the launch of the project *Mobiliteitsbudget werkt!* the project manager, Roel Vanderbeuren, claimed that if the MB is implemented, the number of kilometres driven will be reduced (De Pourcq, 2012). The number of car trips, especially in the daily commute, seems to be the primary interest of the presentation of the results of this experiment (J. Christiaens et al., 2013). The experiment was regarded to be a success due to the conclusion that people with a MB use their car less often. In response to the results the Former Minister of Transport, Hilde Crevits, observed: 'There is a way to nudge employees. The concept of the mobility budget makes road users more creative with transport modes and promotes a certain awareness regarding mobility' (KAV & Belga, 2013, par. 2).

Of course, there are uncertainties about the effect of the MB on congestion levels (Ch. 7). Critical questions or counterarguments can be expected. One could think of issues regarding the implementation, the adaptation levels of the MB on company and individual level, travel behaviour of those with and without the MB, the number of CCs, the times and places where

these cars are used, and, finally, the causes of congestion (see remainder of this thesis). On the one hand, actors ignore and avoid this uncertainty by referring to the acute and alarming situation on the Belgium roads. On the other hand, they anticipate critical questions by referring to the non-linear character of congestion: through a reduction of a few per cent in the number of cars, congestion levels will drop by a multitude (PwC & Febiac, 2013; Van den Bergh, 2013b). This supports the attractiveness of the MB concept: with a minor intervention, a maximum result is generated: a gentle nudge is enough. Note, however, that multiple actors admit that the MB is in itself probably insufficient to tackle congestion. In multiple occasions, a combination with road pricing is suggested (J. Christiaens et al., 2013; Kaesemans, 2015; Mouton, 2012; PwC & Febiac, 2013). Others suggest to alter the beneficial position of the CC the current tax system (§1.2.2; §2.5.7).

2.5.4 Pragmatic Multi-Modalism

The concept of the MB is primarily about transport mode choice, a trend strongly visible in the corpus, for example: 'The mobility budget eases transport mode switching: it allows for a variety of transport needs of the employees' (Pans, 2010, p. 4). The MB represents an important step towards more diversified travel patterns according to the actors. Key term here is *multimodal*: a multimodal transport system is presented as a solution to the congestion problem. The actual meaning of multimodal remains implicit in most occasions, though based on the context it seems to suggest *a shift from unimodal car use to a combination of transport modes*. This claim is supported by the headlines of the articles in the corpus (Appx. I):

- 'Mobility budget must eliminate car thinking',
- 'Beyond the company car',
- 'People do no longer want the same car every day',
- 'The company car makes way for the mobility budget', and
- 'From automatism to multimodality'.

Theoretically, one could suggest that a shift from an 'alternative' mode to a combination including a car is also multimodal; however, this option is neglected by the actors involved.

One of few insights about the meaning of multimodal is found in BBL et al, as they provide a definition:

> *Multimodal means that multiple transport modes are used in for trips. This can mean that multiple modes are used successively in one trip or that the most appropriate mode is selected based on the type of trip. Multimodality combines the strengths of the individual and slow transport systems (fine-grained access) with the strengths of collective transport modes. Multimodality means that travellers are able to switch modes at strategic locations and/or are able to use a certain mode depending on the type of trip (2010, p. 6).*

What 'the most appropriate mode' is, remains implicit in this definition, though from the context it is clear that it implies avoiding 'irrational' car use for trips where there are feasible

‘alternatives’ available. Multimodal travel behaviour itself seems to be rational by definition, as one only uses the strengths of a particular mode.

Multimodality is not only a key word in the MB debate; it features in many debates about sustainable transport and it is promoted by many governments (e.g. Fig. 2.6). Multimodality gained much popularity over the last three decades (Givoni & Banister, 2010); it became a trend, labelled *pragmatic multi-modalism* by Shaw and Walton (2001). More precisely, they use this term to describe the shift in policy emphasis to promote ‘integrated transport’ in the UK. This shift was first announced in the Labour government’s White Paper *A New Deal for Transport: better for everyone* in 1998. Although the analysis of Shaw and Walton is mainly concerned with the effect on road building, their notion of a policy shift does seem to be useful in the context of the MB. In *pragmatic multi-modalism* the second part ‘refers to the government’s stated willingness to consider a wide range of transport provision […] as possible solutions to traffic-congestion problems’ (idem). The first limb, ‘pragmatic’ refers to ‘a policy approach that has been carefully tailored and designed by ministers to satisfy the need and interests of both public transport and […] the car-using constituencies’ (Shaw & Walton, 2001, p. 1052).

FIG. 2.6: PROMOTION OF MULTIMODAL TRAVEL BEHAVIOUR IN THE NETHERLANDS.

Source: De Volkskrant, 11/05/2015

This 'pragmatic' approach can be contrasted with stronger normative visions on the future of transport in the UK. On the one hand there is the clear choice in favour of the car and road building, an approach adhered by the Conservatives in the years before Labour came to power in London. Their emphasis was on the 'great car economy'. The growth in traffic volumes was predicted through models and plans were made to facilitate this growth. On the other hand there is the *new realism* as outlined by Goodwin et al. (1991). 'In contrast with predict and provide, new realism implored policymakers to manage, rather than facilitate, traffic growth through a variety of measures including a marked increase in the quality of public transport services' (Shaw & Walton, 2001, p. 1032). The new realism approach acknowledges that facilitating the growth in traffic volumes is a race to the bottom, as more road and facilities will induce more car transport. Pragmatic multi-modalism 'falls between the two stools of predict and provide and new realism', according to Shaw and Watson (2001, p. 1052), as 'it incorporates both the introduction of demand management measures and a significant road-building programme in an attempt to accommodate the demands of those travellers whose desire to use their cars cannot be controlled' (Shaw & Walton, 2001, p. 1052).

There are some clear similarities between pragmatic multi-modalism and the promotion of the MB. First, both stress the need for a holistic approach to the transport system. Second, both underline the need for better options; barriers that limit mode switching should be removed. Third, the MB and pragmatic multi-modalism are explicitly not anti-car. In the UK 'the new Secretary of State for Transport, John Prescott, was keen to reassure car owners that Labour's integrated transport strategy was not intended as a threat their interests' according to Shaw and Walton (p.1039). They continue: 'Prescott emphasised that his policy, rather than introducing draconian anti-car measures, would tackle the country's transport problems by creating a genuine choice of modes for transport users, so benefiting society as a whole' (idem). Fourth, in line with the previous arguments, both the MB and pragmatic multi-modalism opt for a positive approach. Illustrative here is Van den Bergh: 'The car is a central element in our transport system. We do not demonize this, but we promote the alternatives. We opt for positive stimuli, not a punishment of the car user' (as quoted in De Crom, 2013, p. 37). Finally, the concept of the MB and pragmatic multi-modalism are presented as policies to promote sustainable transport.

2.5.5 Target Group: Company Car Owners

There is neither a consensus nor coherency regarding the target group of the MB, though the concept and purpose of the MB strongly suggest that it was conceptualised with the company car owner in mind. To substantiate this claim, I provide five arguments. First, in the description of the MB it is often stated that the company car can still be a part of the MB, yet a similar statement is not present for any of the other transport modes, suggesting that the car is considered to be the default. Second, the explicit objective of the MB is less congestion (see above); this implies a shift from using only a car to the use of multiple modes. The objective and definition of multimodal travel patterns also suggest less car trips. Third, the budget available to the employee should equal the current travel expenses; hence, if there are no noteworthy expenses, there is no MB. This situation will apply to people who cycle short distances, who walk or who use regional PT services; full annual access to De Lijn (the

regional PT service) is only about € 250 per year. Fourth, nearly all examples provided by the actors are about CC owners who are enabled and seduced to alter their travel behaviour. Finally, next to MB, the Flemish term for CC ('bedrijfswagen') is the most frequently used noun in the corpus, with a total of 452 hits. This suggests an average of about 9 hits per article or report.

Please notice that in most occasions, non-CC owners are not explicitly excluded. Some actors even explicitly include non-CC owners. Most evident example are the Greens (Jns & Belga, 2013). In the first exploratory study on a multimodal travel package, which later became the MB, the final advice is to design a MB for all employees (BBL et al., 2010). However, in the same report they point out that the CC owner is probably already best served when it comes to travel options. Elsewhere in the same report, BBL and Mobiel21 suggest the implementation of a multimodal MB as a substitute for the CC. Hence, many scenarios are included. The ambivalence regarding the target group remains throughout the debate.

2.5.6 Administrative Burden and Legal Complexity

The current state regulations regarding work-related transport are too complex according to the advocates of the MB. This complexity is generally regarded as an obstacle for both multimodal travel behaviour and the implementation of the MB in Belgium. 'All modes are taxed differently' according to Koen Magerman, the legal expert of SD Worx. 'Moreover, we need to make a distinction between business trips, commutes and private trips, since each type of trip is treated differently' (De Crom, 2013, p. 37). Elsewhere, Magerman provides more details: next to differences per mode and type of trip, there are also differences in relation to social security, taxation and employment law, and per unit of analysis – a sector, an enterprise, or on individual level (Knop, 2013). This line of reasoning is underlined by Frank Vancamp, partner at KPMG. He complements the fact that they listed all currently relevant statutory regulations and that they ended up with ten pages of text (Van Dyck, 2014, p. 7).

According to the proponents of the MB, this also implies that combining transport modes is not evident. '[T]he current administrative system does not offer sufficient opportunities for flexible travel behaviour,' concluded Pans (2010, p. 4). 'There are possibilities in the current situation,' says Kathelijne Verboomen from SD Worx, 'though this is an administrative muddle, it is much easier for an employer to distribute company cars to all his workers' (Vonck, 2014). One of the problems that companies encounter is insecurity, Verboomen states in another news item (VRT, 2012); due to the complexity it is hard to get an overview of the transport costs. According to Verboomen, 'a common thread is missing' and 'simplification is needed' (VRT, 2012). The statements by SD Worx are substantiated by their own studies and echoed by others, as many authors refer to their results. In 2012, SD Worx conducted a survey among employers, which gained much media attention. At least six other items in the corpus refer to this study.

Based on the identified barriers regarding the complex set of rules, many actors suggest that changes are needed in the current body of legislation. 'We need to streamline the current rules, because these are too complex' says Magerman in De Pourq (2012). 'Fiscal and juridical reforms are advisable. This can either be an optimisation of the existing regime or more

exhaustive reforms in order to come to a unified tariff for the mobility budget' (BBL, 2014). The suggestions from these actors 'in the field' are in line with those from political parties. The 'juridical obstacles' need to be removed, according to a press release from CD&V (Knop, 2013). And the Green party advocates administrative simplification. The legislative proposal by van den Bergh and others (CD&V) is presented as a solution to the identified juridical barriers.

2.5.7 Two camps: Corporate-Minded versus Eco-Modernists

Based on my analysis I would argue that on a general level there are two camps in the discussion about the MB: the corporate-minded and the eco-modernists. The camps have much in common (see also §2.5.8). Everyone argues that freedom of choice for the employee is a good thing or even a necessary feature for success. All actors agree that the current system is too complex and in itself an obstacle for the implementation of the MB. And, of course, both camps are in favour of the MB. However, they refer to different versions of the concept. Actors are able to embrace the same term, because there is plenty of room left for further interpretation (Avelino, 2011; Hajer, 1995). The essential discrepancy between both camps, within and beyond the MB concept, is about *the current position of the CC in the fiscal and social security system* in Belgium and the need to alter this position.

The dominant perspective is represented by the corporate-minded camp with political parties including the Christian-democrats and the liberals, companies such as SD Worx, KPMG, and PwC, and automobile clubs such as Febiac and Touring. The label 'corporate-minded' is mainly due to the dominant vantage point, which offers the perspective of employers and businesses. To the corporate-minded, the MB is solely about freedom of choice. Employees should not be forced to accept a CC as part of their reward package; neither should they be forced to use the CC on a daily basis. The MB is a way to obtain this new freedom and autonomy for the employee. In order to help the employee to make 'more sustainable choices', the alternatives should be just as attractive as the CC currently is. The current position of the CC is not questioned, it is used a point of reference instead.

Three sets of arguments are used to secure the current position of the CC. First and foremost, there is reference to the functional role of the CC. Actors from the corporate-minded camp stress that the CC is a tool: an instrument to carry out a job. Altering the current position of the CC is dangerous, the actors argue, since it will have a negative impact on the primary processes of many companies. Second, the CC is presented as the most obvious option to deal with 'the excessive labour costs' in Belgium, a result of the current tax system. A such, it is also a critique on income tax and governmental interference (KPMG, 2012). Third, altering the position of the CC is simply depicted as a 'no-go' area. 'It is political suicide' said Van den Bergh during the presentation of his legislative proposal (05/11/2013). This is also the explanation offered by Sinardet (2014a): 'there is only one big taboo in the discussions about tax reforms: the fiscal support to company cars'. One year later, his conclusion was almost literally confirmed by chairman of the NVA and well-known politician Bart de Wever during the meetings on the so-called 'tax shift'. He confirmed that all issues were open for discussion in tax reforms, except for the CC (HLN, 2015). Basically, the third set of arguments are about a

lack of public support and the fear of losing the electorate (Walks, 2015b). A nice summary of these arguments is provided by Magerman:

> *Combined with the ease of use, its status-enhancing value and the net wage advantage, the company car has become an irresistible element in the relationship between employer and employee. Taxing away the company car is because of these reasons not an option, there is also no democratic support to do so, apart from the fact that these kind of radical policy changes are unlikely to occur in our country (2013a, p. 1).*

An often-observed strategy by the corporate-minded camp is to pull alternative positions regarding the current position of the CC into extremes. Instead of proposing a small or slow increase in taxes for the CC, they depict these interventions as 'major government interventions', 'taxing away the company car' and 'abolishing the system of company cars'. Due to this juxtaposition the MB is positioned as the only feasible option, and as a result 'there is no alternative' (De Cat, 2015; Magerman, 2013b; see also Harvey, 2005 on Thatcher). Any attempt to alter the position of the CC is an attack; it is even associated with dictatorships:

> *Mobility means economic development and prosperity, but also intellectual development, knowledge, culture, leisure, personal development freedom and self-determination. It is not without reason that dictatorships want to control and curb mobility. Solving the mobility problem by major government interventions is therefore not an option (Magerman, 2013a, pp. 1–2).*

Since altering the current position of the CC is out of the question, it becomes *the point of reference*. Rather than making the CC less attractive, the alternatives need to be more attractive (see also Zijlstra & Vanoutrive, 2013). Four examples:

- 'An alternative to the company car should be offered, which is psychological and financially speaking, just as attractive as the company car' (Magerman, 2013a, p. 3).
- 'The company car has a favourable fiscal and social security regime; this is not the case for the mobility budget. As a result the mobility budget has a serious handicap' (Magerman, 2013b, p. 1).
- 'The idea is to come to a tax contribution in relation to the cost for the employer which is the equivalent of the company car' (PwC & Febiac, 2013, p. 25).
- 'The mobility budget is unable to compete. Unless, the use of the mobility budget for other transport modes than the company car is stimulated. The mobility budget should contain sufficient stimuli for employers and employees to switch to other modes than the company car voluntarily' (Idem, p. 3).

To the actors from the eco-modernist camp, the current position of the CC in Belgium lies at the heart of the problem (§1.2.2). This view is best represented by the Greens, the social-democrats, Sinardet, the OECD, and BBL. The opposing view of these actors regarding the CC becomes visible via an action-reaction pattern in the debate. Either they react to suggestions from 'the other side', or they evoke others to react:

- 'We need to tell the people that the current system for the company car is a poor system. With this system we will all be worse off in the longer term' said the newly elected chairman of the social-democrats (SP.a) in a press release, while referring to the need to make take 'more radical positions' in the debate (Maerevoet, 2015; SPA, 2015).
- At the time when the Christian-democrats launched their legislative proposal, the environmental organisation BBL reacted with a short comment: 'It is to be welcomed that the CD&V submitted a legislative proposal, therefore they receive support from BBL. A drawback: CD&V regards the mobility budget as a complement to the system of company cars. Although the mobility budget does offer some promising results, the maximum effect manifest itself when the system of company cars is phased out' (Grietens, 2013).
- Sinardet (2014a) proposed to abrogate the current system for the CC in Belgium. The government should use this money in order to lower the labour taxes. His opinion article gained much attention (Sinardet, 2014b). The Christian-democrats were quick to respond: 'We already offer an alternative' (A. Christiaens, 2014). This alternative was, of course, their version of the MB.
- The Greens proposed their version of the MB on multiple occasions and in multiple press releases. Their view was criticized by Kaesemans from Febiac (2015; Maerevoet, 2015).

As is clear from the previous sections, the eco-modernists represent a small counterweight to the dominance of the corporate-minded camp. Most prominent of these counterweights is the environmental NGO BBL. The main reason for this is because of their involvement in the debate from day one (BBL et al., 2010). They initiated the first project and were involved in the most important project, *Mobiliteitsbudget werkt!.* They are, however, no longer involved in the latest project: the smart mobility budget (*Slim mobiliteitsbudget*) by VIM. BBL seems to be disappointed by the way the MB is predominantly depicted. They argue that the dominant interpretation offers too little guidance and will have a limited impact:

> *Instead of phasing out the support for the company car, governments decide to choose the path of least resistance, but probably also the path of a minimum result. With attempts to make the alternatives equally attractive to the company car the Minister hopes to promote sustainable travel behaviour. The results of this transport policy now depend on the individual and, as such, less congestion or pollution are not guaranteed, on the contrary (BBL, 2014, para. 1).*

Motivations to alter the position of the CC relate to important values of the eco-modernist camp, like equity, equality, and respect for the environment. Both the Green party and the social-democrats frequently refer to the subsidies for the CC: 'Belgium is world champion in subsidizing the company car. 88 % does not have a company car, but does pay this bill' says Almaci, chairman of Groen (Maerevoet, 2015). The social-democrats (SP.A) proposed a 'tax shift' of € 5.1 billion based on four central themes. One of these themes relates to mobility and concerns a shift from the CC to the MB, worth € 0.5 billion; this shift would make travelling by train or bus cheaper (de Roy, 2015). The non-governmental environmental organisation

(BBL) refers to the OECD and echoes their message that is it is also a matter of efficiency; it is simply inefficient to subsidize all modes of transport in one country (BBL, 2014).

The existence of two camps is reflected in the problem definition. This can be illustrated by looking at the number of CCs in Belgium. This number might seem to be a rather neutral fact, though analysis of the numbers mentioned, their relative size, and the interpretation by the actors does suggest otherwise:

- 'Febiac, the federation of the car industry, says there are 300 000 cars that might also be used for private purposes. However, according to SD Worx this is an underestimation. A representative sample of this HRM service provider shows that 30 percent of the clerks ('bedienden') and 1.5 percent of the workers ('arbeiders') has a company car. This suggests a total of 456 000 cars. […] More than half of all passenger vehicles that are registered on a company name are also used privately. And with a total of 5.4 million vehicles in our country, almost one in ten cars appears to be a company car, as we should have known' (Vonck, 2014, p. 52).
- In the memorandum of the MB-bill, Van den Bergh (2013b, p. 2) says: 'Allegedly, there are about 400 000 company cars in our country, this number is rapidly increasing (more than 60 000 new cars in the period 2010 to 2012). If we compare this to the total number of 14 million vehicles, this figure is relatively small. Although, each additional car in the daily commute is added to the already congested rush hours'. Please notice that there is a huge gap between the total number of vehicles mentioned by Vonck and Van den Bergh.
- In 2015 the Hay Group stated that there are 650 000 CCs in Belgium. According to De Cat (2015), editor of magazine Trends, this means just 11.8 % of the total fleet. 'Are these cars the cause of the congestion?' he rhetorically asks (idem, para. 3). De Cat continues: 'What about the messy spatial planning, poor infrastructure, and the quality of our public transport system?'
- Kaesemans (2015), managing director of communications at the automobile federation Febiac, refers to the same study: '650 000 vehicles […] that is a significant, but not all that of a determining factor of the traffic on our roads' (para. 2). He continues by pointing out that these CC do not come on top of the number of private cars, they are substitutes: people would buy and drive a private car if they did not have the CC. 'If we look at the neighbouring countries, we observe that neither the number of cars per inhabitant, nor the number of kilometres driven is significantly different from our situation. In the Netherlands the number of company cars is much lower, there are, however, just about the same number of cars in total: about five per ten inhabitants' (para. 7).
- In an opinion article about CC policy in Belgium, Sinardet (2014a) claims that one out of two cars on the ring of Brussels is an CC. According to him, there are over 1 million CCs driving around in total. Two out of the three the most congested cities of Europe and North-America lie in Belgium, says Sinardet (2014).

The absolute number of CCs in Belgium ranges from a minimum of 300 000 to a maximum of over 1 million in the discussion (Febiac vs. Sinardet). The relative number of CCs to the total

fleet ranges from 3 % to 50 %, though the latter is in a specific geographical location (Van den Bergh vs. Sinardet). The impact of these CCs on the congestion levels runs from a side issue to the essence of the problem: 'people will buy and drive a private car' versus 'no wonder we have the most congested cities in the world.'

2.5.8 The Mobility Budget as a Neoliberal Concept

In the introduction to the discourse analysis I provided some common characteristics of the neoliberal discourse (§2.2). In this section I will discuss some of these features in relation to the MB. The main purpose is to gain a better understanding of the concept of the MB, its origins and its seeming inevitability. I will return to these issues in the remainder of this thesis.

Above I concluded that the corporate-minded camp dominates the debate; the discourse they draw from has hegemonic tendencies. This implies that, in general, the primary interests underlined in the debate are commercial interests; the well-being of companies and the economy are the foremost concern. Both seem to be goal by themselves. The companies in this discourse are not blamed for any negative effect of their corporate mobility practices on the environment, society or the economy. Employers running a business are depicted as rationally acting agents in search for wage optimization; their solution is invariably the CC. This kind of single-dimensional rationality is not questioned by the actors in the debate; the actions of companies are regarded to be the result of the irrational system of the state, companies are merely victims of the system. However, there is some movement in the opposite direction, as companies that have already implemented the MB are complemented for making an extra effort. The authors frequently stress that the managers at these companies go against the grain, which again underlines the attack and wider critique on the complexity of current regulations and the administrative burden that comes along with it. This critique is present in both the key documents as in the mainstream news articles.

Freedom is a central issue in the corpus, and the most important value stressed by the actors in the debate, as to be expected in a neoliberal discourse. Terms used to emphasize the importance of this freedom are: autonomy (11), voluntarily (4), independent (9), free (77), and freedom (26 times). More important than these word frequencies is of course the core idea of the MB: a central role of the employee in the selection of his or her transport mode. It is because of this freedom that the MB concept offers that it is something worth pursuing, and it is due to this freedom that the MB will work, according to the proponents. As can also be expected from a neoliberal discourse: the freedom discussed is primarily the freedom to shop around and maximise ones' individual utility.

In relation to the 'freedom of choice' mantra, one can observe that employees are unilaterally depicted as consumers. A new market needs to be created for work-related multimodal transport options. The online tool in the project *Mobiliteitsbudget werkt!* was literally called 'the shop'. The tools discussed by the actors in the corpus are regarded to be an essential precondition for the MB to succeed. This, of course, relates to the ideal of a 'perfect market' in which full information to all actors in the market is constantly available at a low cost. The up-to-date information enables employees to optimize their actions, as it offers opportunities to

calculate the costs and benefits of the possible actions and it creates a way to assess the risks involved.

In the concept of the MB, the individual is depicted as *an entrepreneurial self*, constantly in search for better opportunities. The employee selects the most rational travel mode in accordance with the situation, he or she can easily combine modes, will act wisely to save money and is willing and capable to manage the budget. Conversely, if the MB is not offered in short term, the frustrated employees will just hop to another job.

It is not difficult to see that the discourse here is different from classical liberalism. Advocates of the MB constantly stress the need to act: the stubborn car driver, guided by habits and constrained by all kinds of barriers, needs to be transformed into a hopper. It is up to the state to facilitate this process of transformation; it is up to the individual to execute the concept. On the one hand, there is a push towards a utopian multimodal ideal with free choosing individuals (§2.5.4). On the other hand, and maybe even more so, one can observe that the current situation and the near future have dystopian characteristics in the corpus, especially with respect to the congestion problem (§2.5.3). In short, actors do propose to build a better world.

On top of this, I observed the contradictory tendencies of neoliberalism of 'aiming for deregulation through regulation'. As already noted above, there is a fierce and frequent attack on the current set of regulations as a barrier: 'it is an administrative muddle'. However, instead of a simplification of the current situation, or a removal of redundant articles of law, the new legislative proposal from the Christian-democrats actually adds new rules.

The MB , however, is regarded to be a suboptimal solution by some in the corporate-minded camp, as they recognize that the MB itself comes with an administrative burden, its own legislation, and so on. The better option would be to lower taxes on income or to introduce road pricing. The actual line of reasoning used here is: 'as long as income tax is as high as it is, we need the company car in order to keep wage cost under control.' The argument to treat the MB like the CC in the tax and social security system is of course perfectly in line. An illustrative example of this position can be found in the final report of the project *Mobiliteitsbudget werkt!*:

> *In recent decades, multiple wage optimization techniques have been developed in order to cope with the high labour costs. […]. The project members [from Voka, BBL and Mobiel21] can do nothing else than to conclude that a substantial reform of the fiscal system with regards to remuneration in our country is pressing. The most flexible, easiest and fiscal interesting way to introduce a mobility budget: make sure that the employee has more net salary left; as such the employee can make his own choices regarding mobility. The whole clutter of fiscal back-doors and benefit regimes can be avoided (J. Christiaens et al., 2013, p. 53).*

The voluntary nature and atomistic perspective of the MB is rejected by some critics, mainly from the eco-modernist camp. They argue that the dominant interpretation of the MB will not result in the desired effect. This position is present, for instance, in the quote from the

environmental non-governmental organisation of the BBL, as provided in the previous section (§2.5.7).

It seems safe to conclude that the MB is a neoliberal concept, which can be an explanation for its popularity. By tapping in to the hegemonic discourse, success is almost guaranteed. By success in this context I do not mean the level in which certain goals an achieved, but the embracement and adoption of the concept by political parties, companies and civic society.

2.6 Conclusions Chapter Two

The main goal of this chapter was to understand how and why the concept of the MB was able to become popular in such a short period of time. This implies a study of the way the MB is presented, positioned and framed by the dominant actors in the field, and the genealogy of the concept. Indeed, in this explorative chapter the focus was on both the operationalisation and the contextualisation of the concept. With respect to the latter, the aim was to reveal the need for the MB and to understand its current popularity. The operationalisation of the MB is needed in order to proceed with the study of the MB itself, as I aim to study the MB that is most likely formalised through legislation and practices in the field.

In order to obtain answers to my research questions, I performed a discourse analysis, as actors in a discussion are assumed to draw from a certain discourse. Meanwhile, they are restricted by this discourse, as a discourse defines the possible and the impossible. Special attention is paid to storylines, which are used to overcome fragmentation and generate unity. The data used for this analysis comes from popular media and important documents by main actors. It roughly covers the period from 2009 to 2014. In total I used 52 sources.

A rather diverse, but small network of actors was identified in the MB debate. The various kinds of actors are companies, civic society, political actors, government, academics and more. Many of them are actively and frequently involved in the discussion. A central position is taken by (experts from) SD Worx. They conduct studies, participate in other studies, send out press releases and act as authorities in the field. Other important actors are members from the political party CD&V (Christian-democrats), and the project teams of the studies on the MB, especially Mobiel21 and BBL. The latter can be regarded as the strongest critical voice in the debate.

The storyline of the MB is as follows. Employees and society at large suffer from car dominated travel patterns. Employees are no longer able to enjoy the freedom and efficiency offered by the car, because of congestion, which also disrupts the economy. These traffic jams are caused by irrational car use. Employees use the car even when this is not the most rational option. This behaviour can be explained by a lack of choice. The current tax system is far from optimal when one wishes to combine transport modes and the administrative burden is an obstacle. Moreover, for some modes there is no reimbursement at all, while many CC owners have a fuel card that will cover the expenses. The MB addresses this issue and offers the employee 'freedom of choice'. This enables the employee to make more rational choices. Using

the car and owning a CC is still an option; the concept is not anti-car. Small changes in the travel patterns might already result in considerable improvement with respect to road conditions.

The polemic in the discussion takes off when *the relative position of the CC* enters the debate. In the dominant approach, the current position of the CC in the tax system is not to be disturbed. Rather, the alternatives to the CC should be made more attractive. As a result, although also due to other reasons, the CC becomes the point-of-reference in the dominant approach. For the eco-modernists, with actors such as BBL, the Greens, OECD, and others, this is not the way to go. According to them, the position of the CC needs to change in order generate some substantial effects. An important value referred to by these critical voices is equity.

The poor definition of the MB seems to be part of its success. Due to the poor definitions in the debate, actors are able to add their own accentuation. This also suggests that further institutionalisation and structuration without conflict is not evident. It also implies that I need to make some generalisations and choices with respect to the definition of the MB (see below). With respect to these assumptions, I followed the interpretation of the MB as held by the most dominant actors, since they are most likely to come out as winners of the debate.

As evident from this chapter, and also suggested by Hajer (1995), coherency is not a key feature of a discourse. To give just one example: according to the MB storyline, employees are looking for alternatives to the car due to high levels of congestion. If they are enabled to use transport alternatives via the MB, congestion levels will drop. This also implies that the main incentive to start using 'alternatives' will disappear. Issues like whether these people will continue to use these 'alternatives' if congestion levels decline remain unaddressed.

The MB was able to gain popularity in recent years because it is nested in a neoliberal discourse, which is a dominant discourse in contemporary Europe. This discourse is dominated by an economic concepts and terms. The MB is a way to overcome the economic principle of the split incentives. The MB is not a liberal concept in the sense that is promotes a laissez-faire policy. Conversely, additional legislation is proposed in order to implement the MB. The main way to generate consent is to stress the freedom obtained when implementing neoliberal projects, where freedom is always negative freedom; the removal of constrains. The freedom of choice is also the main feature of the MB: it is because of this that the MB will work. The strong emphasis on an up-to-date online tool can be understood as a way to let 'the market of multimodal transport options' work.

Within the discourse the employee is an entrepreneurial self. He or she quickly adapts to new conditions, this being the changes in oil prices, road conditions, or the rearrangement of business trips in order to improve efficiency. As such, the entrepreneurial self is inherently flexible. He or she relies on up-to-date information as a real competitor should do. Hence, all the values imputed to the ideal type of a company are now demanded from the individual employee.

The MB concept coincides with the rise of 'pragmatic multi-modalism', a new trend in transport policy. On the one hand, pragmatic multi-modalism recognizes that road building might result in a never-ending story; on the other hand, it clearly avoids anti-car policies; a modal shift through measures against the car is out of the question. In the new policy the car is part of the transport system and can be used as a feeder mode for train, bus, and even bicycle. The concept of the MB is primarily presented as a tool to alter transport mode choices. Other pathways to 'sustainable transport', such as reducing trips and kilometres, have a limited presence. Hence, research regarding to effectiveness of the MB should include mode choice.

In section 2.4 I mentioned the use of a second dataset for the validation of the results presented in this chapter. With respect to this second analysis, the following nuances are in place. Overall, I observe that political parties and the Flemish and Federal government are more strongly represented. Meanwhile, there is a less central position for the Christian-democrats (CD&V), while the position of the Liberals (OpenVLD) and especially the Greens is more prominent. The rise of the Nationalist party (NVA; see Table 2.2) is also reflected in this second corpus. The CD&V altered its position somewhat by stating that the costs of the MB and its introduction should be covered by lowering the subsidies for CCs. Employers' associations are better represented and emphasize that if the MB is introduced, the current benefits need to stay in place and can be extended to other modes or ways to compensate employees. The project of *Mobiliteitsbudget werkt!* and the actors involved (SD Worx, Mobiel21, BBL) are less important in the second analysis. At the same time, other projects and initiatives are more prominent. Conversely, I have observed a strong overlap in the arguments used in favour of the MB. Again, the MB is needed because of excessive car usage and congestion in Belgium. Again, employers and employees demand the MB and CC owners are depicted as captives of the system with no freedom of choice. Again, the MB offers a competitive advantage for companies and hope for better transport conditions and the Belgian roads.

Some of the differences observed are relevant in terms of the results and conclusions presented in this chapter. Nevertheless, I argue that the observed differences are mainly a result from the inherent different character of the dataset used. In the primary dataset there are predominantly long articles and papers. I even added a full research report and the legislative proposal. In the second corpus, used for the validation of the results, there are mainly short newspaper articles included, and four out of five articles stem from one of the Flemish newspapers. These newspapers demonstrate a strong focus on politics. Furthermore, there is a difference in the period covered. In the primary corpus I relied inter alia on Google Alert, which provides a weekly update on news items in the period the alert was active. The GoPress search covers a long period, from the first reference to the MB in 2001 to the last discussion in Federal government in 2016. These inherent differences are not easily controlled for. The best option would probably be to conduct the analysis once more with both datasets combined. All in all, the outcomes of the validation process do not repudiate my findings, but mainly strengthen the results.

The insights gathered in this chapter will be used in the remainder of this thesis. This is a list of the key characteristics of the MB.

- The MB is provided by the employer to the employee.
- The implementation of the MB by the employer is voluntary.
- Participation in the MB by employees is also voluntary. This also implies that the current system remains in place.
- Since the main target group are CC owners, I will solely focus on this group. That is, people who are entitled to a CC because it is part of the contract between employer and employee. Hence, people do not necessarily need a CC for their job.
- The administrative period of a MB is one year. This is an arbitrary choice, since there is little coherence in the sources studied. It is a safe choice between daily and once every five years. Issues with respect to administrative complexity and the possibility of inter-period transfers of selected options or budgets are beyond the scope of this study.
- The amount of budget is based on the full operational lease costs of the CC. This includes both capital and distance costs.
- Options available within a MB are public transport, a bicycle and an end-of-year bonus. The CC will always be available to those with a CC in the current situation.
- Employees are free to choose within a MB. This can be any combination of options available. Most evident correction to this freedom of choice is the condition to at least include a CC in the package, as some employees do need a CC for their job. This can also be observed in the actual practices nowadays in Belgium. The option of adding primary wage to enlarge the MB is excluded.

CHAPTER THREE: METHOD AND DATA

I've got the company car

I'm the one swinging at two below par

Yeah, I've become one with the ones

That I've never believed in

But I've got the company car

— ***Switchfoot**, Company car (1999)*

3.1 ONLINE QUESTIONNAIRE

For this thesis I gathered a dataset through an online questionnaire and used additional data. Both are presented in this chapter. With respect to my dataset, I discuss the design of the survey, processes of data gathering, response levels and basic descriptive statistics of the dataset. A key part of the questionnaire is a discrete choice experiment (DCE). I pay special attention to this experiment and its design in this chapter. With respect to important additional datasets, I discuss their origin, quality, and added value.

There were a number of goals related to the questionnaire. First and foremost, the questionnaire was designed to conduct a choice experiment. With this experiment I mimic the mobility budget (MB) as presented by the dominant actors in the debate, while monitoring the preferences of employees. In relation to the experiment, though also for general purposes, the goal was to obtain data in order to estimate the size of the MB on an individual level. Next, the questionnaire was used to obtain socio-demographic data and details on travel behaviour. This data was also used to assess the quality of the sample. Finally, a number of questions served to validate other results.

The questionnaire comprised three parts (Appx. II). In the first part, the elements and levels of the choice experiment were introduced. Five elements were presented in total: company car (CC), bicycle, public transport (PT), leave days, and wage. The respondents were asked to provide some insight into their current situation regarding these elements, e.g. questions were added regarding bicycle and PT use. This was done to get people acquainted with the elements included, to be able to include this data as co-variates in my choice models, and to monitor the current situation of my respondents. With respect to the latter, the results on the CC were particularly important, as these were to be used to select target group members. The second part of the questionnaire covers the choice experiment. After one introduction page with a control question, all participants were offered 16 choice situations. Each set of two packages was displayed on a single page. In the next section I discuss the design of the experiment in detail. For the third part I gathered socio-economic information, with details about the job, details on the travel behaviour and I tested three statements regarding the MB. On the final page, room was provided for remarks or comments. Furthermore, some of the additional data was meant to test the validity of my results.

Not all participates were presented the exact same questionnaire. The first tests, performed at a small company called *Xella*, revealed some minor defects, which were immediately corrected. These defects were mainly textual, including typing errors and ambiguous sentences. Other differences in the questionnaire resulted from conditional questions; these were only presented when relevant, based on previous answers provided by the respondent. Requests from four cooperating employers resulted in minor alterations for the surveys at these companies. Finally, the choice experiment was split up in eight blocks. Only one out of eight blocks was presented to a single respondent. In all cases I tried to minimise variation between questionnaires in order to be able to compare the results from different companies and rounds.

This chapter starts with the design of the choice experiment in the next section, with special attention for the use of mixtures. In section 3.3, the data gathering process is discussed. I was able to find many candidates by approaching them via their employer. Next, I move on to the descriptive statistics of the questionnaire, with a special section concerning the choice data and data improvements through matching procedures. In section 3.5 I introduce four additional datasets that a frequently used for the purposes of the remaining chapters. Important additional information to this chapter can be found in the appendices. Most importantly, the full questionnaire is included in the appendix (II). I also provided a full overview of the experimental design in the appendix (III).

3.2 A Mixture Amount Discrete Choice Experiment

3.2.1 An Introduction to Discrete Choice Experiments

The method used to mimic the choice behaviour of CC owners when offered a MB is a mixture amount DCE. With this experiment I examined the preferences with respect to the composition of elements within a MB; I do not examine the actual travel patterns. Travel patterns would be a next step in the process, and are beyond the scope of my thesis, though I do assume that choices within the MB serve as a proper indicator for these patterns. Indeed, on the one hand, options are enabled or disabled through the composition of the MB, and on the other hand, current or future travel behaviour is likely to be the most important guide in the composition of the MB.

Key characteristics of the MB that I model in the experiment are as follows (§2.6):

- The MB is a fixed budget available to the employee on an annual basis;
- The available budget equals current individual-level transport-related costs for the employer;
- In the MB a combination of options can be selected to equal this total amount;
- Included options are at least:
    - options to select the same, a less expensive or no CC at all;
    - options to select 'alternative modes', like train, bus or bicycle;
    - an option to save money for an end-of-year bonus.

The mixture amount DCE is a particularly suitable method for my research objectives, since it closely resembles the way employees are depicted in the debate, when offered a MB. [1] The composition of the MB is prior to actual travel behaviour, as employees are requested to make choices for a longer period. Likewise, I requested respondents to make choices for the year to come. [2] Within choice experiments, respondents are requested to choose the most attractive option from a set of options, as they are assumed to maximise their utility in real life (§7.3.5). [3] The mixture amount DCE complies with the requirement to keep the available budget fixed; packages presented to the respondent in a choice situation are equally expensive. [4] Furthermore, due to an experiment with mixtures, I did not model the preferences for individual elements of the package, but rather the overall appreciation for a package with a

certain combination of elements. Indeed, synergetic effects for multimodal travel options, as suggested by actors in the debate, are integrated in the design and can be modelled accordingly.

A DCE is a stated choice method. In turn, stated choice is a specific stated preference method (Ortuzar & Willumsen, 2011). Stated preference techniques are warmly welcomed in this thesis, since revealed data in Belgium is scarce and often biased due to other changes in the corporate mobility policies, such as the introduction of parking fees (§1.3). Moreover, gathering newly revealed choice data through a field experiment is costly, and involving a sufficient number of participants can be troublesome, as the projects *Mobiliteitsbudget werkt!* and *Slim mobiliteitsbudget* revealed (§1.3). With the stated preference method one can more easily obtain sufficient observations. Moreover, as I demonstrated in the previous chapter, new legislation for the MB is forthcoming, which results in a new situation. Stated preference studies are the most common way to study new, currently still hypothetical situations (Louviere, Hensher, & Swait, 2000; Ortuzar & Willumsen, 2011).

There are some common characteristics that make it easy to recognise a DCE (Louviere et al., 2000; Ortuzar & Willumsen, 2011):

- The options are presented as a package. Usually, these are attributes of the same thing. For instance: travel time, reliability, and travel cost when choosing between transport modes.
- Respondents are asked to choose between two or more packages presented in one choice situation. Such a choice situation is also known as a choice set. The number of options in a set usually varies between two and four (Rolfe & Bennett, 2009). More than four options are generally considered to be too difficult for respondents (Iyengar & Lepper, 2000; Schwartz, 2004).
- Respondents are usually asked to select the most attractive option available in the choice set.
- The attributes presented in each option are often the same in a choice set, while the levels per attributes differ. When not all attribute levels are different, we call this a 'partial profile'. Partial profiling can be a design strategy to reduce the complexity of the choice situation for the respondent (Kessels, Jones, & Goos, 2014).
- Commonly, respondents are offered multiple choice sets. The number of choice sets usually lies between 12 and 24. Because of the multiple choice observation per individual, the choice models that use this type of data are reliant on panel techniques nowadays.
- There are labelled and non-labelled experiments. Labels are often used when there is a clear and unambiguous title for the package available, for instance Apple IPhone 7 versus Samsung Galaxy S7. The use of labels also depends on the research objectives and the experiment design. In my study the use of names is not evident, since it is difficult to come up with unambiguous names for each package.
- One of the options in a choice situation might be an 'escape' option, like 'none of the options' or 'status quo' (Zijlstra et al, 2015).

- The options in a choice situation are not necessarily presented in words. In both marketing and spatial planning, there are examples of the use of visualisations.

3.2.2 Experiments with Mixtures

In this thesis I use a special and innovative type of DCE, namely a *mixture amount* experiment. A mixture amount experiment takes two important features of the concept of the MB into account, namely the fixed annual budget for a *mixture* of transport options and differences on individual levels with respect to the *amount* of budget. Examples of mixture are, for example, bread with flour, salt, water and yeast, a coffee with water, beans, sugar and cream, or a new colour of paint as a result of mixing primary colours. The amount is then the weight of the dough, size of the coffee mug, and the new total litres of paint respectively.

Traditional DCEs are unable to take these two factors into consideration; they are beyond the optional constraints for the design of a DCE. An attempt to integrate these constraints in a traditional set-up for a DCE failed. In contrast to the traditional approach, the mixture approach expresses elements as share of the total mixture. Indeed, the relative size is used for both the design and modelling. As a result, the sum of all elements in a mixture is always equal to one (Scheffé, 1958); this is also known as *the mixture constraint* (Eq. 3.1):

Eq. 3.1

$$\sum_{i=1}^{q} x_i = x_1 + x_2 + \cdots + x_q = 1$$

In this equation, x represents the share of a certain element, expressed by the integer i {1,2,..,q}.

In the analysis of mixtures, the focus is generally on the effect of a certain mixture to a single response variable, for instance, strength in case of mixing metals or growth rates for fertilizers. In my case the response variable is marginal utility, the standard in DCEs. The effect of a mixture on the response variable of interest is commonly monitored by fitting one of Scheffés' polynomials to the data. Scheffé (1958) introduced a set of canonical polynomials ranging from a linear effects model (Eq. 3.2) via quadratic (Eq. 3.3) and cubic effects (Eq. 3.5) to quartic effects. In practice, these complex polynomials are of little use as four-way interaction terms are very unlikely of added value to the model performance. Truncated versions of the full cubic or quartic models are known as *special* cubic (Eq. 3.4) and *special* quartic respectively. These truncated versions are often outperformed by their full counterparts (Smith, 2005).

Eq. 3.2

$$Y = \sum_{i=1}^{q} \beta_i \, x_i + \varepsilon$$

Eq. 3.3

$$Y = \sum_{i=1}^{q} \beta_i \, x_i + \sum_{i=1}^{q-1} \sum_{j=1+i}^{q} \beta_{ij} \, x_i x_j + \varepsilon$$

Eq. 3.4

$$Y = \sum_{i=1}^{q} \beta_i \, x_i + \sum_{i=1}^{q-1} \sum_{j=1+i}^{q} \beta_{ij} \, x_i x_j + \sum_{i=1}^{q-2} \sum_{j=i+1}^{q-1} \sum_{k=j+1}^{q} \beta_{ijk} x_i x_j x_k + \varepsilon$$

Eq. 3.5

$$Y = \sum_{i=1}^{q} \beta_i \, x_i + \sum_{i=1}^{q-1} \sum_{j=1+i}^{q} \beta_{ij} \, x_i x_j + \sum_{i=1}^{q-1} \sum_{j=1+i}^{q} \delta_{ij} x_i x_j (x_i - x_j) + \sum_{i=1}^{q-2} \sum_{j=i+1}^{q-1} \sum_{k=j+1}^{q} \beta_{ijk} x_i x_j x_k + \varepsilon$$

The total amount is often irrelevant in mixture problems. It does not matter whether 2 litres of red paint are mixed with 2 litres of blue, or 5 litres with 5 litres; as long as the ratio is the same, the final colour will be the same. When the total amount of a mixture is expected to be a relevant dimension, size becomes a *process variable* in the analysis (Piepel & Cornell, 1985; Smith, 2005); these models are known as *mixture-amount* models. With respect to the examples mentioned above, the size of the bread might be a relevant factor, next to the proportions of yeast, water, and flour, since a small bread might rise more easily than a large one, which, in turn, has an impact on the taste or appearance (Prescott, 2004). With respect to the MB, I do assume that the total size is a relevant dimension, an assumption which will be tested thoroughly in Chapter Six.

Basically, there are two ways to account for amount: via additive or integral effects. The former assumes that the form of the effect of the components is the same for each level of the modelled amount. For the latter, the amount has an effect on the blending characteristics of the elements in the mixture. I expect to see *integral effects* on different budgets, due to the fact that people with a small budget can only select a very basic car, while more fancy cars come within reach as the budget increases. Furthermore, as Prescott (2004) points out, the additive effect assumption is usually not realistic. To model an integral effect, the parameters of Scheffés' polynomial model need to be crossed with budget size (Cornell, 2011; Piepel & Cornell, 1985). In case of a linear effect, this means that the total number of parameters will double. In case of a quadratic effect, the number of parameters will triple.

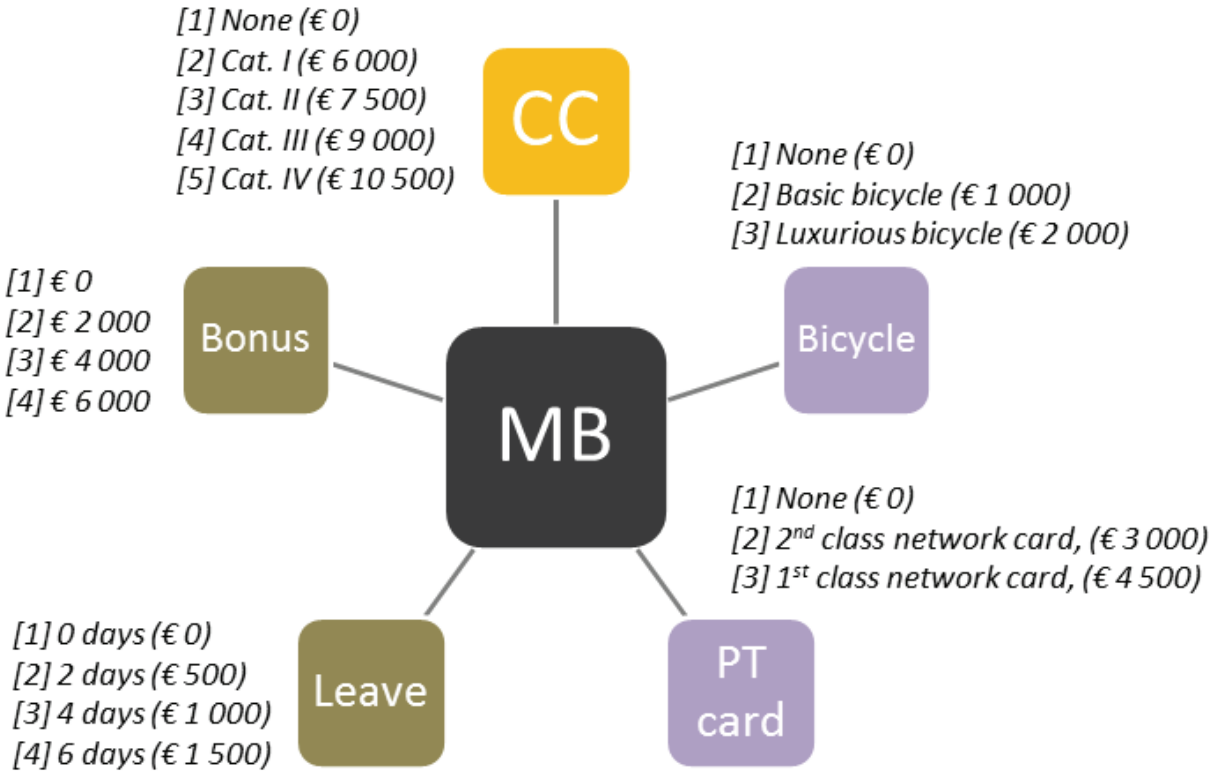
3.2.3 SELECTION OF THE ELEMENTS

Because I aim to mimic the MB as it is presented by the dominant actors, the selection of elements and their levels is based on the observations in the discourse analysis (Ch. 2). Furthermore, there are three methodological considerations. First, the total number of elements needs to be manageable. Too many elements will result in too many choice situations, too much information for the respondent and many parameters in a choice model. In the majority of DCEs, the number of attributes is somewhere between three and eight. The second constraint is the need to use independent elements. If one element comprises the share of budget spent on a CC and the other element is a fuel card for 0 to 10 000 litres of diesel, there is a potential complication in the design. On the one hand, because the leasing costs depend strongly on the kilometres driven; on the other hand, because there is not much need for a fuel card without a car. A third consideration can be derived from the fact that the elements in the mixture are modelled as continuous variables. Hence, the levels for each element need to be unique and compatible with each other. It is because of this constraint that offering both an electric car and a hybrid car for 8 000 per year should be avoided, since the share of budget spent on the car element for these options will be the same in the model. Alternatively, one could add another element and end up with one parameter for hybrid and one for electric cars, although then the second consideration applies once more, as offering two cars in a single package might be a little bit too much.

As a result of the research questions and the MB concept, the CC has a dominant position in the experiment. Next to the CC, two other mobility options are added: the bicycle and public transport (PT). The combination CC and PT is by far the most frequently observed combination offered by companies with a MB in the field (Venneman & Vanderbeuren, 2012). The bicycle is frequently mentioned as an option in the debate (Ch. 2). Together, these modes account for almost all of the commuting trips and business trips in Belgium (Ch. 5). Next to the mobility options, I added non-mobility options that are common in FBPs: time and money. The latter is, of course, a direct translation of the 'bonus' option in the MB; it is the financial incentive, a key feature of the MB (Ch. 2).

Five elements were selected in total $\{x_1, x_2, \ldots, x_5\}$. Below I discuss the levels for each element (see also Fig. 3.1). The costs for all levels of all elements is rounded up or down to the nearest multitude of € 500. The necessity to round all figures results from the need to obtain full mixtures: the total of the elements must always be one in order to comply with the mixture constraint (Eq. 3.1).

FIG. 3.1.: ELEMENTS AND LEVELS IN THE EXPERIMENT



Element 1 (x_1)**:** *Company Car* - The CC has the highest number of levels with a total of five. There is an option not to take a car and there are four price categories of cars available in the experiment. I chose 'categories of cars' instead of prices or types of vehicles in the experiment, mainly because the make or type of car is beyond the scope of this research. Furthermore, using brands and car models causes discrepancies in the results, as participants might prefer one brand over the other. However, to introduce the car categories of the experiment, I did use annual costs and some car brands and types as illustration of the class. The selection of car types shown is based on popularity in Belgium, measured in the number of car sales, availability and price range. In the introduction to the experiment in the questionnaire I also showed the *benefit-in-kind*. These costs were based on the tax rules of 2014 and the rounded mean of cars presented in that category (Table 3.1). Note that the actual gross lease costs (not presented to participants) might be an overestimate, since these numbers are based on the private lease costs and relatively higher fuel prices. These costs include the cost use of the car for 25 000 kilometres per year (fuel, service, maintenance, depreciation) and a fixed cost of € 500 for a parking space at the workplace.

TABLE 3.1.: DESCRIPTION OF THE LEVELS FOR THE ELEMENT CC

Level	Annual cost#	Catalogue value	Examples	Estimated benefit in kind (first year)
No CC	€ 0	n.a.	-	€ 0
Cat. I	€ 6 000	€ 17 500	Citroën C3, Ford Fiesta, Opel Corsa, Renault Clio	€ 1 250
Cat. II	€ 7 500	€ 25 000	Ford Focus, Renault Mégane, Volkswagen Golf	€ 1 500
Cat. III	€ 9 000	€ 32 500	BMW 1-serie, Nissan Quashqai, Toyota Avensis, Volvo V40	€ 2 000
Cat. IV	€ 10 500	€ 40 000	Audi A4, BMW 3-serie, Opel Insignia, Volvo V60	€ 3 000

 # This column was not shown to the respondents

Element 2 (x_2)**:** *Bicycle* - There are three levels for the element 'bicycle': no bicycle, a standard bicycle of € 1 000, and a deluxe bicycle of € 2 000. Employees might also buy accessories, special clothing, or insurance in addition to their bicycle, as I also indicated in the introduction of the experiment (Appx. II). Moreover, by showing pictures in the questionnaire I suggested that there is an interesting variety of bicycles available, like tricycles, folding bikes and e-bikes (Fig. 3.2). Off course, there is no need to buy a new bicycle every year. People who opted for a bicycle in the first year might not do so in the following year because of this. However, this does not mean they dislike cycling.

FIG. 3.2: EXAMPLES OF BICYCLES SHOWN TO THE RESPONDENTS

Row 1: simple racing bicycle, Cube Touring Pro, luxurious city bike from Gazelle, folding bicycle from Dahon, Row 2: Luxurious racing bicycle, Koga Traveller, Pedelec from Giant, Brompton folding bicycle

Element 3 (x_3)**:** *PT network card* - In the experiment I added three levels for PT, namely: no public transport, a second class network card and a first class network card. It would make sense to add a seasonal ticket to this list, which can be used for the daily commute on a certain track; however, the price of such a ticket depends on the distance covered, which was unknown during the design stage and is also known to display a high level of variance (Ch. 5). A similar argument holds for single tickets for an occasional journey by train or other form of PT. Therefore I added an additional question in the questionnaire about other types of PT tickets and passes (Appx. II; §6.6.2).

Element 4 (x_4)**:** *Leave days* - Four levels were used in the element 'leave', from zero to six days in steps of two days. A single leave day was valued at € 250. A more detailed approach was complicated and somewhat redundant as I still needed to round these costs to the nearest multitude of € 500, in order to comply with the mixture constraint. Leave days were mainly used to obtain full mixtures in the experimental design.

Element 5 (x_5)**:** *Bonus* - In the element 'bonus' I used four levels ranging from € 0 to € 6 000 in equally divided steps. The bonus is presented as additional annual gross income. Because I expected the respondents in my survey to have different wage levels, and therefore varying income tax and contributions to social security, the use of a net bonus was not convenient. In order for the 'bonus' option to be competitive, as suggested by actors in the debate, I cancelled the obligatory employer contribution (*'patronale bijdrage'*) of 35 % on wages. As a result, the gross bonus for the employee is close to the net cost for the employer in the experiment.

3.2.4 An Optimal Experimental Design

In a traditional set-up of a choice experiment, there would be a total of 720 packages (a.k.a. 'profiles') and a total of 258 840 choice situations. Due to two constraints inherent to the concept of the MB, the number of relevant packages and choice situations are strongly reduced. The first reduction results from the need to present only the packages within reach of CC owners with a MB available to them. The relevant range is set from a minimum of € 6 000 to maximum of € 11 000, based on an educated guess, although this turned out to be an appropriate range (Appx. IV). The number of packages with a total cost within this range is 151, significantly less than 720. Furthermore, employees are requested to choose with a fixed budget, which implies that in a choice situation, both packages presented to them are equally expensive. This constraint, in combination with the latter, results in a total of 1 023 relevant choice situations.

Further reductions were necessary, as 1 023 choice situations are impossible to cope with for one single respondent. These reductions were obtained through an optimal design and segmentation of the choice tasks into blocks. For these further improvements I received help from Professor Peter Goos.

The criterion used for the optimal design of my experiment is a *D-optimality* (Huber & Zwerina, 1996; T. J. Mitchell, 1974). This criterion is by far the most popular criterion in optimal design of choice experiments (Kessels et al., 2006). D-optimal designs aim to maximise the determinant of the Fisher information matrix. A maximised determinant results

in little variation around the estimates, therefore it improves chances for obtaining significant results. In general, the D-optimality criterion also serves other criteria, like A- or G-optimality (see for a further discussion Kessels et al., 2006). In short, maximising the determinant will help to obtain significant parameter estimates with relative small standard errors and it will lower the number of respondents that are needed.

For the optimal design, all priors for the parameters were set to zero, meaning a *utility neutral design* is generated (Ruseckaite, Goos, & Fok, 2014). This is a safe choice, since a complex model with many interaction terms and 38 terms in total was used (Eq. 3.6). Solid assumptions on the priors and their distributions are difficult to make in mixture models (Ruseckaite et al., 2014), as the results of my choice models will demonstrate; the posteriors are hard to predict (Ch. 6; Appx. V). One way to overcome this issue would have been a small scale experiment to obtain a-priori estimates (Huber & Zwerina, 1996), although the use of informative priors in the design of mixture-amount experiments is still uncharted territory.

The utility formula for the design of the experiment is based on Scheffés' special cubic model with integration of the amount-effect for the parameters of the quadratic model:

Eq. 3.6

$$U_i = \sum_{i=1}^{q-1} \boldsymbol{\beta_i}\, \boldsymbol{x_i} + \sum_{i=1}^{q-1} \sum_{j=1+i}^{q} \boldsymbol{\beta_{ij}}\, \boldsymbol{x_i x_j} + \sum_{i=1}^{q-2} \sum_{j=i+1}^{q-1} \sum_{k=j+1}^{q} \boldsymbol{\beta_{ijk} x_i x_j x_k} + \sum_{i=1}^{q-1} \boldsymbol{\beta_i}\, \boldsymbol{a_i x_i} + \sum_{i=1}^{q-1} \sum_{j=1+i}^{q} \boldsymbol{\beta_{ij} a_i}\, \boldsymbol{x_i x_j} + \boldsymbol{\varepsilon}$$

In this formula:

- U is marginal utility for an alternative
- β is the parameter to be estimated, with the label in its subscript
- x is the share of a certain element in the mixture, with element in subscript
- a is the total cost of the combined alternatives divided by 10 000
- The 'ε' is the unknown error term
- The small letter 'i' represents the alternative

Please notice that this equation is not the same as the final utility function used for the estimation of the choice models. A series of trials has revealed that other utility functions provide a better model fit (§6.3.2).

The D-optimal design is generated by using a *choice set exchange algorithm* as designed by Prof. Goos and inspired by the point exchange algorithm by Fedorov (Fedorov, 1972). In this iterative process, the effect on the determinant of the variance covariance matrix is measured while swapping all 1 023 possible choice situations in a list of 96 choice sets. A choice set consists of two choice options. This process was conducted with the *proc optex* function in SAS and repeated eight times. Finally, the version with the most appealing features was selected.

With the algorithm 96 choice situations were generated, each one with two mixtures next to each other. According to the calculations and tests, this number should be sufficient to

estimate the full model with a relative low number of respondents with similar preferences (<10). Although 96 choice situations is a limited selection from the total of 1 023, it still is too much for one person. Therefore these choice situations were divided into eight blocks with twelve choice situations each. The choice situations were separated from each other on the basis of the total amount. Four blocks with relatively low budgets (≤ € 9 000) and four blocks with high budgets (≥ € 9 000) were constructed from the 96 initial choice sets.

In these blocks, the number of mixtures with a CC was rather low, especially for the mixtures below the total cost of € 9 000, while my target group currently does have a CC. I expect them to have a strong preference for the car. Moreover, there is a risk of drop-outs during the experiment as respondents might observe that their preferred option is simply unavailable (in the majority of the choice situations). For these reasons I added four extra choice situations, which include the CC in one or both of the mixtures presented in the choice set.

I decided not to add a 'no choice' option to the choice set. Therefore, people are forced to choose between the two provided options. The main reason for not adding an escape was the need for sufficient, useful responses and complete blocks with answers. Of course there are also risks involved with forcing respondents to answer all 16 choice situations. Because of these risks, I created a control group, were people did have a possibility to opt out. The analysis of both groups, with and without escape, points out that there is no reason to question the quality of the main sample (Zijlstra, Goos, Vanoutrive, & Verhetsel, 2015). A full overview of the experimental design, including the blocks and additional choice sets, can be found in the appendix (Appx. III)

3.3 DATA GATHERING

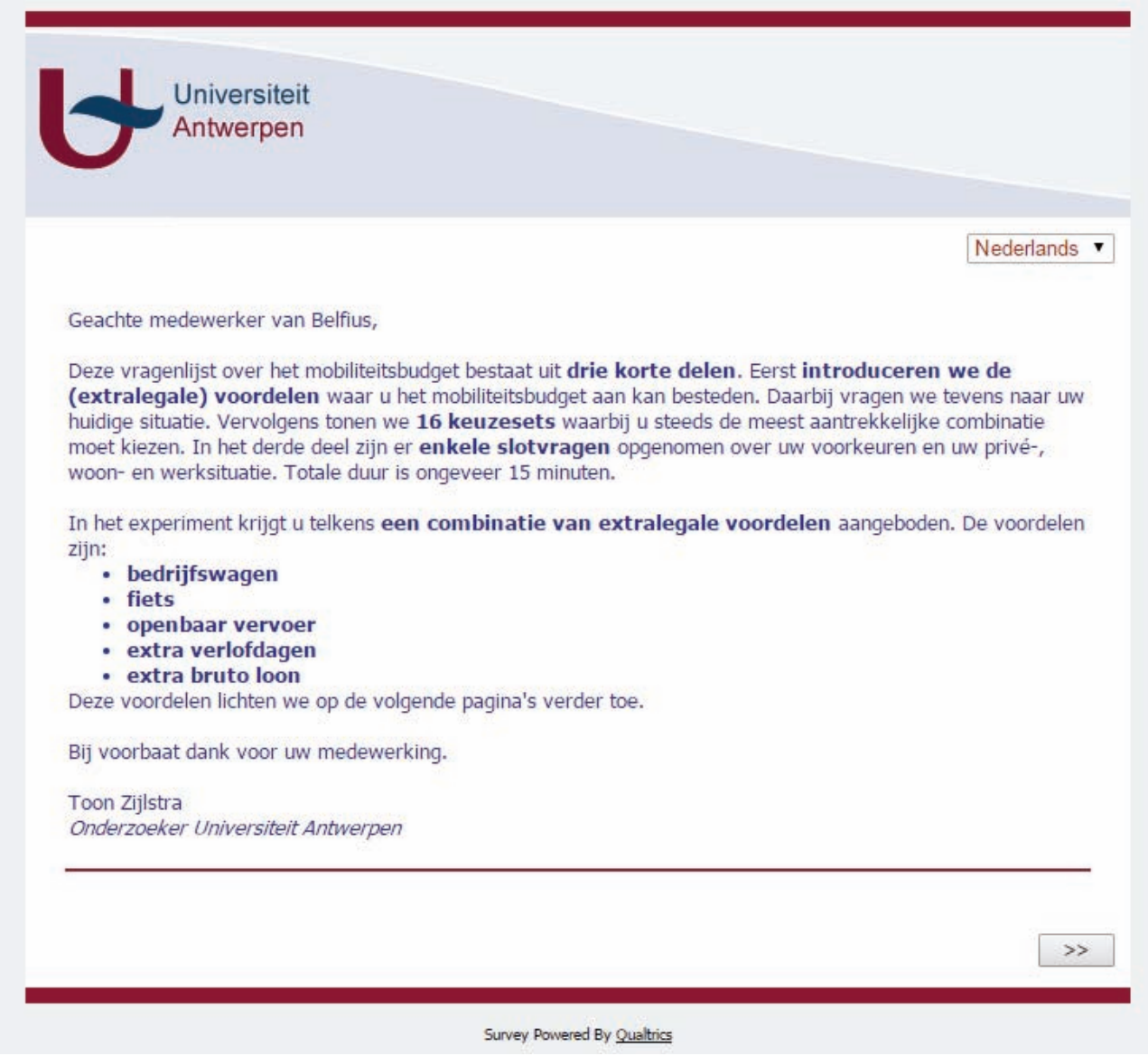
3.3.1 APPROACHING THE TARGET GROUP VIA EMPLOYERS

All questionnaires were distributed digitally via e-mail with a hyperlink. I used the survey platform Qualtrics (www.qualtrics.com) for the design, tests, and the distribution of the questionnaire and choice experiment. With respect to the design, the University of Antwerp template was used (Fig. 3.3). This includes the standard colours of the university, fonts, and the logo of the University of Antwerp. By doing so, I hoped to improve the quality of the results, as people might be inclined to make a more serious effort for a public non-commercial authority such as a university.

Online surveys are known to be problematic with respect to response levels and the quality of the data (Fan & Yan, 2010). In their meta-analysis, Shih and Fan (2008) conclude that response levels are on average about 11 percentage points lower in web based surveys as opposed to paper surveys (34 % versus 45 %). Low response rate can be problematic for a number of reasons. First, I did not know beforehand whether I would be able to obtain sufficient observations in order to estimate the choice model. Especially with maximum simulated likelihood methods, a lack of observations can be an issue (Ch. 6). Second, in line with the previous argument, other statistics and explanatory models are generally more

robust with more observations. Hence, the overall aim was to obtain at least 300 respondents. Third, a high response rate implies less potential non-response bias, or lower odds of self-selection by the respondents. In the case of the latter, mainly people with a positive attitude toward the subject are inclined to respond, which in turn might result in optimistic results. All-in-all, a high response rate improves to the overall quality of a survey.

FIG. 3.3.: INTRODUCTION PAGE OF THE QUESTIONNAIRE IN DUTCH



Universiteit Antwerpen

Nederlands

Geachte medewerker van Belfius,

Deze vragenlijst over het mobiliteitsbudget bestaat uit **drie korte delen**. Eerst **introduceren we de (extralegale) voordelen** waar u het mobiliteitsbudget aan kan besteden. Daarbij vragen we tevens naar uw huidige situatie. Vervolgens tonen we **16 keuzesets** waarbij u steeds de meest aantrekkelijke combinatie moet kiezen. In het derde deel zijn er **enkele slotvragen** opgenomen over uw voorkeuren en uw privé-, woon- en werksituatie. Totale duur is ongeveer 15 minuten.

In het experiment krijgt u telkens **een combinatie van extralegale voordelen** aangeboden. De voordelen zijn:

- **bedrijfswagen**
- **fiets**
- **openbaar vervoer**
- **extra verlofdagen**
- **extra bruto loon**

Deze voordelen lichten we op de volgende pagina's verder toe.

Bij voorbaat dank voor uw medewerking.

Toon Zijlstra
Onderzoeker Universiteit Antwerpen

>>

Survey Powered By Qualtrics

Participation in the survey was promoted in multiple ways. The most important contribution came from the active involvement of employers (see below). Thanks to the employers, I was able to send a hyperlink leading to the questionnaire to the professional e-mail address of the candidate during work hours. A personal approach was used here, implying that respondents were approached using their first name and surname in the invitation. In this invitation I clearly explained the purpose of the questionnaire and the affiliated organisations were mentioned, including their employer. This approach is suggested by multiple authors (Frankfort-Nachmias & Nachmias, 1992; Robson, 2011). The approval for participation from the employer also implied that employees were allowed to complete the questionnaire during

work hours, which is supportive to higher response rates. If possible, and after authorization of the employers, candidates who did not reply after two weeks received a reminder. Furthermore, I gave away 25 sets of two cinema tickets for the biggest cinema chain in Belgium. In order to compete for these tickets, respondents had to provide a complete survey, had to indicate that they liked to compete, and had to provide a valid e-mail address. About 3 out of 4 participants indicated that they liked to be eligible for the cinema tickets. See Table 3.2 for additional details on the data gathering process.

I approached employers with the request to collaborate in multiple ways. I directly approached HRM managers, car fleet or mobility managers, or other managers within a certain company by e-mail of telephone. I requested mobility coordinators from all of the provinces in Flanders to look at their network and contact possible interesting and interested companies for my project. Moreover, I mentioned this research project in the Dutch version of the newsletter of the Department Transport and Regional Economics. In exchange for their help, I offered these companies an analysis based on the responds of their workers. This (confidential) report was sent to the company two or three months after the data was collected. This strategy did influence the sample, since I mainly approached larger companies with this option, for practical reasons. Although, note that the CC and therefore also my target group is overrepresented at larger companies (§4.4). In total I managed to find sixteen companies willing to cooperate, though some of these did not meet some of the requirements. The questionnaire was eventually distributed at twelve companies.

Some of the companies involved indicated they also had workers who would prefer another language. Without a translation of the original Dutch questionnaire into French or even English, they were reluctant to cooperate due to discrimination issues or a skewed sample. I partly respected these wishes and decided to get a French version; a linguistics student from the university translated the original Dutch questionnaire into French. This translation was checked by five different people, of whom two originated from the French speaking part of Belgium. The suggestions of these people were used to further improve the translated version of the questionnaire. All respondents of the second wave had the option to switch between the Dutch and French version while conducting the questionnaire. I did not create an English version of the survey, since the increase of respondents that this extra language option would provide was considered to be insignificant; the expected benefits were small compared to the considerable investment.

The surveys were carried out in two waves. The first wave was launched before the summer holiday, from May to June 2014. The second wave was launched after the summer holiday in September and October 2014.

3.3.2 RESPONSE

The overall response level of 38.5 % is excellent (Table 3.2) and above my initial expectations. This response rate is based on the total number of participants divided by the total number of e-mail addresses used. The exact level remains unknown because of various reasons. In one case, with a small company, the exact size of the mailing group was unknown. In other cases, a couple of the invitations 'bounced' and did not reach the candidate, possibly because the e-mail addresses were no longer in use. Nevertheless, 38.5 % seems to be a solid estimate of the response rate.

There are significant differences in the response levels between the participating companies (Table 3.2). The levels range from a maximum of 88 % to the minimum level of 28 %. These variations can partly be explained by the way the candidates were invited. Additionally, I assume that company culture, timing, and work pressure are also related. Finally, I concluded that Dutch speaking candidates were more eager to respond, probably due to the fact that the University of Antwerp is a Flemish university and the research project is financed by the Flemish government, as I indicated in the invitation to the questionnaire.

TABLE 3.2: DETAILS ON DATA COLLECTION

			Method					
Employer	Wave	Lang.	*Approach*	*Participation*	*Reminder*	Candidates	Resp.	Resp. level
B-Bridge	1	NL	personal	voluntarily	1	165	101	61.2%
Randstad	1	NL	personal	voluntarily	1	845	360	42.6%
Tempo-Team	1	NL	personal	voluntarily	1	156	77	49.4%
BOSS paints	1	NL	personal	voluntarily	1	96	72	75.0%
Quadrant	1	NL	anonymous	mandatory	1	33	28	84.8%
KatoenNatie	1	NL	anonymous	voluntarily	2	140	60	42.9%
Xella	1	NL	anonymous	voluntarily	0	25	13	52.0%
Siemens	2	NL+FR	personal	voluntarily	1	1523	576	37.8%
Telenet	2	NL	anonymous	voluntarily	0	860	255	29.7%
SISW	2	NL+FR	anonymous	voluntarily	0	300	87	29.0%
B-Bridge	2	FR	personal	voluntarily	0	411	72	17.5%
Belfius	2	NL+FR	personal	voluntarily	1	407	175	43.0%
Eandis	2	NL	anonymous	expected	0	100	73	73.0%
						5061	**1949**	**38.5%**

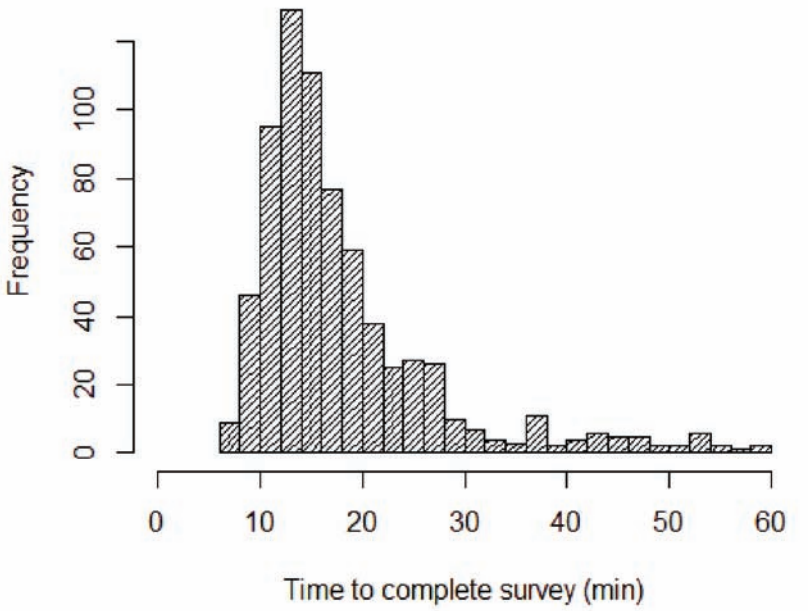
Not all respondents in the dataset are a member of the target group in this thesis. From the total of 1 949 useful respondents, 390 people did not have a CC. Since this group is large, contains many respondents who are eligible for a CC within a short term, and the data was collected at the same companies and work places, it is an interesting control group for multiple analyses in this thesis. This group is called the 'no CC' group from here on. Another 742 respondents do have a company vehicle, but they are excluded from further analysis. I excluded all respondents who completed the French version of the questionnaire, due to multiple considerations. The results from the French speaking group turned out to be less reliable because of low response levels, more drop-outs, more strange observations or combinations, and potentially more noise in the translation from Dutch to French and later

back to Dutch. Moreover, the main focus of this thesis is Flanders. The additional exclusions, from the total of 742 excluded cases, resulted from the fact that these did not meet my definition of a CC (Ch. 1), namely passenger cars with a fuel card provided by the employer and available for professional and private trips.

It should be clear that companies agreed to participate in this research project. They agreed to be mentioned in the description of the data gathering process (this section). However, it was also agreed upon that no analysis of the data on a company level will be made public. This also implies that some analyses, like sector-based differences, are out of the question, since most sectors will only be represented by one company. As a result of this agreement, no company name or data will be mentioned or presented from now onwards.

In the introduction of the survey, I included an estimate for the required time to complete the survey, which was 15 minutes. The median time to completion for target group members is in fact 16 minutes and 3 seconds. However, some respondents clearly needed more time (Fig. 3.4), probably because of distraction during the survey.

FIG. 3.4: TIME USED TO COMPLETE THE QUESTIONNAIRE



n=716; extreme values (> 60 min) are excluded

3.4 DESCRIPTIVE STATISTICS, QUALITY CONTROL AND ENHANCEMENT

3.4.1 INDIVIDUAL LEVEL OBSERVATIONS

The share of male workers (62 %) is significantly higher than the share of female workers (38 %) in the sample (Table 3.3). This is not in line with the potential labour force in Flanders or Belgium; there the partition is about 50 % – 50 %. It is also not in line with the working population, which is 54 % – 46 %. However, it turns out that CCs are not equally distributed

between male and female workers, since other studies surveying people with a CC in Belgium present different numbers. According to the INDIGOV survey (n = 2 000), about 28 % of male workers in Belgium have access to a CC, while only 11 % of the female workers do so (KPMG, 2012). This would lead me to expect a distribution of about 75 % to 25 %. In the PROMOCO project, the main survey gathered 26 % female and 74 % male respondents with a CC. In some additional surveys that the researchers conducted, this distribution was even more in favour of male respondents, with the share of male respondents ranging from 70 % to 80 %. In the federal mobility study (BELDAM), the distribution of CCs is 80 % – 20 % (Cornelis et al., 2012). Finally, the previous federal mobility study (MOBEL) reported that 77 % of the CC drivers are male (Toint & Hubert, 2002). All in all, we need to conclude that the number of male respondents in my survey is relatively low in comparison and gives a skewed reflection of the current situation in Flanders. I will return to the issue of male dominance in the world of CCs in Chapter Four.

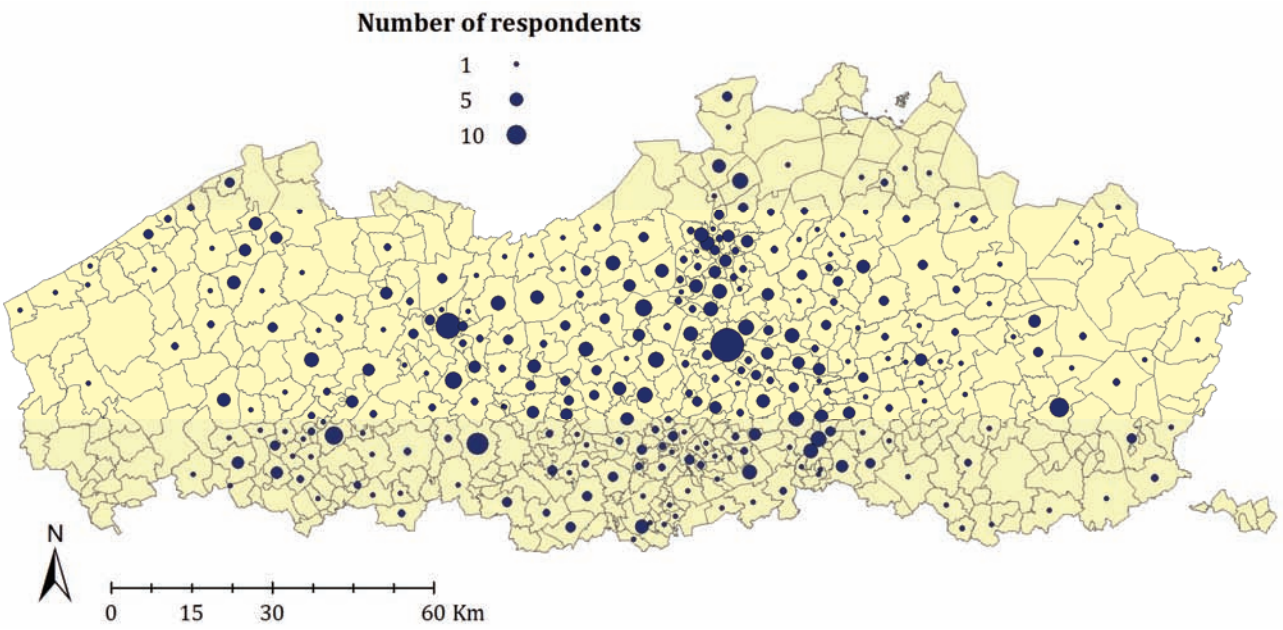
Other socio-demographics are presented in Table 3.3. The majority of the people in the sample are in a family situation with a partner and children living at home. The dominant age group in my sample is between 40 and 49 years, closely followed by the group 30 to 39 years. The group of people above 50 years of age is rather small compared to the size of this same group in the actual labour market and people with a CC (Cornelis et al., 2012; Verhetsel, Vanoutrive, & Zijlstra, 2014). This suggests an underrepresentation of the group between 50 and 65 in the sample. There are too many young females and too few older men. This might be an indication for self-selection, as I demonstrate in §5.3.2. However, It is hard to compare the other descriptive statistics of the sample to other research projects studying people with a CC, as these numbers are not well documented.

TABLE 3.3: SOCIO-DEMOGRAPHICS OF SAMPLES

	Group	Target Group		Excluded		no CC group		All complete	
	N	817		742		390		1949	
Aspect	**level**	**obs.**	**%**	**obs.**	**%**	**obs.**	**%**	**obs.**	**%**
Gender	*Male*	505	62%	472	66%	114	30%	1091	57%
	Female	306	38%	240	34%	271	70%	817	43%
	NA	6		30		5		41	
Age in years	*< 30*	42	5%	72	10%	102	27%	216	11%
	30 - 39	313	38%	227	32%	100	26%	640	33%
	40 - 49	329	40%	259	36%	104	27%	692	36%
	50 - 59	121	15%	143	20%	72	19%	336	18%
	≥ 60	9	1%	12	2%	6	2%	27	1%
	NA	3		29		6		38	2%
Children (at home)	*Yes*	613	76%	497	70%	172	52%	1282	69%
	No	197	24%	212	30%	156	48%	565	31%
	NA	7		33		62		102	
Partner	*Yes*	695	86%	601	85%	270	73%	1566	83%
	No	115	14%	108	15%	102	27%	325	17%
	NA	7		33		18		58	

The respondents in the target group are nicely distributed over Flanders (Fig. 3.5). The centre of gravity is located in the triangle Ghent – Antwerp – Brussels. The number of respondents is rather poor in the province of Limburg and West-Flanders. On the one hand, this is due to a lack of participating companies or a lack of company locations in these areas. On the other hand, these regions have a low density in terms of inhabitants; few respondents were expected. The highest number of respondents was found in the postal codes 2800, 9000 and 9620. These are the municipalities of Mechelen, Ghent and Zottegem. Some of the respondents are missing on the map, mainly because they did not provide a (valid) postal code.

FIG. 3.5: RESPONDENTS FROM TARGET GROUP PER POSTAL CODE IN FLANDERS



Map by Jeroen Cant & Toon Zijlstra

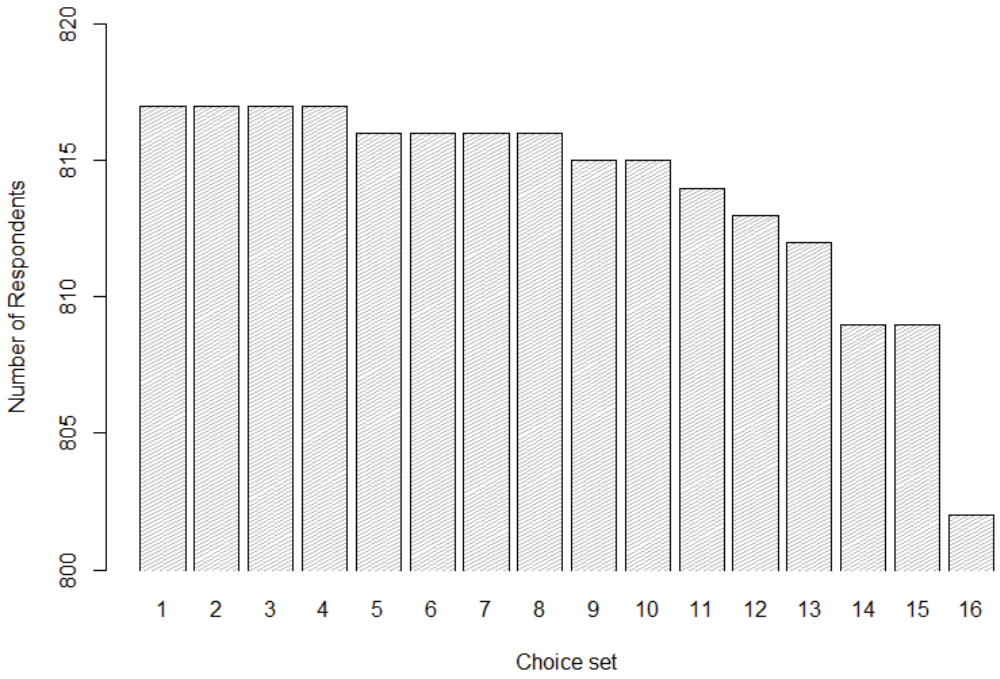
The comment box at the end of the questionnaire turned out to be a valuable source of information, as many people felt the need to provide comments. The fact that many participants were eager to use the comment box is probably related to the clear focus of the survey and the involvement of the employer. In total, 128 out of 817 respondents in the target group used the comment box. Often, these boxes seem to be used in surveys out of courtesy, because it is the right thing to do, and the actual input is disregarded. Here, however, I will integrate the gathered information. Multiple comments are used as illustrations in the following chapters. These comments are presented as block quotes and flagged by a hash tag and ID-number of the respondent.

To conclude this section, it is necessary to state that my dataset is very informative, though it is not representative for the full population of employees with a CC in Flanders, as a result of several limitations. First, the sample of observations from just a few large companies was too small. Second, the dataset is skewed as there were too few male participants and an overrepresentation of younger employees. The use of weights to compensate for these issues is not straight-forward, as unbiased information on the actual population is scarce, and weighting also inflates the error of measurement.

3.4.2 Choice Level Observations and Quality Control

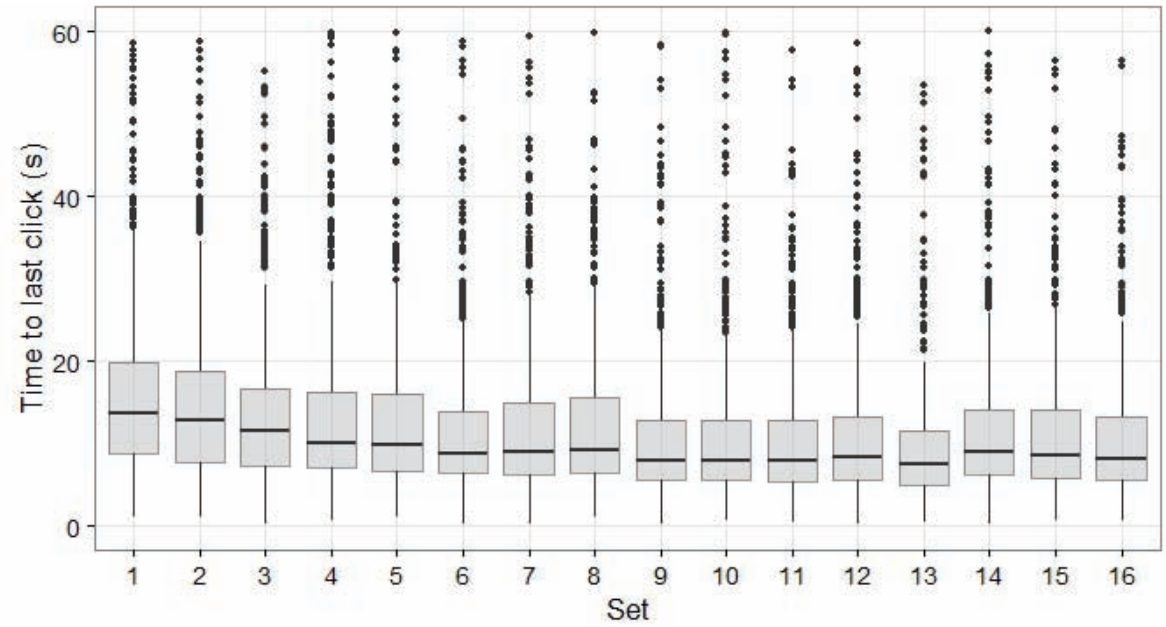
In the questionnaire each candidate was presented with sixteen choice situations. The final, cleared sample contains 13 022 choice observations. Notice that the number of choice observations is not the expected number (817 * 16 = 13 072). In some cases, people were able to skip questions, and on other occasions there seemed to be technical issues. There seems to be some sort of experimental burden effect, as the number of missing observations increased during the experiment (Fig. 3.6), although it was very small (< 2 percentage points). All in all, the number of choice observations is excellent.

Fig. 3.6: Observations per choice set



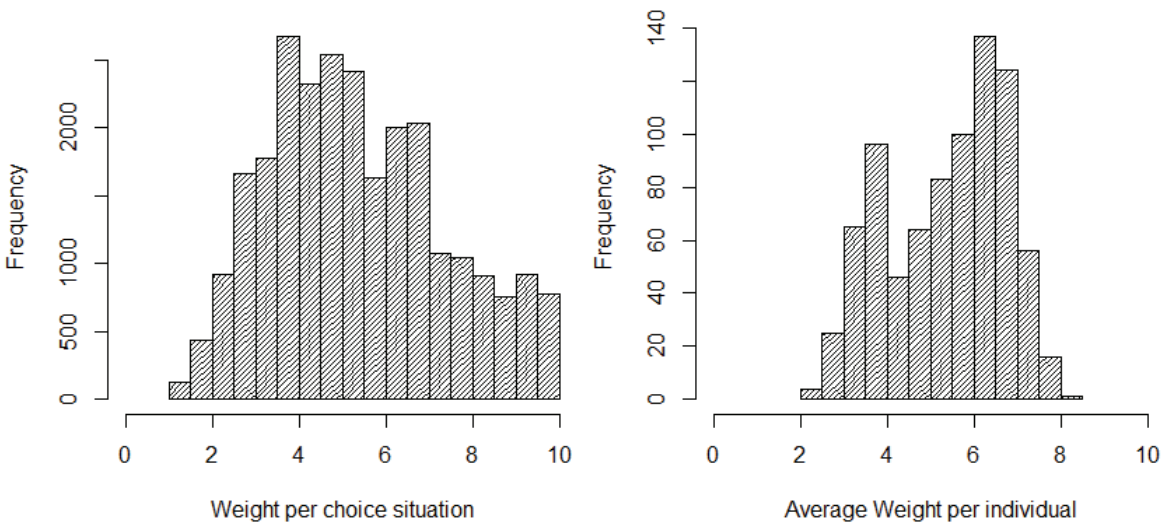
Choice observations reveal a slight preference of the right option over the left option. In 53.3 % of all choice sets, the option situated on the right was selected. This might be a result of a lack of randomness, although a more plausible explanation is the proximity of the '*continue*' button, which was situated in the lower right corner of the screen. During the experiment, some learning effects or choice heuristics can be observed (Fig. 3.7), as the median time that was needed to complete a choice task decreased. However, this decrease is relatively small. With respect to changing the initial choice, I do not observe a particular pattern. The number of participants that changed their initial choice ranges from 13 % to 19 %. The latter is observed in choice sets 1 and 14, while the former is observed in sets 5, 6, 11, 12, and 13. Overall, most people did not alter their initial choice, which is an indication for clear preferences.

FIG. 3.7: TIME USED FOR FINAL CHOICE PER CHOICE SET



In an attempt to improve the quality of the choice models, various weights were considered and tested in the modelling process (Ch. 6). The final weights were the product of four factors, on both the level of the individual and of the choice set. From the choice set level I integrated a penalty for attempts to skip a choice situation and the time used per choice situation. On the individual level I included a penalty for a potential mismatch between the estimated individual budget and the budget presented in the experiment (Appx. IV) and I penalised inconsistent choice behaviour. Due to computational reasons, the weights were scaled in the range [0,10] (Sermas, 2015). A histogram of the weights per choice situation and the average weight of all choice situations per individual can be found in Fig. 3.8. Contrary to my expectations, these weights did not result in significantly different parametric outcomes, while the improvement in model performance is only slightly significant.

FIG. 3.8: HISTOGRAMS OF THE WEIGHTS PER CHOICE SITUATION AND THE AVERAGE PER INDIVIDUAL



An alternative to the use of weights is to fit a model with all choice observations and then delete all observations with a poor goodness-of-fit (Wonder et al., 2008). Some modelling software provides overall and individual level estimates for the goodness-of-fit (RLH, see Ch. 6), thereby this is option. However, this approach might turn out to be an elimination of minorities. A poor goodness-of-fit performance could be the result of deviating preferences, instead of the result of the absence of concentration, a lack of interest, or sabotage. Or, the other way around, a high RLH is not evidence for a 'perfect' respondent. High RLH scores might be obtained because of one-dimensional choice behaviour. If a respondent concentrates solely on one of the attributes, and ignores the full package, the RLH score might be high, yet the information not very informative. On account of these reasons, I preferred another approach. Observations with a poor goodness-of-fit deserve further examination, not deletion.

3.4.3 Matching for Data Pre-processing

In Chapter Five I compare CC owners to others with respect to mode choice, commuting distance, and many other variables. The main issue here is that it is relatively hard to compare them; there are some obvious differences. In an ideal experimental set up to study causal effects, one obtains a large random sample of people who are than randomly subjected to a treatment, while others are not given this treatment, but for instance receive a placebo. In the observational data I see that CC ownership is linked to other variables including sector, employment, age, income level, and gender. Indeed, the treatment is *not* randomly assigned. In order to overcome this issue and to improve the comparability of the group with a CC to those without a CC, I relied on matching techniques (Rosenbaum & Rubin, 1983; Ho, Imai, King, & Stuart, 2007).

Matching in this thesis is used for data pre-processing, which means that I ran a matching algorithm before running the model. The ultimate goal of matching here is to reduce or even remove the bias that occurred through non-random assignment of the treatment: both groups need to become more balanced (Ho et al., 2007). In the ideal situation, the groups are perfectly balanced.

The typical output of a matching procedure is an updated version of the dataset. In this new dataset, some observations from both the treated and control group might be lost, as they did not find a proper match (Table 3.4). The share of lost observations depends on the type of algorithm used and the settings for criteria, although the loss of too many observations should always be avoided (Ho et al., 2007). To improve the balance between both groups in the sample, weights are generated for the updated dataset. Finally, matching procedures commonly provide clusters of people with same values for the matched variables or propensity scores. These propensity scores are often used to improve model outcomes after matching, especially when an imbalance remains.

I used the same matching procedure for my dataset and the dataset from BELDAM (see §3.5). In both cases I relied on 'exact' matching, as provided in the package 'MatchIt' for the "R" platform (Ho, Imai, & King, 2013). Exact matching searches for a perfect fit between people in the treated group and the control group, meaning the exact same values for all variables. This can result in any kind of combination; one-to-one, one-to-many, many-to-one and many-to-

many. If the matched cases are not equally represented in numbers, weights adjust this remaining imbalance.

I matched people with a CC (treatment) to people without a CC (non-treatment) on the basis of a seven criteria, which were: age category, having a partner, having children, gender, wage level, educational degree, and residential region in Belgium. Note that the last two criteria were only used for the pre-processing of the BELDAM dataset. The use of transport related variables as matching criteria should be avoided, as these values are affected by the CC ownership (§5.4-6), and a variables that are influenced by the treatment should *not* be included in the matching procedure (Ho et al., 2007). For this same reason, the use of income is a somewhat controversial criterion in my matching procedure, since the CC is generally regarded to be part of the remuneration package (Ch. 4). Moreover, the cost for the CC can be considerable (Appx. IV); on average the CC represents about 15 % of the income. To mitigate this issue, I used only four relatively wide categories for income.

TABLE 3.4: THE PERFECTLY BALANCED RESULT OF EXACT MATCHING

	own survey				**BELDAM**			
	Original data		Matched		Original data		Matched	
	CC	*No-CC*	*CC*	*No-CC*	*CC*	*control*	*CC*	*control*
N	817	302	606	281	529	1999	454	965
female	37.7%	71.5%	40.9%	40.9%	22.3%	46.8%	22.7%	22.7%
no partner	14.2%	23.8%	11.2%	11.2%	22.9%	33.0%	19.2%	19.2%
no children	24.2%	41.7%	21.8%	21.8%	42.9%	50.1%	40.7%	40.7%
age < 30	5.1%	28.8%	5.1%	5.1%	9.5%	16.3%	8.4%	8.4%
age 30-39	38.3%	25.8%	37.8%	37.8%	33.1%	27.6%	35.5%	35.5%
age 40-49	40.5%	26.2%	44.4%	44.4%	30.4%	29.7%	30.4%	30.4%
low wage	13.3%	63.2%	17.0%	17.0%	8.9%	24.8%	7.5%	7.5%
low-mid wage	40.4%	30.5%	52.1%	52.1%	20.8%	29.9%	20.0%	20.0%
high wage	17.6%	1.3%	10.7%	10.7%	43.5%	21.4%	45.6%	45.6%
Walloon region					46.3%	51.0%	46.7%	46.7%
Brussels region					22.7%	18.1%	20.9%	20.9%
sec. education					19.3%	46.4%	21.4%	21.4%
high education					39.3%	34.1%	40.5%	40.5%

Reference category: male, with partner, having children at home, age group 50+, high-mid wage, Flemish region, academic degree

In order to make the BELDAM dataset better fit to the group under study, and make it more like my dataset, I added some additional filters, before applying the matching procedure as described above. I only included people with a driver's licence, in an employment relationship, and only those working in the private sector. The original weights available in the BELDAM set are retained and integrated in the matching procedure (see also §7.3.3).

Matching procedures are unable to cope with missing data, therefore a missing data strategy was necessary and I applied the following rules. In case the dependent variable is incomplete, the missing cases are deleted. The same holds for the most important independent variable and matching criterion: CC ownership. In the rare case of any remaining missing observations

in the covariates, I relied on multiple imputation; in all cases predictive mean matching is used (Van Buuren & Groothuis-Oudshoorn, 2015). A result of this missing data strategy is that the actual observations vary slightly between the explanatory models.

3.5 ADDITIONAL DATA

Prompted by the need to validate my results and due to practical reasons, I complemented my dataset with additional data for this dissertation. With respect to the latter, I was unable to add all relevant aspects in my questionnaire, as it would become too long, meaning that the chances of drop-outs would increase, and the risk of employers not willing to cooperate would be substantial. Indeed, additional data was used to fill in some gaps. Additionally, secondary data served to assess the quality of my dataset. This other data can be used for validation of the results. By comparing the statistics from my data to other data, results become more likely and more solid.

For this one as well as the following chapters, I used four additional questionnaires from Belgium. These studies are: BELDAM, PROMOCO, INDIGOV and SD Worx –mobility trends. I will briefly introduce these sets one by one. I also discuss the strengths and weaknesses of these sets. As such, I do not need to and will not point out these strengths and weaknesses every time I refer to a certain dataset.

The full *BELDAM* dataset was provided by the original researchers. BELDAM is the acronym for Belgian Daily Mobility. This is by far the most solid, extensive and useful additional dataset. The dataset contains a large sample of Belgian households (n = 8 500), details on each household member (age > 6 y), and the details on the travel behaviour of these household members on the reference day set by the researchers. Furthermore, households needed to indicate travel opportunities and the appreciation of transport services (Cornelis et al., 2012). Most importantly, it was possible to differentiate between those with and without a CC in this sample. This important feature lacks, for instance, in another popular dataset, namely the Federal tri-annual home-to-work survey (Pauwels & Andries, 2016). The data was collected in the period 2009-2010. BELDAM succeeds MOBEL, the passenger travel behaviour survey from 1999 (Toint & Hubert, 2002). The project was initiated by the Federal Ministry of Transport and the policy centre for scientific research.

PROMOCO is an acronym for Professional Mobility and Company Car Ownership; this is an extensive study from Belgium on this subject. The main objective of the study was to see whether CC ownership induces specific travel patterns by its owner (Castaigne et al., 2009); therefore it is particularly relevant for my study. Additionally, this study also focused on the relationship between CC ownership and the relative locations of workplaces and households, a topic I will also address (Ch. 5). The research project was carried out by a group of researchers from both the Flemish and the Walloon region. The process of data gathering was laborious. In total, three rounds of surveys were needed to obtain sufficient observations. The project was carried out near the end of the 2000s. The final report was published in 2010. Even though I did not receive the dataset from the original researchers, the project was of

central importance in the additional data used in this thesis. An extra benefit of the PROMOCO project is that employers were also included in the survey through a separate questionnaire. This is an interesting feature for the purposes of Chapter Four.

The *INDIGOV*-questionnaire is the third source of information. The dataset consists of CC owners, both employees and self-employed participants (n=1000), and private car drivers (n=1000). Indigov, a commercial research institute conducted this study, which was commissioned by FEBIAC, the Belgian automobile federation, and RENTA, the organisation of lease companies. The main motive behind for this study was the proposal from the federal government of Di Ruppo to alter the legislation on CCs. The quality of the data is good and sampling procedure is thorough (KPMG, 2012); the response rate was about 20 %. As already indicated, the data consists of both self-employed participants and employees with a CC; these groups are not always separated from each other, as I did not have access to the original dataset. Additionally, I only have one report on this dataset with mainly descriptive statistics (KPMG, 2012); a thorough analysis is missing. Febiac decided not to provide the original dataset since, according to them the results are outdated and no longer valid.

In 2012 *SD Worx* conducted a survey among employers in close cooperation with mobimix.be. The latter is a platform for mobility management in Belgium. In total, 506 companies completed the questionnaire. These employers were mainly represented by HR, mobility or fleet managers. The questions in the survey covered multiple issues on corporate mobility, with a special interest in the policies with respect to the CC. Especially useful was the link created by SD Worx with their own database. Many companies in Belgium use SD Worx for pay-roll and remuneration administration. Over 100 000 employees with a CC are included in their database, which is one out of four or five of the total population. This makes the estimates on, for instance, the benefit-in-kind very robust. The results are presented in one report, *Trends in mobiliteit,* and key figures were used in multiple press releases. I referred to many of these articles in the previous chapter. I will use the original report. I did not have access to the actual dataset of the questionnaire or the pay-roll administration database. Multiple requests to cooperate with SD Worx were rejected by them or did not result in any response.

CHAPTER FOUR: IMPLEMENTATION BY THE EMPLOYER

She give me money

When I'm in need

Yeah, she's a kind of friend indeed

I've got a woman

Way over town

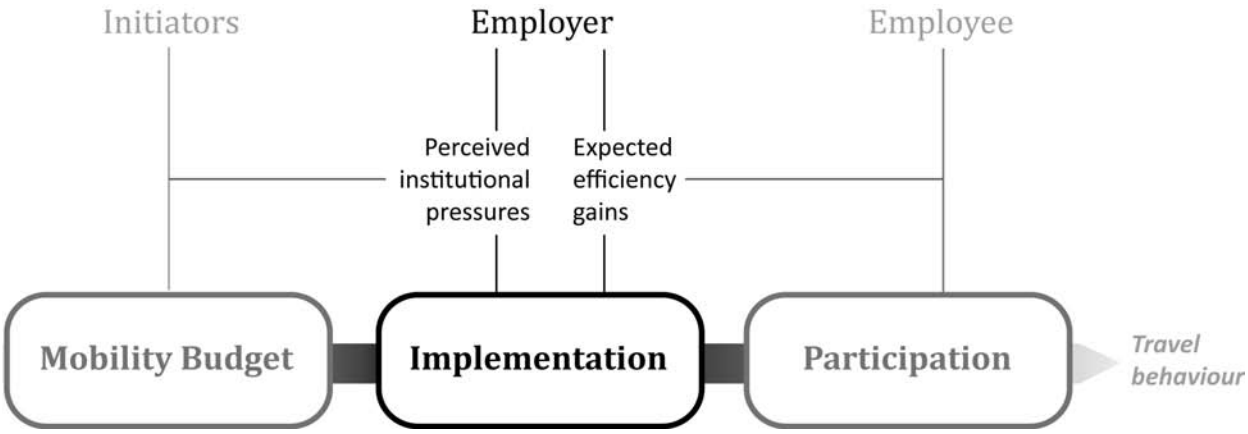
That's good to me oh, yeah

— ***Ray Charles***, *I got a woman (1958)*

4.1 INTRODUCTION

In this chapter I examine the motivation and impendency to the implementation of the MB by the employer. The general aim is to provide insight in the likelihood of voluntary implementation by employers in Belgium. This is the key step from design to participation by employees (Fig. 4.1).

FIG. 4.1: FOCUS OF CHAPTER FOUR



The focus in this chapter lies on employers in the private sector, since 97.3 % of all CCs are distributed by these employers, according to the declarations for social security (RSZ, 2016a). Meanwhile, the private sector accounted for about 72 % of all jobs in Belgium in 2014 (RSZ, 2016b).

In this chapter I emphasise that companies are not only driven by their unceasing search for efficiency and wage optimization, as commonly suggested, but that there are institutional factors involved as well. Indeed, for both the obduracy of the CC and the odds of implementation of the MB, I will refer to an *institutionalist perspective* (DiMaggio & Powell, 1983; Zucker, 1987). Within this perspective, the traditions, culture and following market leaders serve as an explanation: in the institutional perspective, employees are entitled to a CC because others in the field are also entitled to a CC – it simply seems the right thing to do. I will discuss three kinds of tendencies towards the loss of variation between companies (§4.3), this is called isomorphism by DiMaggio and Powell (1983). Kesselring (2015) underlines the cultural dimension with respect to corporate mobility regimes. He emphasises the importance of mobility as a *value in itself* (see also Cresswell, 2006; Seiler, 2008). In the current discourse mobility is associated with flexibility, chances, adaptability, and so on. In short: 'People who are geographically mobile also demonstrate mental and social mobility and open up individual and collective chances' (Kesselring, 2015, p. 578), meaning that both the CC and the MB promote some sort of highly mobile human beings.

Evidence for institutional tendencies is often complicated. Since actors rationalise their behaviour and defend their choices (Festinger, 1962; Schwartz, 2004), it is rather unlikely that the presence of a certain culture will be designated as a motive for certain corporate policies; few employers are inclined to admit that they simply mimic the behaviour of others or have not thought about it. Institutional practices are primarily observed from a distance.

Furthermore, the idea of adopting policies without clear efficiency gains is somewhat controversial in the current 'Darwinian' perspective of neoliberalism. The dominant view stresses that only these companies 'that adopt the most efficient organizational practices will thrive, those that do not will stagnate and die' (Vallas, 2012, p. 11). To offer a CC simply because it is common practice conflicts with this dominant view.

This relatively short chapter is divided into two parts. In the first part I discuss six motives employers might have to provide a CC to their employees, and then I continue to the second part: the appealing features of the MB and potential barriers for implementation. At the end of this chapter, I try to provide some insight in the actual voluntary implementation levels by studying these figures for the implementation of flexible benefit plans (FBPs) and mobility management measures. In the final section I list the most important conclusions related to this chapter.

4.2 THE ROLE OF THE COMPANY CAR

There are at least six reasons why an employer might provide a CC to his or her employees and why the CC might be preferred over the MB. In a random order, these six motives are: *functional, compensation, status, representation, wage optimisation,* and *company culture* (cf. Schuler, Youngblood, & Beutell, 1989). These motives are not mutually exclusive; in practice, one will often observe a combination. The MB should be able to compete with this mixture of motives.

The first motive for employers to provide a CC to their employees is because of **functional reasons**. This reason is most closely related to the basic idea of the CC, namely a vehicle to be used for business purposes, as a work tool (Ch. 1 and 2). When the car is not allowed to be used for private trips, many other reasons to provide a car do not apply. A substantial part of the vehicles owned or leased by companies are used as vehicles for professional goals. They are used to deliver parcels, to pick up garbage, to drop off furniture, to visit clients or potential customers. These vehicles usually promote the productivity. However, many of these vehicles do not meet my definition of a CC, as private use is not allowed or evident. There are about 1.1 million company owned vehicles in Belgium; only about 400 000 to 450 000 of them meet my definition of a CC (Ch. 1).

During the introductory talks with a representative of the candidate companies for my survey, many of them stressed that the functional reasons were important in the company's policy regarding CCs. In the PROMOCO project, the employers were presented with a number of factors for the attribution of CCs to employees. They indicated that *job-specific reasons* were among the most important reasons to provide a CC (Castaigne et al., 2009). Likewise, researchers from SD Worx observe significant differences in the propensity to have a CC between those employees with an indoor and an outdoor function (Table 4.1). For outdoor functions the CC is certainly the standard (Venneman & Vanderbeuren, 2012).

TABLE 4.1: SHARE OF EMPLOYEES WITH A CC AND BENEFIT-IN-KIND PER FUNCTION LEVEL

Function level	Function type		Average benefit in kind*
	Indoor	*Outdoor*	
Senior executives	96%		€ 273
Higher management / Senior experts	73%	96%	€ 196
Lower management / Experts	36%	81-93%	€ 161
Collar workers	11%	89-93%	€ 152

*Data: Venneman & Vanderbeuren (2012); * per month*

Data concerning the use of the CC for business purposes confirms the relative importance of the CC for functional reasons. In the PROMOCO-project, the researchers conclude: 'Persons without a company car make only 2.68 % professional trips, while for persons with a company car one trip out of ten is a professional trip' (Castaigne et al., 2009, p. 63). Consequently, while 65 % of people without a CC state they rarely or never conduct professional trips, only 11 % of people with a CC do so (Idem). According to my sample, only 19 % of CC owners does not use the CC for professional reasons. An almost equal share of CC owners use the vehicle very intensively (Table 4.2; see also §5.5). These numbers suggest that the typical divide between the professional and non-professional CC owner (Laine & Van Steenbergen, 2016; Næss-Schmidt & Winiarczyk, 2010; Ommeren & Gutiérrez-i-Puigarnau, 2012), or between a functional and wage-car, as mentioned in Chapter One and Chapter Two, does not exist. Indeed, many CC owners are situated in a twilight zone, between the extremes.

TABLE 4.2: BUSINESS TRIPS AND KM BY TARGET GROUP SAMPLE

		Business trips (p.m.)				
	n=810	*< 1*	*1 - 3*	*4 - 12*	*> 12*	*Total*
Distance (km/y)	*< 1000*	18.8%	6.4%	2.0%	0.4%	27.5%
	1000 - 4000	3.1%	12.3%	6.9%	2.3%	24.7%
	4000 - 8000	1.1%	2.7%	5.9%	3.7%	13.5%
	> 8000	1.1%	1.2%	6.0%	20.7%	29.1%
	DK	1.4%	1.7%	1.6%	0.5%	5.2%
	Total	25.4%	24.4%	22.5%	27.7%	100%

The estimates on the importance of business trips with respect to the total annual km by car differ strongly, based on the technique used by researchers. When CC owners are asked to indicate which part of the annual mileage is a result of professional purposes, most of them indicate about 32 % to 42 %; this, in absolute figures, is 9 600 km in the INDIGOV-survey and 13 900 in the PROMOCO survey. The results from my regression model on vehicle mileage indicate that the average annual distance covered for business trips, by people with many business trips, is 8 130 km (§5.4) or about 25 % of their total distance is covered. About 60 % of the CC owners in the sample used indicate they have many business trips (see also Ch. 5).

There are obvious reasons for allowing workers to use the CC for private trips. From an employer's point of view it might be more convenient if the worker drives directly from their

home location to a client or site, instead of travelling to the workplace first and then to the client. Data presented in Chapter Five suggest that this is indeed common practice. From a societal point of view one could argue that permission for private usage helps to reduce the total number of cars, since workers would no longer need a private car. However, research indicates otherwise. Indeed, CC ownership increases total car ownership and the size of the fleet (Laine & Van Steenbergen, 2016; Ommeren & Gutiérrez-i-Puigarnau, 2012). It is not straightforward to sell the family car once a new CC enters the scene, also because of the high transaction costs in the second-hand car market (Akerlof, 1995).

The CC can also be regarded as **compensation** to the worker. If so, the CC is part of the remuneration package. The worker receives a car on top of his salary in return for his or her labour. If the CC is part of the transaction, the use of the car will not be limited to business trips; otherwise there is not much use for the employee. 'Motivating employees' is appointed by the employers as the most important reason to provide a CC to the employees as is indicated by about 73 % (Castaigne et al., 2009). Though, the car as compensation might also be initiated by the employees themselves, as part of the bargaining in the labour-agreement.

Note that compensation is explicitly included in the definition used for the CC. In case the worker does not like cars or prefers to travel otherwise, the CC still remains a form of compensation, like an unwelcome Christmas gift. The MB seems to be particularly interesting for this group: those with a car, but with a stronger preference for other modes. In car dependent societies, however, one could expect that the vast majority of the employees would welcome and enjoy the CC as benefit in kind (Ch. 1), as the primary alternative to the CC is a private vehicle (Ch. 5).

The CC might not only be compensation for labour, but also for the poor accessibility of a workplace. In this respect, the benefit of the CC is aimed at neutralising negative job characteristics. There is some evidence to support the latter form of compensation: workplaces with a poor accessibility seem to have more CCs (Collard, Godwin, & Hudson, 2005; Van Ommeren, Van Der Vlist, & Nijkamp, 2006). This evidence can be contrasted with my observation that the large companies I approached all have multiple locations and only a single corporate mobility policy. Moreover, according to Castaigne et al. (2009), 'poor accessibility by public transport' is the least important reason for employers to provide a CC to their employers in Belgium. In the same study, 92 % of the employers state that their current CC policy is not prompted by the location of the workplace. Hence, the CC policy at the workplace in Belgium is predominantly independent of its geographical location and accessibility levels.

Strongly related to the idea of compensation is the concept of a CC as part of remuneration package **optimisation** (De Borger & Wuyts, 2011; Oyer, 2008)**.** This role of the CC is strongly present in the discourse on the MB (Ch. 2), and is directly linked to the under-taxation of the CC, as discussed in Chapter One (§1.2.2). The average untaxed benefit of the CC in Belgium was about € 3 340 per year, based on data from 2012, according to Harding (2014). This turns out to be the highest level of implicit subsidy of all 26 OECD countries in her dataset. Indeed, it is often more beneficial for both employer and employee to turn a raise into a CC with a fuel

card (KPMG, 2012; Venneman & Vanderbeuren, 2012; Wellemans, 2011). In the PROMOCO project, the financial reasons for attributing a CC to the employees are ranked as motives with medium importance; third position in a total of five. About 40 % of employers underline that this is an important consideration, while 21 % of the employers indicate that financial reason are irrelevant.

Next to taxation and contributions to the social security system, there might also be *economies of scale* that offer opportunities for optimisation. Large firms benefit from their size as they negotiate with lease or car companies for the provision of CCs. Due to economies of scale, an important study on CCs uses a general discount rate of 15 % for business-to-business lease (Næss-Schmidt & Winiarczyk, 2010). Moreover, economies of scale might apply in relation to employee turnover; a long lease contract is less likely to be a burden for large firms, as they can easily transfer the CC to another employee. The hypothesis – larger firms are more eager to provide a CC – is tested by Collard et al. (2005), using a large database from the UK. The authors do not find evidence for this relation, probably due to the high share of CCs among self-employed workers. I did, however, find evidence to support this hypothesis (see §4.4).

Survey results from SD Worx illustrate three important issues in relation to wage optimisation (Table 4.1). First, employees situated higher in the internal hierarchy of the company are more likely to have a CC. These higher level functions usually strongly correlate with higher wage levels. Second, the benefit in kind also increases. This suggests that either car-prices are higher or CO_2-emmissions are higher, since the benefit in kind is a product of the catalogue price of the car and CO_2-emmissions. This is probably a combination of both. Third, as already mentioned above, instrumental arguments cannot solely account for the pattern found here, as a substantial part of the employees with an indoor function is entitled to a car and the average benefit in kind correlates with the hierarchy. Hence, the functional role of the CC in Belgium is not its only role.

The employer might offer a car as a **status object** for his workers. The idea of a car as a status object is hardly controversial. Many of the actors in the MB debate refer to the car as status object (De Crom, 2013; Magerman, 2013a; Sinardet, 2014a; Vonck, 2014). The figures on car sales, provided by the automobile federation Febiac, demonstrate a strong preference for expensive brands as company vehicles. BMW, Mercedes-Benz, Audi, Volvo and Porsche account for 24 % of the car sales to households, compared to 45 % of the purchases done by companies (Kurstjens, 2016). Status objects are often 'highly visible products,' according to Sheth et al. (1991, p. 161). 'For example, a particular make of automobile may be chosen more for the social image evoked than for its functional performance' (Idem). Indeed, many studies demonstrate that the car is a positional good (Alpizar et al., 2005; Carlsson et al., 2007; Hoen & Geurs, 2011; Steg, 2005). Many people derive some sort of pleasure from the idea that they have a faster, a more expensive, or a more spacious car than other people. However, few people will directly 'confess' they do so (Steg et al., 2001), probably because they feel it is not a socially desirable response. People are more inclined to stress instrumental, more rational reasons when it comes to car use (idem).

In this era of enterprise culture, the identification in the material world has become increasingly important:

> *When wealth creation and making a profit becomes the yardstick to measure the self in its central role as a producer, it is highly tempting to display success by way of conspicuous consumption. The cultural emphasis on competition in the realm of production readily gets transferred into competition in the realm of consumption. (Heelas & Morris, 1992, p. 14)*

Elsewhere, I already argued that the car is the icon of the neoliberal man, as it reflects many values of contemporary society (Rajan, 2006; Zijlstra, 2009). These are values such as self-reliance, flexibility, autonomy, strength, vigour, and boldness (D. Mitchell, 2005; Rajan, 2006; Rose, 1992; Zijlstra, 2009). However, there are threats to this cultural status: congestion, market saturation, and in-car technologies that challenge the autonomy of the driver.

The reason to provide a positional good to the workers is threefold. First of all, employers driving around in status objects might have a positive impact on the image of the company. This motive of representation is discussed separately below (see 'representation'). Second, if cars are appreciated by both their instrumental and symbolic features, the overall utility for this 'gift' grows. Hence, the CC becomes a perfect item in the remuneration package. This argument relates to wage optimisation and compensation to the individual worker, as already discussed above. The third argument, and the main reason to present status as a separate motive, relates to the reproduction of hierarchy in the workplace (Dale-Olsen, 2006; Green, Hadjimatheou, & Smail, 1985). Because the car is highly visible and because it is still highly valued as a status object, the car is regarded to be a perfect tool to boost productivity. The CC is better equipped for this goal than actual wage and bonuses. Employees who meet certain targets are rewarded with a CC, while others do not receive this fringe benefit. Employees with a higher position in the hierarchy receive more expensive models and brands with fancy options, while those at the bottom will have to make do with a simple, standard car model. 'For someone who climbs the internal job-ladder, the promotion is only completed when there is also a more expensive company car on the driveway' (Vonck, 2014, para. 5). This inequality is regarded to be an incentive for those at the bottom to work harder (Mirowski, 2009; Wilkinson & Pickett, 2010). In other words, the CC is used to corroborate inequality.

There is a strong relationship between the wage level and the price of the CC, or major fringe benefits in general (Green et al., 1985; Kristal, Cohen, & Mundlak, 2011; Venneman & Vanderbeuren, 2012). In Table 4.3, gross wage levels are set off against the CC prices for the people in the target group sample. The polychoric correlation coefficient, used for two ordinal variables, is 0.71 (n = 698). Hence, as the wage level increases, so does the class of car. Meanwhile, the most expensive CC category is absent in the lowest wage category and the least expensive CC category is absent in the highest wage category. These numbers seem to support the thesis that the CC serves as a status object and serves to confirm ones' status within the company or within society at large. However, the previous argument, regarding the role of the CC in wage optimization, might be another explanatory factor here, especially because of the progressive tax rates.

TABLE 4.3: CROSS TABLE OF MONTHLY WAGE VERSUS CC PRICE

			Gross wage (1 000 euro / month)					
		Obs.	*< 3*	*3 - 4.5*	*4.5 - 6*	*6 - 7.5*	*> 7.5*	*na*
		n (%)	109	314	222	84	53	*35*
	< 20	48 (6 %)	34%	2%	1%	1%	0%	*0%*
	20 - 30	262 (32 %)	41%	47%	24%	8%	0%	*23%*
Car Price	*30 - 40*	300 (37 %)	10%	33%	51%	49%	21%	*51%*
(x 1 000 Euro)	*40 - 50*	93 (11 %)	1%	3%	16%	27%	38%	*14%*
	> 50	28 (3 %)	0%	0%	1%	6%	34%	*6%*
	Na	*86 (11 %)*	*14%*	*15%*	*5%*	*8%*	*8%*	*6%*
	Total	817 (100 %)	100%	100%	100%	100%	100%	*100%*

Data: my survey, target group sample

The idea of **representation** is closely linked to status, although the latter is about the social position of the individual employee, while the former is about *the image of the company*. The relevance of representation is growing along with the rise of the service economy. Today's workers are no longer hidden away in factories. The dyadic relationship of the industrial age, the relationship between factory owner and worker, has changed into a triadic relationship, including employer, employee and the customer. 'In effect workers become sign vehicles', concludes Vallas (2012, p. 52), 'whose style and appearance come quite literally to embody the corporate brand.' This development can be linked to the rise of 'aesthetic labour', in which managers tend to focus on the representation of the worker instead of the technical skills and experience (Vallas, 2012; Warhurst & Nickson, 2007). If employers and managers are strongly concerned about the pattern of speech, fashion, make-up, and physical appearance of the workers, then they ought to be equally concerned about the type of car used by employees on the public roads or parked in sight of the client. Wijman (2011) provides multiple examples of this point from self-employed workers. They actively search for a suitable car to match with their core business: a BMW for a negotiator and a Toyota Prius for a specialist in sustainable development. By providing (certain types of) cars, the employer might aim to prevent the use of the private car or other modes of transport. Or, as suggested by someone from PricewaterhouseCoopers in the corpus of Chapter Two, regarding the risk of the MB:

> *Another problem: when employee chooses to use a 15 year old rickety car, with the intention to save money in his mobility budget, you will need to reconsider whether this system is beneficial for the image of the company (Van Dyck, 2011, p. 6).*

Approximately 28 % of the companies in Belgium states that 'the image of the company' is an important reason to attribute a CC to the employees (Castaigne et al., 2009). One of the respondents in my dataset referred to the importance of appearances:

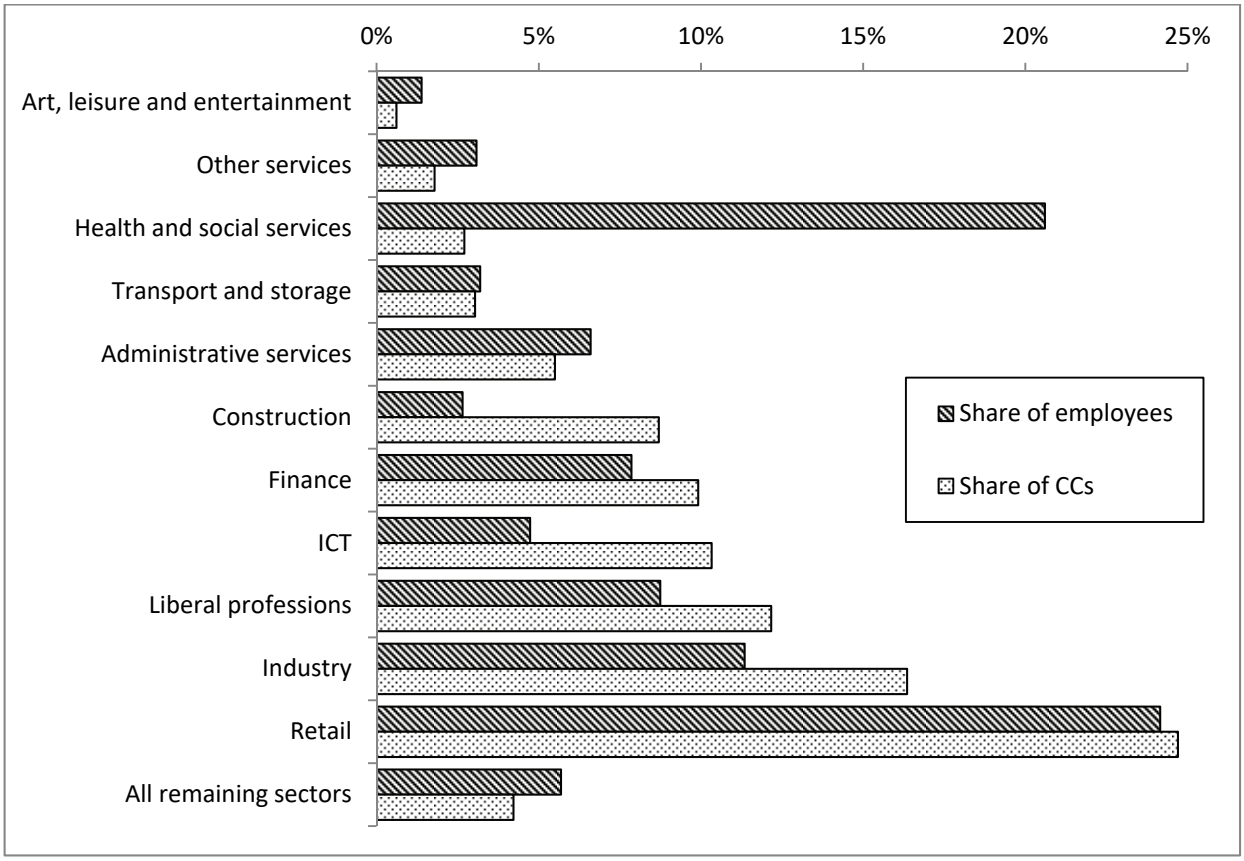
> *The company car is my office. Therefore, comfort, safety and appearance are important. – ID#714*

The final explanation for the provision of a CC by the employer is **company or sectorial culture**. Evidence to support this institutional approach relates to the uneven distribution of CCs among sectors, copy-cat practices, and a lock-in situation. First, it can be observed that

CCs are common in some sectors, yet they are almost absent in others (Castaigne et al., 2009; KPMG, 2012); in some sectors the share of CCs is twice as large as expected (Fig. 4.2). Especially construction and ICT have a relatively high share of CCs, while the number of CCs based on employment is below expectations in health care. Differences in job profiles might be able to provide a partial explanation. According to Hillebrink (2006), the institutional pressure was an important factor in the implementation process of the FBPs in the Netherlands. Even though employers themselves state that the actions of competitors in the field are irrelevant, Hillebrink observes clear patterns in the adoption rates that suggest otherwise.

Second, with respect to the number of CCs per sector there is a striking pattern: these sectors with a high share of male workers have a higher CC density. A simple logistic regression model on the aggregated RSZ-data reveals a factor eight difference in the odds of CC ownership between all female and all male subsectors (51 obs.; z-value=1.6; L=-22.2). This observation is in line with the dominance of male CC owners (Ch. 3) and the masculine car culture.

FIG. 4.2: EMPLOYEES AND CCS FOR MAIN SECTORS IN BELGIUM



Based on RSZ (2016a) and RSZ (2016b). Data from 2014, private sector only.

Third, while approaching companies for my study, multiple firms stated they did not wish to participate because of an ongoing dispute between the CC owners within the company and higher management. The employers felt the need to change the current situation, but were simply unable to do so. Once a system of CCs is in place, it seems difficult to change or remove

it. Especially in the case of the CC, resistance against adjustments of the system does not only result in the embedding of a certain fringe benefit, but also the lifestyle enabled through this particular benefit, with instant access to a car and unlimited mileage (Ch. 5). Once provided with a CC and fuel card, employees might move away from the workplace (see 'moral hazard' in §1.2.3). They move to a more spacious home or green environment as they consider their commuting costs from then on to be negligible. I would argue that the presence of a strong (masculine) CC culture makes the implementation of the MB less evident.

4.3 THE FUTURE ROLE OF THE MOBILITY BUDGET

According to SD Worx, only 2.7 % of the employers in Belgium offered a MB to their employees in 2012 (Venneman & Vanderbeuren, 2012). In order for the MB to succeed, high implementation levels are a necessary or at least desirable condition. In the optimal scenario, all employers offer a MB to their workers with a CC. Therefore, it is relevant to study both potential motives for and barriers to implementation of the MB, which is the focus of this section.

Because of the substantial attention for the concept in the last few years (Ch. 2), one might assume that the rate of 2.7 % will have increased. Companies that have implemented a kind of MB are predominantly large companies with many employees (Venneman & Vanderbeuren, 2012). Therefore, the share of employees with access to a MB is certainly above 2.7 %. These large companies probably enjoy economies of scale, which results a relatively positive cost-benefit ratio.

Why would an employer implement the MB? For the answers to this question I rely on the general economic assumption that companies aim to stay in business and want to maximise their profit. Indeed, employers are looking for efficiency gains and a competitive advantage. Furthermore, I draw from the work of Barringer and Milkovich (1998) on the adoption of FBPs. They stress that there are institutional pressures in play, next to the search for efficiency gains. These institutional pressures might, for instance, arise from new rules, competitors in the market that adopt the MB or employees that demand the MB.

The costs of fringe benefits are relatively easy to calculate for the employer. Conversely, it is difficult to assess the benefit for the individual employee (Perman, 1991). This is simply because of heterogeneity in preferences, situations, and the actual use of these benefits by employees (Ch. 2). A single might have little use for a CC, when he or she lives in close proximity to work, does not have a parking permit and prefers to cycle. A husband and father living in a small town might have more use for a CC, especially when other members of the household are also allowed to use the car. This makes a one-size-fits-all company policy with respect to the fringe benefits in the remuneration packages less evident and *not efficient*. The MB is a deviation from these one-size-fits-all policy. By offering some freedom of choice to the employee, he or she is able to 'optimise' the fringe benefits according to his or her insights, preferences, and needs. Employers might expect to see an increase in the employees'

satisfaction with the remuneration package in case the MB is implemented (Barber et al., 1992; Benders et al., 2006).

Many employers already offer some freedom in the selection of fringe benefits (§4.4). With respect to the car, the majority of the companies currently engage employees in the decision process. In 65 % of the companies in the PROMOCO dataset, employees were involved within certain predefined limits (Castaigne et al., 2009). In the INDIGOV questionnaire, 62 % of the employees state they had (some) freedom in the selection of the new CC (KPMG, 2012). The most common limitations are a maximum in monthly leasing costs or a shortlist of car brands and models; maximising the total costs of the car is less common (Castaigne et al., 2009; KPMG, 2012; Venneman & Vanderbeuren, 2012). According to data from 2014, about 15-20 % of Belgian companies use a car allowance, which can be used to cover the costs from full-operational lease (Davis & Grunditz, 2014). The questionnaire from SD Worx reveals that the involvement is unequally distributed. Senior executives and higher management are frequently actively involved, while labourers and many collar workers are often offered no choice at all (Venneman & Vanderbeuren, 2012). The freedom of choice offered here is illusory to some extent. In 79 % of the companies, the employees do not receive any compensation in case of 'downgrading' (idem). Indeed, selecting a cheaper model is mainly beneficial for the employer. The principal-agent problem seems to apply here (§1.2.3).

An additional benefit of the MB for the employer relates to *cost control*. According to the concept, there is no room for cutting direct costs, since the current costs are simply transferred into a budget. However, this does imply stabilisation and opportunities for a decent prognostication of future costs, even if compensation for inflation is obliged. Short-term effects of fluctuation in prices, such as the fuel price, do not directly affect the financial situation of the company. Excessive use of the CC by employees is now more under control, as employees themselves are held accountable for budget overruns. If the employee would suddenly decide to move away from their job or go abroad on holiday by car, the additional costs are no longer on the account of the employer, to the extent that these are not readily transferred to the MB. The MB (or a car allowance) secures the self-control of the employee (Zijlstra & Vanoutrive, 2016) and bridges the problems associated with the principle-agent problem (§1.3).

Employers might also expect to see efficiency gains through alterations of the travel behaviour by employees; that is, a shift from single car use to a mixture of transport modes. In this case, the image of the non-car modes and the assessment of their potential to compete with the car in terms of efficiency are of central importance. With respect to travel time, it seems rather hard to compete with the car, as in almost all types of trips the car simply is the fastest option (Cornelis et al., 2012; KiM, 2013; Verhetsel et al., 2009; §5.2). Exceptions to this rule can be found in (very) short distances, and intra-urban and intercity trips. A rise in congestion levels might also be beneficial for the relative position of 'alternative' modes. Currently, 25 % of all employers of medium and large worksites in Belgium indicate traffic jams as a problem; however, it is a rather local phenomenon, as 60 % of the employees in the Brussels region state that congestion is a problem (Pauwels & Andries, 2016). An alternative view is possible if one does not simply regard travel time as lost time. Working on a bicycle is

not evident, though working on a train is common practice (Cornelis et al., 2012; Lyons et al., 2007).

Furthermore, the MB might have a positive effect on other costs. When the MB succeeds in generating a higher level of job satisfaction, the costs related to employee turn-over will reduce and attracting new talent might become easier. If the MB results in fewer trips to the workplace by car, this, in turn, could result in less pressure on parking. Providing (free) parking at the work site can be expensive (Ch. 5). However, in contrast, the economies of scale that some firms are currently enjoying in the procurement of cars might be lost once employees start practicing their freedom of choice.

The institutional drivers for the implementation of the MB are derived from DiMaggio and Powell (1983) and their theoretical paper concerning the *isomorphism of organisations*. As they observe, there are processes which 'make organisations more similar to each without necessarily making them more efficient' (p.147). They distinguish three mechanisms in the processes towards this isomorphism: coercive, mimetic and normative. I will discuss each of these mechanisms while simultaneously drawing attention to the MB.

Coercive isomorphism 'results from both formal and informal pressures exerted on organisations by other organisations upon which they are dependent and by cultural expectations in the societies within which organisations function' (DiMaggio & Powell, 1983, p. 150). An evident example of coercive isomorphism is a legal restriction or other obligations that result in less variation and the adoption of similar techniques. This path is unlikely for the MB, as all actors stress the need for a voluntary system (Ch. 2). Next to the legal obligations, there might be more subtle ways and indirect pressures. Unions could affect the corporate mobility policy, for instance through the collective labour agreements (Benders et al., 2006; Vanoutrive et al., 2010).

With respect to these indirect coercive pressures, it is necessary to point out the potential role of wider societal pressures and the government. Wider societal pressures might result from a public indignation about CC policies, the general image of the 'congestion problem' and the way these are depicted in the general media or the public debate. These indirect coercive pressures are in fact about *the performative power* of the discourse (Austin, 1962; Butler, 2010; Mayr, 2008). The Belgian and regional governments frequently stress the need for more sustainable transport. The MB is seen as a means for more sustainable travel behaviour by employees (Ch. 2). The government is also a major factor, since many companies depend on the financial resources of governments. One of these aspects, or a combination of both, might be sufficient to implement the MB, even when the possible outcomes are unknown. Firms are likely to present the implementation of the MB as an act of *corporate social responsibility* (Banerjee, 2008; Frankental, 2001).

Mimetic isomorphism results from uncertainties. 'When organisational technologies are poorly understood, when goals are ambiguous, or when the environment creates symbolic uncertainty, organisations may model themselves on other organisations' (DiMaggio & Powell, 1983, p. 151). There a many potential causes for mimetic isomorphism, e.g. organisations hire a small number of consultancy firms to improve the operational processes,

employees move from one company to the other, or managers use the same textbooks. With respect to the MB, one might expect to see an increase in isomorphism because corporate mobility managers attend the same courses and events. As a result they might adopt mobility policies that are alike in a variety of companies. The most evident example for mimetic isomorphism, however, is SD Worx. They do not only dominate the debate (Ch. 2), but they also have a ready-made tool tested in an experiment (Christiaens et al., 2013), they gathered knowledge about FBP in Belgium, due to a federal subsidy, and already serve as a payroll administrator for about 20 % to 25 % of all CC owners in Belgium. Indeed, the power of SD Worx is a deciding factor in the implementation rates of the MB. Finally, the implementation of the concept by employers might gain momentum when leading firms implement the MB, as others are inclined to follow (Westphal et al., 1997). Again, this would not be due to expected efficiency gains, but simply because these companies have an image of success and are respected market leaders (Idem).

Normative isomorphism can be associated with professionalization. Here, professionalization refers to 'a collective struggle of members of an occupation to define the conditions and methods of their work' (DiMaggio & Powell, 1983, p. 152). The pressures of professionals or experts are especially relevant if organisations strongly depend on them: doctors in a hospital, professors in a university, or lawyers in a law firm. The future of the organisation is often strongly linked to the career of these professionals. As a result, the educational background, as well as preferences, values, and standards of these experts tend to become embedded in the organisational practices. Hospitals do not really compete for patients, they compete for doctors. This special group of (potential) employees can generate pressure to implement the MB. The organisation, in turn, wants to be seen as a modern and attractive employer in order to attract professionals, and the MB could be part of this image (Benders et al., 2006).

From the literature on FBPs I derived multiple barriers for the implementation of the MB: the high cost of plan design and plan implementation, ever-changing regulations, concerns about the employees' capacity to make sound decisions, and adverse selection (Barringer & Milkovich, 1998; Mercer, 2014). The results from the questionnaire among employers by SD Worx certainly underline the two first motives with respect to the MB (Table 4.4). About 86 % of the employers point out *an increase in the cost* as a bottleneck for the implementation of the MB (#1). Bottlenecks regarding regulation are also important (#3 and #7). The risk of adverse selection is somewhat, but not explicitly, covered by bottleneck #6 concerning the need to add additional budget. Bottlenecks with regard to the capacity of employees to make sound judgements were unfortunately not included in the survey from SD Worx. Note that two of the most important reasons to implement the MB are present. About 46 % of the companies underline the statement that there is no interest from employees. Another 45 % does not see any added value for the organisation as a whole. The combination of clear barriers, such as costs and regulation, with missing incentives to implement the MB, is of course problematic for further implementation of the MB.

TABLE 4.4: BOTTLENECKS FOR THE IMPLEMENTATION OF THE MB, ACCORDING TO EMPLOYERS

#	Bottleneck	Share of companies
1	Additional costs (administration, organisation)	86%
2	Increase in administrative burden	82%
3	Complexity of current regulations	80%
4	Too few options within current wage policy	78%
5	In conflict with straightforward policies	69%
6	Need to reduce current wage levels / add additional budget	68%
7	No options within current regulations	61%
8	Inequality between employees with same status	49%
9	No interest among employees	46%
10	No added value for the organisation	45%
11	Obstructed by the unions	35%

Data: Venneman & Vanderbeuren (2012)

4.4 IMPLEMENTATION RATES OF THE MOBILITY BUDGET

Little is known about the propensity of employers to offer a MB to their employees. A study by Touring from 2015 indicates that 1 out of 5 employers (n=490) considers implementation of the MB (HG, 2015). Other studies are not familiar to the author.

The best possible indication of future adaptation levels of the MB by employers can be obtained by looking at the adaptation rates of FBPs, since these plans show a strong resemblance to the MB (§4.3). In addition to this observation, I would argue that adaptation rates of the MB will probably be lower, as the MB is mainly about mobility and the FBP is more comprehensive (X. Baeten & Verwaeren, 2012; A. E. Barber et al., 1992).

Adaptation rates of the FBP by employers in the US, where the FBP originated in the 1970s, are relatively high. Among the Fortune 1000 companies, the biggest companies in the US, 35 % of the companies implemented some sort of FBP in 1987 (n=476). This share almost doubled to 68 % in 1993 (n=279), though generally only half of the staff was eligible to participate (Ledford et al., 1995). Implementation rates of the FBP by small and medium enterprises (SMEs) in the US are much lower; about 17 % to 31 % of the SMEs offered a sort of FBP in the early nineties according to two studies reported in Hornsby et al. (1993).

In 2002, 2004, and 2007, the use of the FBP was monitored in the Netherlands via a representative sample (Table 4.5). In the three cross-sectional samples, the share of employers who offer a FBP ranges from about 20 % to a maximum of 40 %. One might expect a constant increase in implementation levels, but this is not observed. The drop in 2007 can be explained by chances in the fiscal system, which made some popular parts of the FBP less interesting.

TABLE 4.5: DIFFUSION OF FBPS IN THE NETHERLANDS

Year	Implementation	Participation	Overall participation *	Est. number of participants (x 1000)
2002	21.6 %	13 %	2.8 %	233.7
2004	38.6 %	19 %	7.3 %	602.2
2007	25.2 %	23 %	5.8 %	498.8

Sources: ten Have et al. (2007) and van Sloten et al. (2005). (*) The estimates are simply the product of the share of employers and the participation rate. This is likely to be an underestimate, as larger companies are often faster to implement HRM innovations. The total number of people with a job, as used in the last column, is obtained from www.cbs.nl: statline 'arbeidsrekeningen' (on 17-dec-2015).

More recent data on implementation of FBPs can be obtained from the *EMEA employee choice in benefits survey 2013-14*, in which 636 (mainly) European employers participated (Mercer, 2014). The results show that over half of the employers offer some degree of benefit choice; about 10 % offer a full comprehensive program. Again, these practices are not equally distributed, as larger companies are more likely to offer such a full program, while only 4 % of the SMEs (< 250 employees) do so. Moreover, note that the researchers did not aim to obtain a representative sample of European employers, as countries were selected for inclusion on the basis that *some form of employee choice was certainly in place*; this selective approach results in an over-estimate. Belgium is not represented in the survey.

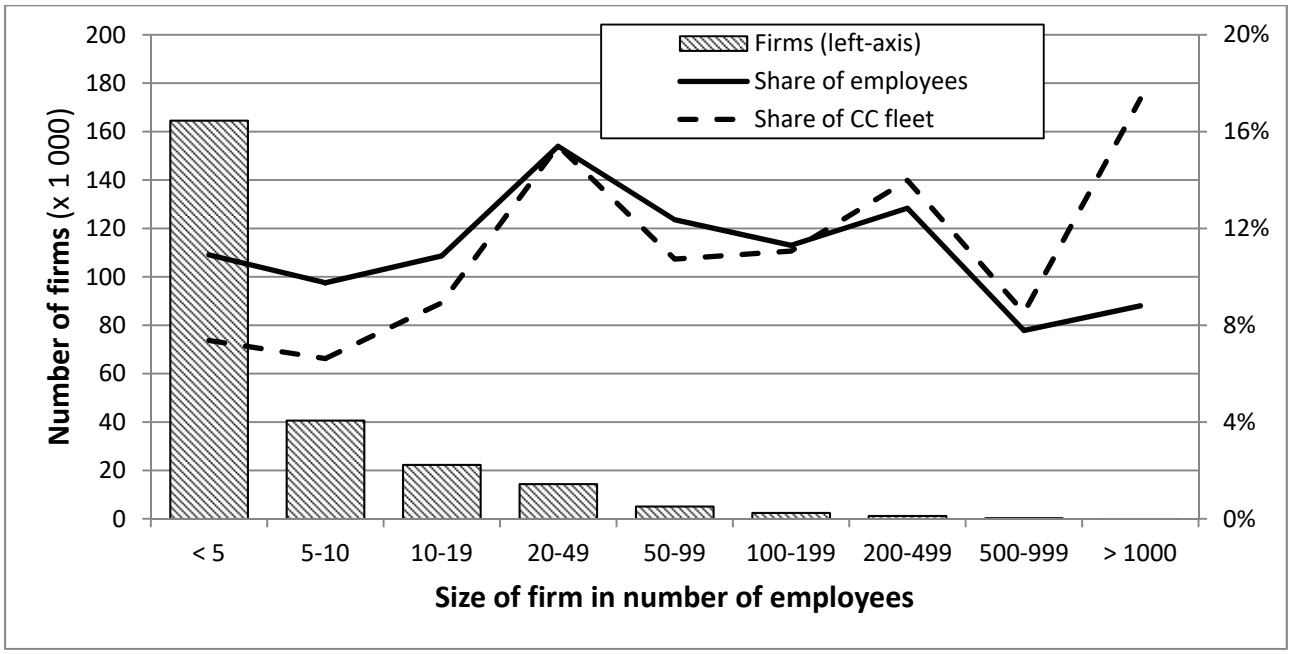
A small scale survey about FBPs among employers in Belgium and the Netherlands (n=51) has offered some additional interesting observations (Baeten and Verwaeren, 2012). Overall, the implementation levels of different kinds of plans are at least a factor two higher in the Netherlands in comparison to Belgium. The most popular types of FBPs in Belgium are directly related to transport; other kinds of arrangements are below 15 %. The transport-related arrangements include options like cash for a car, a car for cash, a car allowance and the MB. About 29 % of Belgian employers offer some flexibility with respect to mobility, according to the survey results. Again, one can observe that the implementation rate of a FPB at large companies is twice the level found at medium or small sized companies. Due to the very small sample size and the overrepresentation of large companies (77 % instead of 0.2 %, see below), one should be aware that the figure of '29 % with a FBP related to mobility' is an overestimate with a considerable error margin.

Based on the findings presented above, I have drawn several important conclusions. First, a full implementation seems to be out of the question, as the highest rate that was observed is 68 %; meanwhile, not all employees were eligible for participation, so it is actually partial implementation. Second, there are considerable differences in adaptation rates between large firms and SMEs, a factor two is not uncommon. Third, over time, implementation rates tend to increase. This is probably associated with the wider and longer process of labour market flexibility. Fourth, due to the loss of participants in a panel, self-selection or a bias in the sampling procedure, the presented numbers might be overestimates.

The implication of the lower adaptation rates among smaller firms is enormous. As shown in Fig. 4.3, the vast majority of the private sector employers in Belgium are SMEs: 99.8 % of all

enterprises has less than 500 employees. In total, the private sector SMEs account for 83.4 % of all jobs for employees ['bedienden']. Furthermore, based on the figures concerning the contribution by employers to social security, one is able to obtain a decent estimate in terms of the share of the CC fleet for small, medium, and large companies. These numbers show that people working at a large company are more likely to receive a CC, though at the same time large companies still only distribute a minor part of the total fleet (26 %). About 38 % of all CCs are provided at small firms (< 50 employees) and another 36 % is provided at medium sized firms (50 – 499 employees). Hence, if we assume that 60 % of large companies, 40 % of medium sized firms, and 20 % of small firms implement the MB for all target group members at the company, only 38 % of all CC owners will have access to the MB, which is about 160 000 employees in Belgium. Moreover, not all these employees will be inclined to participate, as I will demonstrate in the next two chapters.

FIG. 4.3: ESTIMATED SHARE OF THE CC FLEET PER FIRM SIZE IN 2014



Based on RSZ (2016a) and RSZ (2016b); only employment relationship, self-employed are not included

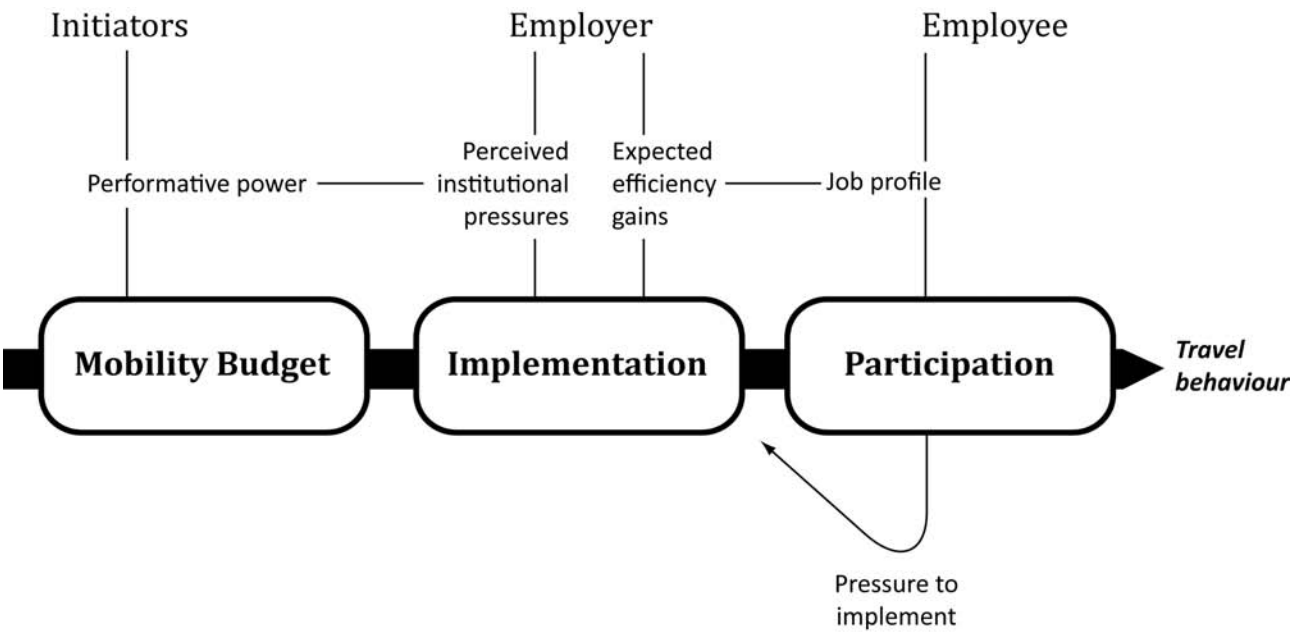
In addition to the figures on FBPs, I would suggest that current mobility management measures by employers serve as a proper indicator for the implementation levels of the MB, as the MB is also presented as a mobility management measure. Numbers on mobility measures in Belgium are collected in the tri-annual home-to-work-travel questionnaire, which contains information about 7 460 medium or large worksites (> 30 employees) and 38 types of mobility management measures. The first questionnaire of this kind was conducted in 2005. The numbers from the first tranche 'reveal that most mobility management measures are only present at few worksites' (Vanoutrive et al., 2010, p. 133). Indeed, the most popular measure, with 43 % of all employers, is an additional bicycle fee; next in line is a covered bicycle storage, which is available at 35 % of all employers; multiple monitored measures are implemented by less than 1 % of all employers (Idem). In the most recent results from 2014 there is a significant increase in the implementation of measures by employers. According to

the latest results, 83 % of the employers now offer a reimbursement for commuting by bicycle. Next in line is now free public transport, with a total of 50 % of all worksites with this option, which was only available at 23 % of the work places in 2005. However, there are still some measures with low implementation levels (Pauwels & Andries, 2016). Again, a familiar pattern can be observed: mobility management measures are more common at large work sites; smaller firms are less likely to adopt them (Idem).

4.5 Discussion and Conclusions Chapter Four

In this chapter I explored one of the basic preconditions for the MB to become a success. This first step is the availability of a MB at the workplace: the voluntary implementation of the MB by the employers in Belgium (Fig. 4.4). I studied economic and institutional pressures in favour of both the CC and the MB from the perspective of the employer. I also looked into potential barriers for implementation. Finally, I provided some estimates on the implementation rates, mainly by comparing the MB to the FBP and 'other' mobility management measures.

Fig. 4.4: Relationships discussed in chapter four



There are six different, although to some extent interrelated, potential explanations for the provision of a CC to an employee. These grounds are: functional, compensation, wage optimisation, social-economic pressure through status, representation, and institutional effects. Functional motives for the employer are related to the car functioning as a work instrument, e.g. for visiting clients. From my own and other data, I can safely conclude that functional reasons are an important motive. Many owners of a CC have frequent and long professional trips, though at the same time many CC owners hardly use the car of professional reasons. The common divide between professional and non-professional use is a simplification. The CC is not used as a solution for poorly accessible workplaces, though it is

used as a common part of the remuneration package, also due to tax benefits. Furthermore, a car is a positional good which can be used to underline the social status of the employee or to boost the image of the firm. Institutional explanations are related to the tendency of isomorphism, companies in the same sector tend to become more alike over time. Finally, the car is embedded in the daily practices of both firms as well as households, which makes changes complex (§1.2.4; Ch. 5).

Reasons to provide a MB are also related to potential efficiency gains and institutional pressures (Fig. 4.4). With respect to the first, cost control might be an important incentive for employers. Once implemented, the MB might result in better management of transport related costs; this is simply a result of working with a fixed annual or monthly budget. The MB can result in efficiency gains if the MB indeed succeeds in promoting the more rational use of transport modes. If employees will lower their car use, this might result in other savings, such as less need for 'free' parking spaces. In terms of institutional pressures, three types of processes towards isomorphism are offered. Indirect coercive pressures are about the performative power of the MB and the discourse it is nested in. These pressures might result from social pressures and the central importance of the governments in Belgium. With respect to this pressure, one should not underestimate incentives towards corporate social responsibility, even if this only implies green washing. Since the MB is clearly framed as a step towards more sustainable travel behaviour in the public debate, companies might adopt the MB merely to show they care. SD Worx plays a central role in terms of mimetic isomorphism, as they have power, knowledge and resources, and they are a key player in the market as consultant for many Belgian companies. If employees are dissatisfied with their current benefits, especially with the CC, this could generate pressure for employers to implement the MB. Barriers against implementation of the MB are related to the expected increase in transport related costs, the administrative burden, and uncertainties or impossibilities, especially with respect to legislation and taxation.

The figures of the comparison of the MB to FBPs and mobility management measures show that full implementation is out of the question. Even though the FBPs are received with great enthusiasm, the overall implementation rates are modest, e.g. 20 % to 40 % of the employers in the Netherlands offered some kind of FBP in the period of 2002 to 2007. Furthermore, large companies are more likely to implement the MB; a factor two difference with SMEs is not uncommon. Meanwhile, large firms only account for a quarter of all CC in Belgium. In all cases implementation will take multiple years, though this process has already started with 2.7 % of the employers offering a kind of MB in Belgium in 2012.

All in all, I conclude that the voluntary implementation of the MB is a major obstacle for its potential impact. The implementation by the employers comes with a cost, while clear incentives might be lacking. Meanwhile, the culture of CC is well-established. Participation by employees will be the next object of study.

CHAPTER FIVE: PARTICIPATION BY EMPLOYEES

Can you pay my bills?

Can you pay my telephone bills?

Do you pay my automo' bills?

If you did then maybe we could chill

I don't think you do

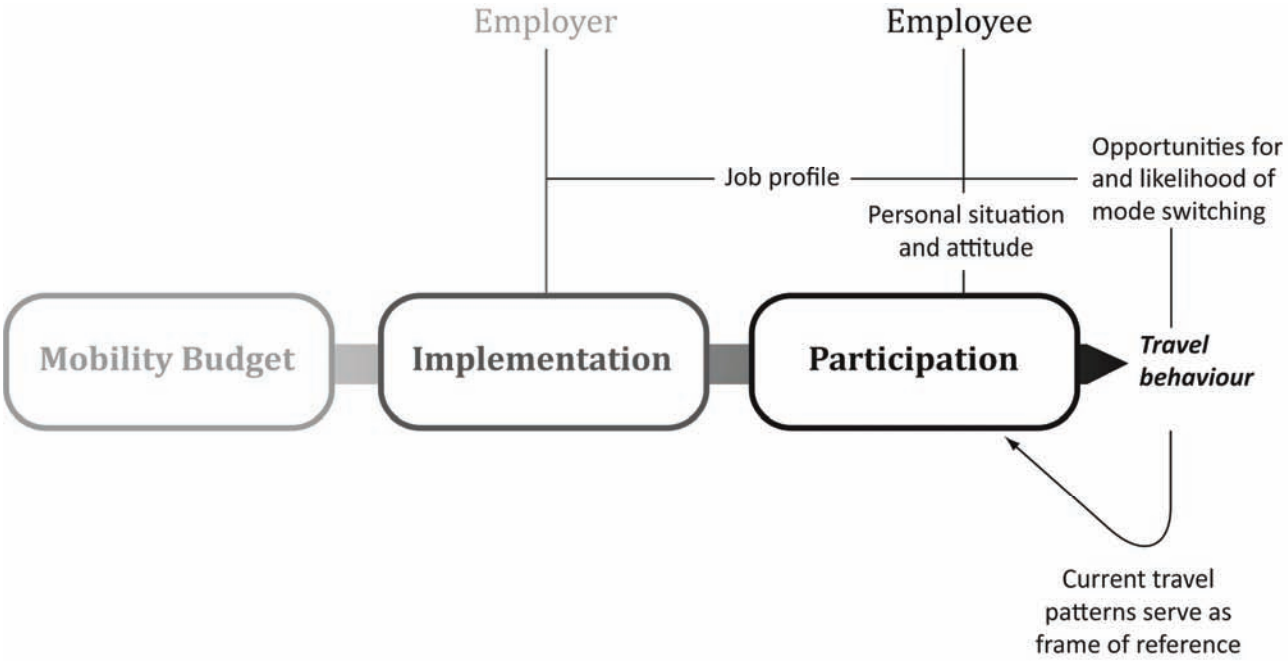
So, you and me are through

— ***Destiny's Child***, *Bills, bills, bills (1998)*

5.1 INTRODUCTION

In this chapter I focus on the likelihood of voluntary participation in the mobility budget (MB) by target group members (Fig. 5.1). More specifically, this chapter is about the receptiveness to the concept and the individual level potentiality of the MB. The research questions I address are: what is the attitude of target group members towards the MB concept, to what extent is the benefit offered by the company car (CC) currently consumed by target group members, and are target group members willing and able to use alternative transport modes? The answers to the questions are clearly negative in terms of opportunities for the MB: the attitude is relatively negative, the CC is eagerly consumed, and the most likely alternative to the CC is the private car.

FIG. 5.1: FOCUS OF CHAPTER FIVE



A first clue on the participation rates was already provided at the end of the previous chapter. In section 4.4 I have provided the participation rate by employees in the Dutch flexible benefit plans (FBPs). These rates range from 13 to 23 % (Table 4.5). A study on the FBP at the University of Groningen reports annual participation rates in the range of 17.1 % to 20.4 % among the 4 800 employees, though the researchers note that participation is more common among full timers and people in higher wage categories. Over a period of four years, 35 % of the employees participated at least once, about 10 % participated every year, and 65 % never joined the program (van der Meer & van Veen, 2009). Similar numbers are found by Langedijk (1998) at a Dutch insurance company, as 35.7 % of the people in her sample (n=1980) joined the FBP at least once in a period of four years. Numbers on the participation levels in other countries besides the Netherlands are rare, though Langedijk (1998) suggests that the levels in the United States are higher, mainly because of medical plans included in these FBPs.

A second clue on participation rates can be derived from the 'cashing out parking' experience in California. This state has a law that requires employers to offer employees cash instead of a

parking allowance. Shoup (1997, 2005) offers an evaluation of eight firms where the effect of cashing out has been monitored (n=1694). As a result of the cashing out option, the share of solo drivers dropped from 76 % to 63 % at these firms. Hence, cashing-out employer-paid parking induced 13 out of every 100 commuters to switch to another mode or to start carpooling. This suggests that about 17 % of the former car commuters opted for the cash option.

A third and final clue can be obtained from a limited number of studies in Belgium on the propensity of employees to participate in the MB. Acerta, a company for HRM solutions, conducted a survey among 2 000 Belgian employees in 2015. They found that 21 % of them wanted a MB. The CC was more popular, as 34 % of the employees stated they were willing to hand in wage for a car. However, the amount of wage people were willing to hand in was modest, which suggests that ordinary wage is more popular (De Rouck, 2015). According to the results from a survey conducted by SD Worx (n=2 500) the MB is more popular than the CC, as 60 % of the employees working in Brussels prefers a MB over a CC and 54 % of the people working in Flanders do so. In the Walloon region the CC surpasses the MB in popularity. Furthermore, in case of long commuting distances, many business trips and poor accessibility by PT the CC is more popular (De Rouck, 2014). All three clues combined suggest that, in general, a minority of the employees joins the program voluntarily.

In this chapter, I study the receptiveness by looking at CC owners' attitudes towards the concept of the MB. A large-scale study on FBPs in the Netherlands (n=11 150) has concluded that the attitude towards the concept is the primary indicator for intended or actual participation in the FBP, and is more important than any covariate available in the dataset (Langedijk, 1998). In this dissertation, attitude is defined as 'a learned predisposition to respond in a consistently favourable or unfavourable manner with respect to a given object' (Fishbein & Ajzen, 1975, p. 6). Three terms in this definition deserve further attention: 'consistency', 'predisposition', and 'learned'. First, attitudes are *consistent*; this implies that individuals are likely to provide the same response to the same object at various moments in time, though it also implies a degree of consistency in a variety of responses regarding the same object. I primary rely on the latter interpretation, as I only have cross-sectional data. Second, attitudes are *predispositions*, they are regarded to be latent or underlying variables (Fishbein & Ajzen, 1975), which means they are hard to reveal and study directly. Therefore I primarily focus on the relative positions through inter- and intra-group comparisons. Third, attitudes are *learned*, which implies that they are commonly the result of past experiences. There is a conflict with the relative new concept of the MB here: the experiences with the MB are limited. Thus I suggest that people mainly 'learn' their attitude from their experience with the CC and the way the MB is framed in popular media (Ch. 2). I will primarily focus on the use and experiences with the CC in this chapter, which is the competitor to beat.

In order to study the avidity of the target group towards their current benefit in kind, I offer an analysis of CC usage. More specifically, I compared vehicle mileage of CC owners to the control group. Annual vehicle mileage is the best possible indicator for the keenness toward the CC, as this does not discriminate between users within the household and moves beyond the observations of one single reference day. Indeed, the CC is usually a benefit for the entire

household and maybe even for a larger social network around the CC owner. In both the BELDAM and PROMOCO project, car use by someone different than the CC owner was documented on the reference day; in the latter project this occurred in 8.5 % of all trips (Castaigne et al., 2009). In my survey, multiple respondents from the target group referred to the importance of the CC as a family car:

> *The current company car is a comfortable, spacious family car. That is something you do not renounce easily. – ID#1549*
>
> *A seasonal ticket for public transport is not interesting at all, because other family members cannot enjoy it, while the company car offers opportunities for everyone. – ID#244*
>
> *My choice for an [expensive] car directly relates to the need for space: I need to be able to transport three children. If I did not have any children, a smaller car would be fine. – ID#1823*
>
> *In our situation, with young children, the car is a necessity. – ID#577*

In terms of the individual level potentiality, the second key issue of this chapter, I focus on the transport-related side of the MB and its chances of assertion. With individual level potentiality of the MB I am referring to the opportunities for other transport modes as a feasible alternative to the car. To me, this is a central point for the assessment of participation levels: if CC owners lack alternatives, they are not inclined to participate in the MB (§1.2.4). If so, the only attractive alternatives offered within the MB would not be transport related, and the impact on the transport related objectives will be very modest or even non-existent. I discuss the indicator used to study the potential for commutes in the next section (§5.2).

I do not cover all aspects that might be relevant for the purposes of this chapter, as there are additional conditions to fulfil and barriers to overcome in order to effectuate change, and there are transaction costs involved. Most of these additional barriers suggest that change is more complex. Potential barriers to overcome are provided by the field of psychology and behavioural economics; examples are the status quo bias, risk and loss aversion, and default effects. With respect to the latter, if the CC is the default within a company and employees need to make an additional effort to participate, no matter how small this effort is, participation levels might already be negatively affected (Johnson & Goldstein, 2003; Kaenzig, Heinzle, & Wüstenhagen, 2013). Risk aversion is associated with the uncertainty attached to an option. In the legislative proposal, Van den Bergh (2013b) suggests a maximum period of five years for the MB, and employees are expected to make their choices in advance; but how do employees know for sure what they need in two, three, or four years' time? The main effect might be the selection of a safe, flexible option, such as money or a car. A status quo bias is a well-documented effect, which basically results in a disproportionally strong preference for the status-quo (Samuelson & Zeckhauser, 1988; Kahneman, Knetsch, & Thaler, 1991; Fernandez & Rodrik, 1991), which in this case is the CC. Even though these aspects and many others are relevant for participation levels, they are beyond the scope of my thesis. Finally, it is both relevant and necessary to point out that travel behaviour, and especially car use, is

highly habitual (Aarts & Dijksterhuis, 2000; Gärling & Axhausen, 2003; Middleton, 2011). Most commuters do not evaluate the options available to them on a daily basis; they just do what they always do. Shocks would be necessary in order to disturb these habits (Bamberg, Rölle, & Weber, 2003).

In terms of the alternatives to the CC, one needs to conclude that the most obvious alternative is a private car. Cars are a standard consumer product in nearly all households nowadays (Ridout, 2012; Soron, 2009; Urry, 2007). In Belgium, only 17 % of all households do not own a vehicle, while 28 % have two vehicles or more, a number that is even higher in Flanders. Moreover, households with dual earners, a higher income, or with children nearly always have at least one car at their disposal. Households with a CC do have at least one other car in 72 % of the BELDAM sample (Cornelis, et al., 2012). Indeed, CC ownership is associated with higher levels of car ownership in general (Laine & Van Steenbergen, 2016; Ommeren & Gutiérrez-i-Puigarnau, 2012). In this chapter I mainly focus on car use by studying vehicle kilometres, mode choice, and trip distances.

After I finished the studies presented in this chapter and the writing process of this chapter in February 2016, a research project was published from the Federal Planning Bureau in Belgium (Laine & Van Steenbergen, 2016). This study concerning the fiscal treatment of CCs in Belgium is very similar to my work, as it has overlapping research objectives and it employs the same dataset used for multiple models in this chapter, namely BELDAM (§3.5). A positive aspect is that the results presented by Laine and Van Steenbergen (2016) are strongly alike, as such that their study can be regarded as a replication study. A setback is that the original detailed approach in this chapter became somewhat redundant, as I could also refer to this other research. As a result I altered the scope of this chapter somewhat; some new elements have been added. Furthermore, I followed their advice to use matching techniques in the analysis of the data (§3.4.3). Together we submitted a paper with the results from our studies for publication in European Transport Research Review, an open access journal (Appx. VI).

Following this introduction, this chapter contains five sections and a conclusion. In the next section I introduce the indicators for the assessment of transport mode change; the results on these indicators are presented in section 5.5 and integrated in a car choice model, as presented in section 5.6. In section 5.3 I study the attitude of CC owners towards the MB by looking at comments and the response to Likert-scales. Section 5.4 concerns the eagerness to consume the benefit-in-kind called the CC, measured by studying the annual vehicle kilometres.

5.2 Strategy to Determine the Modal Shift Potential

In order to determine the potential alternatives to the car as offered within the MB, I study five key factors in mode choice. These factors are trip distance, the quality of PT and access to PT services, parking opportunities, and the frequency of business trips. The significant importance of the five key factors on the daily commute will be illustrated at the end of this chapter by a mode choice model (§5.6).

In this assessment I focus on commutes; there are three main reasons to do so. First, commuting has a central role in the MB debate, since proponents of the concept stress the opportunities of the MB with respect to commuting. Moreover, they associate commuting with congestion (Ch. 2). Second, commuting is a popular indicator to inform transport policies. It is one of the most frequent trip purposes, as 2 out of 9 trips are commutes; it accounts for a substantial part of the total vehicle mileage. Meanwhile, the distribution in time is relatively small: almost 40 % of all commuting trips in Belgium start between 7 and 9 AM (Cornelis et al., 2012; Verhetsel et al., 2014), which underlines the association with congestion. The third reason is practical; due to the popularity of the commute as an object of study, commuting behaviour and patterns are documented in detail.

5.2.1 Home-Work Distance

Home-work distance is one of the most important determinants in mode choice for commutes (Cornelis et al., 2012; Limtanakool et al., 2006; Scheiner, 2010; Verhetsel et al., 2009), as distance has a direct effect on the energy, time, and money needed for the trip. In general, longer commutes will take more energy, more time, and are more expensive. The energy is particularly relevant for active modes, such as walking and cycling. Due to the physical exercise involved, the effective range of an individual might be limited. Moreover, as energy levels drop over time, pedestrians and cyclists usually slow down, with a lower average speed as a result. More indirectly, energy is relevant to the costs of the commute and environmental considerations as well, when these are relevant to the commuter. In order to keep (long) distance commuting acceptable in terms of travel time, fast modes are preferred over slower ones. This implies a hegemonic position for the train and the car for commutes over 30 km. However, it seems that this relationship is primarily the other way around: faster travel options are mainly used to cover longer distances and not to reduce travel time (Metz, 2008; Van Wee, Rietveld, & Meurs, 2006). In the long run, acceleration results in longer commutes and more annual kilometres. Finally, the financial costs of a trip tend to increase as distances increase. This is, for instance, perfectly reflected in the price of a train ticket.

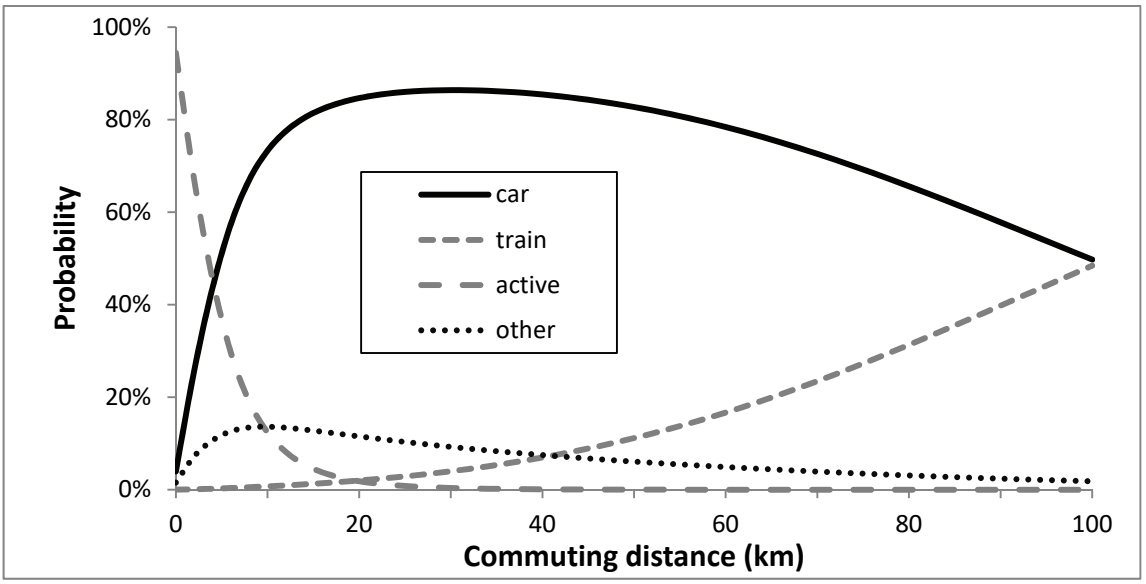
With regards to the financial cost, one expects that commuting distances for CC owners are longer compared to those of non-CC owners, due to cost-free commuting with a CC and a fuel card. This effect might be two-sided. On the one hand, people with a CC are relatively more inclined to move away from the workplace, in case of relocation. On the other hand, people currently living in areas with poor job perspectives and poor accessibility are probably more inclined to seek or compel a job with a CC in the remuneration package (Laine & Van Steenbergen, 2016; Van Wee, 2009). This is an example of adverse selection, as discussed in Chapter One (§1.2.3). The actual effect of cost-free commuting might be downsized by the fact that many other employees also receive some sort of compensation, with the most common example being the full reimbursement of seasonal tickets for public transport in Belgium (Ch. 1).

As a result of the time, money and energy involved, there are more transport modes to choose from on shorter distances. It is not a binary relationship, but a sliding scale: as distances increase, the number of options decreases. Walking to work is commonly only observed in distances under 2 km. Cycling is popular for distances between 500 m to a maximum of 4 or 5

km (Heinen, Maat, & Van Wee, 2012), although the rise of the electric bicycle certainly implies an increase in the feasible cycling distance for many people. Ride sharing is more feasible on shorter distances, since employees are more likely to find someone with an overlapping trajectory (Furuhata et al., 2013). Car use is popular for a wide range of distances, although the share of car users often slightly drops in commuting distances over 60 km, which is related to fatigue and the need to concentrate on the road for a long period of time. The train is therefore a relative popular option on very long commutes, as it also offers opportunities for other activities (Lyons et al., 2007). For PT use, a certain threshold needs to be crossed before usage levels rise. This is related to the effort needed to get to the PT node (train station, bus stop), waiting time, uncertainty, and the direct competition with active modes (Annema, 2013; White, 2002). Indeed, for very short distances walking is often faster.

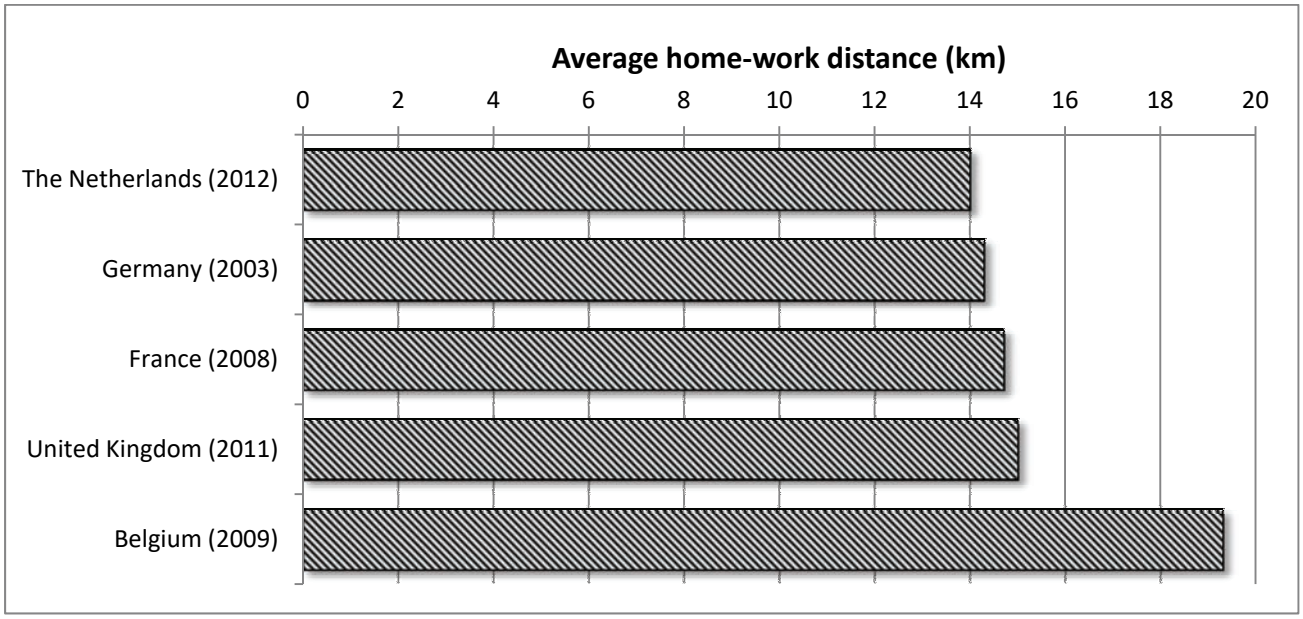
In Fig. 5.2 I illustrate the importance of commuting distance when confronted by mode choice. This plot is based on the results from a multinomial logistic regression model concerning commutes from the travel diaries in the BELDAM dataset. In the sample I excluded all CC owners, as there are strongly inclined to 'choose' from one single mode: the car (see §5.6). The estimate for distance is highly significant for all modes used in the model. Meanwhile, distance has the highest added value to the model performance; it is more important than income, age, region, urban level, or any of the other parameters in the model (model not provided).

FIG. 5.2: MODE CHOICE PROBABILITIES WITH RESPECT TO COMMUTING DISTANCE FOR CONTROL GROUP



Home-work distances in Belgium are known to be relatively long. This picture is confirmed when commuting distances for Belgium are compared to those of nearby countries (Fig. 5.3). The estimated average distance in Belgium lies in the range of 18 to 21 km (Cornelis et al., 2012; Declerq, Janssens, & Wets, 2012; Janssens, Moons, Nuyts, & Wets, 2009; Verhetsel et al., 2009, 2014). These studies indicate there are significant differences between regions, as commuting distances in the Brussels capital region are below average and commuting distances in the Wallonia region are above the overall average. In my analysis on commuting distances, I used both my and the BELDAM dataset.

FIG. 5.3: AVERAGE HOME-WORK DISTANCE FOR BELGIUM AND NEIGHBOURING COUNTRIES



Sources: Pfaff (2014); CBS (2016); François (2010); Cornelis et al. (2012) ; ONS (2014)

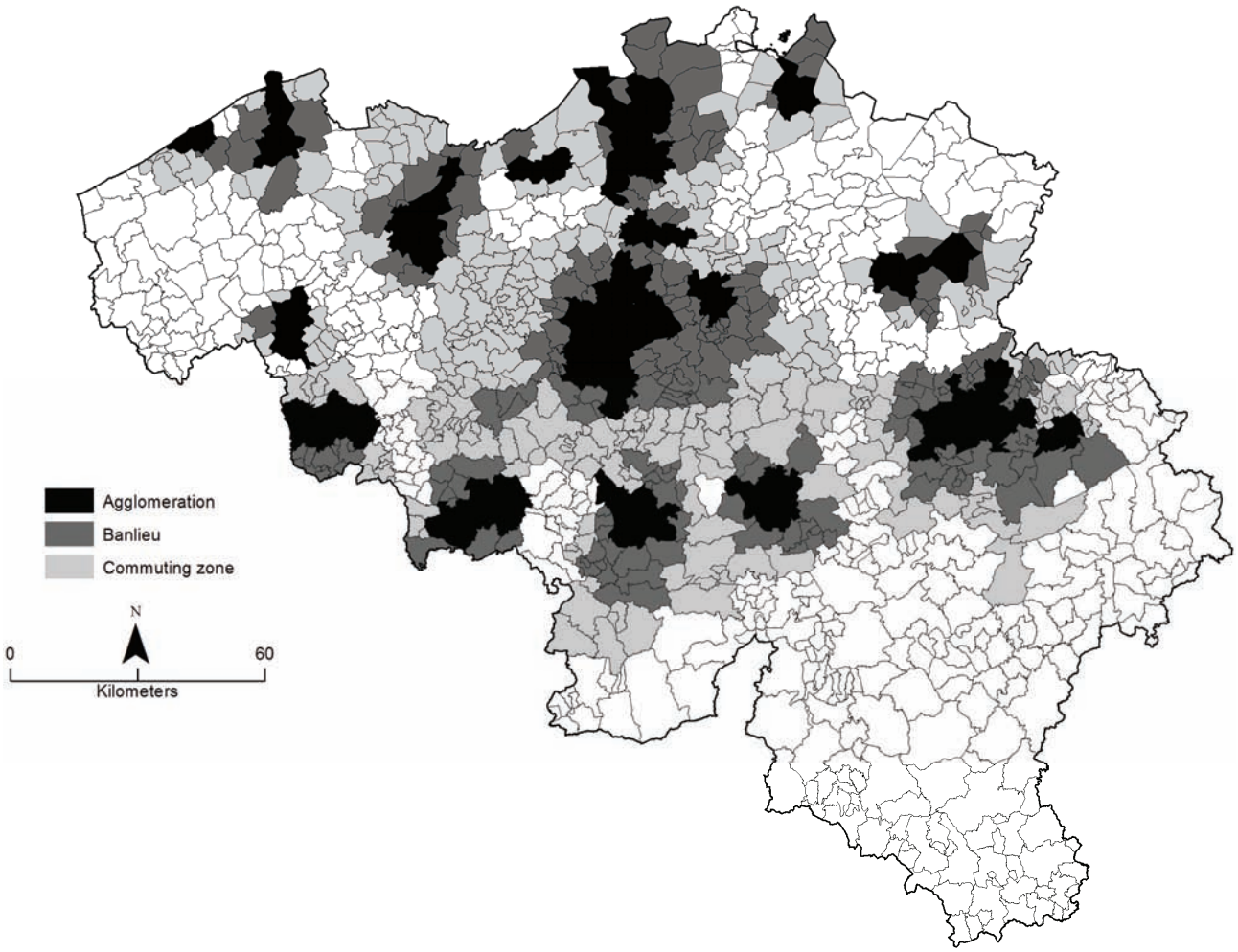
5.2.2 PUBLIC TRANSPORT ACCESS AND QUALITY

Access to and quality of PT services are an important indicator for mode switching, as PT is the most frequently cited alternative to the CC in the MB debate, and the only feasible alternative on long distance commutes. For the assessment of the quality of the PT services I study the urbanisation level and distance to PT nodes.

Urbanisation levels are studied in accordance with the typology provided by Luyten and Van Hecke (2007). They categorise the municipalities of Belgium in four classes: agglomeration, urban fringe, commuting zones, and rural areas (Fig. 5.4). The assignment of a class to a municipality is based on indicators such as population densities, commuting patterns, build-up areas, income, and so on. In general, it is to be expected that PT service levels decrease from the most urban to the rural areas, as PT supply is more feasible in dense and intensively used environments (Newman & Kenworthy, 1999; White, 2002).

The relevance of the categorisation by Luyten and Van Hecke to PT use is already illustrated in the BELDAM study. Cornelis et al. (2012) demonstrate that PT is three times more likely to be used in urban agglomerations compared to rural areas. Almost 20 % of the respondents from urban agglomerations use PT on a daily basis; this is approximately 12 % in the urban fringe and commuting zones, and only 6 % in rural areas. Meanwhile, 28 % of the people living in urban areas never use PT, while this is almost 50 % for rural municipalities. In my own and the BELDAM dataset I have information on both the urbanisation level of the residential location and the workplace.

FIG. 5.4: CLASSIFICATION OF BELGIAN MUNICIPALITIES



Typology and classification by Luyten and Van Hecke (2007), Map by Joris Beckers

A more direct indicator for the chances of PT is distance to a PT node. The importance of distance to a node partly overlaps with the arguments for total distance (see above). The time needed to get to a node is part of the total travel time, and as PT is often accessed by active modes, short distances are important (Rietveld, 2000; Annema, 2013; Brons, Givoni, & Rietveld, 2009). In section 5.5 I study the distance to four kinds of nodes, namely train stations, bus stops, tram stops, and metro stations, with data only from the BELDAM dataset. In all cases this is the distance from the workplace to the PT node. For all modes it is the distance as estimated by the respondent. To me this estimated distance is more interesting than the actual distance, as perceptions are more indicative for travel behaviour than the actual objective situations (Guo, 2011; MacEachren, 1980; Sadalla & Magel, 1980; Thorndyke, 1981; Van Exel & Rietveld, 2009).

5.2.3 CAR PARKING

Car parking plays a vital role in mode choice, as commuters are relatively sensitive for paid parking facilities and dislike searching for a parking spot (Hess, 2001; Willson & Shoup, 1990; Shoup, 2005). In general, private parking provided by the employer is an untaxed benefit in kind in Belgium (De Borger & Wuyts, 2009). It is a benefit in kind since the employee is mostly

not expected to pay for this service; only 6 % of the employees pay for a parking space provided by the employer (Pauwels & Andries, 2016). Indeed, the costs for parking are commonly borne by the employer, and therefore by all employees of the firm. The introduction of paid parking facilities at workplaces is highly controversial (Van Malderen et al., 2011). Meanwhile, the costs for a single car are estimated by de Borger and Wuyts at € 14.5 a day in Brussels, while they assume an average of € 7.50 for whole Belgium. Van Ommeren estimates the benefit in kind of a car commuter in the Netherlands at € 760 per year (n=2 931), with clear peaks in cities such as Amsterdam, with annual costs over € 2 000.

Due to these observations I study private parking, paid parking, and the ease of finding a parking spot. One might expect that the parking policies are in line with CC policies. If so, CC owners are less likely to pay for parking at their workplace then other employees without a CC at their workplace.

5.2.4 Business Trips

In case of multiple business trips per week, the car is commonly the preferred option, as it is the most time-efficient. According to the census data from 2001 on home-work trips, the average speed for a car driver was 44.8 km/h, while pedestrians, cyclists and regional transport users encounter average travel speeds of respectively 6.9, 15.4, and 18.7 km/h. The main competitor in terms of speed is the train with an average of 42.7 km/h (Verhetsel et al., 2009). The main issue with train use is accessing and exiting the train station. The train network often does not comply with the complex pattern of business trips. A Dutch study found that a door-to-door PT trip in nearly all cases takes at least twice the time needed by car, which includes any time loss due to congestion. Only in a small fraction (<1 %) of the simulated trips PT was competitive in terms of the travel time needed (Bakker & Zwaneveld, 2009).

The importance of professional trips is also related to trip chaining. Often it does not make sense to travel to the workplace before or after visiting a client or business partner. Hence, people travel from home to their appointments and then to the workplace or the next meeting. The effect of trip chaining among CC owners can be observed in the study by Macharis and De Witte (2012), as representatives with many professional trips cover only a limited distance for commuting.

In case of trip chaining the most popular mode is the car, while the use of PT is less evident (Hensher & Reyes, 2000). This can also be observed in the analysis of the census data from 2001: over 34 % of all car users combine the trip to work with another trip; on the way back, 55 % of all car users go somewhere else before returning home. Lower levels of chaining are observed for active modes (walking, cycling); with 25 % of the users chaining the trip to work with another trip and 35 % doing so on the way home. Likewise, relatively low levels of combinations are observed for train use, with 20 % on the way to work and 42 % on the way back. In case of multiple additional trip destinations, the car is definitely the most popular choice. (Verhetsel et al., 2009) As a result of these observations, one does expect to see that people with many business trips are more inclined to use the car for commuting purposes.

5.3 ATTITUDE TOWARDS THE MOBILITY BUDGET

5.3.1 COMMENTS ON THE MOBILITY BUDGET

From a theoretical point of view, one expects to see four basic reactions evoked by the concept of the MB. On the one hand, there is the basic divide between optimistic and pessimistic reactions. On the other hand, due to a difference in interest, some employees depart from the current situation and look at the CC, while others evaluate other or new options (Table 5.1). From all of the comments I have received (Ch. 3; Appx. II), it has become clear that all four positions regarding the MB that are represented in my sample. First, there are *the general optimists*; they regard the MB as a step in the right direction. Second, there are *car opportunists* who primarily seek more freedom to optimise their choice with respect to CC. The third group are *the excused*: those who feel there are insufficient feasible alternatives to the car. The fourth and final group are *the sceptics*; to them the concept of the MB is irrelevant, and they feel misunderstood. These sceptics mainly refer to the importance of the car. The relative size or importance of each group remains unknown as the data collection was insufficiently equipped for this analysis and responses in the comment box were not obliged. Nevertheless, I am convinced that these comments provide a valuable insight into the concerns and priorities of target group members.

TABLE 5.1: FOUR POSITIONS BASED ON GENERAL ATTITUDE AND MAIN FOCUS

	Optimistic	**Pessimistic**
Focus on other options	I: General optimists	III: Excused
Focus on CC	II: Car opportunists	IV: Sceptics

The first group shows signs of an optimistic attitude to the MB. The provided motivations are mostly related to an increase in autonomy, choice possibilities or the availability of new options or combinations. These people regard the freedom of choice as an important feature. Alternative motives in support of a positive attitude are related to the perceived general need to alter mobility policies in Belgium. Hence, the two camps I detected in Chapter Two are also present in my sample. The liberal camp is mainly in favour because of the freedom of choice. The environmentalists believe in the potential contribution of the MB to more sustainable travel behaviour.

> *Aim for an optimal freedom of choice: the employer decides on the budget, the employee selects to the max. Free choice with respect to the type of car, number of kilometres, European fuel card, train tickets, bicycle sharing, Railpass, Keycard, spacious car for the holiday season… As long as the fiscal consequences and the impact of budget overruns are clear. Freedom of choice is most important. – ID#1733*

> *I hope this opens the discussion with my employer, especially with respect to the options of additional wage of extra leave days. –ID#269*

Mobility budget and teleworking are very interesting options for the environment, the costs for the employer and the balance between work and private life. – ID#1670

I hope that this research project will solve issues related to work-related travel. Employees that prefer to travel in a more environmental friendly way should not bear the cost. We urgently need to rethink corporate transport policies. – ID#1324

The second group stresses the need for more freedom of choice with regards to the type of car (or fuel card). They mainly appreciate the additional autonomy in the selection of their new car and do not seem to care much about other transport modes, such as the bicycle or public transport. Hence, the potential success of the MB, to them, is related to the choice possibilities with respect to the car. Their appreciation of the MB will most likely depend on this aspect.

The cars offered by [my employer -TZ] are limited in number, with just a few standard brands and few options to combine. Using a [mobility] budget offers fulfilment and the freedom in order to act according to personal needs. – ID#589

I am very positive about the concept, though I believe the design and interpretation of the MB in this survey is too narrow. If you want to see changes in behaviour, you will need to diversify within the selection of cars. I am able to conduct 90 % of my trips by an electric small car. For long business trips and weekends I would use the more conventional diesel car. […]. It would be interesting to offer a pool of cars which can be used when they fit. – ID#901

If possible I would select a hybrid or electric car with the option to use a different car for the holidays. – ID#855

You might also want to consider the situation where the company car and the fuel card are offered as separate items. For instance, one can select a car but without the fuel card. – ID#575

The third position is related to the difference between choice options within the MB and the actual options in the real world. It is interesting to see that many respondents feel that there is a lack of true options. They refer to their personal situation and conclude that there is no alternative to the CC because of financial reasons or because of poor accessibility by other modes; they refer to automobile dependency (§1.2.4). They do not disapprove of the MB, but can be critical about its potential in practice.

The mobility budget is interesting in theory. It probably is useful to those within close proximity to their workplace. For a single mother a car has a significant impact on the household finances. Especially if one considers additional costs and any cost for repair in case of an accident. […]. A company car is a gift from heaven in this occasion. Our employer already offers many leave days and possibilities for telework. The balance between work and family is, in the current situation, very comforting. – ID#1468

A fourth and final group is sceptic about the MB. They do not consider themselves to be part of the target group or the design of the MB does not meet their professional needs. They would prefer options to upgrade their car. Alternatively, others simply regard the MB as an

attack on their rights. This group neglects other transport modes. Some of these comments are especially striking because both the dominant concept of the MB and my survey did not state that people need to waive their cars, neither did I introduce the idea of additional taxes. Indeed, the MB is explicitly not anti-car (Ch. 2). As such, it seems that some of these people mainly reacted to the general public debate on company cars in Belgium.

> *Bicycle, train, or other options are not desirable for me. The company car is an important part of my remuneration package, and I am not prepared to hand in this benefit. Mobility is, in my opinion, a fundamental right, including mobility by car! Curbing mobility through taxation is to me a step backwards in time. Please provide (car)infrastructure for the 21st century. – ID#201*

> *This survey is totally irrelevant to salespeople who are in need of a car in order to visit clients. – ID#1236*

> *The option to hand in gross wage in order to obtain a more expensive company car was not present in this survey, but I would seriously consider this option. – ID#735*

On top of these reflections regarding the need and applicability of the MB, there are many people that offer alternative solutions to combat congestion, to promote alternative modes, or to make work-related travel patterns more sustainable. Most of these comments are related to the need to improve public transport services in Belgium. In the comments people suggest that the main reason for using a car relates to the poor quality of the PT network. Their position is close to those in group number three: it is not about a lack of choice, it is about a lack of true options. Others suggest raising fuel taxes to, among other things, restrict the number of 'free' kilometres with a fuel card, to promote telework, to build more roads, to provide more parking spaces free of charge at park-and-ride facilities, and so on. These comments suggest that these respondents do not really feel that the MB is a solution; they suggest that the actual issues are situated elsewhere.

5.3.2 Appreciation of the Concept

In order to gain further insight about the attitude towards the MB by target group members, I offered three statements to the respondents in the questionnaire (Appx. II). In this subsection I compare the responses of target group respondents to non-target group respondents. The results indicate that non-target group members generally have a more positive attitude towards the concept of the MB. Furthermore, men, long distance commuters, and those with an outdoor job are less positive towards the MB.

Response options to the three statements were situated on a four-point Likert-scale (Fishbein & Ajzen, 1975) and were ranked from 'totally disagree', 'disagree', 'agree', to 'totally agree'. Moreover, an escape option (*'I do not know'*) was offered for all three statements. All these statements are positively formulated, therefore I already expected to see (more) positive reactions. Below, I first present the basic descriptive statistics from the full target group and the no-CC group (n =1 202 = 816 + 386), after which I present the results from an explanatory model based on the matched and perfectly balanced dataset (§3.4.3).

The response to the first statement on the *added value of mixing fringe benefits* was strongly positive (Fig. 5.5). About 80 % of all respondents, target group as well as no-CC group, agree or totally agree with this statement. Only 7.5 % states they do not know. The second statement revolves around the potential of *pressures from employees to their employer to implement the MB* (Fig. 5.6). Again, the majority of the respondents are positive. However, a larger share now indicates they do not know and the share of people who totally agree is lower. This is especially true for the main target group: the CC owners. The answers to the final statement, concerning *the additional options offered by the MB,* are relatively negative (Fig. 5.7); less people tend to 'totally agree' with this.

FIG. 5.5: RESPONDS TO STATEMENT ON COMBINING FRINGE BENEFITS

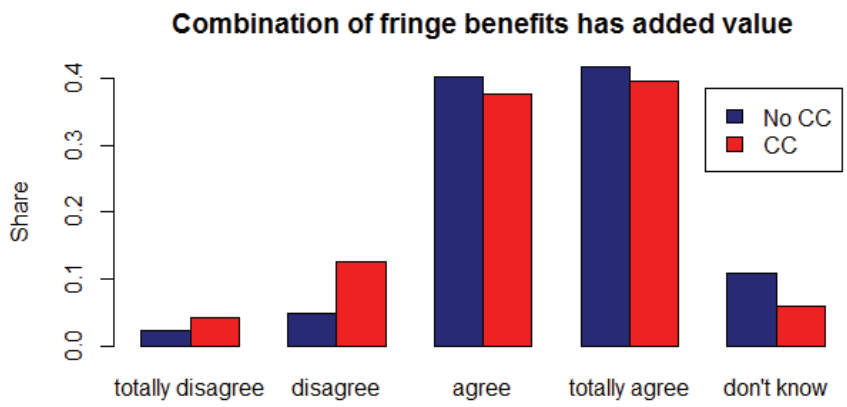


FIG. 5.6: RESPONDS TO STATEMENT ON RECOMMENDATION TO EMPLOYER

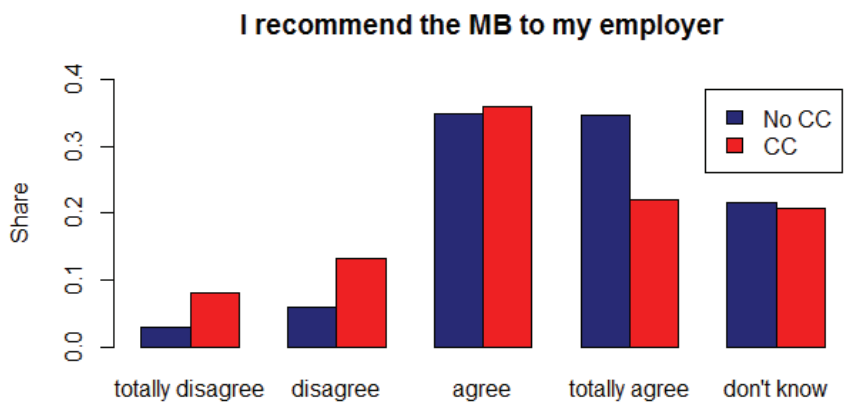
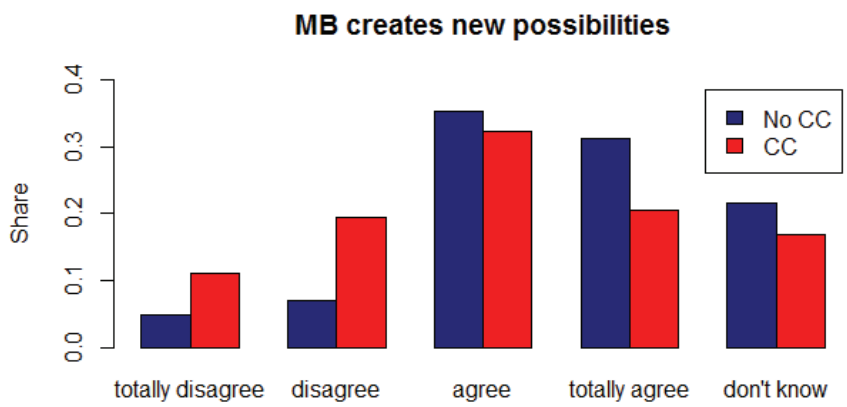


FIG. 5.7: RESPONSE TO STATEMENT ON NEW POSSIBILITIES



The results indicate that respondents from the target group are generally less positive. In order to see whether or not this observation is correct and in order to test relevant additional assumptions, I used a mixed ordered logistic regression model (Christensen, 2015). In this model all three statements are combined through use of 'subclass' to account for matched individuals and 'company' to account for autocorrelation in the statements made within a single company. The 'don't know' observations are neglected and removed from the model.

In Table 5.2 I present the results of the final model. With respect to the individual level fixed parameters I observed the following. Young employees, females, PT users and frequent cyclists generally have a significantly more positive attitude towards the MB, as presented in my survey. The most impressive difference here was found for frequent bicycle users, both in terms of the odds ratio (OR) and significance. Conversely, males, employees with a long home-work distance, and employees with a CC are more negative about the MB. Here the strongest effect is found for CC owners. The results for people with an on-the-road function are close to zero and insignificant, which is somewhat unexpected. The results indicate a potential conflict, as the main target group for the MB is predominantly male, with a CC, and with a longer commute (Ch. 3; §5.5).

TABLE 5.2: MIXED ORDERED LOGISTIC REGRESSION OF COMBINED LIKERT-SCORES

Random effects		variance	s.d.		
subclasses (n=56)	intercept	1.17	1.08		
	CC owner	1.13	1.06		
companies (n=12)	intercept	0.10	0.32	**OR 95%-CI**	
Term	**Value**	**z-value**	**OR**	*lower*	*Upper*
CC owners	-0.958	-4.50	0.38	0.25	0.58
Gender (female)	0.407	2.72	1.50	1.12	2.02
Partner (no)	-0.292	-1.62	0.75	0.52	1.06
Children at home (no)	0.641	0.39	1.90	0.77	1.47
Age (<30 y)	0.634	2.28	1.89	1.09	3.26
Age (30-39 y)	0.444	2.20	1.56	1.05	2.32
Age (40-49 y)	0.172	0.86	1.19	0.80	1.76
Home-work distance (x100 km)	-0.712	-4.03	0.49	0.35	0.69
PT user (> 1 time p.m.)	0.416	2.69	1.52	1.12	2.05
Bicycle user (> 1 time p.m.)	0.583	6.38	1.79	1.50	2.14
Job type (on-the-road)	-0.030	-0.26	0.97	0.77	1.22
totally disagree / disagree	-2.902	-9.63	log-likelihood		-2776.7
disagree / agree	-1.537	-5.23	AIC		5589.3
agree / totally agree	0.530	1.81	AIC.intercept		5967.1

To understand why target group members seem to be less interested in the MB is to understand why non-target group members might be more interested. One of the potential reasons that non-target group members are more interested is because of the prospect of a CC. My questionnaire was designed for people with a CC. People without a car provided by the employer might be given the impression that the CC will become available if the MB is

implemented. This is most likely not the case, as the CC is simply too expensive; the budget available for non-CC owners is too small to select a CC within the MB. This is true as long as only current transport reimbursements are used as input for the MB; in case primary wage or other benefits are a source, the CC could be within reach (see also Ch. 7 & 8 on counterproductive effects). On a more general level, one might suggest that the interpretation of the MB concept by people without a CC is unlike the interpretation of CC owners, though I have insufficient data for a further assessment of this issue.

To conclude this section, I argue that target group members are relatively less interested in the MB in comparison to the no CC group. This seems to be a result of their current personal or professional situation. In case there is an interest, it often revolves around the freedom of choice regarding the car.

5.4 COMPANY CAR USAGE

In this section I study annual vehicle mileage and demonstrate that CC owners eagerly consume the benefit in kind as provided by their employer. The difference in non-professional related usage between CC owners and others is about 6 800 km per year. This supports the evidence of a car-centred lifestyle among CC owners and complicates mode switching.

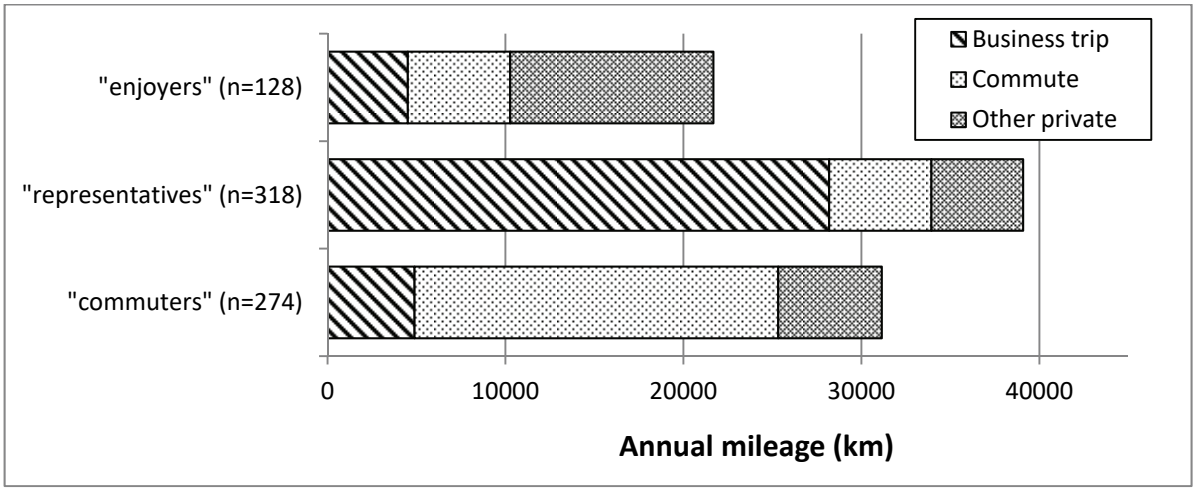
There is a substantial body of literature which shows that, on average, a CC covers more distance than a private car (§1.2.1). The observed differences range from 10 000 to 20 000 vehicle kilometres per year. In relative terms it is a factor 1.5 to a maximum of factor 3; see Harding (2014) and Scott et al. (2012) for international reviews. Data from the Belgian context are, inter alia, provided by Zwerts and Nuyts (2004). They conclude that the average private car covered about 16 500 km in the year 2000 in Flanders, while the CC was used for about 30 000 km. More recent figures from BELDAM show that the CC is used 32 000 km per year on average, while the average for newly purchased private cars is 16 000 km (Cornelis et al., 2012). This means that 15 % of the total travelled distance by car is covered by just 8 % of the car fleet, namely the CCs (idem). In additional sources I found figures in line with these observations, although with a considerable variance. In Israel, several studies indicate CCs are used to cover 24 % to 130 % more kilometres (Shiftan et al., 2012). In the Netherlands, CCs accounted for 22 % of the kilometres driven in the year 2000, while they are just a small part (11 %) of the total fleet. Additionally, as the share of CCs increased up to 17 % in 2005, the share in covered kilometres also grew to 28 % of the covered distance (Korver, 2007). The main issue with many of these descriptive statistics is that they compare apples to oranges. Therefore, explanatory models with control variables and matched data are recommendable.

In the PROMOCO project, one of the central aims was to establish a decent estimation of the effect of CC provision regarding the annual mileage. In their linear regression model, the following aspects are included: home-work distance, the frequency of business trips, gender, age, and education level (Appx. IV). The results are significant for the majority of the parameters. Age and education level turn out to be insignificant and there is no significant difference between making no business trips and rarely making a business trip. CC ownership

turns out to be highly significant and will on average add 9 200 km to the annual mileage, according to the model estimates. Laine and Van Steenbergen (2016) also present an ordinary least square regression. Based on their model, they conclude that the CC is used for an additional 12 100 km in comparison to the private car, though they readily admit this is an overestimation. In a more detailed approach, while controlling for obvious differences, they have found an additional 5 800 km per year for non-work related trips. Shiftan et al. (2012) demonstrate that even when controlled for other possible explanations, the CC is used more intensively in their regression model (ρ^2=0.25). They compare workers with a CC (n=400) and workers without a CC (n=230) in the Tel Aviv region, Israel. According to their model, workers with a CC drive an additional 3 000 km per year (t-value = 1.88). When fuel and parking costs are also covered by the employer, this number increases to an average of 10 230 additional km per year.

A closer examination of the annual mileage suggests that the average numbers presented above might conceal more complex patterns and interactions. Macharis and De Witte (2012) use a cluster analysis to distinguish three types of CC users in the PROMOCO dataset (Fig. 5.8). These clusters are then labelled according to the travel profile: 'commuters', 'representatives', and 'enjoyers'. The first group covers 32 000 km per year on average, 64 % of their kilometres are related to commuting. About 38 % in the original sample could be labelled as a member of this 'commuters' cluster. The representatives travel about 37 500 km a year. However, 75 % of these kilometres are related to business trips, only 13 % to commuting. Due to the high number of business trips these representatives are at their workplace less often. In total, 44 % of the PROMOCO sample can be labelled as a 'representative'. Finally, 'enjoyers' mainly use the CC for private purposes. A small majority of the distance travelled (51 %) is not work related. In total they travel fewer kilometres than the other two groups; on average 22 400 km per year. A complementary segmentation of CC drivers in the UK can be found in Chapman et al. (2001); they also include an additional category for delivery cars for work purposes, which workers may take home when convenient. Both studies discussed in this paragraph emphasise that CC drivers are not a homogenous group.

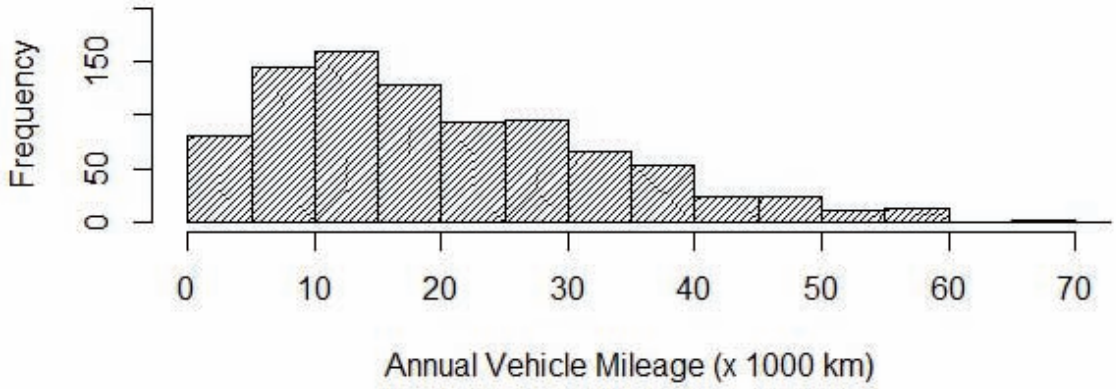
FIG. 5.8: ANNUAL DISTANCE FOR THREE CLUSTERS OF CC DRIVERS



Based on Macharis and De Witte (2012)

The model used to estimate the effect of the CC on vehicle mileage in this section is a generalised linear model (GLM) with a Gamma distributed response and a log link function. A quantile regression model has been used to check the results (Hao & Naiman, 2007; Koenker, 2015); in this case I used the **median value** (τ=0.5). The reason for using a GLM from the Gamma family is related to the distribution of the annual vehicle mileage (Fig. 5.9). On the left side the distribution is somewhat truncated, while in the tail on the right there are some extreme observations (outliers). The dataset used for the model is the pre-processed BELDAM dataset, filtered and perfectly balanced for the treatment and control group, due to exact matching (§3.4.3).

FIG. 5.9: HISTOGRAM OF THE ANNUAL VEHICLE MILEAGE



BELDAM dataset, after matching

The results from the GLM suggest that the difference in the annual vehicle km is nearly 3 600, between those with and without a CC. The 95% confidence interval (CI) ranges from 2 100 to 5 200, which also indicates that the estimate is clearly different from zero, and therefore statistically speaking also highly significant (Table 5.3). The CC effect is substantial (+16 %), since the average mileage for the complete sample is 22 000 km per year. The conclusion regarding the CC effects holds in the rather uncommon reference scenario, with for instance a home-work distance of 0 km. A more decent account can be obtained when predicting the annual mileage based on the sample and the model estimates (see next paragraph). The variables used in the matching procedure are predominantly insignificant. Main exception here is the estimate for gender, as women are less likely to cover many kilometres with their car. In terms of the transport related effects, significant estimates for commuting distance, rural areas, job-type, and age of the car can be observed. Most of these estimates are as expected, except for age of the car, since younger cars are commonly associated with more intensive use. Here the strong correlation with the CC dummy may have caused a bias.

TABLE 5.3: RESULTS GENERALISED LINEAR MODEL FOR ANNUAL VEHICLE MILEAGE (KM)

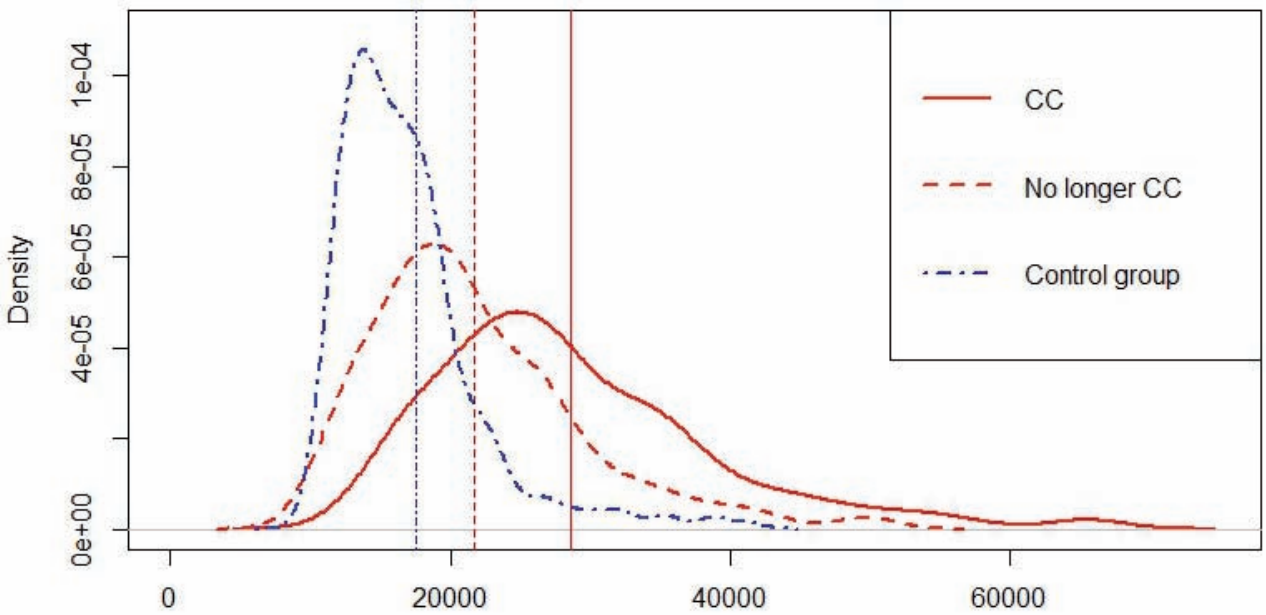
Category	level	estimate	CI-lower	CI-upper
CC access	*yes*	0.274***	0.172	0.377
Gender	*female*	-0.198***	-0.284	-0.111
Partner	*no*	0.066	-0.075	0.207
Children at home	*no*	0.063	-0.034	0.16
Age group	*< 30 y*	0.065	-0.103	0.234
	30 – 39 y	0.097*	-0.002	0.196
	40 – 49 y	0.011	-0.093	0.116
Degree	*secondary*	0.020	-0.097	0.138
	high	0.027	-0.057	0.112
Wage level	*low*	-0.055	-0.241	0.13
	low - mid	-0.048	-0.174	0.079
	high	0.037	-0.056	0.129
Region	*Wallonia*	0.050	-0.035	0.135
	Brussels	-0.086	-0.219	0.046
Commuting	*distance*	0.002**	0.0003	0.005
	distance x car commuter	0.006***	0.004	0.009
Job type	*on-the-road*	0.062	-0.053	0.177
	on-the-road with CC	0.291***	0.13	0.452
Age of car	*years*	0.013**	0.003	0.024
Urban function	*urban fringe*	0.092	-0.022	0.206
	commuting zone	0.100	-0.029	0.229
	rural	0.119**	0.012	0.227
Constant	-	9.330***	9.158	9.503
Model specs	Observations	902	371 w CC	531 no CC
	AIC	19376.2	23 df	
	AIC intercept only	19630.5	1 df	

*Note: *p<0.1; **p<0.05; ***p<0.0, the same notation is used in the following tables*

According to the model results, the average predicted annual vehicle km for CC users in the BELDAM sample is 28 600 km. In the hypothetical case the CC ownership is longer there (set to zero), this average drops to 21 800 km. This implies an additional 6 800 kilometres per year for private purposes as a result of CC access. The hypothetical situation without a CC is still significantly higher than the estimated mean for the control group, which is 17 600 (Fig. 5.10). This is a result of more frequent and longer distance car use for commutes (§5.6) and high levels of car use as a result of business trips (Ch. 4; §5.5).

The difference in mileage is clearly less than the 15 000 additional km reported by the original BELDAM researchers, when they compared the distances travelled with a CC to the distances travelled with a newly purchased private car. It is also less than the 9 200 km reported by the researchers of the PROMOCO project. The estimate is very close to the final estimate by Laine and Van Steenbergen (2016): my estimate is 6 800 and theirs is 5 800 km.

FIG. 5.10: PREDICTED DISTRIBUTION AND MEANS OF THE ANNUAL VEHICLE KMS (GLM)



The parameter for the outdoor job profile ('on-the-road') is not significant at all and very close to zero, except when this parameter interacts with CC ownership; then the additional distance covered approximates 7 000 km (Table 5.3). Another interesting observation is the significant impact of the commuting distance: for each additional km in the home-to-work trip, an annual 208 km are added to the median. This implies the car is used for commuting about 50 % of the time, which makes sense as the car is used for about 75 % of all commutes in the BELDAM dataset, and trips to and from work are often combined with other trip purposes (trip chaining). Annual vehicle km increases from the urban agglomeration to the rural areas, although the differences are not always significant. Higher income levels can also be associated with higher levels of car use. This is also a result from pre-processing the dataset. Moreover, many respondents strongly rounded their stated annual mileage up or down, which makes residuals unavoidable.

The outcomes of the QR confirm the findings mentioned above (Table 5.4). According to the QR model, the difference in the median annual mileage between having a CC and not having a CC also boils down to 6 600 km. The relative improvement in the model fit, when compared to an intercept-only model, is even better.

TABLE 5.4: COMPARISON OF RESULTS OF GLM AND QR ON ANNUAL VEHICLE KILOMETRE

		GLM	QR
Observed	Sample mean	22 027	
Predicted	CC access	28 644	28 189
	No longer CC	21 771	21 558
	Difference	6 873	6 631
	Control group	17 610	17 460
	Difference	11 034	10 729

Based on the literature, the GLM and the QR model, it can safely be concluded that CCs are used more intensively. This extra use is not only the result of the job profile; CC owners also enjoy the opportunities offered by a CC with a fuel card for commuting and in a private setting. These results stress that the CC is an eagerly used bonus provided by the employer.

5.5 MODAL SHIFT POTENTIAL

In this section I discuss the results from the comparison of CC owners to non-CC owners with regards to the potential of using other transport modes than the car to commute. One by one I address the indicators introduced in section 5.2: home-work distance, quality of and access to PT services, car parking, and professional trips. These results are slightly negative for CC owners, which means that even without a CC the levels of car use among CC owners would still be relatively high (see also §5.4 and §5.6). The results are obtained from pre-processed datasets from my questionnaire and the BELDAM survey (§3.4.3).

The importance of home-to-work distance was expressed by target group respondents in some of the comments in the comment box at the end of the survey:

> *Cycling to work will be a very athletic challenge. It boils down to 45 kilometres per day. – ID#92*
>
> *The bicycle as alternative travel mode is only relevant for employees who live within a 10-kilometre radius from work. – ID#586*
>
> *My lack of interest for a mobility budget is solely the result from the fact that my home-work distance is too long. The company car is essential. [...]. If I lived closer to work, the mobility budget certainly would be interesting. – ID#433*

In the PROMOCO project the difference in commuting distance was also subject to further analysis. According to the researchers, 'there is no statistical significant difference between employees with a company car and without a company car with regard to their home-work distance (Chi squared: p=.206). This means that in general, employees with a company car do not necessarily live further from their work location than employees without a company car' (Castaigne et al., 2009, p. 72). The conclusion of Castaigne and others is echoed by Roy (2014), but at the same time others have found evidence for longer commuting distances (Frenkel et al., 2014; Laine & Van Steenbergen, 2016; Van Ommeren et al., 2006).

In my data I do observe a significant difference between CC owners and the no-CC group. The mean home-work distance in my dataset is 36.0 km for CC owners, while this is 28.4 km for the group without a CC. For the BELDAM dataset the difference is 2.0 km for stated home-work distances and nearly 2.5 km in the actually observed home-work trips. Overall, the differences in the mean range from +7 % to +27 %. This difference is only reflected in short distance commutes in my dataset. In the BELDAM-data, the differences in short distances are small or non-existent.

According to the results from a GLM with Gamma distribution and all control variables included (see Table 5.7), there is a substantial CC effect (Table 5.5) ranging from 2.9 to 6.0 km. In all three models the CC effect seems to account for a substantial part of the difference in the predicted commuting distances. Most importantly, all models are in line with each other: ownership of a CC is associated with longer commutes.

TABLE 5.5: DIFFERENCES IN COMMUTING DISTANCES FOR CC OWNERS AND OTHERS

	Own Data		**Beldam**			
	Stated		Stated		Revealed	
	CC	*no-CC*	*CC*	*control*	*CC*	*control*
Mean	36.0	28.4	30.4	28.5	29.0	26.5
Difference	7.63 (+26.9 %)		1.98 (+7.0 %)		2.45 (+9.4 %)	
Distance ≤ 4 km	3.8%	7.6%	12.5%	10.9%	16.2%	13.4%
Distance ≤ 8 km	9.6%	19.6%	24.2%	25.1%	27.2%	27.0%
Model	*glm with gamma distribution and log link function*					
Dif. In mean (km)	8.63		3.29		2.84	
CC effect (km)	6.02		2.87		4.36	
AIC	7 862		11 916		7 250	
AIC- intercept only	7 923		12 062		7 288	

The access to and quality of PT services was often mentioned as an obstacle of mode switching; many respondents indicated a lack of alternatives in the comments they left in the comment box:

> *My workplace [...] is situated on a hard to reach location via public transport. As a result, the introduction of a mobility budget is not evident. – ID#22*

> *Public transport is not a relevant option when one tries to reach [my workplace]. Because of this your questionnaire is of little use, also more generally considering the poor quality of public transport [in Belgium]. In our neighbouring countries public transport is much better organized. – ID#209*

> *Public transport is not an option for my commute. There is only a Dial-a-Ride service ('belbus') available. My preferences are a result of this situation: it is impossible without a car. – ID#631*

> *Travelling by public transport from Limburg to Brussels is not an option for me. – ID#600*

> *If I would travel to work by public transport I would need two hours one way, instead of 45 minutes. So, travelling by public transport would mean an additional loss of 2.5 hours [a day]. – ID#582*

> *Home-to-work trips by public transport are almost impossible in the province of Limburg, there are too few train stations and the bus network is a disaster. – ID#13*

The residential locations of CC owners and the control group are slightly different from one another in the BELDAM dataset (p=0.044), as CC owners are more often found in the urban fringe and the commuting zones. There are no significant differences observed in my dataset (p=0.20); moreover, the results are somewhat conflicting with the BELDAM observations. In my data there are more CC owners in rural areas, and less in the urban fringe. The only overlap between both datasets is an overrepresentation of CC owners in commuting zones.

There are no significant differences found in work places for CC owners and the control group in the BELDAM dataset (p=0.25). In contrast, there are highly significant differences in my dataset (p>0); these results indicate that CC owners are less likely to be found in the urban centres, and more likely less urban environments. However, because my dataset comes from a mere 12 companies, these results can be disregarded. All in all, I conclude that there are no strong differences between CC owners and the control group with regards to residential location and workplaces. The only difference might be an overrepresentation of CC owners in commuting zones.

Only small differences are recorded in the distances from the workplace to the access points of public transport. For three of the PT modes under study (train, tram and metro), the estimated distance to the access point is somewhat longer for CC owners. For tram and metro these differences are slightly significant. Accessibility of bus stops from the workplace is highly similar for CC owners and the control group. A striking observation in terms of access to PT nodes is related to the number of respondents who indicate they 'do not know'. For all four types of PT this share is relatively high. Furthermore, in all four cases the share of CC owners indicating they do not know is higher, although these differences are not significant for any variable. Nevertheless, if all four types are combined, there are significant differences: many CC owners would not know where to find PT services near their workplace.

The differences in terms of parking opportunities for CC owners and non-CC owners are both significant and relevant. Owners of a CC are provided with a private parking at the workplace more often (88.2 % versus 77.3 %). When private parking is provided, the parking is complete free of charge in 95 % of the occasions for CC users, while this is only true for 85 % of the control group. Those without a CC are forced to park their car in public spaces or commercial car parking more often. Whether this means paid parking is unknown. Furthermore, CC owners have slightly less difficulties finding a parking spot at the workplace, as 61.9 % of the CC owners states they experience no difficulties versus 57.7 % of non-CC owners, although the overall differences in finding a place to park the car seems to be insignificant.

The most significant results are found for the differences in professional trips. In the BELDAM dataset a total of 40.1 % of the control group state that they do not have any professional trips, which is only true for 5.3 % of CC owners. Meanwhile, 16.5 % of the control group conducts professional trips very often, while this holds for 54.2 % of CC owners. In my dataset, with more detailed information, 51.9 % of all people in the control group hardly make any business trips, as they are situated in the lowest number of frequencies and distance category. This is only true for 17.3 % of all CC owners (Table 5.6). In contrast, from the people in my control group, 8.0 % says to make more than 12 professional trips per month and travel

over 8 000 km per year. This is true for 21.1 % of the CC owners, a difference of 13.1 percentage points (pp). The people in this subcategory are labelled as people with an on-the-road job, in section 5.6.

TABLE 5.6: DIFFERENCE BETWEEN CC OWNERS AND NO-CC GROUP FOR BUSINESS TRIPS (IN PP)

Distance	**Business trips** (per month)				
(km/y)	< 1	1 - 3	4 - 12	> 12	Sum
< 1 000	-34.5	0.4	0.9	0.5	-32.8
1 000 – 4 000	-6.0	5.7	5.7	1.9	7.3
4 000 – 8 000	0.2	1.9	1.7	3.7	7.5
> 8 000	-2.7	-0.3	6.2	13.1	16.3
NA	-2.1	1.8	1.7	0.3	1.7
Sum	-45.1	9.6	16.0	19.5	0.0

Given these observations, it is safe to conclude that there are clear differences in the total length and frequencies of professional trips between CC owners and others. This implies that the CC is indeed used as a work tool more often. The common distinction between cars for professional reasons and 'wage cars' is not easily made. The majority of the people with a CC are situated between very intensive and hardly any professional use.

The results from this section indicate that, in general, the differences between CC owners and the no-CC group are modest. Although, in case there are differences, it is mainly at the expense of the CC owners' likelihood of mode switching. I found evidence of a significant difference in commuting distance, which makes cycling or walking less evident. I demonstrated that CC owners are more likely to park on unpaid private facilities, and most importantly, I revealed significant differences between CC owners and the control group with regard to business trips. Based on the observations of this section I argue that, at best, CC owners obtain travel behaviour patterns that resemble the travel behaviour of the control group, that is those without a CC. This optimal situation is unlikely within the MB, as there is little pressure involved. Moreover, based on the observation that the outlook for CC owners is somewhat less positive, I expect that car use remains above average, in case the CC option is dropped. The results from the next section strengthen these predictions.

5.6 COMMUTING MODE CHOICE

5.6.1 RESULTS OF FOUR CAR USE MODELS

In this section I present the results from four logistic regression models regarding car use for commutes. In these models I included the explanatory variables for mode choice, as discussed in the previous section, and the variables used for the matching procedure. All four models provide strong evidence for a CC-effect in mode choice: CC ownership results in a hegemonic position of the car in the daily commute. However, the results also indicate that without the CC, the use of the car will not necessarily drop to the levels found for non-CC owners. Overall,

the models highlight a strong reliance on the car for commuting purposes. This also implies that the CC is most likely replaced by a private car if the option of a CC is no longer available. The purpose of the choice models in this section is threefold. First, I demonstrate the importance of the indicators and the differences between CC owners and others, as outlined in section 5.2 and tested in section 5.5. Second, I reveal the importance of corporate transport policies in terms of the provision of CCs. Third, I examine and quantify the likelihood of mode switching for CC owners.

The four models presented in this section are again based on my data and the BELDAM dataset. I have used the perfectly balanced sets after filtering and pre-processing the data via matching. From the BELDAM dataset I derived two interesting dependent variables: a stated and a revealed mode choice for commuting. The stated mode choice was one of the questions in the individual questionnaire. The revealed mode choice is obtained from the trip diaries. From my dataset I had only one useful question in relation to the purposes of this subsection; the question about the frequency of transport mode use for commuting purposes (Appx. II). I have interpreted the response to this question in two ways: binomial and fractional. The binomial variable is coded as one in case someone indicated they use the car all of the time, otherwise it is zero. The fractional variable takes frequencies into account: 'always' is coded as one, 'frequently' as 0.667, 'occasionally' as 0.333 and 'never' is recoded as zero. Hence, the fractional model predictions can be interpreted as car use expressed in percentages of the workdays. In case of the fractional model, more information from the dataset is used, but some assumptions are made regarding the meaning of the responses by the participants.

The independent variables in the models are all the variables that are used to match the CC group to the control group plus the indicators for mode choice, as discussed in the previous section. In the models based on my dataset some variables are left out, simply because they are not available in the dataset (Ch. 3).

The results from the four logistic regression analyses are presented in Table 5.7. The results provide strong evidence for a CC-effect on the mode choice in the daily commute. In all four models the estimates for CC ownership are highly significant and strongly positive; they display some of the strongest effects observed in the models. Furthermore, the indicators used in the previous section (§5.5) are also of significant importance. All estimates for long commutes are negative, and two out of four are significantly different from zero. For (very) short commuting distances, all but one are negative and the vast majority is significantly so. As expected, estimates for the different urban functions are positive, which indicates that car use is more likely outside the urban agglomeration. However, the differences are not always significant on the 95%-level. Individuals with an on-the-road job are more likely to travel to work by car. In all four models the estimate is significantly positive. The information concerning parking and distance to PT services is only available in the BELDAM models. The results indicate a strong effect and significance of parking policies, as was expected. This observation is also relevant with respect to the effect of the MB at Belgian companies, as discussed in Chapter One, since many companies also altered their parking policy while implementing the MB. The estimates for PT access near the work place, both for train and regional services, are mainly negative, which suggests that nearby services improve the

probability of non-car commutes, although only two estimates are significantly different from zero.

TABLE 5.7: RESULTS FROM FOUR LOGISTIC REGRESSION MODELS ON CAR USE FOR COMMUTING

		Own Data		BELDAM	
Cat.	**level**	*binomial*	*fractional*	*revealed*	*stated*
CC owner	*yes*	1.022***	1.327***	2.019***	1.602***
Gender	*female*	0.098	0.351	0.133	0.684***
Partner	*no*	-0.102	-0.264	0.438	0.571**
Children at home	*no*	-0.042	0.042	-0.208	-0.327*
Age	*<30 y*	-0.885	-0.698	-1.107**	-0.275
	30-39 y	-1.182***	-1.087**	-0.696**	-0.046
	40-49 y	-0.565*	-0.436	-1.264***	0.055
Degree	*secondary*	*NA*	*NA*	-0.016	0.462*
	high (BSc)	*NA*	*NA*	0.329	0.174
Income	*low*	1.167***	1.001*	0.123	-0.597*
	low-mid	0.819***	0.789**	0.151	-0.407*
	high	-0.205	-0.156	-0.066	-0.666***
Region	*Wallonia*	*NA*	*NA*	1.222***	1.275***
	Brussels	*NA*	*NA*	-0.183	0.116
Commute	*very short*	-2.547***	-2.033***	-0.073	-1.007***
	short	-1.774***	-1.121***	0.482	-0.447**
	long	-0.292	-0.646	-0.970***	-0.841***
Urban function	*fringe*	0.754***	0.791**	0.486	0.119
	commuting zone	0.173	0.391	1.339***	0.699**
	rural	0.391	0.781*	0.644**	-0.148
Job type	*on-the-road*	1.001***	1.846***	0.562**	0.460***
PT access	*nearby train station*	*NA*	*NA*	0.314	-0.595***
	nearby BTU stop	*NA*	*NA*	-0.443**	-0.212
Parking	*paid*	*NA*	*NA*	-1.322***	-1.050***
	private	*NA*	*NA*	1.038***	1.016***
	easily found	*NA*	*NA*	0.678***	0.465***
Constant	-	0.827**	1.196**	-0.782	-0.298
Model performance	Observations	887	887	879	1419
	Log-likelihood	-351.7	-190.7	-373.2	-585.3
	AIC	739.4	417.4	800.4	1.224.69
	AIC intercept only	884.7	553.6	1061.2	1.526.70

Regarding the model fit I can make the following observations. The strongest improvements of the Akaike Information Criterion (AIC) are found in the BELDAM model with revealed observations and the fractional model with my own pre-processed dataset. In both cases the reduction is about 25 %. The performance of the binomial logistic model based on my data is relatively small (16.4 %), although still highly significant. Given this observation, I prefer the results from the fractional model over the binomial.

5.6.2 Hypothetical Mode Choice for Commutes

In this subsection I argue that the most obvious competitor to the CC is the private car. This argument is prompted by predictions on car use based on the four logistic models as presented in the previous subsection (§5.6.1).

One of the interesting features of choice models is the opportunity to model transport mode choice by CC owners in case they do no longer have the CC, while other aspects are held constant. Regression to the mean provides a general clue, though it does not account for other relevant aspects. I already concluded that there are relevant differences between CC owners and others – one of these being longer commuting distances (§5.5).

Some of the literature on mode choice bias caused by the availability of the CC is discussed in Chapter One (§1.2.1). In additional literature one primarily finds stated mode choice, which is what the mode choice would be in the hypothetical situation that a CC would no longer be offered to the respondent. In the PROMOCO project one of the questions was about the potential substitution for the CC in the commute. About 64 % to 74 % of the respondents state they would use a private car as an alternative. Another 10 to 17 % would switch to PT. The remainder of the sample is most likely to use active modes, though carpooling and a motorcycle are also present as alternatives. In the INDIGOV questionnaire, respondents were also asked about their action in the hypothetical case of Belgium without any CC; multiple answers were allowed for this question. A total of 61 % states that they would switch to a private car for the commute, while another 6 % would carpool to the workplace. The shares for other modes are 16 % for PT, 11 % for bicycle, and 6 % for motorbike or scooter. Interestingly, with respect to the home-work distance: 18 % of the respondents indicate that they would look for a job closer to home (KPMG, 2012). These two stated choice accounts suggest a *regression to the mean*: CC owners without access to a CC mainly indicate they would use the car just as often as other employees currently do. The INDIGOV survey also reveals additional interesting insights on the popularity of the CC; if the current employer of the respondent would no longer offer a CC, over 31 % of the employees indicate they would resign, the majority of them would start working somewhere else; at a workplace that does include a CC in the remuneration package (KPMG, 2012).

The predictions regarding car use for commutes based on my four models suggest a drop in the range of 12 to 23 percentage points (Table 5.8). In the current situation, the BELDAM models predict car use levels over 91 %. In case the CC is no longer offered, these levels are likely to drop to 69 %, according the reveal data model, and 72 %, according the stated mode choice model. These differences are somewhat larger than the 16 percentage points found by Laine and Van Steenbergen (2016), while using the same dataset. According to the models based on my own pre-processed dataset, 85 % of the CC owners always use the car to commute (binomial model); the car is used to commute by 94 % of the CC owners on average (fractional model). These levels drop to 70 % and 82 % respectively.

In all cases the car use among CC owners, in the hypothetical situation of losing the CC, is still higher than the car use levels of the group without a CC in the current situation. However, the differences are relatively small and range from 0.6 to 4.4 percentage points. Indeed, the effect

of the CC is far more significant than the differences observed with regards to commuting distance, professional trips, and other indicators (§5.4).

TABLE 5.8: PREDICTED SHARE OF CAR USERS FOR HOME-WORK TRIPS

	Own data		**BELDAM**	
	binomial	*fractional*	*revealed*	*stated*
sample mean	77,8%	87,9%	73,2%	74,4%
CC owners	84,5%	93,3%	91,9%	91,0%
without CC	69,7%	81,6%	69,0%	72,4%
effect (pp)	*-14,8%*	*-11,8%*	*-22,9%*	*-18,6%*
No CC group	67,9%	80,4%	64,5%	71,8%
difference (pp)	*1,8%*	*1,2%*	*4,4%*	*0,6%*
Obs. (all)	887	887	879	1419
CC owners	606	606	346	454
Others	281	281	533	965

These results indicate that in eight out of ten cases, the CC will be replaced by a private car for commuting trips if people are forced to look for alternatives to the CC. If there is no pressure involved, like in the MB, I expect the difference to be even smaller.

5.7 CONCLUSIONS CHAPTER FIVE

The objective of this chapter was to scrutinise the likelihood of participation by CC owners in the MB. By studying literature, the results from my survey, and multiple explanatory models, I obtained interesting and important insights with respect to the research questions of this chapter. These research questions are related to the receptiveness to the MB concept, the eagerness of CC usage and the potential for transport mode change.

In terms of receptiveness I was able to reveal some interesting patterns. The most important pattern is the observation that CC owners have a less positive attitude toward the MB concept in comparison to employees without a CC. This difference was both strong and highly significant. Another interesting pattern is the more positive evaluation by females, young people and those already frequently travelling by the transport alternatives bicycle and PT. Somewhat disconcerting is the observation that people with a long distance commute and men are less positive towards the MB, especially because these two aspects are commonly observed in the target group. In case of a positive attitude towards the MB, it is not necessarily prompted by the opportunities for cycling or PT use. Many respondents stress the importance of added degrees of freedom regarding the type of car and car options. Others stress the need to convert the benefit in kind to primary wage. Previous research on FBPs concluded that attitude towards the concept is the most important determinant in actual participation.

Based on the analysis presented in this chapter I argue that the CC is received as a very pleasant fringe benefit by a vast majority. It will be very hard for any other fringe benefit to

compete with the CC under the current conditions. The car is intensively used for multiple trip purposes, including commuting and private trips. When controlled for other factors such as business trips, the CC covers an additional 6 800 kilometres per year on average, of which half can be attributed to more and longer commutes by car and the other half to more and longer private trips. This implies a considerable bonus for which the employee only pays benefit-in-kind. The CC is not only a pleasant benefit for the employee; it is a fringe benefit for the entire family. The latter is supported by the comments from the respondents, the strong preferences for family cars, and the use of the CC by non-owners.

The conditions for mode switching among CC owners are slightly negative when compared to employees in the private sector without a CC. This conclusion is mainly prompted by the longer commuting distance and more and longer business trips among CC owners. The differences in terms of the access to and quality of PT services are modest. Car parking policies for CC owners are often in line with the car-friendly treatment of the CC itself. CC owners enjoy private parking at the work place more often, while they are less likely to pay for parking. In the car choice models, as presented in section 5.6, I demonstrated the relevance of these conditions in transport mode choice: the effects are often strong and highly significant.

The car choice models themselves indicate a strong overall preference for the car for commuting purposes; about 90 % of the CC owners use a car to commute, compared to 70 % of employees without a CC. In all four models provided in this chapter there is a significant CC-effect, which implies that mode choice for CC owners is affected due to CC ownership. In the hypothetical situation where the CC is no longer available, the use of the car would almost drop to 'normal' levels, meaning a decrease of 12 to 23 percentage points. As this hypothetical situation of losing the CC is far more radical than the freedom of choice regime under the MB, I argue that these scenarios are unlikely for the MB. In relation to the latter, it is important to repeat some of the barriers discussed in the introduction to this chapter. There I observed that people suffer from a status-quo bias, their travel patterns are the result of habitual behaviour, and waiving the CC often implies buying a new or second-hand private car. Indeed, as I clearly demonstrated in this chapter, the most obvious alternative to the CC for target group members is the privately owned car.

The observation that renouncement of the CC in exchange for other transport options is unlikely does not imply that the MB does not have any chance to succeed. First of all, other non-transport related alternatives to the CC might be successful, for instance additional days off, pension savings or more primary wage. Second, there might be options to substitute the car for a certain set of the trips, for example for the commute. If so, the CC might still be selected as part of the MB, though perhaps accompanied by other transport options, such as a seasonal train ticket. These options will be discussed in the next chapter. All in all, I can conclude that the concept of the MB is mainly useful for a subsample of the main target group. The most promising alternatives to the CC are the options that offer more flexibility in use instead of less. The most obvious example would be additional income.

CHAPTER SIX: PREFERENCES WITHIN THE MOBILITY BUDGET

There's not a problem that I can't fix

Cause I can do it in the mix

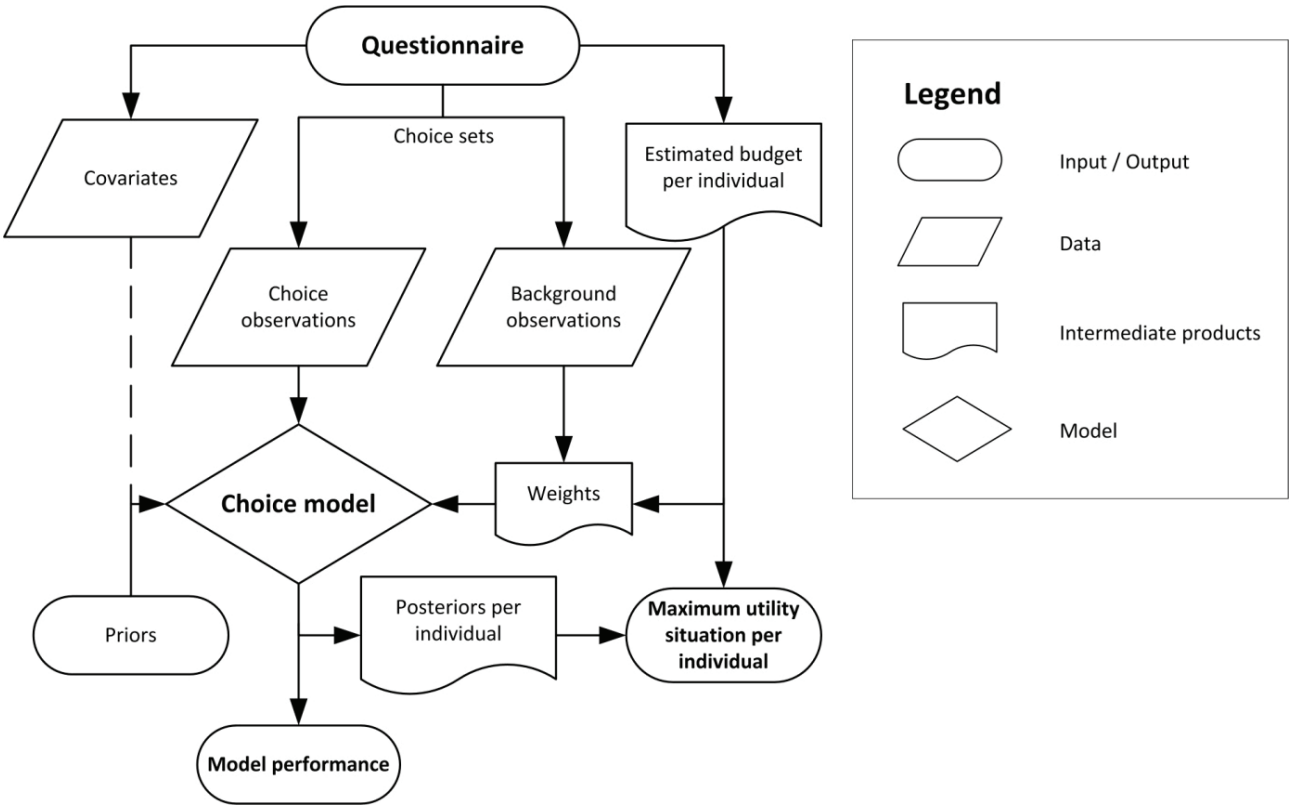
— ***In deep***, *Last night a DJ saved my life (1983)*

6.1 INTRODUCTION

The main focus of this chapter is CC owners' preferences within the MB. Through this study I hope to obtain answers for the remaining research questions. These questions evolve around the willingness to waive the CC, the willingness to select a cheaper car, and the attractiveness of multimodal transport combinations. Moreover, as I already argued in the previous chapter, the results also serve as an indication for the willingness to participate, as employees who opt for a CC-only option indicate they are satisfied with the status quo, they will probably not participate (Ch. 5).

The method and data used for the purposes of this chapter have already been discussed in Chapter Three. In my questionnaire I included a mixture amount discrete choice experiment (§3.2). All participants were offered 16 choice sets with two options, each option showing a MB package with a combination of one to five elements. These mixture components are *CC, Bicycle, PT, Leave days* and *Bonus* $\{x_1, x_2, x_3, x_4, x_5\}$; all of them have a variety of levels (Appx. III). Total response rates are excellent (38.5 %). After cleaning and filtering, a total of 817 target group members remain, with 13 022 choice observations in total.

FIG. 6.1: FLOWCHART OF MODEL OUTCOME CALCULATION PROCEDURE



I did not solely rely on the choice observations from the questionnaire. Additional observations from the experiment, such as the number of clicks and the time used, are transformed into weights (Ch. 3). Moreover, the responses to the questionnaire are transformed into covariates in the models (§6.3). In total I present three choice models, each one with its own contribution regarding the research questions. These models are a mixed multinomial logit model with integrated covariates, a latent class model with two classes as

well as random parameters, and a third model, which I call a Car-First model. The individual level estimates from these three models are combined with other individual level information to obtain detailed and solid results. In Fig. 6.1 I show how all obtained information was processed in this chapter.

This chapter is structured as follows. First, my three choice models for the analysis of the choice data are introduced including illustrations. Next, I focus on the estimation procedure; here the advantages of the used hierarchical Bayesian estimation procedure are discussed and the optimal utility function is scrutinised. Before I move on to the final results, I provide a brief assessment of the model performance and introduce the techniques used for the analysis of the parameters. In section 6.5 I present the results, structured by the research questions of this chapter. Since these results are to some extent inconclusive, I then move on to a further discussion of these results and try to validate them through internal and external confrontations.

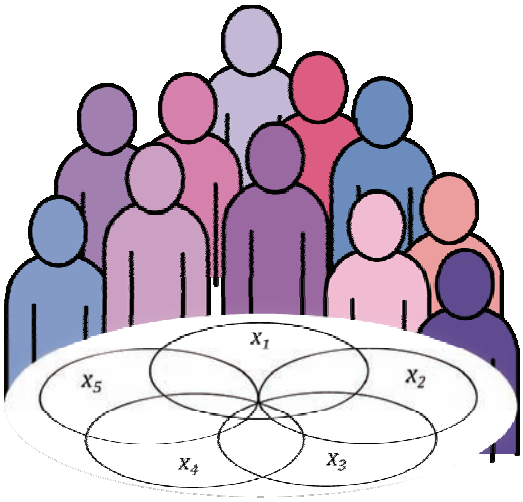
6.2 THREE CHOICE MODELS

6.2.1 MIXED MULTINOMIAL LOGIT MODEL

The first choice model used is a *Mixed Multinomial Logit* (MMNL) model using panel techniques, also known as the random coefficients model or panel mixed model (Boyd & Mellman, 1980; McFadden & Train, 2000; Stern, 1997). It takes under consideration that multiple observations are from the same person, hence the word 'panel'. In my case, there are mostly 16 observations (choice situations) per person, with an average of 15.9. A relatively high level of consistency in the observations for a single person is to be expected. These choices are probably stronger alike than observations between different respondents; therefore the use of panel techniques makes sense. The MMNL model is the standard way of introducing continuous heterogeneity into discrete models nowadays and is preferred over the old standard, the multinomial logit model. The MMNL assumes an informative group mean and uses simulation techniques to identify the spread of the underlying differences (Fig. 6.2). Commonly a normal distribution is assumed.

In my model all 42 parameters (Eq. 6.1) are assumed to be random with a normal distribution. In the early days of MMNL models, there was discussion on which parameters should be random and which parameters should remain fixed, which was mainly due to computational issues. Running the first MMNL models would take days (Hensher & Greene, 2003), but now my model was estimated in just 12 hours (Table 6.4). The normal distribution is a relatively safe and flexible choice; furthermore, I do not have a clear indication that some parameters should be truncated, should only contain positive or negative values, or have a uniform distribution. The assumption of a normality is supported by the outcomes of a test proposed by Hensher and Green (2003). In this test I ran 1 000 MNL models in 'mlogit' (Croissant, 2013), each one with a different subsample of 100 respondents of the full sample. All 1000 parameter estimates were plotted in a density per parameter. In these plots, the distribution is close to normal, though often rather spiky.

FIG. 6.2: ILLUSTRATION OF THE MMNL MODEL



To boost model performance, I used both weights and covariates (Ch. 3; Fig. 6.1). The covariates and their potential to add value will be discussed after this section (§6.3.3), as the third model integrates the same set of covariates. Tests indicate that both weights and covariates indeed improve model performance.

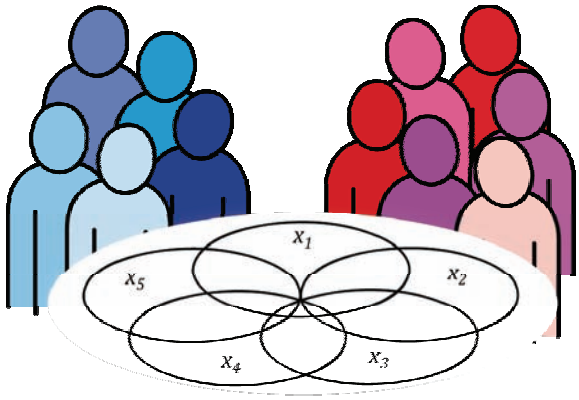
6.2.2 LATENT CLASS MODEL

The second model used for the analysis of the choice data is a *Latent Class* (LC) model with random parameters. In the LC model, individuals are assigned to a class that is to be identified. The first latent class models were based on fixed parameters. Here I use a model with random parameters for each of the classes (Fig. 6.3), also known as the mixed-mixed logit model (Bujosa, Riera, & Hicks, 2010; Keane & Wasi, 2013). In the book on Bayesian choice models by Rossi et al. (2005) this model is known as a model with *a mixture of normal*s, as the normal distribution is there by default used for the random parameters, as is also the case here.

The assignment to a certain class in my model is based on the choices made by the individuals. Theoretically, other aspects could be integrated as well, such as the covariates. Prior to the assignment process one does need to make an assumption about the total number of classes. The estimates per class and their relative size are the result of the modelling process. So, the output of a LC model does not only contain the parameters for each class, it also contains a parameter for the estimate for the relative sizes.

My LC model has two classes (Fig. 6.3). The assumption of two classes is based on the outcomes of the MMNL model, which indicates that some respondents prefer a CC over Bonus and vice versa. Further tests reveal that a model with three classes did not improve the model performance. The third class was remarkably small and hard to identify. Therefore, further tests with more than three classes were not deemed necessary.

FIG. 6.3: ILLUSTRATION OF THE LC MODEL



The major advantage of the LC model is the possibility to identify 'radical' differences between the preferences of groups. If there is a subgroup with deviating choice behaviour, the LC model will demonstrate this. This while a MMNL will always try to fit a certain distribution over the observations in a sample. This usually implies that in the MMNL, deviating groups are forced together from the tails of the Gauss curve towards its mean value (Greene & Hensher, 2003; Rossi et al., 2005). Through the integration of covariates in the MMNL model, I tried to mitigate this phenomenon (§6.3), though it cannot be avoided completely.

A disadvantage of the LC model is the high number of parameters, meaning that it is moving in the direction of overfitting the data. The full set of parameters times the number of classes in the model is needed. On top of this, an additional parameter serving as an estimator for class size is needed for each additional class. In my case, this means a total number of 85 parameters (42*2+1). For this reason I selected a less extensive, yet still very well performing utility function for the LC model: *the quadratic mixture model with an integrated linear amount effect* (§6.3.2; Eq. 6.2).

An additional complexity is related to the layering of uncertainties in the LC model. Combing a utility function with all random parameters, as in the MMNL, with a random size of the each class and no informative priors for the parameters turned out to be overkill: the results were very unstable in multiple tests and computation time was very long. Therefore, I divided the modelling process in two steps. In the first step I estimated a 'traditional' LC model with all parameters fixed (Greene & Hensher, 2003; Shen, 2009; Swait, 1994). In the second step the estimates of the first step were used as priors for a model with random parameters.

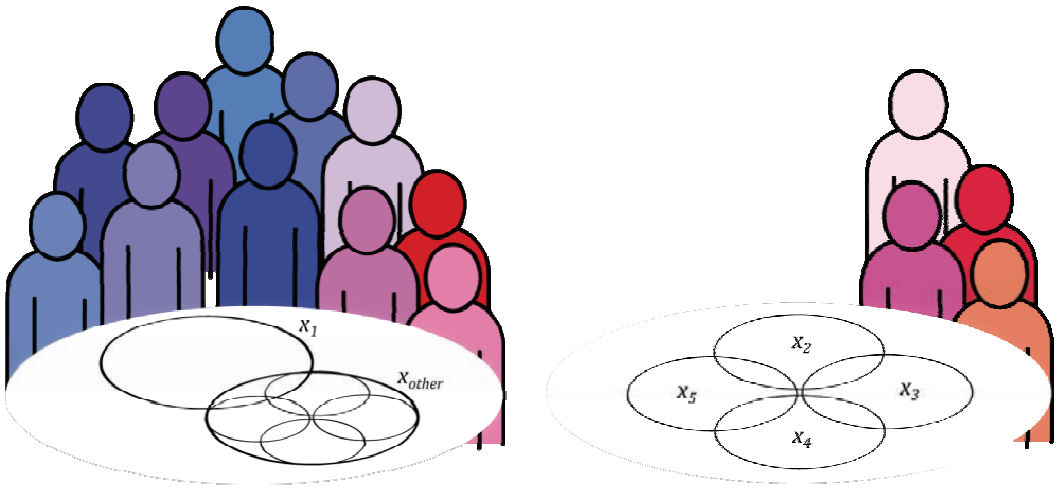
6.2.3 CAR FIRST MODEL

Third and last model used for the analysis of the choice data is a model I call the *Car First* (CF) model. The central principle of this model is that CC owners do not evaluate the options provided within the MB equally when asked to make a choice; they are inclined to evaluate the attractiveness of the CC in the package first, while the remainder of the package then becomes 'the other things': one single category of secondary importance. When eventually the preferred CC is selected, then people continue and see which additional options they would prefer and which they are able to select with the remainder of the budget (Fig. 6.4). This might lead to a re-evaluation of the CC chosen, though this is not accounted for in this model.

This step-wise evaluation of the options is primarily inspired by the notion of *evaluation by aspects*, theorised and empirically substantiated by Tversky (1972). The basic assumption here is that people use choice heuristics and simplify their choice task by elimination of 'redundant' options. Within choice modelling this idea has turned into the conditional logit model (McFadden, 1973), although due to the interaction effects in the utility function (Eq. 6.1), this type of model cannot be applied directly. The central principle of the CF model can also be substantiated from a practical perspective. The employer might demand that a CC will be part of any MB, due to practical or other reasons. If so, the employee is more or less forced to select a CC first, and then the rest. A real-world example is the case of Siemens, as discussed in the introduction of this thesis (§1.3.3).

The CF actually consists of two sequential MMNL models. In the first step, there is the evaluation of the type of CC in a MMNL model, were various car categories are compared to each other. In this comparison all other elements are folded together as one other element; 'the other elements'. Only these choice sets with a CC present in both options are modelled (n=4 350). In the second step the element CC is irrelevant, as it is already decided upon; the other four elements of my experiment remain for a selection of the participants, based on step one. So, only choice situations without the CC or with an equal share of CCs are used for the modelling process for these 295 individuals with an interest beyond the CC (n=2 274).

FIG. 6.4: ILLUSTRATIONS OF THE TWO STEPS IN THE CF MODEL



6.3 ESTIMATION OF THE CHOICE MODEL

6.3.1 HIERARCHICAL BAYESIAN ESTIMATION PROCEDURE

All choice models presented in the results were estimated with Hierarchical Bayesian (HB) estimation procedures (Rossi et al., 2005; Sawtooth, 2009; Train, 2006, 2009). HB estimation is an innovative technique that is rising in popularity. It is an alternative for the commonly used Maximum Simulated Likelihood (MSL) approach (Croissant, 2013; Train, 2009). Both

approaches are simulation methods to overcome the problem of multiple unknown parameters in the probability function.

With the Bayesian estimation procedures, the three known difficulties associated with MSL procedures can be avoided**.** First, the Bayesian technique does not require a maximisation of any function. Maximisation in MSL procedures becomes more difficult as models become more advanced. As a result, the algorithm often fails to converge, according to Train (2009). This argument certainly holds for my study. Using MSL procedures, the choice model failed to converge many times, which meant that after hours of calculations, there would be no results. Conversely, a Bayesian model will always provide some results, even if 'the optimal fit' is not jet obtained, it is up to the researcher to decide if these results are meaningful (§6.4).

Second, the Bayesian procedures provide more consistency and efficiency, while altering the number of parameters, the sample size, or other aspects. These desirable estimation properties are not always ensured with MSL procedures. For example, an efficient estimation procedure with MSL relies on Halton draws, although these draws should only be used when the number of parameters in the model is limited, as demonstrated by Bhat (2001). Moreover, the likelihood estimates of these models can be rather unreliable when the number of random draws is low in relation to the sample size or number of parameters (Andersen, 2014). Train (2009) also points out that, as the sample size increases, the needed number of draws also needs to increase. 'In contrast, the Bayesian estimators that we describe are consistent for a fixed number of draws used in simulation and are efficient if the number of draws rises at any rate with sample size' (Train, 2009, p. 283). In short, Bayesian procedures are better equipped to deal with rather complex choice models.

A third argument in favour of the Bayesian procedure is its ability to cope with correlation between the random parameters in the model. '[F]ully correlated part-worths are difficult to handle in classical procedures due to the proliferation of parameters, while the Bayesian procedures accommodate these correlations readily' (Train & Sonnier, 2005, p. 119). For example, in a MSL model with 42 parameters (Eq. 6.1), the total number of parameters to be estimates when accounting for full correlation is 903 (42 + 42 * 41 / 2). Moreover, as is to be expected with mixture models, there is much correlation between the random parameters of the model. This is simply a result of the mixture constrain (Eq. 3.1); if one parameter increases, another parameter needs to decrease in order to meet the constant sum requirement. Train (2009) also demonstrates that Bayesian procedures are faster than MSL procedures while incorporating correlation. Furthermore, in his comparison of the two estimation procedures, Train (2009) observes only very small differences in the results, though the scale of the Bayesian procedure is larger.

A key benefit of the HB estimation used to be the output of *individual level estimates* (Dumont et al., 2015; Rossi et al., 2005). However, nowadays some MSL software packages, like STATA and GMNL in *R*, also offer this feature. With these individual level estimates one can study preferences of subgroups or individuals in detail. Due to this feature I was able provide the maximum utility situation on an individual level (§6.4) by linking the estimated budget per

individual to their posteriors (Appx. III; Fig. 6.1). This generates more informative, aggregated results.

Next to the advantages of Bayesian procedures, there are some objections. From a practical point of view there is a steep learning curve (Train, 2009). A more theoretical objection is the use of parametric and general model priors, which imply a more central role for the modeller (§6.3.4). Next, a careful analysis of the model output is required, as the HB model will always provide some results; it is up to the researcher to judge whether or not these results are useful (§6.4), of which the latter is especially true in my case. As far as I know, this is the first attempt to analyse a mixture amount experiment using HB techniques.

Via the prior settings of the variance and degrees of freedom of the HB model, it can be determined whether the main focus of the model lies on the individual level betas or on the population wide results. In my case, a strong focus on the individual level seems somewhat problematic, as respondents were only presented with 16 out of 128 situations from the full experimental design, while the utility function is relatively 'heavy' with many parameters (§6.3.2). In contrast, individual level estimates do offer interesting opportunities, such as the maximization of the individual level utilities. Moreover, a strong focus on the aggregated level is underutilisation of a potentially rich dataset and might cause unexpected results as individuals with diverging preferences are bound together (see also §6.6). Therefore, I tried to find a balance between individual level and sample wide estimates, by testing various setting of the priors for variance and degrees of freedom. In general, a relatively high number for the prior degrees of freedom, in combination with a high variance will mean a strong focus on the individual level. A low variance means that most of the information of the individual level estimates are borrowed from the population means, this results in a lower goodness-of-fit (Sawtooth, 2009).

The priors for the degrees-of-freedom and variance in the LC model are inherently different from these in the MMNL and the CF model (Table 6.3). This is because the priors in both software packages used have different implications, as different algorithms were used (§6.3.4). Moreover, and more importantly, the settings of the LC place the emphasis on the aggregated level, while the other models focus more strongly on the disaggregated level. This turned out to be necessary in order to identify the two classes of the LC model. A stronger focus on the disaggregated level increases posterior variance and makes identification of a class more difficult, or even impossible.

6.3.2 Utility Function

In (mixture) modelling it is good and common practice to assess the goodness of fit for a variety of formulations; in this case, utility functions (Cornell, 2011; Prescott, 2004; Scheffé, 1958), since it is not known beforehand what kind of interaction effects are to be expected. Moreover, the utility function used for the design of the choice experiment (Eq. 3.6) is not necessarily the utility function that best fits my collected data. It was primarily used to determine the number and locations of the design points of the experiment. In order find the best fit, I tested all common formulations. This implies four types of Scheffés' polynomials times three assumptions with respect to the effect of amount. The total number of parameters

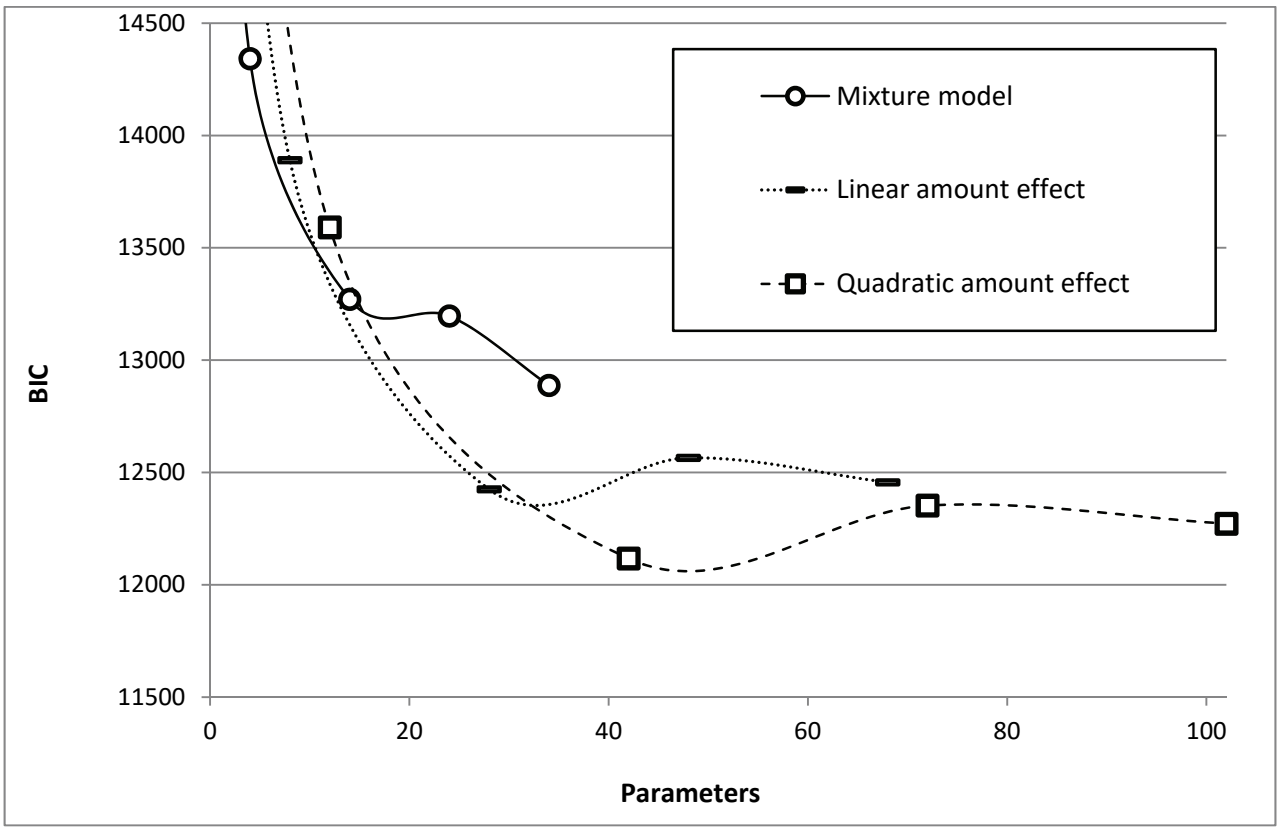
needed for each of these models range from 4 to a total of 102 (Table 6.1). In all the tests discussed in this subsection, I used a simple MMNL model (without covariates or weights), although the results from tests with a LC model demonstrated a similar pattern.

TABLE 6.1: PARAMETERS NEEDED PER TYPE OF MIXTURE AND AMOUNT EFFECT

	Amount effect		
Mixture effect	No	Linear	Quadratic
Linear	4	8	12
Quadratic	14	28	42
Special cubic	24	48	72
Cubic	34	68	102

The main conclusion of this exercise is that the *quadratic polynomial with integrated quadratic amount effects* is the preferred model to analyse the data. This implies a model with 42 parameters. It suggests that the set of first order interaction effects, that is, the effect of two elements combined in a package improves model performance. Hence, there are synergetic or antagonistic effects in play. It also suggests that quadratic amount effects are preferred over linear effects, a conclusion that seems to hold for all polynomials (Fig. 6.5). The latter is quite unexpected and not accounted for by the initial equation used in the design (Eq. 3.6).

FIG. 6.5: BIC SCORES FOR 12 TESTED MODELS



The selection criterion used in this assessment is the minimum Bayesian Information Criterion (BIC) (Schwarz, 1978). Alternative performance indicators, such as the Akaike Information Criterion and the Likelihood Ratio test are regarded to be less suitable. The

former because the penalty for addition parameters is rather modest compared to the BIC, while from both theoretic and practical considerations a penalty is in place. The latter because this test employs pairwise comparisons, which would mean performing 66 tests with 12 models.

In general, differences between two BIC-scores below 2 points can be disregarded, as the performance is alike. Differences above 10 point serve as strong evidence in favour of the lowest score (Kass & Raftery, 1995). The results presented in Fig. 6.5 are strongly in favour of the quadratic model with quadratic amount effects. There is a difference of 155 points between the first and second best option, of which the latter is the cubic mixture model with quadratic amount effects. Hence, the preferred utility function for the analysis of the results is:

Eq. 6.1

$$E(U_i) = \sum_{i=1}^{q-1} \beta_i\, x_i + \sum_{i=1}^{q-1} \sum_{j=1+i}^{q} \beta_{ij}\, x_i x_j + \sum_{i=1}^{q-1} \beta_i\, a_i x_i + \sum_{i=1}^{q-1} \sum_{j=1+i}^{q} \beta_{ij} a_i\, x_i x_j + \sum_{i=1}^{q-1} \beta_i\, a_i^2 x_i + \sum_{i=1}^{q-1} \sum_{j=1+i}^{q} \beta_{ij}\, a_i^2 x_i x_j + \varepsilon$$

This implies 42 parameters when all elements are modelled, as in the MMNL. In case of two elements there are 6 parameters, as in the first step of the CF model. Finally, in the second step of the CF model, I included 4 elements, which means 27 parameters.

Unfortunately, the high number of parameters is accompanied by some complications in the modelling process. In the LC model I needed to simplify the utility formula (§6.2.2). In the simplified version the quadratic amount-effect is scaled back to the second-best option with less parameters: a quadratic polynomial with an linear integrated effect of amount. This means the last 14 betas in Eq. 6.1 are removed. This results in Eq. 6.2:

Eq. 6.2

$$E(U_i) = \sum_{i=1}^{q-1} \beta_i\, x_i + \sum_{i=1}^{q-1} \sum_{j=1+i}^{q} \beta_{ij}\, x_i x_j + \sum_{i=1}^{q-1} \beta_i\, a_i x_i + \sum_{i=1}^{q-1} \sum_{j=1+i}^{q} \beta_{ij} a_i\, x_i x_j + \varepsilon$$

6.3.3 Covariates

By the integration of covariates in the models I relax the importance of population average and improve the individual level estimates, without relying solely on the choice observations of the individual. 'Rather than assuming respondents are drawn from a single, multivariate normal distribution, covariates map respondents to character-specific locations within the population distribution' (Sawtooth, 2009, p. 3). In general, the level of discrimination between groups of respondents on the posterior parameter estimates relatively increases in comparison to the generic HB model, where no covariates are used (Dumont et al., 2015; Sawtooth, 2009). In other words, I increase variance and improved the model fit by adding extra information.

In the questionnaire I collected a large number of possibly useful covariates (Ch. 3; Appx. II). These covariates could be divided in 3 categories: socio-demographics, current arrangements

with the employment relationship, and transport needs. From the full list of possible covariates I removed or grouped redundant variables. The word redundant here refers to covariates with very strong overlap to other variables ('correlation') or one with very few observations. Moreover, tests with an extensive list resulted in further deletions. All covariates were dummy-coded, which in some cases meant splitting categorical variables into multiple dummies, therefore 10 final variables resulted in 17 covariates (Table 6.2). These covariates resulted in many unique combinations; the largest group with the same values for all covariates (an exact match) contains only 14 respondents, all other groups are smaller.

TABLE 6.2: COVARIATES USED IN THE MMNL AND CF MODEL

		Observations		
Category	**Level**	n	%	**Reference group**
Bicycle ownership	*none*	125	15%	*one bicycle*
	multiple	171	21%	
Public transport use	*PT user*	61	7%	*no PT user*
Leave days	*limited*	242	30%	
Income level	*low*	109	13%	*medium wage*
	high	137	17%	
Gender	*female*	307	38%	*male*
Age group	*< 30*	42	5%	*age group 40-49*
	30-39	313	38%	
	> 49	130	16%	
Children at home	*no*	197	24%	*having children at home*
Home-to-work distance	*short*	75	9%	*medium commuting distance*
	long	225	28%	
Business trip distance	*medium*	109	13%	*none or few business km*
	max	239	29%	
Business trip frequency	*medium*	182	22%	*none or few business trips*
	max	224	27%	

6.3.4 MODEL CONFIGURATIONS AND OVERVIEW

Two software packages from the software platform *R* were used for the models: *ChoiceModelR* and *RSGHB* (Dumont et al., 2015; Sermas, 2015). Both are open source software packages for the estimation of HB choice models. ChoiceModelR is based on the algorithms used by Rossi et al. (2005), also implemented in the *bayesm* package for *R* from the authors. It employs a hybrid Gibbs sampler with a random walk metropolis step (Sermas, 2015). Its use is rather straightforward, although the options with respect to distributions and formula within ChoiceModelR are limited. Conversely, RSGHB offers the necessary flexibility in the specification of the likelihood-function to design a LC model as well as many other models from the family of discrete choice models, although a integration of weights and covariates is not straightforward. RSGHB employs the algorithms for HB estimation by Kenneth Train (Train, 2006, 2009; Train & Sonnier, 2005). As a result of the use of two different packages, not all priors and posteriors can be compared to each other.

In the estimation process I made sure to use more iterations than necessary for stable results, by monitoring the stability of the chains via trace plots and other techniques (see Cowles & Carlin, 1996). The final number of iterations varies, as the complexity also varies from one model to the other. For the posteriors, these are the parameter estimates; only the last part of the iteration process is used. I used a relatively long burn-in period, since I mostly relied on only zeros for the priors of the parameters. Thinning, which means skipping iterations that are saved, was used to lower autocorrelation and to prevent extremely large data files (> 1 GB). A final overview of the general assumptions, model configurations, the number of observations and individuals, and the iterations used and saved can be found in Table 6.3.

TABLE 6.3: MAIN CHARACTERISTICS OF THREE CHOICE MODELS

	MMNL	**LC**	**CF**
General assumptions			
decision rule	all options in the package are evaluated simultaneously	all options in the package are evaluated simultaneously	choice of CC comes first, then come the other elements
classes and covariates	Optional assignment based on covariates	Individual-level choice-based assignment to two classes	Only preference for CC added in second step as covariate
preference heterogeneity	all random parameters	step 1: fixed, step 2:random pars	all random parameters
Configuration			
utility formula	quadratic mixture, quadratic amount effect	quadratic mixture, linear amount effect	quadratic mixture, quadratic amount effect
number of parameters	42	57 (2*28+1)	step1: 6; step2: 27
weights	active	not-active	active
software package	ChoiceModelR	RSGHB	ChoiceModelR
Observations			
individuals	817	817	817 and 295
choice situations	13022	13022	4350 and 2274
Iterations			
total	500 000	500 000	50 000
burn-in	450 000	400 000	40 000
saved	50 000	100 000	10 000
thinning factor	20	40	10
used for estimation	2 500	2 500	1 000
Priors			
parameters	all zero	step 1: all zero, step 2: posteriors step 1	all zero
variance	5	step 2: 500	5
degrees of freedom	50	step 2: 1	50 and 50

6.4 On the Analysis of the Model Results

Before I move on to answering the research questions based on the model output, I will discuss the robustness of the models and the analysis of the parameters. This robustness is expressed in two ways; on the one hand there is the general goodness-of-fit of the model, while on the other hand, there is the stability of the model.

6.4.1 Model Performance

The model performance and basic parametric tests are summarised in Table 6.4. In the column for the LC I only provided the results of the final random parameter model.

Table 6.4: Basis statistics for three choice models

	MMNL	**Latent Class**		**Car First**	
General				*step 1*	*step 2*
RLH	0.919	0.786		0.731	0.929
Average variance	3561	8800		8132	123
Run time (min.)	733	530		23	112
Parametric					
Significant at 95%		*class 1*	*class 2*	*step 1*	*step 2*
naïve s.e.	42 (100 %)	28 (100 %)	28 (100 %)	6 (100 %)	25 (92.6 %)
time-series s.e.	41 (97.6 %)	25 (89.3 %)	27 (96.4 %)	6 (100 %)	23 (85.2 %)
Stability					
Average Geweke-score	1.5	4.9	4.2	0.7	2.6
Heidelberger-test (passed)	37/42	17/28	20/28	all	all

For the general model performance, I compared the RLH-score of the three models. RLH is short for Root Likelihood; this number is an indicator for the general goodness-of-fit. It compares the choice probabilities from the model output to the actual observed choices in the original data. Since there are two options in each choice set, the default value here is 0.5. A model based on random chance would imply an RLH score of 0.5. Meanwhile, the absolute theoretical maximum value is just below 1, as this represents all predictions for all individuals correctly predicted with high probabilities. Models or individuals with a RLH below 0.5 indicate a performance below random chance. The main advantage of the RLH is its ease in interpretation and standardised form in HB modelling. An alternative and more frequently used indication is the log-likelihood, although I would argue that this indicator is hardly informative as the models presented in this chapter are inherently different from one another.

With respect to the RLH-scores, I observed that the best fit is obtained for the second step in the CF model (Table 6.4). This is however after the first step with a relatively poor goodness-of-fit. This indicates that the respondents, in general, do not generalise the other elements next to the CC in their evaluation of the choice options. The second best RLH-score is found for the MMNL model, which is more or less equal to the score from the second step of the CF model. The score for the LC model is relatively modest, though as I will argue in section 6.6, there are many possible explanations for this.

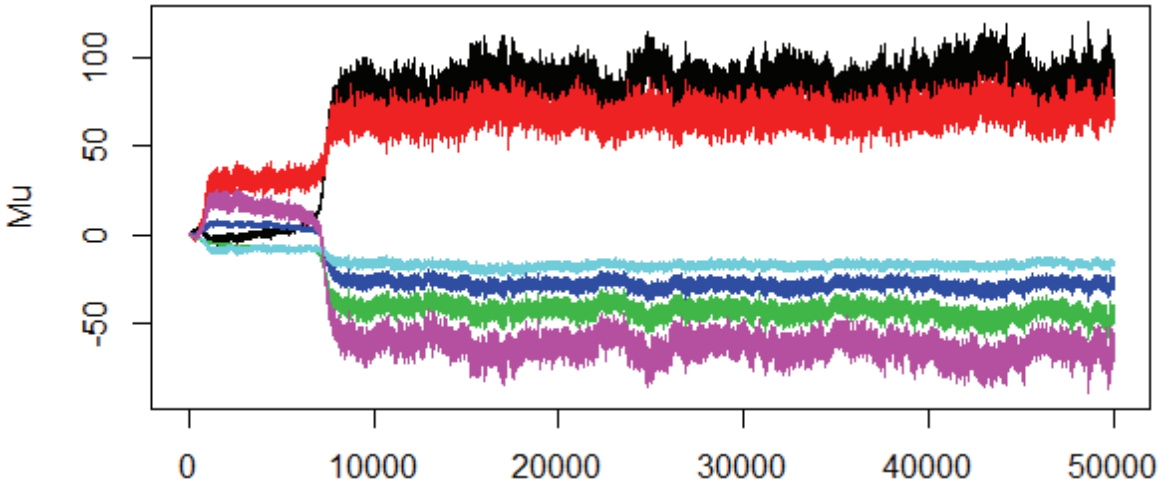
The average variance is an alternative indicator for the goodness of fit according to a manual for HB model estimation (Sawtooth, 2009). This indicator is based on the means of the variance per estimate. In turn, the variance per parameter is derived from the individual level estimates. In general, a larger the variance indicates a better fit, as individual level estimates are optimised. Conversely, a model with a low average variance has a strong emphasis on the aggregated results. However, I do not think this indicator is very useful to compare models, due to inherent differences in the models, interaction effects, amount effects, and the use of different software packages. Hence, the average variance is mainly used to check general model stabilisation (see below).

Individual parameter significance is irrelevant in the modelling of mixtures. Instead, the relative improvement in terms of model fit is studied by altering the utility formula (§6.3.2) or other model specifications. The effects of some parameters can cancel each other out, which makes them not significantly different from zero. This, however, does not mean that these parameters are redundant (Prescott, 2004). Deleting these parameters, and especially the main effects, would be a mistake (cf. Yang et al, 2014).

In the study of models and their parameters from a MCMC, the focus should be on the *stability* of these indicators and estimates. In contrast to MSL, the HB model does not converge (Rossi et al., 2005), which is simply because no stopping-rule or clear maximisation goal is defined. It is up to the researcher to determine the number of iterations needed. The best way to do this is to request a high number of iterations and study the process of stabilisation (Sawtooth, 2009). On a general level, the researcher looks at stabilisation of model performance indicators in the chain of iterations, like the sequence of average variance and the RLH-scores. On a more detailed level, the stabilisation of individual parameters is studied. On both levels a wide range of graphical and quantitative techniques can be used (Cowles & Carlin, 1996).

To test for stabilisation, I used three techniques for the study of the RLH, the average variance, and parameter estimates. The graphical approach I used is the analysis of the trace plots. The two quantitative approaches I used are Geweke-scores and Heidelbergers' stationary test. A trace plot is a very simple but informative approach. One plots the iterations on the x-axis and the average of the estimates on the y-axis; most HB software packages already provide a kind of trace plot by default. In Fig. 6.6 I provide the default output by ChoiceModelR for one of the estimated models, though for many of the models I needed to create my own plots, as there were too many parameters or iterations displayed in a single plot. The quantitative approach is based on the all saved observations of the Markov chain when running a single model. For the final models I saved at least 1 000 iterations from the last part of the chain (see Table 6.3). For the stationary test of Heidelberger and Welch (1983), I will provide the number of parameters that passed the test (Table 6.4). For the Geweke test I only provide the mean of the absolute z-scores per parameter (Geweke, 1992; Plummer et al., 2015). Low values, close to zero, indicate stable results. For further details, formulas and so on, I kindly refer to the original papers and reviews, since a detailed discussion on these stability checks is beyond the scope of my research.

FIG. 6.6: TRACE PLOT FROM CHOICEMODELR FOR ESTIMATION PROCESS THE CF MODEL



On the x-axis iterations, on the y-axis the average estimates for 6 parameters of the first step of the CF model

On a general level, I observed very stable RLH-scores for all models. At the end of the chain, the differences between the scores from one iteration to the next are often below 0.001. The trace plots and indicators from Geweke and Heidelberger all suggest stabilization. The average variance is somewhat more problematic in this respect; in many models tested there is a constant and seemingly infinite increase in the average variance. Stabilisation is only obtained after many iterations or when higher prior degrees of freedom are used. In most models, some of the parameters, though certainly not all, remained unstable, even after thousands of iterations (Table 6.4; Appx. V). This relates to either a lack of observations to estimate a certain parameter, or a high level of cross-correlation (Eq. 3.1). A lack of observations is less likely with the number of respondents and choice sets in my data. Since I assume that cross-correlation is the main driver here, this lack of stability can be neglected. The results from multiple runs of the same model indicate that estimates are indeed trustworthy.

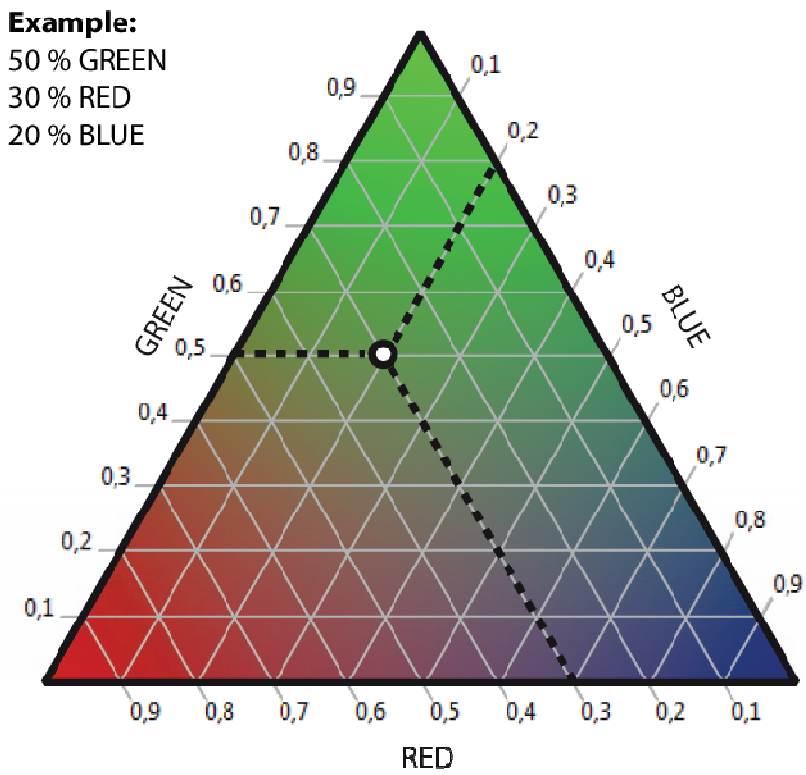
6.4.2 PARAMETER ANALYSIS TECHNIQUES

The parameter estimates (Appx. V) are scrutinised with three techniques in addition to the checks for stability, as discussed above (§6.4.1). A detailed analysis of the results is important, since the individual estimates of complex mixture formulas are hardly informative by themselves. This is a result of the strong cross-correlations (Eq. 3.1), the presence of multiple interaction effects, and the layering of amount effects (§6.3.2). The techniques used for the analysis of the parameters are ternary plots, screening of elements and optimisation. In this section I briefly discuss these techniques.

Ternary plots are a popular way of visualising the data of mixture experiments (Cornell, 2011; Smith, 2005). The main feature of these plots is that every single point within the triangle equals a total of 100 % of the mixture (Fig. 6.7). A ternary plot has three axes; each axis is used for the proportions of one element or the sum of multiple elements. The latter is necessary in case there are more than three elements in the mixture. Via filled contours or lines in the triangle, the response value is displayed, which is marginal utility in this case. An

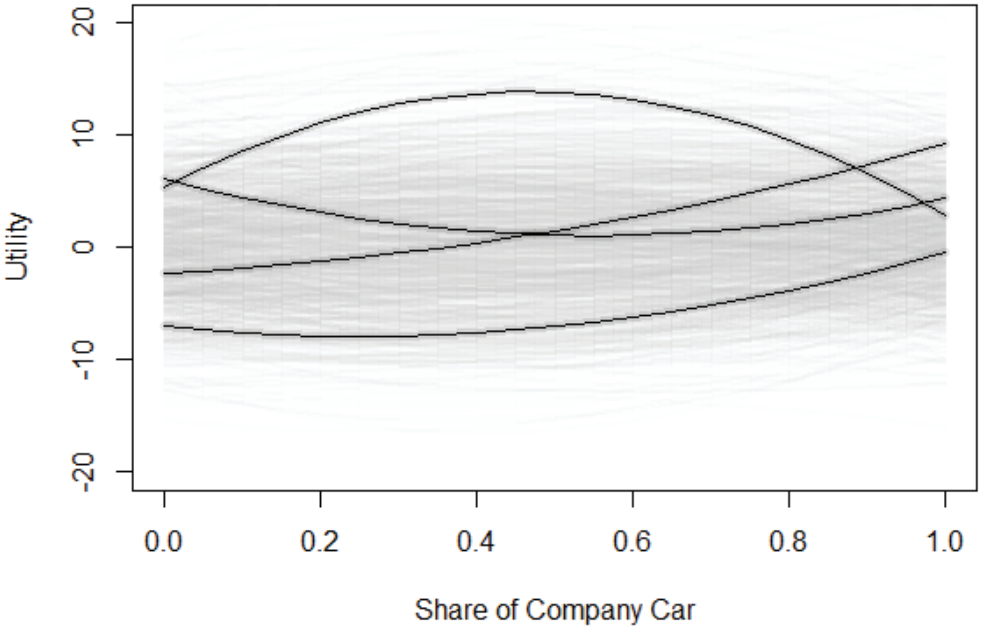
important benefit of plotting the results is easy interpretation. Plots contain a rather high information density. The downside, in this case, is the limited number of available dimensions. There are five elements in the experiment and only three axes; hence, I plotted a single element on two axes and I needed to combine the other three elements on the remaining axis, which are then called 'others'. Furthermore, for one single plot only one level of the process variable, the amount-effect in this case, can be displayed. A series of plots is needed to study the effect of amount on marginal utility (Fig. 6.9). An additional downside is the need to use a point estimate. While I do have individual level estimates and the distribution per estimate, only one value can be displayed at a time. I mainly relied on the means of the estimates for the analysis.

FIG. 6.7: EXAMPLE OF READING A TERNARY PLOT



To improve the understanding of the effect of a single component (or element) in the mixture, I used a technique discussed by Cornell (2011, sec. 4.5), called *screening of components*. In this approach one of the elements of the mixtures is contrasted with equal shares of all other elements. The screening of a single element is useful when confronted with a high number of elements (q>4). An important benefit of this technique, especially for this study, is the possibility to show the utility lines for singles, groups, or all individuals. Instead of using the population means, as is commonly done, I used this opportunity to study preference heterogeneity in detail. See the example with four randomly selected individuals in Fig. 6.8.

FIG. 6.8: EXAMPLE SCREENING OF ELEMENTS TECHNIQUE WITH INDIVIDUAL PREFERENCE LINES



A third way to analyse the parameters of the choice model is through the optimisation of the utility formula, in order to obtain *the maximum utility* (U_{max}) and the values for underlying elements $\{x_1, x_2, x_3, x_4, x_5\}$. This approach resembles the way employees are depicted in the debate of the MB: they are supposed to maximise their utility (Ch. 2). An important additional advantage of this approach is the fact that the scale parameter in the probability function of the Random Utility Theory is no longer relevant. One does not need to make any assumption for this parameter, since the optimum is the same for whatever scale parameter is used. Furthermore, this approach allows a very dense display of information. For instance, the 42 parameters of the MMNL model, with their standard errors and standard deviations, can be reduced to the values of the underlying elements, which implies merely five values: the proportions of each element in the mixture.

It is common practice to maximise the aggregated results, although this results in a major loss of valuable information. Conversely, I used an innovative method to obtain the maximum utility situation on an individual level. To maximise the utility for a single respondent (n=817), I used the individual level posteriors from the HB models in combination with the estimated size of the MB of this individual (Fig. 6.1; Appx. IV). I simulated the optimum situation per individual using their personal simplified utility function. These calculations were performed in *MATLAB*, with the use of the *optim*-formula. The number of iterations used in the process to find the optimal varies between 10 and 30 per individual. All jobs for all models were successfully completed.

In the optimisation process I needed to indicate a range per element. On the one hand, using the maximum range [0,1] for all elements results in strange optimal scenarios, for instance putting the entire budget to leave days or public transport, while these elements have their own practical limits. On top of this, one should be careful when extending the original range, as there are no observations beyond the initial proportions of the design of the experiment.

On the other hand, using the original range for the elements results in serious constraints. A CEO with a budget of € 12 000 might want to spend his or her entire budget on the CC, though this would be impossible within the original ranges, since a CC of € 10 500 was the maximum amount. Due to these considerations I selected a new meaningful range for all elements (Table 6.5). For each element, an additional 'level' was added on top of the previous maximum value, except for *PT*, because € 4 500 is considered to be the absolute maximum. The minimum value for the elements is zero; this means that the element is not present in the mixture, which is an option for all elements in both theory and experiment, except for the first step of the CF model.

TABLE 6.5: MAXIMUM VALUES FOR THE ELEMENTS IN THE OPTIMISATION

	Original	New range
CC	10 500	12 000
Bicycle	2 000	3 000
PT	4 500	4 500
Leave days	1 500	2 000
Bonus	6 000	8 000

Any solution that is located beyond the new range is a-priori excluded as an option. This means that mixtures containing just one element are often impossible, especially when maximising the options of the *Bicycle*, *PT* or *Leave days*. Indeed, maximising one of the elements frequently means to complement the mixture with other elements to a full 100 %.

For the analysis of the optimisation results I relied on a few rules of thumb that ensure consistent comparisons between the models. First, in order to state that a respondent includes a certain option, a threshold is used. With respect to the minima, these are calculated using the estimated individual budgets and the proportion of the budget for a certain option in the optimal situation. For the *CC* this is at least € 3 000, and for *PT* and *Bicycle* this is a minimum of € 500. Below these values, these options are probably not included in practice. An individual is willing to select a cheaper *CC* if less than 90 % of the budget is allocated to the *CC* in the maximum utility situation. The use of a full 100 % would result in many cheaper CCs, as extreme values are rare in the results. Multimodal options include at least two transport modes; their inclusion is based on the same rules as discussed above.

6.5 RESULTS REGARDING THE RESEARCH QUESTIONS

In this section I will address the three main research questions of this chapter. These questions are as follows: [1] Are employees with a CC willing to renounce their CC? [2] Are employees with a CC willing to select a cheaper car model in order to reserve some budget for additional options? [3] Are employees with a CC interested in multimodal transport combinations within the MB? Each question will be addressed in a separate subsection. The results presented are solely based on the results from the experiment and the three choice models.

6.5.1 *Waiving the Company Car*

Letting go of the CC is probably the best outcome with respect to the objectives of the MB (Ch. 5). This said, only few proponents of the MB actually suggest that people should hand in their CC (Ch. 2). In this part I discuss the willingness of the respondents to hand in their CC in exchange for other benefits or transport options.

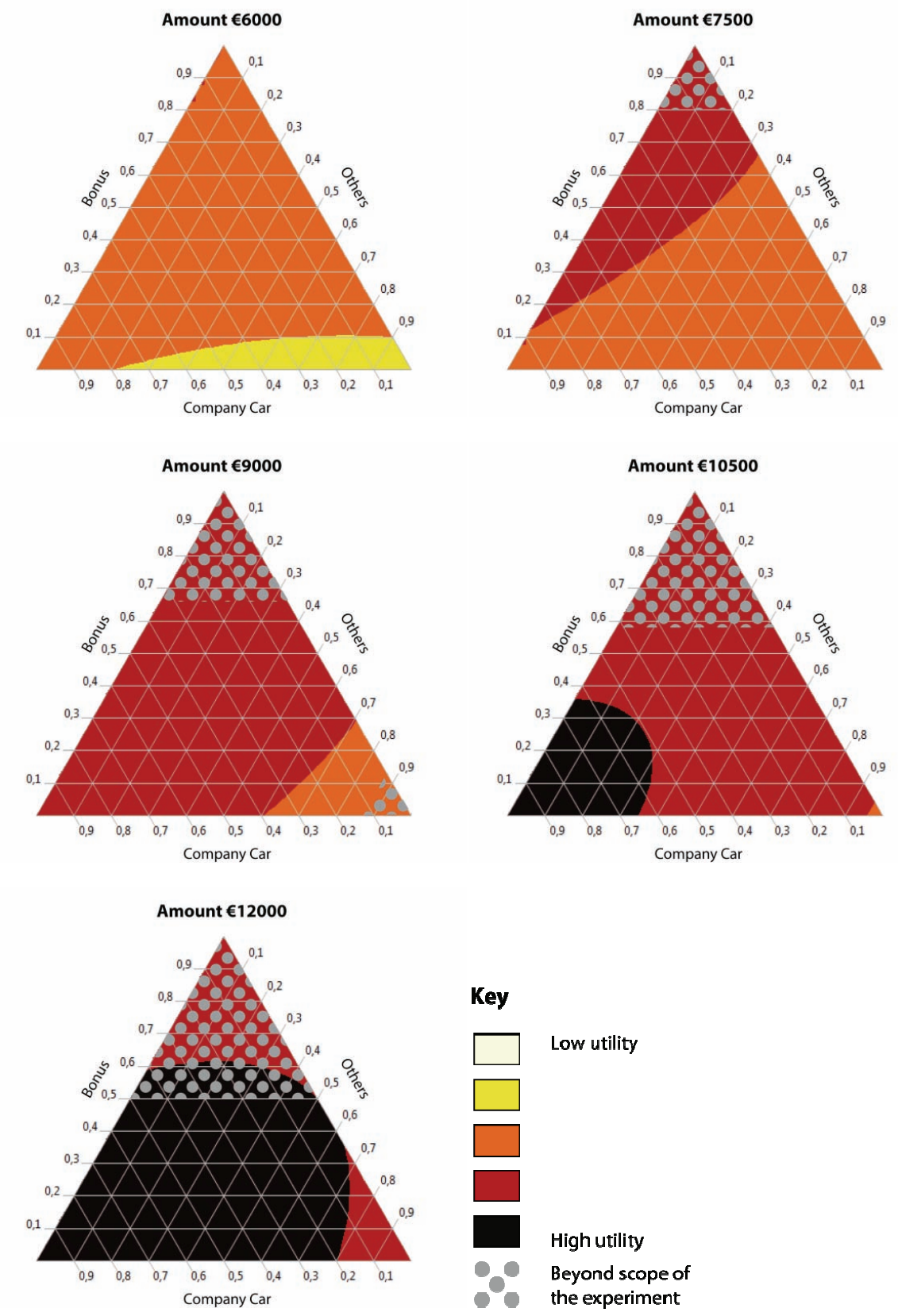
In the MMNL model, about 462 respondents assigned an insufficient proportion of their individual budget to the *CC* in their individual level maximum utility situation, they covered 56.5 % of the sample. Hence, a majority of the respondents indicate they are willing to waive the *CC*. The results from the LC model are more outspoken in this respect. From the two classes, one class is clearly car oriented, the other class is not. The car-orientated class will always select a *CC*, preferably the most expensive car (§6.5.2). The other class, with a low preference for the *CC*, covers 32.8 % of the sample. Thus, 1 out of 3 is willing to lose the *CC* in the LC model. In the CF model, there is no option to waive the CC, as all respondents are assumed to select a CC. The results from the first step indicate that 522 respondents opt for the most expensive car. The remaining respondents might have been willing to waive the *CC*, but this was not an option in the CF model.

A further analysis of the results from the MMNL model reveals that respondents seem to prefer a *Bonus* over a *CC* when the total budget available to them is relatively small. A shift in preferences is visible in a series of ternary plots based on the MMNL model (Fig. 6.9). For the plots with a total amount of 6 000 and 7 500, a higher utility for *Bonus* can be observed. For the plots with a total amount 10 500 and 12 000, the utility for the *CC* is higher on average. Overall, the utility increases as the amount increases. This observation is in line with the results from the first step of the CF model: there is a strong preference for more expensive cars, though if respondents are less inclined to maximise the amount they spent on the *CC*; it is mainly when the total budget available to them is relatively low.

An explanation for the preference of *Bonus* over *CC* for a lower amount relates to one of the issues addressed in Chapter Four, namely functional motives and the car as a positional good. If the available budget is limited, the choice of CC is also limited. For small budgets there is only one class of CCs available, the cheapest one. Used examples for this class were Citroën C3, Ford Fiesta, Opel Corsa, and Renault Clio (Ch. 3). If people feel that these cars are inferior to their current car, they are probably more inclined to opt for additional income (x_5). They might use this budget to cover the costs for their more expensive, private (use) dream car.

The results from the choice experiment are rather optimistic regarding the research question of losing the CC. About 33 % to 57 % of the respondents of the sample are willing to give up the *CC* under the conditions presented in the experiment, although these conditions include a rather favourable *Bonus* option, with a tax cut with respect to the current situation, and a rather popular option for additional *Leave days*. Hence, it is far from certain that people would waive their CC in exchange for other transport modes, as I discuss in the next two subsections.

FIG. 6.9: TERNARY PLOTS FOR THE EFFECT OF AMOUNT IN THE MMNL MODEL



6.5.2 SELECTING A CHEAPER CAR

In order to free money for 'more sustainable transport options', the amount spent on the CC needs to be lowered, simply because in the default situation the full budget is devoted to the CC. However, a cheaper car might also be a goal in itself, as these are commonly smaller, less heavy and less polluting cars (Cheah, 2010).

The results from the first step of the CF model indicate that 295 respondents (36 %) prefer a combination of elements including the *CC* over a package with the *CC* element only. The second step in the CF model is especially designed to see which options are preferred in exchange for a cheaper *CC*. Here I assumed that 20 % of the initial budget was left. The maximum utility results from step two provide a clear picture for the remaining budget: the vast majority of the respondents would like to complement the *CC* option with *Leave days* or the *Bonus*. In total, 87 % of all remaining budget will probably be spent on these options, leaving the remaining 13 % for 'alternative' modes.

The optimised individual results from the MMNL model were analysed with a k-means cluster analysis with four clusters (Table 6.6). The results indicate that the biggest cluster (#1; 37 %) is moving towards the optimisation of the *Bonus* option. The most important other element of interest to individuals in this cluster seems to be *Leave days*, though additional leave is optimised in nearly all clusters and often close to its maximum share in the mixture. The respondents in cluster two maximise the shares for additional *Leave* and the *CC*. Since *Leave days* seem to be more popular than the *CC* the maximum share of *CC* is rarely observed, only 44 respondents allocate nearly all budget to the *CC*. The picture in the remaining and smaller clusters is less clear; the means of these clusters suggest a tendency to include all elements. Overall, preferences in the MMNL seem to be rather blurred. According to the maximum utility results of the MMNL model, 311 individuals (38 %) are willing to select a cheaper class of *CC*.

TABLE 6.6: CLUSTER MEANS OF U.MAX COMBINATIONS MMNL MODEL

Cluster	N	x_1	x_2	x_3	x_4	x_5
1	305 (37%)	7%	1%	1%	16%	75%
2	240 (29%)	78%	0%	1%	16%	5%
3	180 (22%)	26%	35%	4%	11%	25%
4	92 (11%)	14%	11%	46%	16%	12%
All	817	33%	9%	7%	15%	36%

The results from the LC model are less optimistic with respect to the chances for cheaper cars. In total, 109 respondents could be considered as favourable towards the smaller *CC* option. They allocate a sufficiently large proportion of their budget to the *CC*, though not all of it (<90 %). This group accounts for 13.3 % of the sample. On average the proportion of their budget for the *CC* is 74 %. This is primarily in return for additional *Leave days*, which averagely get 23 % of the budget.

Regarding the research question of selecting a cheaper car in return for other benefits, the results from the choice models are partly inconclusive. While the results from the CF and MMNL model are rather favourable towards the opportunities of cheaper cars, the LC model is more reserved. The results suggest a range from a minimum of 13 % to a maximum of 38 %. However, the results do indicate that the main competitors are not 'alternative' modes, but rather additional time and money. This conclusion will be discussed in further detail in the next subsection.

6.5.3 MULTIMODALITY

One of the main arguments used in favour of the MB is the option of multimodal travel behaviour. This seems to be nested in the trend of pragmatic multi-modalism and the popular notion of 'mobility as a service' (Ch. 1 and 2). The MB allows us to move beyond the car-centric transport system, according to the proponents. Therefore, special attention is paid to the power of this argument in this thesis. The question is whether the MB really promotes multimodal travel. I have tried to address this question using the analysis techniques outlined above.

As I observed earlier, the tendency among the people from both classes of the LC model to select a cheaper car is modest. In total about 13 % of the sample might qualify as such. The budget saved by selecting a cheaper car is rarely used to purchase a *Bicycle* as part of the MB. Only three people indicate they are likely to combine *CC* with a *Bicycle*. The preference for a package with *CC* and *PT* is somewhat higher: a total of ten people combine both in their maximum utility situation. Another multimodal option, namely the combination of *PT* and *Bicycle*, is present in the maximum utility results of two respondents. Hence, the suggestion that people will use a MB to finance multimodal options seems false, according to the results from the LC model (Table 6.7).

In the CF model, all people who have a strong preference for either a *Bicycle* or *PT* in the second step of the model are potentially the multimodal travellers, since the presence of the *CC* is assumed by default in this model. Above I mentioned that about 295 people are potential mixers; their optimal MB contains a combination of elements, while the remaining group has a very strong preference for the *CC* only. The results from the second step of the CF model indicate that 25 out of the group of 295 respondents are indeed interested in the combination of *CC* and *Bicycle*. About 22 out of 295 candidates have a strong preference for the combination of *CC* and *PT*. This is respectively 3.0 % and 2.7 % of the full target group sample. Note that in contrast to the LC model, *Bicycle* is more popular than *PT*. In total, about 6 % of the respondents seriously considers a kind of multimodal combination (Table 6.7).

Finally, the MMNL model is most positive of the three models with regards to the chances for multimodal packages in the MB, as the total share of respondents with an interest in any of the multimodal combinations according to the MMNL model is 22.5 % (Table 6.7). According to the model results, about 90 respondents (11 %) are willing to spend a sufficiently large amount on *CC* and *Bicycle* to combine these options. Second best is the combination of *Bicycle* and *PT*, according to the utility maximum values; about 8 % of the respondents will opt for this combination. Another 6 % is likely to combine *PT* and *CC*.

TABLE 6.7: NUMBER OF RESPONDENTS THAT PREFER A MULTIMODAL OPTION

Multimodal combination	**LC** Obs. (%)	**CF** Obs. (%)	**MMNL** Obs. (%)
CC and Bicycle	3 (0)	25 (3)	90 (11)
CC and PT	10 (1)	22 (3)	48 (6)
Bicycle and PT	2 (0)	2 (0)	66 (8)
CC, Bicycle and PT	0 (0)	2 (0)	10 (1)
Total	15 (2)	45 (6)	184 (23)

The results from all three models have one common denominator, namely the fact that the majority of the sample has no interest in a multimodal package, although the share that does have an interest ranges from 2 to a maximum of 23 %. Moreover, there is little consistency with respect to the order of interests, e.g. in the LC model the combination of CC and PT is most popular, while this is the least attractive combination of two modes in the MMNL model. The ambiguity in the results is part of the discussion in the next section.

6.6 DISCUSSION ON CHOICE MODEL RESULTS

6.6.1 INTERNAL CHECKS

For the analysis of the choice data I used three models: a MMNL, a LC model with two classes and a CF model with an atypical decision rule (Table 6.3). The results from these models are certainly not always conclusive with respect to the research questions. Therefore a logical next question would be: what is the best model?

There is no superior choice model, which is also the main reason why three models are offered in the results. Appointing the best model on the basis of the goodness-of-fit statistics is much too simple, since these models are inherently different from each other and are estimated with different software packages, and in addition, reliability of goodness-of-fit is often problematic (Andersen, 2014). In terms of the LC model, I needed to calculate these statistics myself, as the software seemed to be unable to cope with two classes. Moreover, all models offer important insights about the preferences of the target group.

The MMNL model offers multiple benefits over the other two models. From a practical perspective it is the only model estimated in one step, which also limits the chances of noise. In the model I was able to fully integrate both the weight and the relevant covariates obtained from the questionnaire. Moreover, all observations were included. This makes the MMNL model a very information-dense model (Fig. 6.1). The added value of the weights and integrated covariates is substantial.

A comparison of the estimates of the MMNL model to the estimates of the MMNL model without covariates (table not shown) provides three indicators for a better model performance. First, most of the standard errors of the model are closer to zero, which implies

less uncertainty. Second, the estimates of the MMNL model are more explicit. The variance of the mean values is larger (122 versus 54). This results in more contrast in the selection probabilities. Third, even when scaled to the same level of variance, there are differences in the estimates. This suggests that both models are different from each other. Given the other observations, I conclude that a model with covariates is the best of both options.

There is, however, an important issue with the MMNL model. The share of people with a moderate interest in *CC* is rather high, while extremes are rare. According to the results, many respondents will not select the most expensive *CC* available, nor will they renounce the *CC* altogether. This observation is in conflict with practical experience from companies (Ch. 1), the observations that many people need a CC for professional purposes (Ch. 4 and 5), and the idea of the car as a positional good (Ch. 4). In short, to some extent it is the opposite of what I expected to see.

An explanation for this issue relates to the fitting of a normal distribution over the full sample to two extrema, with on the one hand an expensive *CC* (x_1 = 1) and on the other hand a *Bonus* as high as possible, which basically means no *CC* at all (x_1 = 0). Due to the normal distribution these are drawn together from the tails to the main body of the gauss curve. The result is a strong preference for a modestly priced car ($x_1 \approx 0.5$). Support for this hypothesis can be found in the LC model, which uses a mixture of two normals, and where the extremes are well represented. The two classes of the LC model are basically one class for *CC* optimisers and another class for *Bonus* optimisers.

The LC model does not surpass the MMNL model in terms of goodness-of-fit. An explanation for this relates to the fact that there are five elements in the experiment, and not only *CC* or *Bonus*. I do, for instance, observe an overlap in the preference for additional *Leave*, regardless of class. Conversely, preferences regarding the elements in addition to the *CC* or *Bonus* in a mixture can be heterogeneous. This heterogeneity can be captured in the other models, due to a strong focus on the individual level results. In the LC model this was difficult, as the two classes were no longer identifiable with high levels of variance. This variance was reduced even further as I was unable to successfully integrate the set of covariates. Next, the LC contains a less advanced utility function in which the quadratic amount effects are dropped (Eq. 6.2). And, finally, the model is estimated with RSGHB, which deploys different algorithms for the HB procedures and generally obtains lower RLH-scores in models without covariates (Dumont et al., 2015). In short, and as I have concluded before, comparing the goodness-of-fit statistics is not straightforward.

There are several downsides to the LC model. First, the model had difficulties coping with the 42 parameter utility function that was reviewed as the best utility function for the MMNL model. Second, a weakness of the LC model with random parameters is that the class assignment needed to be manually calculated, which might result in minor errors. Third, one could wonder whether the main underlying assumption of two classes holds. It is hard to prove this, especially since the goodness of fits in RSGHB for a MMNL model and a LC with the same settings and data are very similar. Conversely, when using fixed parameters there is a strong and significant improvement in the model fit in the move from one to two classes.

It is hard to compare the CF model with the other models, since it is inherently different. The performance of the first step in the CF model is modest. The estimated RLH is about 0.73, clearly less than the MMNL and LC model. This mainly suggests that most participants do differentiate and evaluate separate elements other than *CC* in the experiment. Hence, empirical evidence for the central assumption in the CF model is not rock solid. This can also be substantiated by the results from the second step in the CF model, namely the evaluation of the elements *Bicycle*, *PT*, *Leave days* and *Bonus*. Clear differences in preferences for the 'remaining' elements, mainly in favour of x_4 and x_5, can be observed here.

The problem of the regression to the group average and the resulting strong preference for cheap *CC* categories in the MMNL model is avoided in the CF model. The results of the first step of the model clearly demonstrate a strong preference for the most expensive *CC*, as 522 out of 817 respondents optimise the share of x_1, though this knowledge comes at the expense of more detailed information on the remaining group. The others are simply assumed to spend part of their budget on a *CC*, even in case they do not want to.

In step two of the CF model I assumed that the *CC* element was irrelevant. If the *CC* is absent in both of the packages presented, this is probably true. Whether this conclusion also holds for choice situations in which both options had the same *CC* included is open for discussion. It is related to the long lasting discussion on the irrelevance of independent alternatives (IIA). According to the IIA principle, an individual who prefers A over B, will still prefer A over B when another inferior option C is added to the choice situation. Because C is less attractive, it is called irrelevant. Central assumption in choice modelling is that there is IIA.

On a more general level I conclude that there is noise in the choice data, which has a negative effect on the overall model performance and outcomes. Based on the results, I am convinced that some participants did not pay sufficient attention or were not inclined to make a real effort while completing the choice tasks. In some cases it seems they almost *randomly selected* one of the provided options. As a result, their preferences are blurred and the results suggest that they hardly differentiate between any of the five components of the mixtures; according to my results, they prefer some proportion of every single element. Members from clusters number three and four in Table 6.6 are most suspicious to me. These clusters cover 30 % of the full target group sample. According to the means of these clusters, all elements are included in the maximum utility situation of cluster members, which to me seems unlikely. However, deleting these observations because the results do not fit my expectations does not comply with my academic standards. Moreover, there are practical objections; how can one objectively differentiate between those who prefer to spread and those who randomly selected packages in the choice experiment.

6.6.2 External Validation

Results from other studies and experiments as discussed in Chapter One and Two, the analysis provided in Chapter Five, and some additional questions from the questionnaire (Appx. II) can serve to validate the outcomes of the three choice models presented in this chapter. In this subsection I will compare these insights with the results of the choice models. Note that part of this comparison is biased, as the attractive *Bonus* option and the possibility

to opt for additional *Leave* are often not present in the current situation. For obvious reasons, the scope here is limited to transport options in the mixtures: the *CC*, the *Bicycle* and *PT*.

Experience with the MB at companies, for instance Siemens, suggests that people are strongly inclined to keep a CC, which is often the default as they currently own a CC (Ch. 1). This tendency was confirmed by a control question in my questionnaire where people needed to indicate whether they wanted to maximise mileage or the class of CC (Appx. II). In response to this question, only 2 out of 817 respondents indicated they 'did not want a CC at all'. However, in contrast to the experiment, there was no attractive bonus option in return. Hence, compared to the experiment, this will be an underestimate. Nevertheless, the strong preference for the car that is assumed in the CF model and strongly present in the LC model, is probably more realistic than the results from the MMNL, which suggested that about 57 % would waive the *CC*.

Current bicycle use and ownership might serve as an indicator for the likelihood of adding a bicycle to the MB package. I would argue that limited use and no ownership are clear indicators for a lack of interest in the bicycle, although only 81 respondents from the target group sample fit this description. A total of 110 respondents cycles on a regular basis; these respondents are potentially interested in a new bicycle, although half of them already has multiple bicycles. Hence, I need to conclude that the initial control questions for the *Bicycle*-option are not very informative.

Next to bicycle use and ownership, home-work distance is relevant here, as respondents are likely to take this factor into consideration. In Chapter Five I already provided a thorough analysis of the commuting distance and behaviour, as well as demonstrating that the share of cyclists among commuters drops to nearly zero for distances over 10 km. The average commuting distance of CC owners is 36 km. Only 4 % respondents live within 4 km of their work. Another 5 % respondents live within 8 km. Hence, travelling to work on a bicycle or electric bicycle is only feasible for a small part of the sample, all other issues neglected.

According to the MMNL model, almost a quarter of all respondents are inclined to include a *Bicycle* in their MB. This share is somewhat lower for the CF model, with a total of 17 %. The share of people with interest in a *Bicycle* in the LC model is modest; less than 6 % has a *Bicycle* included in the maximum utility situation. Based on the observations above, even though they are inconclusive, I suggest that a modest share of bicycle purchases, as observed in the CF and LC model, is most realistic.

The best way to validate the results from the choice experiment regarding the interest in PT is through a comparison of these results to an additional question in the survey. I asked whether or not people were interested in PT travel opportunities; more specifically, I offered four types of PT tickets and asked people to mark the type of ticket they were interested in (Appx. II). In contrast to the choice experiment, there is no trade-off in this exercise, so a higher level of interest from respondents can be expected. Moreover, there is also not a real threshold involved. While I designated a minimum of € 500 from the MB to *PT* as threshold in the choice experiment, one single train ticket worth € 5 is enough to be included here. The most popular option is the option to buy single train tickets (Table 6.8). Almost 15 % of the respondents say

to be interested in this type of PT ticket. Next in line is a seasonal ticket for local or regional PT, offered by De Lijn, MIVB, or TEC in Belgium. One out of ten people selected this option. The part-time seasonal ticket on the route from home to work is not very popular. This might also be related to the familiarity of this product. Please notice that there is a certain overlap in the data, as people were allowed to select multiple items. A large group of respondents (n=191) selected more than one type of PT ticket; two of them selected all available options on the list. A total of 233 respondents selected at least one item.

TABLE 6.8: PREFERENCES FOR PT TICKETS

Product	Obs.	Share
Full-time ticket for home – work journey	56	6.8 %
Part-time ticket for home – work journey	22	2.7 %
Seasonal ticket for regional PT	87	10.6 %
Single train tickets	119	14.5 %
TOTAL	233	28.5 %

These outcomes are strongly in line with the results from both the CF and the LC model. In the LC model, a total of 9 % opts for the allocation of at least 500 euro per year to *PT*. In the CF this is 12 %. In Table 6.7 about 2 to 12 % of the respondents are likely to spend over € 500 on *PT*, due to relatively expensive options, such as a full time seasonal ticket for commuting. This while the MMNL model suggests that 22 % of the respondents have a significant interest in *PT*. Hence, the latter is most likely an overestimate.

All in all, the results presented in this section indicate that that the CF and LC model provide the most realistic results. The MMNL model is 'too optimistic' about the potential of the MB in many respects.

6.7 CONCLUSIONS CHAPTER SIX

In this chapter the preferences of CC owners within the MB is examined. The method used is an efficiently designed mixture amount DCE. In this experiment the most frequently mentioned elements for an attractive MB were added as options (Ch. 3).

With the choice data and additional information obtained in my survey (Fig. 6.1), I built three models for the purposes of this chapter: a Mixed Multinomial Logit model, a Latent Class model and a Car First model. A MMNL is nowadays the default manner to introduce preference heterogeneity in choice models by introducing random parameters in a MNL model. In my case a normal distribution is assumed for each parameter and obtained through panel techniques; furthermore, I add covariates to the model to limit the impact of the sample average. An LC model employs a mixture of two normal distributions; therefore, it is able to identify more radical differences between respondents. The CF model is a direct result from the insight that many CC owners cannot carry out their job without a CC; therefore they or their boss will always include a CC. The CF model is therefore a conditional model based on

two stepwise MMNL models. In the first step, the class of car is examined by studying relevant choice sets. In the second step, I dove into the preferences for the mixtures without a CC; the presence of the CC was assumed.

The estimation method used for all models was a hierarchical Bayesian approach. The important benefit of a HB model is its ability to cope with correlation, which is inherently present in a mixture model. By testing various canonical polynomials from Scheffé and three kinds of amount effects, the optimal utility function was revealed; this is the quadratic mixture model with quadratic amount effects. Overall, the performance of the choice models is good.

The main method to analyse the model outcomes is individual level utility optimisation, as employees are expected to maximise their utility (Ch. 2). In Table 6.9 the aggregated maximum utility results for all three models is provided. In general, these results are inconclusive and in some cases even diverging. The results suggest a high participation rates in the MB, in the range of 36 % to 94 % of the respondents. This range is derived by deduction, as a minimum of 6 % to a maximum of 64 % will spend the complete budget on the default option: the company car. Hence, they do not need to participate. In the CF model all participants have a *CC* by definition. In the MMNL model about 44 % will keep a *CC* and in the LC model this is about 79 %, though often this will be a cheaper model. The potential for multimodal travel behaviour seems to be modest. In the CF and LC model only few respondents opt for a combination of modes. This is certainly higher in the MMNL model, although it is still a mere 23 % of the sample. It is very unlikely that someone will combine all three modes offered in the experiment.

TABLE 6.9: SHARE OF RESPONDENTS PER OBJECTIVE, ACCORDING TO MAXIMUM UTILITY APPROACH

	MMNL	LC	CF
All to CC	6 %	54 %	64 %
Lose the CC	57 %	33 %	-
Cheaper CC	38 %	13 %	36 %
Multimodal MB	23 %	3 %	6 %

In order to minimise the ambiguity of the results, I performed internal checks and a more external evaluation. The internal assessment mainly reflects on the underlying assumptions and compares models. The external assessment relies on other insights obtained in the research for this thesis. This exercise indicates that the results from the MMNL are probably not correct. This mainly relates to a regression to the mean and diverging preferences with respect to the *CC* or *Bonus*. When people opt for additional income, they automatically also 'choose' no car or a very cheap one; the MMNL model seems to be unable to capture this dynamic. The results from the LC and CF model are more likely to reflect the 'actual' situation. This implies that only a minority of the target group will participate in the MB, which is in line with the expectations presented in Chapters Four and Five. Furthermore, the overall interest in multimodal packages is very small.

CHAPTER SEVEN: DISCUSSION

Hard to be sure

Sometimes I feel so insecure

[…]

All by myself

Don't wanna be

All by myself

Anymore

— ***Eric Carmen****, All by myself (1975)*

7.1 A Critical Reflection on the Mobility Budget

In this chapter I offer a discussion on the concept of the Mobility Budget (MB) and the research project. This discussion is divided in three sections. In the first section I reflect on the MB itself. This critique is a preamble in the direction of the policy recommendations presented in Chapter Eight. In the second section I provide a brief review of the research findings and address any remaining issues not already discussed in the earlier chapters. In the third and final section I scrutinise the methods and techniques applied in this thesis. I discuss the discourse analysis, questionnaire, explanatory models, and the design and analysis of the choice experiment.

7.1.1 Effectiveness, Efficiency and Equity

The MB is an appealing concept, as it is related to many of the well-respected values of contemporary society. These values include self-disposal, freedom of choice, flexibility and mobility. The concept of the MB also offers hope for improved traffic conditions on the Belgian roads, and might be used as bait by companies in 'the war for talent' (Ch. 2 and 4). Therefore the concept is embraced by many, including policy makers, HRM professionals and transport experts. It is presented and even celebrated as the alternative to the current dominance of the car. Nevertheless, I argue that the MB is certainly not perfect: there are issues to deal with and barriers to overcome.

Commonly, there are three main criteria to assess the quality of policy interventions, namely effectiveness, efficiency and equity (Van Wee, 2011). Effectiveness relates to the extent to which policy goals are realised through the intervention. Efficiency concerns the relative impact of the policy intervention, as it links costs to benefits or compares one measure to other options. Equity is inter alia about distributive ethics; the rearrangement of 'winners' and 'losers' as a result of the policy intervention. In the remainder of this subsection I discuss the MB in relation to its effectiveness, efficiency and equity.

The concept of the MB is mainly focussed on voluntary mode switching in order to reduce congestion. This is also my main focus in the final assessment of the effectiveness of the MB. The results of this exercise are presented in the next section (§7.2) and demonstrate a somewhat disappointing effect: the results of the MB as studied in this dissertation will be hard to notice. This is a result of some of the popular and key features of the concept, namely its voluntary nature, its dependence on sustainable consumption and the strong focus on mode switching.

The focus of the MB on voluntary mode switching is in line with many measures or projects presented in the name of transport policy. In general, there seems to be an obsession with the choice between the car and its 'alternatives'. A result is that other aspects, which might be equally or even more effective in terms of more sustainable mobility, are overlooked. Examples of these other aspects are trip frequency, trip chaining, speed, and especially distance. From the viewpoint of sustainable transport, it might be more relevant to reduce the length of the daily trips to work, school and supermarket and the seasonal holidays. Meanwhile, I observed that excessive commuting, with distances over 50 and even 100 km is

not considered to be problematic in the debate; most versions of the MB simply suggest to convert the costs related to this lengthy commute into a budget.

For the overall effectiveness of the MB, much responsibility is placed on the shoulders of the individual employee. The individual is called upon to make more rational travel decisions. The individual needs to demonstrate self-control (Zijlstra & Vanoutrive, 2016). Here, the situation is not unique to the MB. There is a strong overall tendency to stress individual responsibility in contemporary society (Dardot & Laval, 2013; Rose, 1999). As Bauman points out:

> *Everything, so to speak, is now down to the individual. It is up to the individual to find out what she or he is capable of doing, to stretch that capacity to the utmost, and to pick the ends to which that capacity could be applied best – that is, to the greatest conceivable satisfaction (2000, p. 62).*

Examples can be found in relation to, for example, a healthy lifestyle (Bell, 2010; Michailakis & Schirmer, 2010; Szmigin et al., 2011), tackling unemployment (Dean, 1995), brain training (van Hintum, 2016), education, and crime fighting. And while the benefits of tackling unemployment or a healthy lifestyle for the individual are self-evident, this is more complex in the situation of the MB. The best outcomes for the individual, the company, and society are not necessarily in line or even compatible with each other. Therefore, the MB confronts the individual with a choice between personal, commercial, or public interests. Meanwhile, companies and governments wash their hands of it, as they outsource their problem to the individual employees.

In relation to the latter, I observed that in the MB debate employees are primarily regarded to be consumers; they ought to be freely choosing and utility optimising individuals (Achterhuis, 2010; Rose, 2010). Currently they are stuck to their cars due to a systemic error, which hampers their freedom of choice, according to the story-line of the MB. A new market needs to be created: employees are invited into 'the shop' of the MB, where they can select these items they prefer in accordance with their needs and life-style (Ch. 2), a situation I aimed to mimic in Chapter Six. If people stick to their cars in the new situation, it is no longer because they have no choice, it is because they 'prefer' to do so. For the majority of the actors involved in the MB debate, this is the ideal and final condition: the problem is solved.

This representation is related to a wider debate on the dominance of the car and automobile dependency (§1.2.4). I observe that the automobile, as well as the networks or systems that support its use, are presented in the dominant discourse as the result of the combined preferences of free utility-optimising individuals (Paterson, 2007; Walks, 2015a). Indeed, the automobile society is simply regarded to be a consequence of what people want, and questioning these desires is a no-go area. Or, as analysed by Walks:

> *[The regime of automobility] is the aggregate expression of individual desires, and as such, the autonomous mobility provided by the car should be considered a right, on par with any exercise of personal and individual freedom. Within this logic, any restrictions on car use, and attempts by the state to tax automobile or gasoline, or to modify commuting behaviour or modal shares, let alone impose speed limits road*

> *tolls, traffic calming, or bicycle lanes, involve the imposition of state power against the expressed free will and preferences of the individual subjects, and thus constitute a perverse form of social engineering (2015a, p. 12).*

I reject this unilateral and inadequate representation of human beings and the origins of automobility, especially with regards to the car as a discrete item of individual consumption. The car might be a consumption item on a very basic level, where people can choose between a red and a blue car; however, the choice between buying a car and not buying a car is inherently different. On the basic level the market can provide interesting options, on a higher level it will be insufficiently capable of doing so (Barber, 2007). The current dominance of the car is not the result of 'the aggregate expression of individual desires'; it is the result of a public love affair with the car in the decades after the Second World War, the result of poor spatial planning and urban design, the result for rules and regulation that favour car use, beneficial tax treatment, and so on (Baeten, Spithoven, & Albrechts, 1997; Dupuy, 2008; Jacobs, 1961; Kunstler, 1993; Paterson, 2007; Peeters, 2000; Walks, 2014). Indeed, I argue that many car users are locked-in by circumstances, they strongly dependent on the car (Ch. 1), therefore their actual choice is limited to the basic level: a choice between a red and blue car (Newman & Kenworthy, 1999; Sanne, 2002; Urry, 2004; Dupuy, 2008). However, many car owners themselves are reluctant to admit they are held hostage. Instead of conceding their dependency on the car, they stress the freedom and independency vested through the car. It is the Stockholm syndrome in practice. The concept of the MB fails to acknowledge this issue.

In terms of efficiency, the MB concept seems to offer an interesting potential, as it is considered to be a cost-neutral intervention. As suggested by many actors in the debate, the costs for companies and government should equate the current situation, while the monetary value of the benefit in kind for the individual employee is also not altered (Ch. 2). If so, the MB offers opportunities for a modal shift and other improvements without any costs involved.

Meeting the goal of cost-neutrality will be difficult in practice. The main arguments in favour of this claim have been presented in Chapter Four. There are transfer costs involved for employees, employers and government to move from one system to the next. These costs include implementation of new regulations on a Federal and company level, and exploring the options within the MB by employees and employers. These transfer costs are one of the explanations for lower implementation levels at medium and small sized companies (Ch. 4). There are various direct costs related to the use of transport modes that are beyond the scope of the MB, including time use, variation between transport modes, physical exercise, and administrative burden. Finally, there are also indirect costs that are related to transport mode use, such as parking facilities provided by the employer. Indeed, the claim of cost-neutrality is difficult to meet in practice (PwC and Febiac, 2013).

Furthermore, multiple actors already acknowledge that the cost-neutral switch from one system to the other is probably not the most effective one, since the car has a high use value and a strong beneficial position in the system. Many actors state that additional incentives are necessary to boost the use of 'alternative' modes, and several practices at companies and

proposals for the MB by political parties explicitly include a bonus for more sustainable choices.

Next, in terms of efficiency, one should also consider the most obvious alternative to address the problems associated with the CC, namely addressing the under-taxation (§1.2.2). In case the current beneficial regime for the CC is altered, and the under-taxation of CC use is dealt with, the number of CCs on the Belgian roads will change. On the one hand the total number of CCs will decrease and on the other hand the use of the CC will be less intensive. The changes in recent years in the fiscal rules regarding CCs in Britain clearly demonstrate the potential magnitude of these tax 'corrections' (Le Vine et al., 2013). Moreover, new tax rates might affect all owners of a company vehicle, including the self-employed, while the MB is by definition limited to those in an employment relationship.

With respect to equity, one needs to acknowledge that the whole discussion about the CC is strongly linked to the debate concerning the high labour costs and income tax in Belgium. In order for the MB to be 'competitive', the alternatives to the CC that are available in the MB need to be as attractive as possible. This will improve the chances of mode switching or multimodal travel behaviour. Within the MB this basically means setting the 'right' relative price. Since most actors believe that the position of the CC in current tax and social security system should not be altered, the 'alternatives' need to become more attractive, i.e. cheaper. This implies a favourable treatment for bicycles, for public transport options, and for the remaining budget. In essence this means that the current beneficial position of the CC should be extended to other options. This makes the issue of the haves and have-nots more relevant.

The expansion of benefits is the key issue of the MB, especially because the main competitors of the CC are not the train, bus or bicycle; it is additional income or other benefits. In order to ensure high participation rates, the remaining budget should not be taxed like ordinary wage, which implies (another) tax benefit for high income groups. If so, the MB becomes a new way for wage optimisation and the number of participants is likely to inflate. Conversely, mode switching can be promoted by lowering the benefit on the CC in the MB. However, this will obstruct high participation rates in case the current system remains in place. In short, it is a catch-22.

One obvious way to avoid an unanticipated inflation in the number of people eligible for a MB, and to deal with some of the equity issues here, is to extend the concept of the MB to all employees beforehand. A MB for all is already explicitly suggested by multiple actors in the debate, like the Green party. There is, however, also a risk involved in this extension, as some of the employees without a car might find opportunities to drive a car or use the new budget for unsustainable consumption.

7.1.2 Beyond the Principal-Agent Problem

Chapter One offers three theoretical explanations for the problems associated with cars provided by the employer. These three explanations are the Principal-Agent (PA) problem from the Agency theory, the under-taxation of CCs and automobile dependency (§1.2). In

section 1.3 I linked the MB directly to the PA problem. In this subsection I reflect on the strength of this link and the relevance of alternative explanations.

The application of Agency theory to the situation with the CC is not perfect. On a general level it should be noted that Agency theory is in itself controversial. Critics question its completeness and its validity in practice (see IEA, 2007). As Lubatkin (2005) points out, the applications of the Agency theory are often problematic due to simplifications; they are unable 'to explain the complexities in real-world organisations' (p. 213). When applied to the relationship between the employer and employee, it should be acknowledged that this relationship is multi-layered and cannot be reduced to a written contract between two parties. For instance, the agents in this case are not merely consumers guided by self-interest; they are employees who have a stake in the well-being and future of the company they work for. Additionally, abuse of the contract can also be punished by the employer in multiple ways (Warde, 1994). Likewise, these agents are humans confined by ethical considerations (Bøhren, 1998). Illustrative for the controversy on the PA-problem in relation to the CC is the fact that the study by Graus and Worrell (2008) was not included in the final report on energy efficiency and PA-problems by the International Energy Agency (IEA), while the IEA initially commissioned this study. In their report, the IEA stresses the importance of addressing distortionary fiscal policies, next to addressing the PA-problems. Nevertheless, the application of the Agency theory to the situation with the CC is informative and offers important insights into the potential and logic of the MB.

On the basis of my discourse analysis, I suggest that the causes of the current issues with the CC in Flanders are eagerly presented as a PA-problem by many of the actors involved. Whether this (re)framing is a result of a delibate strategy with conscious and well thought out actions is impossible to tell; one cannot truly know the intentions of the people involved. It might just as well be a result of coincidences, new insights or the appealing nature of the MB. Nevertheless there is a clear pattern in the corpus.

Reframing of societal issues is a well known phenomenon in policy analysis (Avelino, 2011; Essebo & Baeten, 2012; Hajer, 1995; Patterson, 2007). As famously suggested by Wildavsky (1979): one 'must create problems that decisionmakers are able to handle with the variables under their control and in the time available' (p.15-16). Indeed, policy makers need problems that can be solved. By pointing at administrative muddle and inflexibility of the current system as an important cause for the issues associated with the CC, a new kind of solution comes within sight. The main problem definition shifts from the incorrect taxation to the lack of choice for those with a CC. As such, the MB eases the rather fierce and emotional debate in Flanders, at least in the short run.

There are at least three observations in support of the reframing thesis. Firstly, the main actors themselves stress that the MB does not change anything in terms of current benefits; to them it is one of the attractive features of the whole concept, since they do not expect to encounter any resistance (De Crom, 2013). Indeed, many of those involved emphasise that the current system remains in place. As such, a highly sensitive issue and 'political suicide' is avoided.

Secondly, while the MB gained momentum in a short period, the widely shared enthusiasm for the concept decreased shortly after the legislative proposal by the Christian-democrats was launched. From that moment on the debate needed to move to the next level, from a general concept to details. Indeed, actors now needed to nail their colours to the mast. Soon, parties realised that there were fundamental differences in opinion, or more likely, they were finally forced to admit that these differences existed from the very start (§2.5.7).

Thirdly, in response to critique on the system of CCs there is often a reference to the promise of the MB, while the initial source was not about the MB at all. An example is the column by Sinardet (2014a) in *De Tijd* and the reaction by the Christian-democrats. While Sinardet strongly rejects the current system of CCs in Belgium, and was able to gain considerable public support on very short notice, the Christian-democrats felt compelled to react by stressing that better world was on its way, due to their legislative proposal for the MB (Christiaens, 2014). Sinardet did not refer to the MB in his column. Likewise, Federal Minister Peeters (CD&V) was quick to stress the promise of the MB when the results of the study by the Federal Planning Bureau were published on the excessive use of the CC (Laine & Van Steenbergen, 2016; Winckelmans, 2016). On the exact same day, SD Worx sent out a press release to let the world know they are ready for the MB. Laine and Van Steenbergen (2016) did not refer to or mention 'the mobility budget' once in their working paper of 41 pages.

To me the MB is a post-political policy measure (Mouffe, 2005; Swyngedouw, 2010). In the post-political era true politics are withheld from us. Conflicting ideologies are replaced by the consultation of enlightened technocrats, and politics has become management with politicians as counsellors, according to Bauman (2000). Conversely, proper politics cannot avoid conflict, or as Žižek famously argued:

> *The political act proper is not simply something that works well within the framework of existing relations, but something that changes the very framework that determines how things work [...]. Authentic politics [...] is the art of the impossible – it changes the very parameters of what is considered 'possible' in the existing constellation (1999, p. 199).*

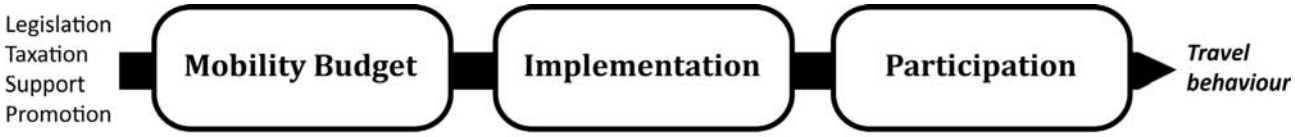
The MB is the opposite of the political act; the MB should be implemented because all parties demand the MB. There is no pain, conflict or impendency; therefore it is the only alternative, according to the dominant actors. As the environmental NGO, called BondBeterLeefmilieu, already noticed, the path of least resistance is probably also the path of minimal results (Ch. 2).

Here, it seems appropriate to discuss the link between the post-political condition and the neoliberal discourse that the concept of the MB is nested in (§2.5.8). Within this discourse there is a frequent reference to freedom of choice, the employee is depicted as an entrepreneurial self, and the most importantly, the initiators want to expand 'the market' beyond the existing domain, namely to transport mode choice in the employment relationship. Indeed, as neoliberalism is mainly about expanding market-based economic rationalities, the post-political condition under neoliberalism becomes the rationality of replacing politics with economics (Taskale, 2016).

7.2 REFLECTION ON THE RESEARCH FINDINGS

In Chapters Two, Four, Five, and Six I presented my study on the MB in Belgium. Nevertheless, it is difficult to confront the results of these four chapters with each other. This is mainly due to their sequential nature; I moved from a general exploration of the concept to implementation by the employer, and from participation by the employee to choice behaviour within the MB (Fig. 7.1). There is not much room for any confrontation, as the overlap between one step and the next is small. Most issues raised in each chapter are already addressed within the same chapter.

FIG. 7.1: THE SEQUENTIAL NATURE FOR THE EFFECTIVENESS OF THE MB



The successive nature of the chapters does offer important insights in terms of my research objectives. In this dissertation I demonstrate the added value of moving beyond the typical studies on the changes in travel behaviour by elucidating the importance of the steps in the process prior to these changes. When it comes to reducing congestion caused by work-related trips, which is the most frequently mentioned goal of the MB, one needs to admit that these work-related trips are only a part of all trip purposes in passenger transport. Moreover, there is also freight transport on the network. Furthermore, the MB is meant as a deal between in the employment-relationship, which excludes self-employed with a CC. The target group is only a small part of the employed population (Ch. 1 and 2). Only a part of the employers is likely to offer the MB to their employees (Ch. 4). Additionally, only some of the employees will participate (Ch. 5), of which only some participants will make choices that enable a less car dominated transport pattern (Ch. 6). Finally, just a fraction of this group will actually demonstrate this multimodal or 'sustainable' travel behaviour. Indeed, at this final level the impact of the MB is limited.

For illustrative purposes I will add some numbers to this sequence and turn it in to an equation. Let us assume that one in ten cars in the daily commute is a CC, a ratio observed in the BELDAM dataset, reflected in the number presented in Chapter One and confirmed by others (Securex, 2016). Moreover, let us assume that in the current situation, all people with a CC use their it to commute, a full 100 % instead of the actual 90 % to 94 %. These cars are provided by small, medium and large employers according to the current distribution. Given the numbers presented in Chapter Four, I assume an optimistic implementation rate of the MB for all target group members of 10 % at small companies, 20 % at medium sized firms, and 50 % at large private sector employers. This would imply that 24 % of all employees with a CC are able to participate. Of those people eligible for a MB, a high number of 10 % switches to full time bicycle use and another 10 % moves to full time PT use. Hence, a total of 20 % opts for alternative modes in this optimistic scenario. This optimistic scenario results in a total reduction of 0.48 % of car commuters on the road for the entire country.

Somewhat more hopeful is the situation near the large agglomerations and centres of employment. In Brussels and other main cities, large employers are strongly represented, which implies both a relatively high share of employees with a CC and a relatively high probability of gaining access to the MB. Moreover, a switch to the MB by employers in the urban centres is more likely, as they have more transport options at hand, they are confronted with the negative effects of congestion more often, and their costs to support car dominated transport are relatively high, for instance due to lack of parking spaces.

To illustrate the effect on the main employment centres, one might assume that one out of four car commuters is a CC owner, and 50 % of all CC owners in Brussels gains access to the MB because many employers are implementing the concept. Then, if 25 % of these people with a MB switches to another transport mode for their daily commute, a reduction of 3.1 % in car commuters on the road to the main centres of employment is obtained. However, in all cases these car commuters are just one category of road users; many people on professional, educational or social trips also use a car and the road is shared with freight transport.

In the opposite direction, the sequential nature reflected in this thesis emphasises the importance of the design of the MB. This design determines the absolute size of the target group, the implementation rates by employers, potential participation by employees, and more. This is exactly the field where we encounter the controversies, inconsistencies and uncertainties, as discussed in Chapter Two. The MB and its constitutive rules do not yet have their final form.

The MB is perceived to be a transport policy tool by its name and by the focus of other studies on this topic. Moreover, proponents of the concept stress the urgent need to address the congestion problem in Belgium, they present examples of mode switching, and they underline that the MB will result in more rational travel behaviour, which to them seems to mean less car use. The results presented in this study suggest that it is necessary to question the way the MB is framed, as there might be a hidden agenda.

As pointed out by Blauwens et al. (2002), transport is typically used by policy makers to realise objectives in other fields. One of the potential demands outside the field of transport is human resource management, according to Vanoutrive et al. (2010). In line with these observations, I argue that the proponents of the MB actively use the congestion problem and the promise of improved traffic conditions on the Belgian roads for other objectives beyond the field of transport policy. Indeed, the strong focus on transport-related issues in this thesis might have been the wrong focus, as the true MB goals of the dominant actors are primarily situated elsewhere.

7.3 Discussion on the Research Methods

7.3.1 Discourse Analysis

The discourse analysis, as provided in Chapter Two, to me, is one of the most interesting features of this thesis. Through an analysis of a wide range of primary and secondary sources I was able to obtain crucial insights regarding the debate about the MB. A key observation was the ambiguity of the concept; the MB was able to gain momentum due to its poor definition.

The data collection method was not very fashionable, as I did not include Facebook, Twitter or LinkedIn messages, while many academics nowadays stress the importance of social media in mainstream communication. My objection to these new media sources is mainly the length of the messages; in general these are very short, with one or two relevant key words and maybe a usable quote of a full sentence, though in general there is insufficient mass to work with. For this same reason I explicitly excluded short newspaper items. Moreover, services such as Facebook are frequently used to echo messages in more traditional media, as users 'like' news items or link webpages of reports in tweets. In contrast, it would have been interesting to add radio and television broadcasts, as these probably involve active participation by key actors and many people watch the same evening news broadcast.

Discourse analysis is far from a straightforward method; some even argue that discourse analysis is no method at all, and merely a catch-all term for a wide range of approaches. This also suggests that the quality of the study strongly depends on the experience and competences of the researcher. In reply to this objection to discourse analysis, I argue that the latter is true for most research methods, also for more quantitative approaches. The influence of the researcher in social sciences is always present.

In order to strengthen my results, I conducted a second analysis with a new dataset. In general, this validation process did not result in the rejection of my earlier findings, but it did result in a more nuanced image. In contrast to the first corpus, not all articles were optimistic in tone: in two out of the 244 articles the concept of the MB was criticised. Furthermore, while discourse analysis is mainly a qualitative technique, I have also offered more quantitative approaches and statistical techniques in the analysis. These quantitative methods invigorate the main qualitative body.

7.3.2 Questionnaire

The questionnaire with the choice experiment is the most important source of information in this thesis. The obtained dataset is used in Chapters Three to Six, and even here not all available information is presented.

The overall response rate of 38.5 % and the total number of respondents are very satisfying to me, especially knowing the effort required to obtain this. However, I must admit that a great deal of my respondents comes from only a few companies. The quality of the data would certainly benefit from a sample from more than just twelve companies. This was also the initial intention as I started out contacting all kinds of companies, small or large and situated in a range of sectors. Soon I noticed that it was difficult to find the right persons within a

company, and even when I did obtain a contact, participation by the company was not the obvious outcome. I needed to offer companies something in return, which became the option to add questions and to receive a full report on the results on the company level. This offer did not apply to small companies, as it would probably be impossible to estimate the choice model. The small number of relatively large companies is mainly the result of practical considerations.

Gathering a control group was not one of my primary concerns when designing the survey. If non-target group members were included in the list of candidates by the employer I did use these, as I thought they might be useful. In the final sample, the group of CC owners was twice the size of the group of non-owners. A more rigorous approach from the start might have resulted in a better balance between the target group and the control group. This balance is restored by using exact matching in the data pre-processing, although the size of the group of non-CC owners is modest. This also explains why I have been hesitant in this thesis to use the term 'control group' for non-CC owners in my sample. In contrast, I argue that the control group from the BELDAM data is a true and decent control group, due to the rigorous approach of the original research group.

I included many practical or instrumental questions in the questionnaire, such as the frequency of PT use and bicycle use, the number of bicycles owned by the respondent, and so on. In hindsight I would replace some of these questions by others in order to obtain more insights in the symbolic and affective meaning of various transport modes for CC owners. Now the study of attitudes was limited to three Likert-scales on the MB. It would have been interesting to include the attitudes of target group members regarding their car, alternative transport modes and a flexible benefit plan in general.

My research strongly focussed on the potential of the alternatives to the CC, as this effect is strongly emphasised in the debate. I excluded the potential effect of the MB on the composition of the car fleet, as this seemed to be of secondary importance and was partly also recently studied by others (Koetse & Hoen, 2014). The results presented in this thesis, however, do suggest that the MB will have an impact on the composition of the fleet. Here, I am particularly referring to the strong preference for a company vehicle, the fact that the private car is the main alternative to the CC, and the group of *car opportunists* in the study of attitudes towards the MB, as presented in Chapter Five (§5.3).

7.3.3 Data Analysis

All data presented in Chapter Five was carefully enhanced to improve the quality of the results. For the BELDAM dataset I combined information on the vehicles, household members, individual and trips level. I filtered this dataset to keep only those individuals in an employment-relationship in the private sector, as this is the group of interest and in order to comply with my dataset. Next, I applied matching techniques to reduce any treatment assignment bias in the sample. For both datasets the new balance was perfect, although some observations of people with a CC were lost. Due to the perfect balance it was no longer necessary to use the propensity scores in the models.

For the data pre-processing, an exact matching algorithm was used. This is probably the most straightforward matching technique, as it links people to exactly the same values for the variables included. One of the outcomes of the exact matching procedure are clusters with matched cases. These clusters can be used in the random part of mixed models to emphasise that these individuals are more alike (e.g. §5.3.2). For the pre-processed and filtered BELDAM dataset the use of mixed models was not straightforward, as the sample was highly fragmented. The small clusters were a result from the high number of matching criteria used, in relation to the size of the original sample. In the final sample there were over 150 clusters with an average cluster size of about 5 cases, which is (too) small for mixed models. Tests with this matched dataset revealed that the use of mixed models did not result in significant differences in the estimates, while the models were slow to converge. Hence, a mixed model was only applied in a model where only my dataset was used on the attitudes towards to concept of the MB.

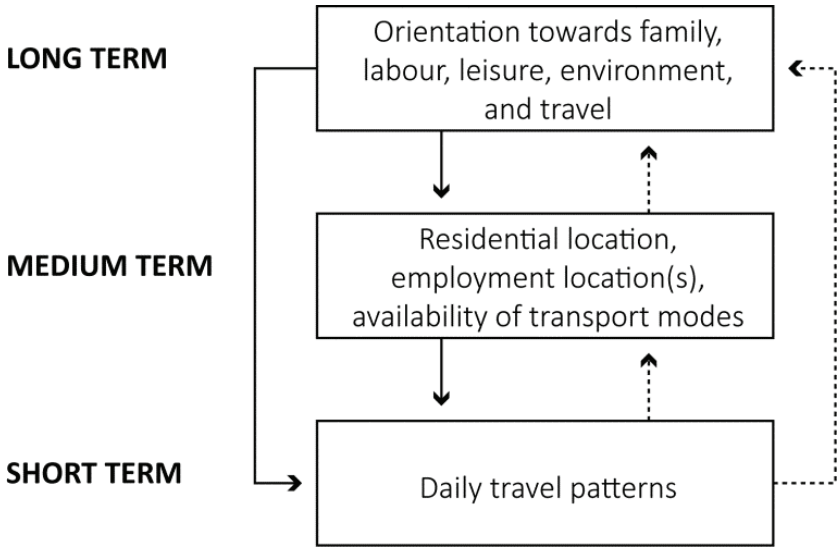
One of the somewhat counterintuitive results of data preparation through matching is a reduced improvement in the goodness of fit for the explanatory models. For instance, in the commuting distance models, as presented in the first part of section 5.5, the relative improvement in the AIC score between the intercept-only model and the full model is 38 % smaller for the matched dataset. In line with this observation, I observe that the t-values for the variables used as matching criteria are closer to zero, which has resulted in few significant estimates for the variables used as matching criteria in the final model. The loss in goodness-of-fit is a result of the fact that obvious differences between groups are removed from the dataset, while 'natural' variation in the depend variable remains. The removal of these obvious differences in the covariates is exactly the goal of matching. By doing so, I was able to reduce the model dependency and rely only on relevant cases in the dataset (Ho et al., 2007). An additional explanation for less significant parameters is the reduction of the sample size. About 40 % of the cases are lost as they did not find an exact match. Nevertheless, I argue that the explanatory value and quality of these models actually increases, as the chances of ecological fallacy and other biases are reduced, irrelevant observations have been removed, making the focus stronger and data selection more careful.

One of the remaining issues with matching and the multiple data filters used, is the representativeness of the sample for the population of CC owners in Belgium in an employment-relationship. For my data this issue is irrelevant as I already concluded that my data is probably not representative for the entire population (Ch. 3). For the BELDAM sample this issue is more relevant, as the original researchers worked hard to obtain a representative sample of the Belgian population of people six years and older. If I compare the basic descriptive statistics of the updated dataset to these presented in Chapter Three, I observe a strong resemblance, which is an indicator of a proper reflection of the population. Nevertheless, the actual representativeness remains unknown. Moreover, due to a lack of observations, data filters and some additional cases lost in the matching procedure, the final number of observations in the BELDAM set is relatively small. This results in a relative high error margin, e.g. for the stated mode choice model this is +/- 4 %. Here the additional observations from my dataset are a welcome extra. The strong resemblance between the four

models presented on car commuting strengthens the results and the conclusions of Chapter Five.

It is hard to tell to what extent current travel patterns inform future travel behaviour. The models implicitly assume a business-as-usual scenario, while transport history informs us that sudden changes in travel behaviour can occur (Gilbert & Perl, 2008). In response to this issue I argue that the MB lacks disruptive power: it is simply not revolutionary enough to break habits or make life-changing decisions. Travel behaviour is nested in more fundamental mid-term and long term decisions (Fig. 7.2), which are probably not affected by the MB.

FIG. 7.2: DAILY TRAVEL PATTERNS NESTED IN MORE MEDIUM-TERM DECISIONS



Based on: Salomon and Ben-Akiva (1983); Schwanen and Mokhtarian (2007)

In relation to the latter, I need to remark that there is one thing the models in section 5.6 do not account, this is a strong willingness to safe budget. In case employees are keen to reduce their travel costs, in order to safe budget and turn this in to additional income, one might see unexpected moves, like cycling long distances or an increase in bus use. However, I expect that these radical changes are very rare among target group members, since they are situated in a high income group, they have a high value of time and, most importantly, they often deliberately selected a job with a CC (see 'adverse selection' in §1.2.3).

7.3.4 DESIGN OF THE CHOICE EXPERIMENT

In retrospect, it is clear to me that there are improvements possible in the design and set-up of the choice experiment, and the accompanying questions in the survey. Below I will discuss some of the most relevant observations.

If I was able to redo the experiment, I would alter the way the PT option is presented: no longer as a card for free public transport for the full year, but rather as a number of days with unlimited and 'free' public transport. There are two reasons to do so. First, a switch from full-time car users to full-time PT users is considerable, especially for CC owners with a relatively high level of overall car use. Hence, they probably do not have much use for a full-time card; the change would be too much and too fast. Second, the options with PT were relatively

expensive because of the fulltime full-network character, which includes all modes in all regions for all days. By transforming the mixture component by offering, for instance, 4 levels with 0, 15, 30 and 45 days of free public transport, the options become much cheaper, and they remain informative. Furthermore, this kind of approach resembles to the *Railease* concept (§1.3), which some employees at larger companies might already be familiar with. A disadvantage of this approach is that it is not very friendly to these few people who do feel they want to switch to full-time PT use or already use PT on a daily basis.

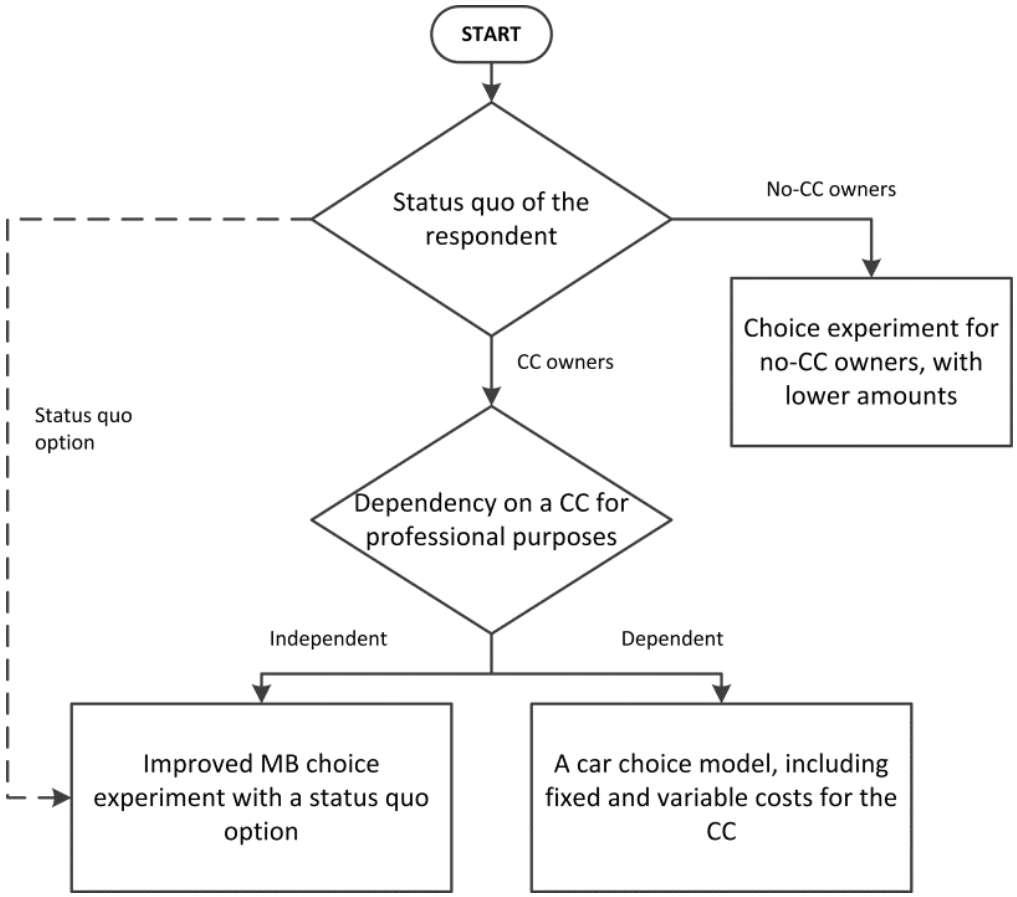
The option to cut back on the variable costs of the CC through the use of a bicycle or PT was not integrated in the experimental design. These interaction effects were assumed to be too complex to model. Moreover, I studied choice within the MB and not the actual travel behaviour. People who opted for a PT ticket or a bicycle do not necessarily use these options, and if they do it would be very hard to predict the impact on budget savings. Indeed, while I do admit that a certain feature of the MB concept was not properly integrated in the choice experiment, I do not see feasible options for a decent integration of this feature. A potentially workable option might be to carry out a posterior correction to the total amounts of multimodal packages. I presented another solution to this problem elsewhere (Zijlstra et al., 2015).

In terms of the primary candidates for the experiment, a stronger divide between those dependent on the CC and those who do not need a CC for professional reasons would be interesting, although this divide is somewhat artificial and mainly prompted by the debate in Flanders, as I both argued and demonstrated (Ch.2, 4 & 5). In my original survey, all participants were presented a block from the same choice experiment, with a non-CC option included for the CC-element. While I would still present nearly the same experiment to those without much professional use for the CC, I would now present a more detailed experiment on the choice of car to representatives and other intensive professional car users. The latter also offers opportunities to model fixed and variable costs of the car more closely. There was no trade-off or interaction between car cost and mileage in the experiment, while the wide range of estimated annual distances indicate that this would have been interesting. An example in the right direction can be found in Koetse and Hoen (2014), although that is not yet a mixture-amount experiment.

On a more general level, it would be both relevant and interesting to study the choice behaviour of non-CC owners. The reason for this is related to the unfinished debate on the definition of the target group for the MB. Furthermore, in the dominant interpretation, these people are non-users and winners: they do not participate, but might benefit from the actions by others. Conversely, and especially in case of an attractive tax treatment, the use of the MB might get extended to non-target group members, therefore we should know what they are about to do. The results from my data (no CC group) suggest that many of them are strongly inclined to select a CC when this option is within reach (results not presented). Since non-CC owners are the vast majority of the employed population in Belgium; this will surely nullify any positive effects among the present CC owners.

Fig. 7.3 displays an improved version of the experiment and the accompanying survey flow. In this scheme I suggest a separate experiment for non-CC owners and two types of experiments for CC owners, namely those with a strong professional need for the car and those without this strong need, e.g. representatives and others. Finally, I would collect data on the current situation and offer a status quo option as one of the options in the choice experiment (see also §7.3.5).

FIG. 7.3: SUGGESTION FOR AN IMPROVED SURVEY FLOW



7.3.5 ANALYSIS OF THE CHOICE DATA

Since the MB actually proposes to move from one system to the other on a voluntary basis, it is important to account for the current situation of candidates, as this is their point of reference. In my model I only did so through the estimation of the costs of the current situation, while neglecting the true meaning of it for the individual. I did not sufficiently take the perceptions of potential losses or gains when moving from one system to the other into account. Indeed, I would have liked to build a prospect model (Kahneman & Tversky, 1979; Tversky & Kahneman, 1992) as one of the models from the choice experiment, since I am convinced that this would yield valuable information regarding the choice probabilities from my respondents. The reason I was unable to estimate this kind of model was due to the fact that I did not include an explicit link between the current and the future situation in the experiment. I did gather sufficient data on current access to transport modes, their usage and other aspects; I also offered a choice experiment for the future situation, although I did not

ask to evaluate the future situation in comparison to the current arrangements. Moreover, mixture amount modelling is not readily equipped for this purpose.

In the analysis of the model parametric outcomes, I strongly relied on optimisation techniques to maximise marginal utility and find the underlying combination of elements accordingly. An objection to use of maximum utility is that the central assumption does not hold in practice (Sen, 1977; Simon, 1982; Sent, 2005; Kahneman, 2011): people are not utility maximising calculators. A long lasting critique against utility maximisation is the idea of *bounded rationality* (Simon, 1982). According to Simon and others, people do not have all the information necessary to maximise their utility, and even if they do, it is hard to process all this information without making mistakes. There is also a trade-off in the decision making process, as a full understanding of the problem at hand and the information needed for a carefully measured decision comes at a cost. Therefore, a satisfying option is often considered to be sufficient (Schwartz, 2004). Furthermore, if people have to make a choice, they will act according to their expectations. So if people would maximise their utility, they maximise their *expected utility,* not their final utility (Kahneman, 2011). Therefore one might expect that choice behaviour improves with experience, which is lacking with regards to the MB (see also J. Christiaens et al., 2013 and Ch. 8). The maximum utility approach also implies that people evaluate and weigh all attributes of a product or service. This is often not the case as people apply choice heuristics; an example of this is the already cited *elimination by aspects* approach by Tversky (1972). I tried to mimic the latter with the Car First model in Chapter Six.

In the literature that displays a cautious position towards the maximisation thesis, two types of criticism come forward (Boland, 1981). The first is regarding *the possibility* of maximisation. These arguments, for instance, refer to the lack of information or information processing capabilities of the individual. The possibility critique does not actually reject the idea of maximisation; this type of critique simply states that people are unable to maximise in practice. The second type is the empirical critique, which questions maximization as a guide in the choice behaviour of individuals: do people really seek to maximise their utility? This question is independent from their possibility to do so. Alternative hypotheses here are, for instance, that individuals are in search of 'sufficient' utility or try to avoid disutility (regret).

With respect to the first line of critique, the fact that people often fail to maximise their utility and make mistakes in the choice process does not necessarily imply one should reject choice experiment as a method of inquiry to reveal preferences or predict choices. Especially, when the choice experiment is capable to mimic the actual or future choice situation, the irrational behaviour in the experiment will be reflected in practice, and predictions will be accurate.

With respect to the critique on the goal of maximisation, it is hard, not to say impossible, to refute this hypothesis of utility maximisation on empirical grounds, according to Boland (1981). Not because of the maximisation part, but mainly due to the weakly defined first limb: utility. Utility refers to the functional value of something (usefulness), but it can also comprise other values, as individuals include ecological, altruistic or social considerations. Utility is commonly revealed by looking at what people try to maximize. Indeed, there is a tautological issue here (Hill & Myatt, 2010). It is also because of this that Boland (1981) rephrases the

hypothesis to 'the maximization of something' in the choice process. This also emphasises the added value of the detailed study of the utility function used in my thesis in section 6.3.

To conclude, despite the critiques and concerns, I have used the concept of utility maximisation for the analysis of the parameters. There are five reasons to do so. First, the best alternative to utility maximisation is probably the estimation of choice probabilities. In order to calculate these probabilities, one needs to make an assumption about the scale parameter in the random utility function, which makes the outcomes somewhat arbitrary. Second, the choice models are accompanied by additional material to address my research question, and the results from the utility maximisation are just one of the techniques used in the analysis, in addition to the ternary plots, screening of elements, and so on. Third, I did not apply an optimisation rule to the general results, but only on individual level parameter estimates; hence, I avoided simplification. The optima per person are then subjected to further analysis, and I still have a distribution of results due to many people in my sample. The maximisation of the individual estimates is the most important correction to a general maximisation of the results. The fourth reason comes from a practical point of view: optimisation eases the interpretation of the results. Finally, and most importantly, CC owners are depicted as utility maximisers in the debate (Ch. 2).

CHAPTER EIGHT: CONCLUSIONS AND POLICY RECOMMENDATIONS

Get outta my dreams

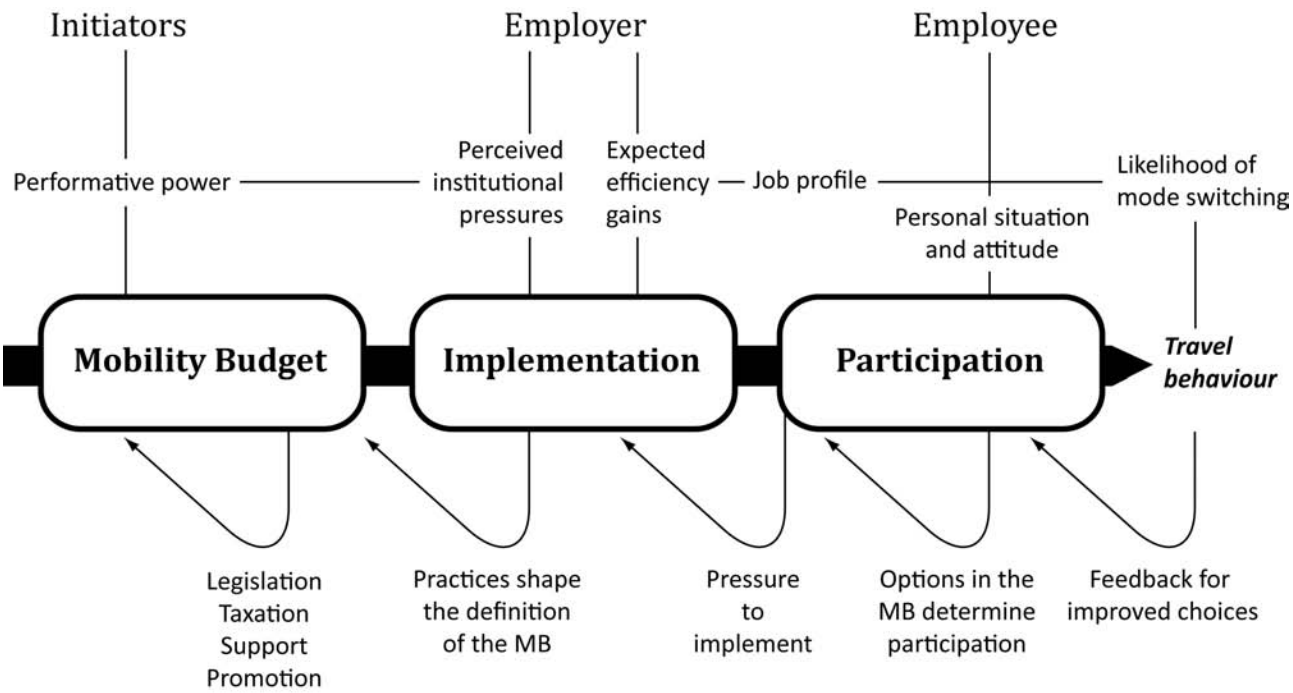
Get into my car

— ***Billy Ocean**, Get outta my dreams (1988)*

8.1 ANSWERS TO THE RESEARCH QUESTIONS

In this chapter I provide the answers to the research questions of this thesis. First, I will address the subsidiary questions one by one, after which I move on to the main question. In this section I do not provide any new material, the answers are solely based on conclusions I have drawn in the earlier chapters; it is merely a summary. The sub-sub-questions, meaning the research questions presented under each section-question in Table 1.3, are integrated with the overarching question and are generally not discussed in detail. In Fig. 8.1 I provide an overview of this thesis with the main actors, key issues and the steps from design of the mobility budget (MB) to actual travel behaviour.

FIG. 8.1: UPDATED VERSION OF THE FLOWCHART



With respect to the conclusions presented in this chapter it is important to recall some of the limitations of the research scope. The analysis presented in this dissertation concerns a MB for CC owners. The size of the budget is determined by the current gross capital and distance costs of the CC. Options within the MB are predominantly transport related, though the option to cash out any remaining budget is regarded to be a key feature. This remaining budget is not subjected to regular income tax, but has a more beneficial regime, in order to compete with the under-taxed CC. Both employers and employees are free to join: implementation and participation are voluntary. Employees opting for the MB have to make choices with respect to the travel options available to them in advance; a period of one year was used in the choice experiment for the allocation of the budget. The validity of the answers to the research questions presented below are restricted to the popular interpretation of the MB.

8.1.1 What are the Successful Features of the Mobility Budget?

The first research question concerns the rise of the concept in Flanders and the way the MB was able to gain momentum in recent years. This question has been studied through a discourse analysis with multiple primary and secondary sources in the corpus. The outcomes of the analysis indicate that the answer is multi-layered (micro – meso – macro).

On the micro level, I conclude that the concept of the MB is ill defined. As a result, multiple actors are able to hold and offer their own interpretation of the concept. This does spur the popularity of the concept. Conflicts are avoided as long as the concept remains indistinct. As soon as the MB is turned into legislation or fixed practices in the field, the inherent differences between the interpretations become clear and parties involved need to nail their colours to the mast.

The concept of the MB has been presented to policy makers, stakeholders and the general public at large through a strong recurrent reference to the 'congestion problem'. This is an issue many political parties from the political left to right, progressives and conservatives can identify with: everyone wants less congestion. Indeed, through a shared goal, coalitions can be built.

The MB promises a better future via a path with little friction: there are no losers, only winners. The employees with a CC can continue their current practices with the car or they can select more suitable transport solutions. The MB equips employers with a new tool in 'the war for talent' and helps to boost employee satisfaction. Governments can solve congestion problems without top-down control, major interventions or additional costs. Moreover, with the clear benefits for both employees and employers, governments probably expect little resistance.

On a meso level I conclude that the concept of the MB draws from the popular idea of 'mobility as a service' and it fits within the current paradigm of pragmatic multi-modalism. A key feature of this current paradigm is that it is explicitly not anti-car, but instead, 'sustainable mobility' is to be achieved through the seamless integration of transport networks, correct financial incentives, fancy apps for smartphones with up-to-date information, and a positive marketing approach which aims to seduce the stubborn car driver in the 'consumption' of a variety of transport modes.

The MB is certainly not only a 'light' measure within transport policy and it is also a new element in the employment-relationship. It is presented by employers as a way to contribute to a more sustainable world and serves to boost the green image of the company. Furthermore, it might help to reduce employee turn-over. The MB is the successor of the ineffectual cafeteria plan in Belgium in the promotion of more flexible benefits. More implicitly, I argue, the MB is a tool for cost-control and self-control of the individual employee. It transfers general corporate transport policies to the individual level. Therefore, considerations, tensions, reflections and the like are also transferred. The MB is about the conduct of conduct; top-down control becomes self-mastery with little guidance. By providing a MB instead of a company vehicle, employers no longer contribute to the highly contested

system of CC provision; rather, the individual employees themselves now *choose to drive* a CC, while they were also able to select a bicycle or a seasonal ticket for the local bus service. Whether these are feasible options in practice is irrelevant for the public image and the innocence of the company.

On the macro level, I observe that the MB is nested in a neoliberal discourse, which is characterised by a strong economic vocabulary, the use of economic concepts and market-based solutions, an emphasis on self-responsibility, and limited interference by the government. This discourse covers some of the most important social norms of contemporary society, like freedom of choice and the entrepreneurial self. Nowadays the employee is framed as a consumer; we use work to become who we are. The acts of choice reveal our identity. The concept of the MB fits perfectly within this rationality, which in itself seems to be a recipe for success.

A key assumption used to move from the delineation of the concept to the assessment of its potential is that these appealing features of the MB, as discussed above, are the features of the concept that are most likely institutionalised and reflected in the practices at companies. At the end of Chapter Two a list is provided of the main characteristics of the popular interpretation of the concept. Note that the debate did continue after the analysis was carried out and some seemingly fundamental characteristics are under discussion; the most evident example here is the under-taxation of the CC and its relative position within the MB.

8.1.2 How likely is Implementation by the Employer?

The results suggest that the voluntary implementation of the MB is a major obstacle to the potential impact of the concept. This conclusion is based on the study of economic and institutional incentives to provide a CC, considerations and motives to provide a MB, and potential barriers to the implementation of the MB. Furthermore, I looked at the implementation rates of flexible benefit plans as an indicator for the implementation of the MB.

There are multiple arguments in favour of the attribution of CCs; I discussed six of them. These reasons are functional, compensation, wage optimisation, status underlining, representation, and sectoral or company culture. For some of these arguments, the MB does not offer a full alternative. The car is still a positional good for the majority of the workforce; therefore it offers opportunities to underline the hierarchy of the workplace. A folding bicycle or a public transport card would probably only be considered status symbols in small subsectors or groups. With respect to efficient remuneration policies, it is important to note that the CC not only has a beneficial position with respect to tax and social security contribution, it is also relatively easy to obtain economies of scale in case a company distributes the same make of car to all of its employees. It will be more difficult to obtain this economic benefit when employees have free choice in terms of brand, type of car, or when they select their option for a pallet of multimodal options. An important argument in favour of CCs are probably still the functional reasons to provide a CC. Here the car is a tool to boost productivity. The typical divide between work tool and wage car is not easily made, as annual or monthly mileage and business trip frequencies are not easy to cluster into two categories.

The benefits of the MB for the employer are mainly related to cost-control, the reinforcement of self-control, marketing and public image, and profiling as an attractive employer. Cost-control relates to budgetary restrictions for the individual employee by setting a maximum amount of employers, there is a guarantee that their costs will be within certain limits; they will not be taken by surprise by excessive use or unexpected expenses. This practice is now already being recorded at many companies; a monthly CC allowance is gaining popularity. Through budgetary limits and the freedom of choice, self-control for the employees is promoted. This means that employers can present themselves as liberated firms, they can loosen the corporate mobility policies, free managers of control tasks, and they will become socially and environmentally responsible employers to the outside world, because their workforce is no longer 'forced' to drive a car.

Selecting the MB over the CC is not only a question of efficient and economically sound corporate governance. In addition, I argue that there are important institutional factors in play. Company or sectoral culture can be a huge obstacle for the implementation of the MB, especially when it is regarded to be a menace to the position of the CC. I observed that the culture of the CC is especially strong in male dominated sectors. Conversely, the storyline of the MB has alluring capacities, which might imply that the MB is implemented no matter if these stories are true or not: this is the performative power of the MB.

Studies on remuneration policies and flexible benefit plans reveal that large companies are significantly more eager to implement policies such as the MB. Often, factor two differences in implementation rates are found between small and medium sized enterprises on the one hand, and at the large firms on the other. Meanwhile, about 38 % of all CCs are provided by small-sized firms and another 36 % comes from medium-sized companies. Together these small and medium sized companies account for about 83 % of the workforce.

I observed that implementation levels are modest. In 2012, less than 3 % of all Belgian companies offered some kind of MB to (some of) their employees. In 2015 about one out of five employers considered implementation of the MB. The maximum implementation rate found for flexible benefit plans was nearly 70 %, although this was only among the largest companies in the United States, and firms were already included in the statistics when only part of their workforce qualified to participate. In the Netherlands, a country often referred to by the proponents of the MB, the maximum recorded implementation rate for flexible benefit plans is 39 %.

8.1.3 How likely is Participation by the Employee?

Participation levels are expected to be relatively low in case of voluntary participation and the absence of accompanying policy measures by the government or the employer. This is mainly because most CC owners need a car for their job, they enjoy the CC as benefits-in-kind, and they lack transport alternatives to the car. By participation I am referring to active participation here, which comprises a fundamental difference in the selection of arrangements by employees compared to the current arrangements. Since all target group members have a CC, it means selecting a cheaper model or waive the CC altogether.

In response to the concept, I identified four dominant positions. One group clearly rejects the concept altogether. They stress the need for the CC for their work and they state that there are no alternatives to the car. A second group are the excused; they acknowledge the need for a change in government or corporate level policies, however, they do not see how they can contribute. A third group are the car opportunists; they would like to see more degree of freedom with respect to the CC and therefore they embrace the concept of the MB. The final group are the optimists; they indicate they would like to use the concept in practice. In general, I observe that people with a CC, the main target group, has a more negative attitude towards the MB. Furthermore, men, older employees and people with long commuting distances are less positive. Current bicycle or PT users are more open to the concept.

The instrumental side of the CC is that it is intensively consumed by its owners. International literature provides clear evidence for a higher annual vehicle mileage with up to a factor two difference. These differences in my model become smaller, yet remain highly significant, when controlled for obvious differences between owners and non-owners. I observed almost 7 000 kilometres of additional car use. Please note that the CC is often a highly-valued benefit-in-kind for a number of reasons and not only for its instrumental use; it might also be appreciated for its status enhancing qualities, and full operational lease alleviates the owner from practical issues.

I studied the potential for alternative travel behaviour by looking at the commuting distance, options for PT use, car parking issues, and business trips. The results are slightly negative, which means that there are relatively less incentives or options for CC owners. They have longer commuting distances, more business trips, limited knowledge about the opportunities for PT use, and they are less often confronted with a shortage in parking spaces or paid parking at the workplace. In short: their situation is favourable to car use. Nevertheless, the results from a model predicting car use in the commute provide clear evidence of a CC-effect. If these employees would not have a CC, then one out of five is predicted to switch to another mode; the remaining four out of five are likely to use a private car to commute.

The likelihood of participation by the employee is, of course, strongly dependent on the design of the MB and quality of implementation by the employer. In my choice model including a rather beneficial position for the end-of-year bonus and a popular additional leave option, I found that a minimum of 6 % to a maximum of 64 % would spend all of the money in the budget on the CC. This implies that the remaining 36 % to 94 % is willing to participate, which is a wide range. Since these estimates vary in quality, my best estimate would be 46 %, based on the Latent Class model. In the case that the popular bonus option and leave days are absent and bicycle and public transport options remain, participation rates drop to approximately 11 %. Indeed, 9 out of 10 employees with a CC will not join the program, in case the only alternatives are transport related.

8.1.4 What are the Preferences of Employees?

The results concerning the owners' preferences indicate that CC owners are not stuck to the vehicle provided by their employer. They are willing to waive the car or select a cheaper model when the conditions are right and the options are attractive. In my choice experiment,

there were two options that could compete to the car, namely additional leave and additional income. The alternative modes in my experiment, a bicycle and PT, are only of interest to a small group within the sample.

When the CC is gone, the most obvious substitute is the private car (see also §8.1.3). Renouncement of the car, in general, is not evident in Belgium. A vast majority of the households currently has a car; in higher income groups, people with higher education levels, or in households with children, a car is almost always present. This means that the bonus, if the CC is not selected, will primarily be used to cover the expenses of the private car.

The option to purchase a standard or deluxe bicycle within the MB was of little interest to the majority of the sample. In the maximum utility situation, 3 to 90 people of the sample (0 % – 11 %) indicated they wished to include a bicycle and a CC in their most favourite package. Moreover, a maximum of only 10 % of the sample lives within a 10 km range of their work place; the use of a bicycle to cover longer distances is very uncommon.

Public transport as alternative or complementary option was the least popular option in the choice experiment, as packages with PT performed poorly with respect to the marginal utility. In the disaggregated optional situation, the share of people looking to combine CC and PT ranged from 1 % to 6 % of my sample. In total 9 % to a maximum of 22 % indicates they would allocate some budget for PT. Additionally, without any trade-offs, a total of 28.5 % of the people indicate that they are interested in some kind of PT ticket, with single train tickets (14.5 %) as the most popular option. Meanwhile, about 3.7 % of the sample already indicated to have some kind of PT seasonal ticket. Hence, the results for a small group of the sample suggests chances for a more 'fundamental' shift to PT, with weekly or daily use, while an additional and somewhat larger group might reserve budget for incidental use. The vast majority neglects PT as option.

I observed that multimodal combinations are of limited importance. According to the most pessimistic model results, only 2 % of the sample is interested in a multimodal combination. The most optimistic model outcomes indicate that 23 % of the people in the sample are interested in such a combination. A further assessment of these results suggests that the pessimistic scenario is more likely.

In my study, the popularity of leave days and additional income are also a result of their relative beneficial position in the experiment. The bonus option is, for instance, exempted from the employers' contribution to social security.

8.1.5 Conclusion: Answer to the Main Research Question

To conclude the answer-section to the research questions, it is time to address the final and main research question: *what is the potential role of the MB in relation to its transport policy objectives?*

Based on the findings of this research, and as summarised above, I conclude that the potential role of the MB in relation to transport policy objectives is very modest. The main reasons for the lack of disruptive power are the relatively small size of the target group, the voluntary

implementation by employers, the voluntary participation in the MB by employees, and the lack of interest in alternative modes. One by one, these steps reduce the potential absolute and relative impact of the MB.

The conclusion holds for the version of the MB scrutinised in this thesis. It does not imply that the MB does not and cannot work after a fundamental reconsideration of the concept and the necessary revisions in legislation, though some of the critiques, as outlined in section 7.1, do apply to many versions of the MB. In the next section I also discuss my policy recommendations for better transport conditions in Flanders.

8.2 Policy Recommendations

8.2.1 Implementation of the Mobility Budget

One of the most obvious questions related to this thesis would be: *should we implement the MB?* In response I would, yet again, stress that *the* MB does not exist. In the discourse analysis I showed that there are many versions, each one with different highlights, key elements, and definitions. The question regarding the need to implement the MB should therefore always be accompanied by the question regarding its design: what kind of MB should be implemented? This question, in turn, is directly related to the question of policy objectives, as various versions of the MB can be associated with a range of policy objectives. Moreover, the MB will always be nested within a larger framework of legislation, taxation, planning and other aspects. Changes in these fields might have a direct or indirect effect on the outcomes of the MB. Indeed, a seemingly technical-juridical issue is in fact political.

First, I would like to recall some of the arguments made *against* the implementation of the MB. The concept places much responsibility on the shoulders of the individual employee and, at the same time, they are equipped with little guidance. Governments and companies can wash their hands of it and refer to the promise of the MB, while they do have an important role when it comes to promoting more sustainable transport. Indeed, there is a risk of window-dressing here. The MB conceals some of the central issues with respect to the fiscal system. I prefer a political debate over the consultation of enlightened technocrats. Since the MB is calibrated on the current system with the CC as central point of reference, future alterations might become even more complicated and current excesses will be incorporated in the new system. In short, the implementation of the MB takes time and energy while the beneficial effects for society are likely to be limited. Therefore, I would support a critical reflection and revision of the current system.

It is important to realise that the current mode-based system of reimbursements is a policy tool: the system offers opportunities to influence mode choice and can also be used for other transport policy objectives. Travel cost surely is an important determinant in mode choice and through taxation and exemptions, governments are able to influence the mode choice of employees. The simple fact that the current tax system for the CC results in adverse effects and excessive use does not imply we should abandon this system altogether. Conversely, I

would argue, it simply means we should tackle this issue and close the loopholes in the current system.

An improved version of the current system includes a financial incentive to tackle long distance commuting in Belgium, since, for me, this is the most important factor in the current unsustainable character in the current situation. Preferably, this issue is addressed for all commuters, not only car drivers. This would mean integrating a maximum distance that is eligible for tax exceptions for car, train and bicycle. I would suggest a maximum of 50 km, optionally combined with the use of regressive classes until this limit is reached. Evidence from the Netherlands suggests that these kinds of limitations have a significant impact (CPB, 2004). In line with my previous suggestion, I would consider a relocation bonus for people who live beyond the 50 km radius. People are eligible for such a bonus if they move significantly closer to their workplace, for instance within a 10 km radius. In order to lower the benefit-in-kind and to provide an incentive for walking, cycling and the use of PT, I would suggest the taxation of the provided parking space as a benefit in kind or the mandatory introduction of paid-parking for all those commuting by car (Shoup, 2005; Van Ommeren & Wentink, 2012; Zijlstra et al., 2014). In short, if the current excessive use of the CC is regarded to be problematic, the system needs to be altered.

8.2.2 Design of the Mobility Budget

If policy makers do feel the need to implement the MB, I would strongly suggest reconsidering the following design aspects: size of the budget, cycle time, and target group.

The size of the budget should *not* equal the current capital and distance costs of the CC. There are pressing reasons to deviate from the popular position that suggests otherwise. The first reason is a practical one; the use of current cost might be informative in the transition from one system to the next. Once the new system is in place, the current cost can no longer serve as guidance, as they do not exist. Indeed, in the new situation mobility budget and transport costs are one and the same. Moreover, using or estimating current costs is difficult for new employees, as they do not yet have current expenses. Second, establishing the current cost is not a straightforward, as these costs might strongly vary from time to time and there is no list readily available concerning what to include and exclude. Third, the current costs are also used to cover the costs for the excesses, which need to be addressed in the viewpoint of many. If the current transport costs are transferred to a future budget, this budget will be sufficient to finance existing excesses. This final argument suggests that the budget should be lower.

Furthermore, I believe that a choice moment every year or every five years is completely ridiculous, as there is too much uncertainty involved. In the project *Mobiliteitsbudget werkt!* many employees regretted their initial choices after merely a few weeks (J. Christiaens et al., 2013). In contrast, there are long-term contracts and economies of scale related to these contracts. This calls for a dual track approach. Fundamental choices such as a CC, an annual card for PT, or a relocation bonus on the long term track, and flexibility for small expenses on a daily basis, e.g. via a mobility card. In the case employees decide to waive their CC, it is preferable that this would have an immediate effect on their pay-check: a bonus paid in *advance* (B50 werkgroep Mobiliteitsbudget, 2012).

Restricting the target group to only those with a CC is probably most effective with respect to reducing car use, at least in the short run. The group of people entitled to a CC, and thus a MB, might *change over time* as tax benefits included in the MB are easily available to more employees by just a small administrative alteration. The same process that occurred with the CC, i.e. the extension of the CC owners beyond the group of original users, can happen with the MB. Therefore I stress the need to set clear rules for qualification. From a societal point of view and with respect to equity, I would reconsider the target group and extent the MB to all employees.

The option to save money within the MB for a bonus is a key characteristic of an efficient version of the concept to some actors, as it provides an incentive to 'choose wisely' (Ch. 2). However, since the CC is frequently used by employers to optimise wages, the two most relevant and interrelated questions here are: what ratio is to be used and should this bonus be limited in (relative) size? The necessity of a limitation in the budget that can be cashed out as additional wage is related to the option of converting ordinary wage in a MB and additionally into this bonus. Indeed, a new shortcut to avoid taxes. Therefore, I suggest that the best and easiest way to avoid abuse is to subject the bonus to the same tax regime as ordinary wage. If so, the MB and its bonus options is relatively uninteresting compared to the CC. Therefore, I would suggest making the MB more interesting by increasing the taxes on the CC and limit the permissiveness of this option.

To conclude this subsection, I would like to stress that the 'administrative muddle' is not resolved by adding yet another law. If the MB is implemented on a federal level, an integral approach including the current system is welcome.

8.2.3 Further Research

It is common practice in the field of social sciences and policy support research to provide suggestions for further research. In general, more research on this topic is always welcome. In this case, however, I recommend not to a lot of extra time or budget on this topic, although there are elements of this study which offer an interesting basis for further research, as I already noted in the discussion part (Ch. 7).

Mixture-amount choice modelling offers great innovative opportunities for further research, as the mixture amount problem is certainly not unique to the MB. In many occasions firms, households, governments, and individuals are confronted with a variety of interesting options while constrained due to budgetary reasons. Moreover, not only financial budgets are limited; time and space are usually limited as well, as there are only 24 hours in one day and urban space is scarce. Within transport research, mixture-amount modelling can for instance be applied to reveal the preferred allocation of functions in an urban street by local residents, the optimal balance between capital and distance costs for private car owners, or the ideal mixture of time spent per day with travelling as one of the components. Beyond transport research many other potentially interesting studies come to mind.

With respect to mixture-amount modelling there is certainly room for further improvements. In the design stage it would be interesting to scrutinise the use of both categorical variables

and continuous variables. The design can become more efficient if some of the quasi-continuous variables are turned into true continuous variables. Furthermore, it would be interesting to study the design of experiments with mixture elements and non-elements, such as multiple process variables. The analysis stage of the mixture-amount experiment offered multiple challenges, which might be overcome by estimation procedures especially designed for mixture amount experiments and more support through a wider academic debate.

By working with matching techniques I was able to gain a more comprehensive picture of the advantages of matching in the estimation of causal interference. Even though matching is certainly up-and-coming in transport research as a data pre-processing technique, the number of examples published in transport journals is still limited. The wider use of matching techniques is welcome in transport policy analysis.

Finally, I want to promote the use of discourse analysis in the field of transport research. My discourse analysis resulted in some interesting, important, and surprising results. To me, these kinds of approaches help to study the actually existing practices and debates. A discourse analysis creates a bridge between the academic world and the 'real' world. Every single PhD-candidate can benefit from a wider contextualisation of their topic through a discourse analysis.

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APPENDICES

CONTENTS OF THE APPENDICES

APPENDIX I: SOURCES USED FOR THE DISCOURSE ANALYSIS

In this appendix I provide an overview of the sources used in the discourse analysis. The search strategy is mentioned for each source: LN for LexisNexis, GA for Google Alert and KD for Key Documents. Additionally, the authors, title, source and optional internet location are shown. In the details I provide page(s), date of publication, number of words, number of nodes and references. The nodes represent the number of aspects addressed in the article according to my analysis. The references are the total number of references to any of these nodes. Hence, references ≥ nodes.

Sr	Author(s)	Title	Source	Details	
LN	De Crom, J.	Nu eens met de wagen, dan weer met de trein; mobiliteitsbudget moet autodenken bannen	Trends	Page Date Words Nodes Refs	37 14/11/2013 1171 12 24
LN	Mouton, A.	Minder bedrijfswagens, meer mobiliteitsbudget; Files maken vacatures in grote steden moeilijk invulbaar	Trends	Page Date Words Nodes Refs	22 7/06/2012 1154 10 18
LN	Unknown	Experimenteren met mobiliteitsbudget	Trends	Page Date Words Nodes Refs	40 13/11/2014 166 2 4
LN	Van Dyck, P.	Mobiliteitsprobleem noopt bedrijven tot flexibel denken; MVO in kijker met mobiliteitsproject	Industrie Technisch Management	Page Date Words Nodes Refs	7 31/03/2014 2237 15 33
LN	Van Dyck, P.	Een mobiliteitsbudget voor de werknemer	Industrie Technisch Management	Page Date Words Nodes Refs	22 14/11/2011 830 3 5
LN	De Cat, K.	Minder maar groener	Industrie Technisch Management	Page Date Words Nodes Refs	7 17/02/2014 1527 12 15
LN	Van Dyck, P.	Snoei in extralegale wildgroei	Industrie Technisch Management	Page Date Words Nodes Refs	6 19/12/2011 2337 11 20

Sr	Author(s)	Title	Source	Details	
LN	Roeland, B.	Mobiliteit rijmt op flexibiliteit; XXIMO biedt betaalkaart voor mobiliteit	Trends	Page Date Words Nodes Refs	56 23/01/2014 1044 4 5
LN	De Cat, K.	Meer telewerken en minder autorijden; CapGemini evolueert naar virtuele onderneming	Trends	Page Date Words Nodes Refs	38 13/11/2014 1035 2 3
LN	Jagers, J.	Belastingaftrek voor tankkaarten afschaffen?	Knack	Page Date Words Nodes Refs	8 8/10/2008 1007 5 6
LN	De Roy, L.	SP.A stelt "tax shift" voor http://deredactie.be/permalink/1.2230259	De Redactie	Page Date Words Nodes Refs	n.p. 5/02/2015 479 1 1
LN	Van Baelen, J.	Een op de twintig Vlamingen staat dagelijks in de file	Knack	Page Date Words Nodes Refs	46 8/09/2010 1376 7 9
LN	Van Baelen, J.	'Mensen willen niet meer dag na dag dezelfde auto'	Knack	Page Date Words Nodes Refs	54 8/09/2010 446 1 1
LN	Van Overstraeten, M.	'De sector van de bedrijfswagens staat voor een revolutie'	Trends	Page Date Words Nodes Refs	38 29/10/2009 721 4 5
LN	Brussel deze week	Delva (CD&V): 'Een mobiele stad is een gedeelde stad'	Brusselnieuws.be	Page Date Words Nodes Refs	n.p. 17/04/2015 1003 1 1
LN	De Smet, L.	Blijft een bedrijfswagen wel interessant?; wagenparkbeheer onder fiscale druk	Industrie Technisch Management	Page Date Words Nodes Refs	15 13/02/2012 1204 2 2
LN	Vonck, S.	Het einde van de rit; Bedrijfswagens: het systeem is niet meer houdbaar	Knack	Page Date Words Nodes Refs	52 2/04/2014 2038 16 28

Sr	Author(s)	Title	Source	Details	
LN	Van Baelen, J. and Zuallaert, J.	10 radicale oplossingen; Knack onderzoekt de files	Knack	Page Date Words Nodes Refs	22 6/11/2013 2900 2 2
KD	BBL & Mobiel21	Multimodaliteit in het woon-werkverkeer; op weg naar een multimodaal mobiliteitsbudget?	Final Report	Page Date Words Nodes Refs	65 pages apr/10 19206 4 6
KD	PwC and Febiac	Slimme fiscaliteit voor betere mobiliteit	Original document	Page Date Words Nodes Refs	48 pages okt/13 17252 15 36
KD	Christiaens, J., De Witte, F., and Vanderbeuren, R.	Mobiliteitsbudget werkt!	Final Report	Page Date Words Nodes Refs	92 pages mrt/13 30016 18 58
KD	Magerman, K.	Een mobiliteitsbudget betekent zelf beslissingen kunnen nemen	Impuls, sociaal-economisch congres	Page Date Words Nodes Refs	4 pages okt/13 2691 17 42
KD	Magerman, K.	Het mobiliteitsbudget: een handleiding	Impuls, sociaal-economisch congres	Page Date Words Nodes Refs	4 pages okt/13 2391 14 35
KD	Pans, M.	Van automatisme naar multimodaliteit	CRB - Sociaal-Economische Nieuwsbrief, nr. 156	Page Date Words Nodes Refs	3 - 12 pp. apr/10 4137 NA NA
KD	Van den Bergh, J.	Wetsvoorstel: betreffende de invoering van een mobiliteitsbudget en het bepalen van het sociaal en fiscaal statuut	De Kamer	Page Date Words Nodes Refs	15 pages nov/13 6720 NA NA
KD	Sinardet, D.	Fiscale inconsequenties	De Tijd	Page Date Words Nodes Refs	n.p. 10/12/2014 844 1 1
KD	Kaesemans, J.	Auto's van het bedrijf: absoluut niet rede(n)loos!	deredactie.be	Page Date Words Nodes Refs	n.p. 15/06/2015 896 12 14

Sr	Author(s)	Title	Source	Details	
KD	Sinardet, D.	File shift: zet voordelen bedrijfswagens om in daling lasten op arbeid	De Tijd	Page Date Words Nodes Refs	n.p. 26/11/2014 817 9 11
GA	De Pourcq, E.	Bedrijfswagen maakt plaats voor mobiliteitsbudget http://www.demorgen.be/economie/bedrijfswagen-maakt-plaats-voor-mobiliteitsbudget-a1550889/	De Morgen	Page Date Words Nodes Refs	n.p. 18/12/2012 188 7 7
GA	MH	Werknemer zoekt naar alternatieven voor bedrijfswagen http://www.express.be/business/nl/hr/werknemer-zoekt-naar-alternatieven-voor-bedrijfswagen/183122.htm	express.be	Page Date Words Nodes Refs	n.p. 19/12/2012 139 6 6
GA	De Redactie	Mobiliteitsbudget in plaats van bedrijfswagen? http://deredactie.be/cm/vrtnieuws/binnenland/1.1507058	deredactie.be	Page Date Words Nodes Refs	n.p. 18/12/2012 189 3 3
GA	Unknown	Mobimix: "Mobiliteitsbudget kan aantal bedrijfswagens verminderen" http://www.autofans.be/nieuws/varia/24707-mobimix-mobiliteitsbudget-kan-aantal-bedrijfswagens-verminderen	autofans.be	Page Date Words Nodes Refs	n.p. dec/12 301 7 7
GA	KAV	Mobiliteitsbudget voor woon-werkverkeer doet autogebruik met ruim een derde dalen http://www.knack.be/nieuws/belgie/mobiliteitsbudget-voor-woon-werkverkeer-doet-autogebruik-met-ruim-een-derde-dalen/article-normal-89554.html	knack.be	Page Date Words Nodes Refs	n.p. 12/3/2013 227 4 6
GA	BBL	Mobiliteitsbudget zorgt voor verschuivingen in het woon-werkverkeer http://bondbeterleefmilieu.be/page.php/15/show/797	bondbeterleefmilieu.be	Page Date Words Nodes Refs	n.p. mrt/13 928 7 13
GA	Knop, H.	CD&V werkt aan mobiliteitsbudget http://www.politics.be/persmededelingen/34998/	politics.be	Page Date Words Nodes Refs	n.p. 13/3/2013 425 6 8
GA	Mobimix	Mobiliteitsbudget succesvol in Vlaanderen http://www.reiskostenblog.nl/nieuws/mobiliteitsbudget-succesvol-in-vlaanderen/	reiskostenblog.nl	Page Date Words Nodes Refs	n.p. 13/3/2013 522 6 14

Sr	Author(s)	Title	Source	Details	
GA	Belga	Ook Voka pleit voor mobiliteitsbudget en shuttledecreet http://www.hln.be/hln/nl/957/Binnenland/article/detail/1686409/2013/08/13/Ook-Voka-pleit-voor-mobiliteitsbudget-en-shuttledecreet.dhtml?show=react	Het laatste nieuws	Page Date Words Nodes Refs	n.p. 13/8/2013 135 2 2
GA	JNS and Belga	Groen pleit voor 'mobiliteitsbudget' http://www.nieuwsblad.be/cnt/dmf20130827_00709979	nieuwsblad.be	Page Date Words Nodes Refs	n.p. 27/8/2013 436 4 7
GA	Rosseel, K.	Vlaamse Regering : duurzame verplaatsingen http://www.politics.be/persmededelingen/36497/	politics.be	Page Date Words Nodes Refs	n.p. 18/9/2013 1547 5 5
GA	Belga & Redactie	CD&V wil mobiliteitsbudget als concurrent bedrijfswagen http://www.hln.be/hln/nl/957/Binnenland/article/detail/1735298/2013/11/05/CD-V-wil-mobiliteitsbudget-als-concurrent-bedrijfswagen.dhtml?show=react	Het laatste nieuws	Page Date Words Nodes Refs	n.p. 5/11/2013 429 7 11
GA	Knop, H. & Bastelaere, D.	CD&V : invoering van het Mobiliteitsbudget http://www.politics.be/persmededelingen/36947/	politics.be	Page Date Words Nodes Refs	n.p. 5/11/2013 1004 8 21
GA	Timmermans, K.	Mobiel 21, Bond Beter Leefmilieu en Voka Halle-Vilvoorde haalbaarheid van mobiliteitsbudget-app http://www.politics.be/persmededelingen/36950/	politics.be	Page Date Words Nodes Refs	n.p. 5/11/2013 270 6 7
GA	Grietens, E.	CD&V dient wetsvoorstel mobiliteitsbudget in http://bondbeterleefmilieu.be/page.php/30/747/14843	bondbeterleefmilieu.be	Page Date Words Nodes Refs	n.p. nov/13 154 6 7
GA	BBL	Mobiliteitsbudget legt verantwoordelijkheid bij individu http://bondbeterleefmilieu.be/page.php/30/820/15429	bondbeterleefmilieu.be	Page Date Words Nodes Refs	n.p. nov/14 117 5 5
GA	WVER	Eén chipkaart voor trein, tram en bus http://www.standaard.be/cnt/dmf20141114_01375229	De Standaard	Page Date Words Nodes Refs	n.p. 14/11/2014 321 5 7

Sr	Author(s)	Title	Source	Details	
GA	Almaci, M.	Groen-voorzitster tekent petitie BBL en pleit voor mobiliteitsbudget http://www.politics.be/persmededelingen/40053/	politics.be	Page Date Words Nodes Refs	n.p. 1/12/2014 242 6 8
GA	Christiaens, A.	CD&V : Hoog tijd voor een meer duurzame mobiliteit http://www.politics.be/persmededelingen/40062/	politics.be	Page Date Words Nodes Refs	n.p. 2/12/2014 326 8 10
GA	Maerevoet, E.	"Geef mensen vrijheid om vervoersmiddel te kiezen" http://deredactie.be/cm/vrtnieuws/politiek/1.2367782	deredactie.be	Page Date Words Nodes Refs	n.p. 15/6/2015 400 10 15
GA	SP.A.	“Koppel mobiliteitsbudget aan taxshift” http://www.s-p-a.be/artikel/koppel-mobiliteitsbudget-aan-taxshift-dat-is-veel/	s-p-a.be	Page Date Words Nodes Refs	n.p. 15/6/2015 415 8 9
GA	De Cat, K.	'Stop de bedrijfswagen in een slim mobiliteitsbudget' http://trends.knack.be/economie/beleid/stop-de-bedrijfswagen-in-een-slim-mobiliteitsbudget/article-opinion-580259.html	trends.knack.be	Page Date Words Nodes Refs	n.p. 21/6/2015 266 8 13
GA	Unknown	Mobiliteitsbudget als alternatief voor bedrijfswagens http://www.vacature.com/carriere/werk-leven/mobiliteit/Mobiliteitsbudget-als-alternatief-voor-bedrijfswagens-0	vacature.com	Page Date Words Nodes Refs	n.p. aug/15 403 10 14
GA	KIDR	‘Geef werknemers met bedrijfswagen extra mobiliteitsbudget’ http://www.standaard.be/cnt/dmf20150917_01871530	De Standaard	Page Date Words Nodes Refs	n.p. 17/9/2015 405 10 13

APPENDIX II: QUESTIONNAIRE IN DUTCH

Deze vragenlijst over het mobiliteitsbudget bestaat uit drie delen. Eerst introduceren we de extralegale voordelen waar u het mobiliteitsbudget aan kan besteden. Daarbij vragen we tevens naar uw huidige situatie. Vervolgens tonen we 16 keuzesets waarbij u steeds de meest aantrekkelijke combinatie moet kiezen. In het derde deel zijn er enkele slotvragen over uw voorkeuren en uw privé-, woon- en werksituatie. Totale duur is ongeveer 15 minuten.

In het experiment krijgt u telkens een combinatie van de onderstaande extralegale voordelen aangeboden. Deze voordelen lichten we op de volgende pagina's verder toe.

- bedrijfswagen
- fiets
- openbaar vervoer
- extra verlofdagen
- extra bruto loon

Bij voorbaat dank voor uw medewerking.

In de categorie bedrijfswagen krijgt u één van onderstaande opties te zien. Bedenk nu al welke categorie uw voorkeur heeft. U mag de wagen gebruiken voor woon-werk, zakelijke en privé verplaatsingen.

Omschrijving	**Nieuwwaarde**	**Voorbeelden**
Geen bedrijfswagen	N.V.T.	U reist met de eigen wagen of met andere vervoersmiddelen
Cat. I	€17.500	Citroën C3, Ford Fiesta, Opel Corsa, Renault Clio
Cat. II	€25.000	Ford Focus, Renault Mégane, Volkswagen Golf
Cat. III	€32.500	BMW 1-serie, Nissan Quashqai, Toyota Avensis, Volvo V40
Cat. IV	€40.000	Audi A4, BMW 3-serie, Opel Insignia, Volvo V60

Om vergelijkingen mogelijk te maken gaan we hierbij steeds uit van een dieselwagen met een leasecontract van 4 jaar en met een tankkaart van uw werkgever. De kosten zijn geschat op basis van 25.000 kilometer op jaarbasis. Na het experiment kunt u aangeven of u dat liever wil veranderen.

Kunt u aangeven wat de nieuwwaarde van uw huidige bedrijfswagen is?

- ❍ Ik heb geen bedrijfswagen
- ❍ 20.000 euro of lager
- ❍ 20.000 tot 30.000 euro
- ❍ 30.000 tot 40.000 euro
- ❍ 40.000 tot 50.000 euro
- ❍ 50.000 euro of meer
- ❍ Weet ik niet. Geef merk en model: _____

Welke situatie is bij u van toepassing?

- ❍ Ik heb salaris ingeleverd voor de bedrijfswagen
- ❍ Ik betaal vanuit met nettosalaris mee voor de bedrijfswagen
- ❍ Mijn werkgever betaalt de volledige leasekosten / aanschafkosten. Ik betaal voordeel alle aard

Waarvoor mag u de bedrijfswagen gebruiken en wie betaalt de brandstofkosten?

	Toegestaan en vergoed	Toegestaan, maar voor eigen rekening	Niet toegestaan
Zakelijke verplaatsingen	❍	❍	❍
Woon-werkverplaatsingen	❍	❍	❍
Privéverplaatsingen in België	❍	❍	❍
Privéverplaatsingen buiten België	❍	❍	❍

In het experiment worden drie netto budgetten voor een fiets gepresenteerd. U mag het volledige bedrag vrij besteden aan fiets en eventuele accessoires, zoals tassen, slot of fietskleding. De 3 opties zijn:

- Geen budget voor de fiets
- Standaard fiets: 1000 euro netto voor fiets en accessoires
- Luxe fiets: 2000 euro netto voor fiets en accessoires

Hieronder treft u een aantal voorbeelden van fietsen die u zou kunnen aanschaffen voor dit budget:

Heeft u een fiets?

- ❍ Nee, ik heb geen fiets
- ❍ Ja, ik heb een fiets
- ❍ Ja, ik heb meerdere fietsen

Hoe vaak fietst u? Denk hierbij aan alle soorten verplaatsingen: privé, zakelijk, woon-werk, enzovoort

❍ Minder dan 1 keer per maand
❍ 1 tot 3 keer per maand
❍ 4 tot 12 keer per maand
❍ Meer dan 12 keer per maand

Met een Netkaart voor het Openbaar Vervoer kunt u een jaar lang onbeperkt gebruik maken van al het openbaar vervoer in België. U kunt reizen met trein (NMBS), tram, metro en bus (De Lijn, MIVB en TEC). Voor de trein is er bovendien de keuze voor reizen in:

- de Eerste Klas
- of Tweede Klas

Om uw voorkeur beter te begrijpen zouden we graag meer weten over uw huidige openbaar vervoer gebruik.

Vink aan wat voor u van toepassing is (meerdere opties mogelijk):

❑ Ik beschik over een abonnement van het lokaal openbaar vervoer (De Lijn, MIVB of TEC)
❑ Ik beschik over een abonnement van de NMBS voor een bepaald traject
❑ Ik beschik over een abonnement van de NMBS voor het gehele spoornetwerk
❑ Ik heb geen abonnement voor het openbaar vervoer

Hoe vaak reist u gemiddeld met de trein? Denk hierbij aan alle soorten verplaatsingen: privé, zakelijk, woon-werk, enzovoort

❍ Minder dan 1 keer per maand
❍ 1 tot 3 keer per maand
❍ 4 tot 12 keer per maand
❍ Meer dan 12 keer per maand

De extra verlofdagen zijn extra vrije dagen boven op uw huidige vrije dagen. U krijgt deze dagen uitbetaald als gewone werkdagen. U dient deze dagen hetzelfde jaar op te nemen. De beschikbare opties zijn:

- Geen extra verlofdagen
- 2 extra verlofdagen
- extra verlofdagen
- extra verlofdagen

In het experiment kunt u kiezen voor extra bruto loon, dit bovenop uw huidige inkomen. Over dit bedrag moet u nog wel belastingen en sociale bijdragen betalen. In het experiment varieert het extra bruto loon tussen de 0 en de 6000 euro. Het gaat over een bedrag op jaarbasis.

- Geen extra loon
- 2000 euro extra bruto loon per jaar
- 4000 euro extra bruto loon per jaar
- 6000 euro extra bruto loon per jaar

Om uw keuzes beter te begrijpen zouden we graag een indicatie willen van uw huidige inkomen. Kunt u aangeven wat uw bruto maandinkomen ongeveer is?

❍ 3.000 euro of minder
❍ 3.000 tot 4.500 euro
❍ 4.500 tot 6.000 euro
❍ 6.000 tot 7.500 euro
❍ 7.500 euro of meer
❍ Weet ik niet / Zeg ik liever niet

NB. Hierna volgden 17 schermen voor het keuze-experiment. Deze zijn hier niet weergegeven.

Hieronder volgen een aantal stellingen. Geef aan in hoeverre u het eens bent met deze stellingen. Hierbij kunt u uitgaan van de hiervoor gepresenteerde mogelijkheden.

	Helemaal mee oneens	Mee oneens	Mee eens	Helemaal mee eens	Weet ik niet
Het combineren van extralegale voordelen heeft voor mij veel meerwaarde	❍	❍	❍	❍	❍
Ik raad het mobiliteitsbudget aan bij mijn werkgever	❍	❍	❍	❍	❍
Het mobiliteitsbudget biedt mij nieuwe mogelijkheden	❍	❍	❍	❍	❍

In het keuze-experiment waren de vervoersmogelijkheden beperkt tot kaarten voor het hele net in België. Heeft u interesse in andere (goedkopere) vervoersbewijzen? (meerdere antwoorden mogelijk)

- ❑ Voltijd treinkaart voor woon-werktraject
- ❑ Abonnement voor lokaal openbaar vervoer: bus, tram en metro van De Lijn, TEC of MIVB
- ❑ Losse treintickets
- ❑ Deeltijd treinkaart voor woon-werktraject
- ❑ Geen interesse

De kosten voor de wagen in het experiment zijn gebaseerd op de voertuigklasse en 25.000 kilometer per jaar. Bent u tevreden met 25.000 kilometer op jaarbasis (voor woon-werk, zakelijke en privé)?

- ❍ Ja, 25.000 kilometer is een prima schatting
- ❍ Nee, ik zal waarschijnlijk meer dan 30.000 kilometer rijden
- ❍ Nee, ik zal waarschijnlijk minder dan 20.000 kilometers rijden
- ❍ Ik wil helemaal geen bedrijfswagen

U geeft aan meer kilometers te willen rijden. Wat doet u om uw extra kosten te compenseren?

- ❍ Een minder dure wagen
- ❍ Inleveren op bruto loon of andere benefits (verlofdagen e.d.)
- ❍ Eigen bijdrage

U geeft aan minder kilometers te willen rijden. Wat doet u met de extra bestedingsruimte binnen het mobiliteitsbudget?

- ❍ Een duurdere wagen
- ❍ Besteden aan andere mobiliteitsopties: fiets of openbaar vervoer
- ❍ Uitkeren als extra bruto loon

Wat is uw geslacht?

- ❍ Vrouw
- ❍ Man

Wat is uw leeftijdscategorie?

- ❍ 29 jaar of jonger
- ❍ 30 - 39 jaar
- ❍ 40 - 49 jaar
- ❍ 50 - 59 jaar
- ❍ 60 jaar of ouder

Welke van de onderstaande situaties beschrijft het beste uw thuissituatie?

- ❍ Alleenstaand zonder thuiswonend(e) kind(eren)
- ❍ Alleenstaand met thuiswonend(e) kind(eren)
- ❍ Samenwonend of Gehuwd zonder thuiswonend(e) kind(eren)
- ❍ Samenwonend of Gehuwd met thuiswonend(e) kind(eren)
- ❍ Overig

Waar woont u? Vul uw postcode in

Wat is de enkele reisafstand in kilometer tussen uw huidige woonplek en werkplek?

Gebruik de slider hieronder

_____ Reisafstand (km)

Wat is uw hoofdvervoersmiddel van uw woon-werkverplaatsing?

- ❍ Wagen
- ❍ Openbaar vervoer
- ❍ Fiets
- ❍ Overig

Hoeveel zakelijke kilometers maakt u per jaar? Het gaat hier over alle vervoersmiddelen, behalve het vliegtuig Zakelijke kilometers worden gemaakt voor het uitvoeren van uw job, maar woon-werkverplaatsingen vallen hier niet onder.

- ❍ Minder dan 1000 km (gemiddeld nog geen 5 km per werkdag)
- ❍ Tussen de 1000 en de 4000 km (gemiddeld 5 tot 20 kilometer per werkdag)
- ❍ Tussen de 4000 en de 8000 km (gemiddeld 20 tot 40 kilometer per werkdag)
- ❍ Meer dan 8000 km (gemiddeld meer dan 40 kilometer per werkdag)
- ❍ Weet ik niet

Hoe vaak maakt u zakelijke verplaatsingen? Het gaat hier over alle vervoersmiddelen, behalve het vliegtuig. Zakelijke kilometers worden gemaakt voor het uitvoeren van uw job, maar woon-werkverplaatsingen vallen hier niet onder.

- ❍ Minder dan 1 maal per maand
- ❍ 1 tot 3 keer per maand
- ❍ 4 tot 12 keer per maand
- ❍ Meer dan 12 keer per maand

Hoeveel uur werkt u per week, volgens uw contract?

- ❍ 32 uur per week of meer
- ❍ Minder dan 32 per week

Heeft u nog opmerkingen naar aanleiding van deze vragenlijst? U kunt deze hieronder plaatsen.

APPENDIX III: DESIGN OF CHOICE EXPERIMENT

In this appendix I provide the details on the design of the mixture-amount stated choice experiment. This experiment is introduced in Chapter Three and the results from the actual experiment are provided in Chapter Six. The 128 choice sets are divided in 8 blocks (blk) with 16 sets in each block (q). The label 'xtra' flags all sets that have been added to the initial design. These extra sets include (high) levels for company cars in the choice option. These high levels were rare in the initial design, while currently all target group members have a CC. The column 'a' is the amount of budget times € 10 000. The mixture components are labeled as x1 to x5, respectively referring to the company car, bicycle, PT network card, leave days and bonus. The design was generated with the help from Professor Peter Goos and the proc optex function in the statistical software package SAS.

blk	q	xtra	a	x1	x2	x3	x4	x5	x1	x2	x3	x4	x5
1	1	1	0.9	1	0	0	0	0	0.83	0.11	0	0.06	0
	2	0	0.65	0	0.15	0	0.23	0.62	0.92	0	0	0.08	0
	3	0	0.8	0.75	0	0	0	0.25	0	0	0.56	0.19	0.25
	4	0	0.85	0	0.24	0.53	0	0.24	0.71	0	0	0.06	0.24
	5	1	0.9	0.67	0	0.33	0	0	1	0	0	0	0
	6	0	0.6	0	0	0	0	1	0	0	0.5	0.17	0.33
	7	0	0.6	0	0	0.75	0.25	0	0	0.17	0	0.17	0.67
	8	0	0.8	0.75	0	0	0	0.25	0.75	0.25	0	0	0
	9	1	0.9	1	0	0	0	0	0	0	0.33	0	0.67
	10	0	0.8	0	0.25	0.56	0.19	0	0.75	0.25	0	0	0
	11	0	0.7	0.86	0.14	0	0	0	0	0.29	0.43	0	0.29
	12	0	0.6	0	0	0	0	1	0	0.33	0	0	0.67
	13	1	0.85	0.88	0.12	0	0	0	0.88	0	0	0.12	0
	14	0	0.75	0	0	0	0.2	0.8	0	0.27	0	0.2	0.53
	15	0	0.65	0	0	0.69	0	0.31	0	0.15	0.69	0.15	0
	16	0	0.6	0	0.17	0	0.17	0.67	0	0.33	0.5	0.17	0
2	1	1	0.9	0.67	0	0.33	0	0	1	0	0	0	0
	2	0	0.8	0	0.25	0	0	0.75	0.75	0	0	0	0.25
	3	0	0.7	0	0	0.43	0	0.57	0	0.29	0	0.14	0.57
	4	0	0.6	0	0.17	0.75	0.08	0	0	0.33	0	0	0.67
	5	1	0.9	1	0	0	0	0	0	0	0.33	0	0.67
	6	0	0.75	0	0	0	0.2	0.8	0	0	0.4	0.07	0.53
	7	0	0.85	0	0.24	0.35	0.18	0.24	0.71	0.12	0	0.18	0
	8	0	0.6	1	0	0	0	0	0	0	0.5	0.17	0.33
	9	1	0.9	1	0	0	0	0	0.83	0.11	0	0.06	0
	10	0	0.6	0	0	0.75	0.25	0	0	0.33	0.5	0.17	0
	11	0	0.65	0	0	0	0.08	0.92	0	0.31	0.46	0.23	0
	12	0	0.8	0	0	0.56	0.19	0.25	0	0.25	0.56	0.19	0
	13	1	0.85	0.71	0.24	0	0.06	0	0.88	0.12	0	0	0
	14	0	0.6	0	0	0.75	0.25	0	0	0.17	0.5	0	0.33
	15	0	0.65	0	0	0.46	0.23	0.31	0	0.31	0	0.08	0.62
	16	0	0.85	0	0.24	0	0.06	0.71	0.71	0.12	0	0.18	0

blk	q	xtra	a	x1	x2	x3	x4	x5	x1	x2	x3	x4	x5
3	1	1	0.9	1	0	0	0	0	0	0	0.33	0	0.67
	2	0	0.6	0	0.17	0.75	0.08	0	1	0	0	0	0
	3	0	0.7	0.86	0	0	0.14	0	0	0	0.43	0	0.57
	4	0	0.6	0	0	0	0	1	0	0.17	0.75	0.08	0
	5	1	0.9	1	0	0	0	0	0.83	0.11	0	0.06	0
	6	0	0.6	0	0.17	0.5	0	0.33	0	0.33	0	0	0.67
	7	0	0.8	0	0.13	0.38	0	0.5	0	0.25	0.56	0.19	0
	8	0	0.65	0	0	0.46	0.23	0.31	0	0	0.69	0	0.31
	9	1	0.9	0.67	0	0.33	0	0	1	0	0	0	0
	10	0	0.6	1	0	0	0	0	0	0.33	0.5	0.17	0
	11	0	0.65	0	0.15	0.46	0.08	0.31	0	0.31	0.69	0	0
	12	0	0.75	0.8	0	0	0.2	0	1	0	0	0	0
	13	1	0.85	0.88	0	0	0.12	0	0.71	0	0	0.06	0.24
	14	0	0.7	0.86	0	0	0.14	0	0.86	0.14	0	0	0
	15	0	0.7	0	0	0	0.14	0.86	0	0.14	0	0	0.86
	16	0	0.6	0	0	0.5	0.17	0.33	0	0.17	0.5	0	0.33
4	1	1	0.9	1	0	0	0	0	0.83	0.11	0	0.06	0
	2	0	0.7	0	0	0.43	0	0.57	0	0.14	0	0	0.86
	3	0	0.85	0	0.24	0	0.06	0.71	0	0.24	0.35	0.18	0.24
	4	0	0.6	0	0.17	0.5	0	0.33	0	0.17	0.75	0.08	0
	5	1	0.9	0.67	0	0.33	0	0	1	0	0	0	0
	6	0	0.65	0	0	0.69	0	0.31	0	0.31	0.69	0	0
	7	0	0.6	1	0	0	0	0	0	0.33	0	0	0.67
	8	0	0.8	0	0.25	0	0	0.75	0.75	0.25	0	0	0
	9	1	0.9	1	0	0	0	0	0	0	0.33	0	0.67
	10	0	0.65	0	0.31	0.46	0.23	0	0	0.31	0.69	0	0
	11	0	0.6	0	0	0	0	1	0	0	0.75	0.25	0
	12	0	0.75	0	0	0	0.2	0.8	0	0.27	0	0.2	0.53
	13	1	0.85	0.88	0	0	0.12	0	0.71	0.12	0	0.18	0
	14	0	0.65	0	0	0.69	0	0.31	0	0.15	0	0.23	0.62
	15	0	0.85	0	0.12	0	0.18	0.71	0.71	0.24	0	0.06	0
	16	0	0.75	0.8	0	0	0.2	0	0	0.27	0.6	0.13	0
5	1	1	1.05	1	0	0	0	0	0.86	0	0	0.14	0
	2	0	1.05	0	0.19	0.43	0	0.38	0.57	0.1	0.29	0.05	0
	3	0	1	0.6	0	0	0	0.4	0.6	0.1	0	0.1	0.2
	4	0	1.05	0	0.19	0.29	0.14	0.38	0.86	0	0	0.14	0
	5	1	0.95	0.79	0	0	0	0.21	0.63	0.21	0	0.16	0
	6	0	1.1	0.82	0.18	0	0	0	0.55	0.09	0.27	0.09	0
	7	0	1.05	0	0	0.29	0.14	0.57	0.57	0.1	0.29	0.05	0
	8	0	0.95	0	0.21	0	0.16	0.63	0	0.21	0.47	0.11	0.21
	9	1	0.9	0.67	0	0.33	0	0	1	0	0	0	0
	10	0	1.05	1	0	0	0	0	0.57	0	0.29	0.14	0
	11	0	1.1	0	0	0.41	0.05	0.55	0.55	0	0.27	0	0.18
	12	0	1.1	0.55	0.09	0	0	0.36	0.68	0.18	0	0.14	0
	13	1	1.05	1	0	0	0	0	0.71	0.19	0	0.1	0
	14	0	1.05	0.57	0	0.29	0.14	0	0	0.19	0.29	0.14	0.38
	15	0	1.05	0	0	0.29	0.14	0.57	0	0	0.43	0	0.57
	16	0	1.05	0	0	0.43	0	0.57	0	0.19	0.29	0.14	0.38

blk	q	xtra	a	x1	x2	x3	x4	x5	x1	x2	x3	x4	x5
6	1	1	1.05	1	0	0	0	0	0.57	0	0.29	0.14	0
	2	0	1.1	0.55	0.09	0	0	0.36	0.55	0.18	0.27	0	0
	3	0	1	0	0.1	0.45	0.05	0.4	0.6	0.2	0	0	0.2
	4	0	1.05	0.86	0	0	0.14	0	0.57	0.1	0	0.14	0.19
	5	1	0.95	0.79	0.21	0	0	0	0.79	0	0	0	0.21
	6	0	1.05	0.57	0	0	0.05	0.38	1	0	0	0	0
	7	0	1.1	0	0.09	0.41	0.14	0.36	0.55	0	0	0.09	0.36
	8	0	0.9	0.67	0	0.33	0	0	0.67	0.11	0	0	0.22
	9	1	0.9	1	0	0	0	0	0.83	0.11	0	0.06	0
	10	0	1.05	0	0	0.43	0	0.57	0.86	0	0	0.14	0
	11	0	1.1	0.55	0	0.27	0	0.18	0.82	0	0	0	0.18
	12	0	0.95	0	0	0.32	0.05	0.63	0	0.21	0	0.16	0.63
	13	1	1.05	1	0	0	0	0	0.57	0	0	0.05	0.38
	14	0	1.1	0.55	0	0.27	0	0.18	0.55	0	0.41	0.05	0
	15	0	1.1	0.55	0.18	0.27	0	0	0.95	0	0	0.05	0
	16	0	1.05	1	0	0	0	0	0.86	0	0	0.14	0
7	1	1	1.05	0.57	0	0	0.05	0.38	1	0	0	0	0
	2	0	0.9	0.67	0	0.33	0	0	0.67	0.22	0	0.11	0
	3	0	1.05	0.57	0	0.29	0.14	0	0.57	0.19	0	0.05	0.19
	4	0	1.1	0.55	0.18	0	0.09	0.18	0.55	0.18	0.27	0	0
	5	1	0.95	0.63	0	0.32	0.05	0	0.79	0.21	0	0	0
	6	0	1.1	0.68	0	0.27	0.05	0	0.68	0.18	0	0.14	0
	7	0	1.05	1	0	0	0	0	0.57	0	0.43	0	0
	8	0	0.9	0	0.11	0.5	0.17	0.22	0.67	0	0.33	0	0
	9	1	1.05	0.57	0	0.43	0	0	1	0	0	0	0
	10	0	1.05	0	0.19	0.43	0	0.38	0.71	0	0.29	0	0
	11	0	0.95	0.63	0	0	0.16	0.21	0.63	0	0.32	0.05	0
	12	0	1.1	0.55	0.09	0	0	0.36	0.68	0	0.27	0.05	0
	13	1	1.05	1	0	0	0	0	0.71	0	0.29	0	0
	14	0	1.1	0	0.18	0.27	0	0.55	0.82	0.18	0	0	0
	15	0	1.05	0.57	0	0.43	0	0	0	0	0.29	0.14	0.57
	16	0	1.1	0	0	0.41	0.05	0.55	0	0.18	0.27	0	0.55
8	1	1	1.05	1	0	0	0	0	0.57	0	0.43	0	0
	2	0	1.05	0.57	0	0.29	0.14	0	0.57	0	0.43	0	0
	3	0	1.1	0.55	0	0.27	0	0.18	0.55	0.18	0.27	0	0
	4	0	0.9	0.67	0	0.33	0	0	0	0	0.33	0	0.67
	5	1	0.95	0	0.21	0.47	0.11	0.21	0.79	0	0	0	0.21
	6	0	1	0.6	0	0	0	0.4	0.6	0.2	0	0	0.2
	7	0	1.1	0.55	0	0.27	0	0.18	0.82	0.18	0	0	0
	8	0	1.1	0.68	0.18	0	0.14	0	0	0.18	0.41	0.05	0.36
	9	1	0.9	0	0	0.33	0	0.67	1	0	0	0	0
	10	0	0.95	0.63	0	0	0.16	0.21	0.63	0.21	0	0.16	0
	11	0	0.95	0	0.21	0	0.16	0.63	0.63	0	0	0.16	0.21
	12	0	1.1	0.82	0	0	0	0.18	0	0.09	0.27	0.09	0.55
	13	1	1.05	1	0	0	0	0	0.86	0.1	0	0.05	0
	14	0	1	0	0	0.45	0.15	0.4	0	0.1	0.3	0	0.6
	15	0	1.1	0	0.18	0.27	0	0.55	0.55	0	0	0.09	0.36
	16	0	1.1	0.82	0.18	0	0	0	0.68	0	0	0.14	0.18

APPENDIX IV: ESTIMATED BUDGET PER INDIVIDUAL

The options available to the individual employee within the MB depend on the amount of budget available to him or her (Ch. 3). With more money to spend comes a higher degree of freedom. As a result, my hypothesis is that the amount of budget has a significant influence on the choice behaviour of employees when offered a MB. In this section, I estimate the budget available to the individuals in my target group sample; these estimates are a central element in the models presented in the Chapter Six (Fig. 6.1).

The budget available to the individual employee should equal the current travel costs, according to the MB concept (Ch. 2). Hence, for the assessment of future budgets I need to estimate the costs of current travel behaviour. This is done by an estimating the annual vehicle km and the value of the car; combined they are the full operational lease costs. In this assessment, I will concern only the costs related to the CC, as I already showed that other costs can be neglected. The costs for the CC will be calculated in gross costs, before tax discounts.

The basis for the estimation of *the annual mileage* is the formula provided by Castaigne et al. (2009). This formula is preferred over the formula from the BELDAM data (§5.4), because of its simplicity and the overlap in the categories for business trips. This formula is:

EQ. APPX.IV.1:

$$\begin{aligned} Annual\ mileage \\ &= 29\,513 - 3\,472 * GENDER_{female} - 17.417 * HW_{<5\,km} - 18\,876 * HW_{5-10km} \\ &- 15\,299 * HW_{11-20\,km} - 9\,458 * HW_{21-50\,km} + 8\,805 * BT_{daily} + 5\,605 \\ &* BT_{regularly} + 3\,992 * BT_{sometimes} + 9\,196 * CC \end{aligned}$$

There are four basic elements in this equation: a constant, a gender part (GENDER), the effect of home-to-work distance (HW) and a business trip frequency correction (BT). This original equation can be improved by the conversion of five commuting distance categories to a continuous variable and a more detailed approximation of professional use. This prevents the loss of valuable information. For the conversion to a linear relationship I use the centroids of the categories and 75 km in the highest category, which results in a line with a nice fit (ρ^2 = 0.983), though there are only five points to fit this line. The new slope is used in my own formula, after a correction for the intercept. With respect to business trips there is room for further improvement as I both have business trip mileage and frequency, the new values are provided in Table A.IV.1. For missing data I use the categorical average. Potential interaction effects between commuting and business trips are neglected.

TABLE A.IV.1: CROSS TABLE FOR BUSINESS TRIPS, PER CELL THE ESTIMATED EFFECT ON ANNUAL MILEAGE

			Business trip frequency (times/month)				
		Cat.	< 1	1 - 3	4 - 12	> 12	NA
	Cat.	obs.	195	184	169	220	91
Business trip Distance (1000 km/year)	< 1	223	0	250	500	750	104
	1 – 4	200	1000	2000	3000	4000	2345
	4 – 8	109	4000	5333	6666	8000	6544
	> 8	236	8000	9000	10000	11000	10593
	NA	49	682	2284	5834	9847	4825

The new, simplified and improved formula for the estimation of annual mileage by CC owners for my data becomes:

EQ. A.IV.2

$$\begin{aligned} &Estimated\ annual\ mileage\ CC\ owners \\ &\quad = 19\,225 - 3\,472 * GENDER_{female} + 277.65 * HW_{distance\ km} \\ &\quad + BT\ part\ (see\ table\ 3.x) \end{aligned}$$

The estimated annual mileage for all individuals in the target group sample is provided in Fig. A.IV.1. Note that the distribution is negatively skewed, as expected (§5.5). The total range is 16 030 to 63 958 km per year, with an average of 32 994 and a median of 31 719.

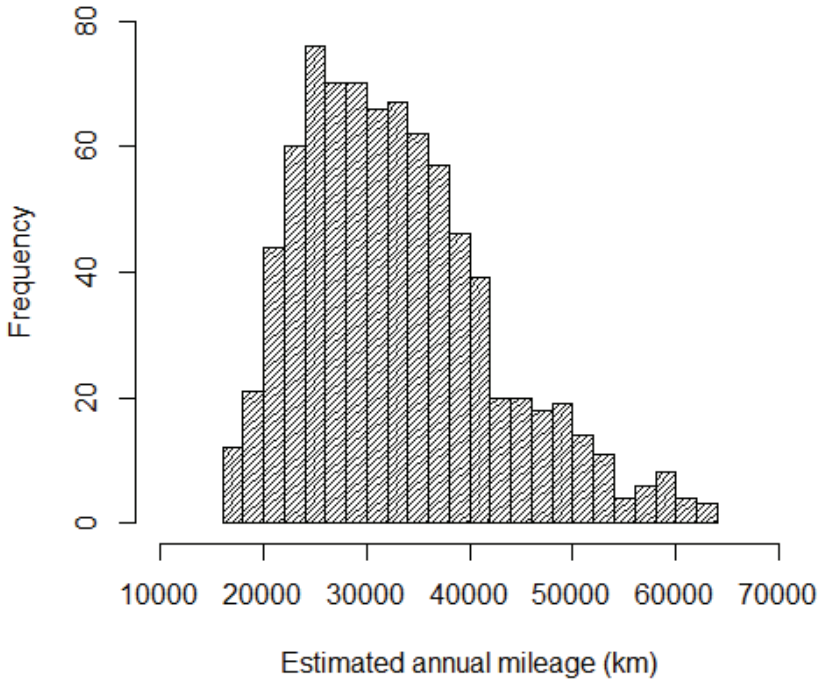

FIG. A.V.1: ESTIMATED ANNUAL MILEAGE OF CC OWNERS (N=817)

I complemented the vehicle km formula with the estimated lease costs, in which the effect of annual mileage is integrated. This is necessary because the annual lease costs are related to the annual mileage. More kilometres driven result in higher maintenance costs, a higher risk

of accidents and a lower rest value of the car. The lease costs are estimated on the basis of the price of the car currently owned by the respondents. The final results, in which fixed and variable costs are combined, are provided in Fig. A.IV.2. The estimated MB for the people in the target group sample ranges from 5 944 to 12 882 euro per year. Note that this is the *gross cost* for the employer. The net costs are definitely significantly lower. Moreover, I did not account for any economies of scale for the employer.

With this budget all individuals should be able to continue their current travel practices - driving a CC - as this was the input. Alternatively, this budget is surely sufficient to finance other travel modes like a bicycle, a motorbike, or using PT. Indeed, the most expensive first class PT card for the entire network in Belgium is well below the minimum budget found. In most situations, the budget can also be used to finance multimodal travel behaviour.

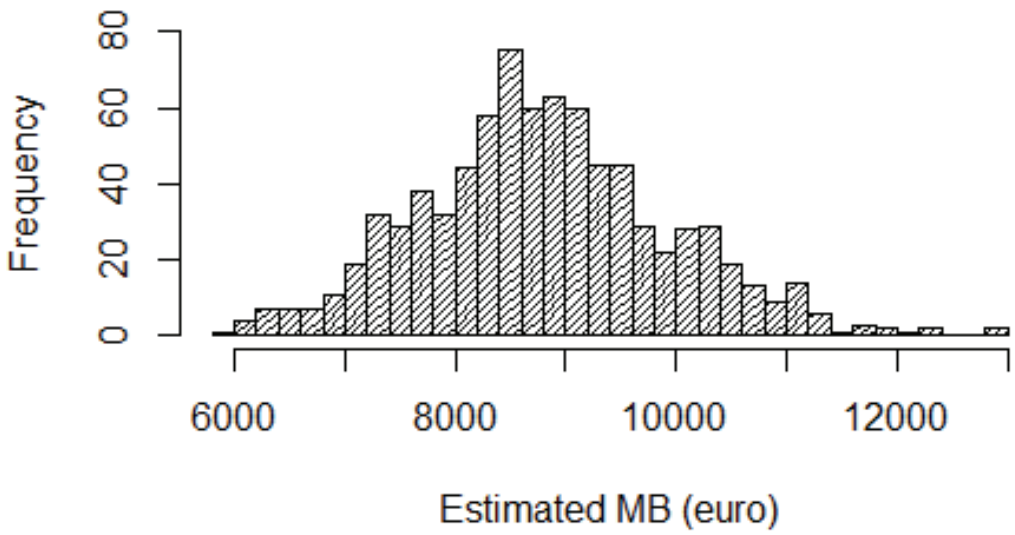

FIG. A.IV.2: HISTOGRAM OF ESTIMATE ANNUAL BUDGET FOR TARGET GROUP SAMPLE

APPENDIX V: CHOICE MODEL ESTIMATES

In this appendix the model estimates for all models is provided. In total, the results from three models are presented: mixed multinomial logit (MMNL; Table A.V.1), latent class (LC; Table A.V.2), and car first (CF; Table A.V.3). For each model I provide the estimated mean and the time-series corrected standard error (s.e.) of the mean of each parameter in the model. Furthermore, since all models are random parameter models, I provide the standard deviation (s.d.) of the individual level estimates. At the end of each table I provide the number of parameters, number of individuals and the number of iterations used for the parameter estimates, which is just a fraction of the total iterations used.

TABLE A.VI.1: THE MIXED MULTINOMIAL LOGIT MODEL

	Mixture model			**Linear amount**			**Quadratic amount**		
parameter	mean	s.e.	s.d.	mean	s.e.	s.d.	mean	s.e.	s.d.
B1	-16.92	0.36	52.11	4.67	0.06	18.54	16.02	0.19	50.27
B2	-6.07	0.28	65.27	-7.37	0.12	41.66	-3.61	0.13	32.08
B3	-17.99	0.33	66.08	-16.69	0.17	29.17	-5.68	0.15	28.65
B4	5.47	0.32	55.82	5.88	0.15	32.80	1.79	0.17	35.44
B12	-8.23	0.21	47.09	-2.99	0.19	37.81	4.52	0.16	42.32
B13	9.71	0.30	49.50	2.09	0.26	36.87	1.37	0.29	46.84
B14	-0.63	0.26	63.79	9.53	0.18	57.60	4.78	0.38	60.93
B15	2.49	0.11	40.09	-7.67	0.21	45.88	0.37	0.22	42.67
B23	19.68	0.16	70.55	16.36	0.14	58.57	18.95	0.34	54.53
B24	-6.45	0.17	35.22	3.60	0.14	34.30	1.07	0.09	19.63
B25	-16.31	0.34	64.60	-19.69	0.25	65.03	-13.57	0.22	55.48
B34	-12.16	0.33	94.72	2.94	0.19	55.76	-2.55	0.12	44.12
B35	4.69	0.40	72.51	8.44	0.40	70.12	-2.20	0.30	41.35
B45	23.42	0.33	83.48	17.25	0.42	91.77	3.87	0.15	32.40
n.iter	2500								
n.ind	817								
pars	42								

TABLE A.V.2: THE LATENT CLASS MODEL

	Class1			Class2		
parameter	mean	s.e.	s.d.	mean	s.e.	s.d.
B1	-1.87	0.20	1.51	-41.00	0.81	1.02
B2	-1.32	0.14	2.38	-14.86	0.36	0.65
B3	-7.41	0.13	2.64	-45.37	0.31	1.05
B4	11.50	0.45	1.44	7.73	0.29	0.64
B12	-10.10	0.16	1.00	-2.90	0.36	0.60
B13	-6.73	0.50	0.90	14.38	0.64	0.82
B14	0.70	0.17	0.83	-3.71	0.69	0.58
B15	26.98	0.72	0.92	45.17	0.18	0.62
B23	4.95	0.16	0.95	0.95	0.64	0.65
B24	-7.37	0.69	0.62	15.07	0.79	0.59
B25	9.78	0.64	0.86	-33.51	0.50	0.64
B34	7.81	0.69	0.86	13.71	0.65	0.63
B35	20.31	0.13	1.04	26.37	0.55	0.63
B45	-10.16	0.23	0.72	44.76	0.25	0.71
B1a	23.76	0.13	1.40	-41.17	1.07	1.08
B2a	-1.43	0.27	1.90	-1.69	0.58	0.68
B3a	1.44	0.23	2.23	-45.91	1.05	1.07
B4a	5.31	0.12	1.24	24.92	1.54	0.63
B12a	18.76	0.18	0.85	-4.03	0.16	0.64
B13a	13.38	0.22	0.82	-9.67	0.31	0.78
B14a	-0.57	0.27	0.81	2.70	0.22	0.60
B15a	-18.84	0.25	1.00	64.42	1.15	0.63
B23a	-11.99	0.86	0.89	41.51	1.14	0.61
B24a	-1.84	0.32	0.66	8.30	0.45	0.58
B25a	-20.10	0.20	0.81	-13.64	1.39	0.60
B34a	-7.79	0.28	0.70	19.67	0.93	0.63
B35a	-19.95	0.17	0.86	40.45	0.32	0.63
B45a	-2.96	0.28	0.72	1.46	0.34	0.60
θ	*0.39*	*0.00*				
n. iter	10000					
n. obs.	817					
n. par	57					

TABLE A.V.3: STEP ONE OF THE CAR FIRST MODEL

parameter	mean	s.e.	s.d.
B1	91.58	1.17	117.04
B1.other	70.76	0.70	115.66
B1a	-45.29	0.77	56.90
B1.othera	-28.68	0.55	37.34
$B1a^2$	-16.64	0.31	23.67
$B1.othera^2$	-66.35	1.29	95.32
n. iter	1000		
n. obs.	817		
n. par	6		

Note: other = x2+x3+x4+x5 ≠ x1

TABLE A.V.4: STEP TWO OF THE CAR FIRST MODEL

parameter	mean	s.e.	s.d.
B2	-11.89	0.14	17.30
B3	-10.69	0.35	14.62
B4	7.76	0.25	16.41
B23	0.09	0.13	12.72
B24	9.05	0.14	11.81
B25	-0.10	0.45	12.83
B34	0.62	0.23	13.20
B35	4.50	0.26	14.56
B45	3.62	0.38	20.11
B2a	2.45	0.10	18.69
B3a	-2.96	0.54	8.20
B4a	16.83	0.15	18.09
B23a	1.69	0.40	17.65
B24a	2.41	0.68	12.40
B25a	2.52	0.62	13.23
B34a	2.79	0.19	14.30
B35a	5.58	0.24	13.90
B45a	2.79	0.25	12.58
$B2a^2$	-4.00	0.28	14.36
$B3a^2$	-3.96	0.23	14.30
$B4a^2$	6.14	0.12	12.98
$B23a^2$	0.02	0.30	10.49
$B24a^2$	-3.99	0.33	13.31
$B25a^2$	-9.29	0.39	20.78
$B34a^2$	-0.01	0.15	15.84
$B35a^2$	2.57	0.69	18.04
$B45a^2$	-3.44	0.34	16.77
n. iter	1000		
n. obs.	295		
n. par	27		

APPENDIX VI: LIST OF PUBLICATIONS

In this appendix I provide an overview of publications I contributed to during my time as a PhD-candidate at the University of Antwerp.

Academic Journals (peer-reviewed)

Zijlstra, T., Vanoutrive, T., Verhetsel, A. (2015) A meta-analysis of the effectiveness of park-and-ride facilities, *European Journal of Transport and Infrastructure Research*, 15, 4, pp. 597-612

Verhetsel, A., Kessels, R., Goos, P., Zijlstra, T., Blomme, N. and Cant, J. (2015) Location of logistics companies: a stated preference study to disentangle the impact of accessibility, *Journal of Transport Geography*, 42, pp. 110-121

Verhetsel A., Kessels R., Zijlstra, T. and Van Bavel, M. (2016) Housing preferences among students: collective housing versus individual accommodations? A stated preference study in Antwep (Belgium), *Journal of Housing and the Build Environment*, first online; not jet assigned to an issue

Vanoutrive, T. and Zijlstra, T. (forthcoming) Who has the right to travel during peak hours? On congestion pricing and 'desirable' travelers, *Transport Policy*, accepted with changes

Zijlstra, T., Laine, B., and Van Steenbergen, A. (forthcoming) Mode choice bias for company car owners in Belgium, *European Transport Research Reviews*, accepted with changes

Conference papers

Zijlstra, T., and Vanoutrive, T. (2013) De economische motor: over normatief taalgebruik in transportplanning, Reniers, S. et al. (eds.) *Planning is niet waarde-n-loos*, Stichting planologische discussiedagen, Antwerpen, pp. 91-100

Zijlstra, T. Vanoutrive, T., Verhetsel, A. (2013) Designing a park and ride scheme : location and public transport mode, Hesse, M (eds.) *Proceedings of BIVEC transport research days 2013*, University Press, Walferdange, pp 343-351

Zijlstra, T., Vanoutrive, T. and Verhetsel, A. (2014) Pendelpijn: over reistijd en welzijn, *Colloquium Vervoersplanologisch Speurwerk*, 20-21 November 2014, Eindhoven, The Netherlands, www.cvs-congres.nl/cvspdfdocs_2014/cvs14_056.pdf

Vanoutrive, T. and Zijlstra, T. (2014) Piekethiek: over het recht op rijden tijdens de spits, *Colloquium Vervoersplanologisch Speurwerk*, 20-21 November 2014, Eindhoven, The Netherlands, www.cvs-congres.nl/cvspdfdocs_2014/cvs14_004.pdf

Zijlstra, T. (2015) A no choice option in discrete choice experiments: a case study of the mobility budget, Rasouli, S. and Timmermans, H. (eds.) *Proceedings of BIVEC transport research days 2015*, University Press, Eindhoven, pp 161-167

Vanoutrive, T. and Zijlstra, T. (2015) Rail, rights and road pricing. Rasouli, S. (eds.) *Proceedings of BIVEC transport research days 2015*, University Press, Eindhoven, pp 261-270

Zijlstra, T. (2016) Exploring heterogeneity in electric bicycle preferences of Flemish commuters, Extended abstract, in: Cappelle, J. And Motoasca, E. (eds.) *The First International workshop of electric bicycle commuting*, WEBike 2016, June 9-10, Ghent, Belgium, pp. 33-34

Transport Policy Research Papers

Zijlstra, T., Vanoutrive, T. and Verhetsel, A. (2014) De effectiviteit van park + ride: een meta-analyse van park+ride gebruik, Beleidsondersteunende paper, D/2014/11.528/3, Steunpunt Goederen en Personenvervoer, Antwerpen

Verhetsel, A., Vanoutrive, T. and Zijlstra, T. Het woon-werkverkeer in Vlaanderen: zoektocht naar indicatoren, D/2014/11.528/4, Steunpunt Goederen en Personenvervoer, Antwerpen

Zijlstra, T., Vanoutrive, T. and Verhetsel, A. (2014) Het mobiliteitsbudget: een verkenning, beleidsondersteunende paper, D/2014/11.528/1, Steunpunt Goederen en Personenvervoer, Antwerpen

Zijlstra, T., Goos, P., Vanoutrive, T. and Verhetsel, A. (2015) Keuzegedrag van bedrijfswagenrijders binnen het mobiliteitsbudget, Beleidsondersteunende paper, D/2015/11.528/5, Steunpunt Goederen en Personenvervoer, Antwerpen

Zijlstra, T. Vanoutrive, T. and Verhetsel, A. (2016) Indicator wonen-werken. Beleidsondersteunende paper, D/2016/11.528/5, Steunpunt Goederen en Personenvervoer, Antwerpen

Journals and Magazines (no-peer review; editorial review)

Zijlstra, T. and Vanoutrive, T. (2014) De bloedsomloop van de economie, *Agora*, 30, 2, pp. 13-16

Langstraat, F. and Zijlstra, T. (2014) Gefixeerd op techniek, *Agora*, 30, 2, pp. 22-26

Zijlstra, T. and Vanoutrive, T. (2016) Opgelet met het mobiliteitsbudget, *Oikos,* 78, 3, pp. 53-61