Housing preferences among students: collective housing versus individual accommodations? A stated preference study in Antwerp (Belgium)

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ABSTRACT

Collective housing or cohousing has gained popularity in the housing market because it promotes social, economic and environmental sustainability, and contributes to a better quality of life. While young professionals are increasingly choosing for peer-shared housing, student expectations are increasing with regard to personal space and comfort. Following the massive expansion of the student population, private sector developers have recently become more involved in the student accommodation market providing high standard expensive single person flats. Responding to a lack of attention to student housing preferences in both student housing and cohousing research, this study aims to discover housing preferences of Belgian students with a focus on the relative importance they attach to private versus shared amenities. We carried out a stated preference experiment among students in higher education in Antwerp. Our results show that the main point of interest for the majority of the students is the type of housing, followed by rent and size. Regarding the type of housing, a studio flat is the most preferred accommodation, while living in a student room in the same house as the landlord the least preferred. Hence, our results show a high preference for private facilities. We conclude that private investors are actually responding to current student preferences. As their high standard student housing projects are easy to construct, maintain and organise, we expect more of them in the near future. However, the willingness to pay of university students is significantly lower than that of university college students who study one or two years less. Consequently, a demand for a diversified student housing market will presumably persist.

Keywords: Student housing, Cohousing, Housing preferences, Stated preference experiment, Belgium, Antwerp

1. FROM COLLECTIVE HOUSING TO INDIVIDUAL ACCOMODATION?

Cohousing outside the student environment has become increasingly common due to various social evolutions, ranging from growing living costs and space scarcity to an aging population and shrinking household sizes. Despite this growing prominence of cohousing in housing markets, within the student housing market – a market in which collective forms of living have always existed to various degrees (ranging from institutional or privately owned student residencies to student-organised house sharing) – there are indications that growing groups of Flemish students prefer individual amenities. According to the 'Guide for Antwerp Landlords', students increasingly prefer single accommodation (i.e. flats and studio flats), but the traditional student room remains popular (Meeuws, 2011). The housing service of the Catholic University of Leuven states that only 15% of their non-commuter students opt for a studio flat (Huisvestingsdienst KULeuven, 2012). In Ghent, although the majority of the students still opt for a traditional student room, a quarter of the students cohabit, while another quarter opt for a studio flat (Stad Gent, 2012). Belgian students are not alone in their higher expectations regarding student housing: in other countries too students are reported to have increasing housing demands (Reeves La Roche et al., 2010). This may not be surprising considering that cohousing entails a number of drawbacks. Cohabitants need to put in time and effort for decision-making, negotiate economic, social, cultural and individual differences, and relinquish a degree of freedom and privacy.

In line with indications that a growing number of students prefer individual amenities, we currently observe a string of private sector initiatives towards individualized student living, mainly in studio flats. Although such projects certainly represent progress in terms of comfort (with regard to sanitary and kitchen facilities, energy usage, technological equipment, and meeting the increasingly stringent governmental requirements), one could question the rising living costs and reduced social dimension associated with individualized student housing. On the other hand, the contemporary increase in high quality and hence more expensive private sector student housing may actually encourage part of the student population to opt for shared accommodation in order to lower housing expenses, as has been argued by the 'Flemish Association of Students' (Vlaamse Vereniging van Studenten, 2011).

Consequently, a number of contradictory statements on student housing preferences circulate. We carried out a stated preference experiment among students in higher education in Antwerp

in order to come to a more thorough understanding of the complexity of student housing preferences and the desirability of cohousing within these preferences. Central to our research is the question: what are the preferences of students in Antwerp with regard to communal living facilities, location, size, cost, housing type and design, and to what degree are students prepared to pay for these attributes? Consequently, we examine whether students desire this evolution towards individualized living supported by the private market.

In Section 2, we continue this article with a literature review about cohousing and student housing in order to provide a better understanding of the backdrop against which this research is set and to indicate the gap in the literature this research addresses. In Section 3, we explain the design and modeling approach of the stated preference experiment. Section 4 presents the modeling results quantifying the preferences and the willingness to pay. Finally, in Section 5, we discuss the results and make suggestions for policy initiatives.

2. COLLECTIVE HOUSING AND STUDENT HOUSING PREFERENCES

Cohousing is an umbrella term used for various types of collective housing. The degree of communality is determined by the amount and nature of the cohabitants' shared spaces, facilities and activities and influenced by the community's legal and financial structure, and the expectations, social involvement and attitudes of the residents (Dubois, 2004; Jonckheere et al., 2010). Cohousing takes various shapes within different national contexts. It has gained popularity in the housing market because it promotes social, economic and environmental sustainability, and contributes to a better quality of life (Choi, 2004). As a "community-oriented housing format combining a reduction of private space with enhanced shared spaces and facilities" (Crabtree, 2005, p. 335), cohousing both enjoys "the autonomy of private dwellings and the advantages of community living" (Williams, 2005a, p. 146). It offers a sense of community and increased levels of social interaction. It induces stronger support networks as well as safety and security (Williams, 2005b). Furthermore, the "use of shared facilities allows for smaller, and therefore more affordable, individual units" (Calfee and Weissman, 2012, p. 6), "offering people more environmentally friendly, economically cheaper and socially sustainable ways of living" (Bergman et al., 2007, p. 11).

Mainly young professionals and families in the Scandinavian countries who sought a new urban living model and a more humane housing environment, initiated the cohousing movement in

the 1960s (Choi and Paulsson, 2011; Tchoukaleyska, 2011). Since the 1970s, the concept has spread to other parts of Europe, North America, Australia and Japan and to different groups in society. Evolving from the original left-wing political and 'counter draft' intentions in the early years, cohousing attitudes moved towards a focus on individual self-fulfilment outside the core family and towards an increasingly social and/or ecological orientation. From the 1980s and 1990s onwards, flat sharing subsequently functioned as an alternative and rather 'normal' housing option for young adults who left the parental home (Steinführer and Haase, 2009).

Scholars have studied the benefits of cohousing regarding safe spaces to play for children, the reduction of time spent on household tasks and the creation of a supportive infrastructure for care giving (Brenner and Haaken, 2000). Although the overall housing stock for the elderly who live in cohousing communities is rather marginal, a vast amount of research has focused on senior cohousing initiatives that have started to surface in diverse contexts in the 1980s (Bamford, 2005; Glass, 2009). Senior cohousing provides a solution to an aging society, by safeguarding seniors from poverty and loneliness and by providing an incentive to a prolonged active and independent lifestyle (Baars and Thomése, 1994; Brenton, 1999). Moreover, elder cohousing may provide seniors with safety and comfort through being part of a community (Glass, 2013). In Germany, the Mehrgenerationenhäuser (houses shared by multiple generations) appears as a successful civil society initiative already embedded in the housing market (Nagel et al., 2011; Kehl and Then, 2013).

Many scholars have also studied the housing practices of young people and found that these are characterized by shared housing (Rugg et al., 2004; Hubbard, 2009; Munro and Livingston, 2012). In England, people under 30 are increasingly likely to share their housing facilities as shown, for example, by their dominance in the privately rented shared housing market. "Shared living has traditionally been associated with students […] and economically constrained single young adults" (Heath and Kenyon, 2001, p. 87). "However, there is also a growing association between shared housing and relatively affluent single young people" (Kenyon and Heath, 2001, p. 620). Opting for a shared household may initially have stemmed from economic constraints, but it may also constitute a lifestyle choice and even an alternative 'family of choice' (Heath, 1999). Similarly, lifestyle and attitudes may have led to a change in car use and the phenomenon of "peak car". This states that car use has peaked and has now been falling in a sustained manner. Particulary young people in urban centres appear to be less car-dependent and prefer to live in the city centre as a result (Schwanen and Mokhtarian, 2005; De Vos et al., 2012).

However, the literature on cohousing suffers from a lack of attention to student populations. This may be due to the fact that some stricter definitions of cohousing do not consider communal forms of student housing as collective housing, because the students do not own nor manage the property and are not involved in establishing the housing community. Nevertheless, it could be argued that the student housing market is characterized by longstanding traditions of collective housing, ranging from institutional or privately owned student residencies to student-organised house sharing. The boundaries between the different forms of collective housing are not easily drawn, but rather constitute a continuum in which students – because of the temporary nature of their housing requirements – usually live within looser forms of cohousing.

Interestingly, while young professionals are increasingly choosing for peer-shared housing, student expectations are increasing with regard to personal space (Devlin et al., 2008). Unlike previous generations, who were used to sharing a bedroom and bathroom in residence halls, students have recently developed higher expectations with regard to their student housing. No longer willing to live in formal supervised settings and looking for more privacy and comfort, students are willing to pay an additional fee for certain amenities (Balogh et al., 2009; Reeves La Roche et al., 2010). Following the massive expansion of the student population, institutions of higher education are no longer able (or willing) to accommodate them and private sector developers have become more and more involved in the student accommodation market (Macintyre, 2003; Bromley, 2006; Hubbard, 2009). The "provision of accommodation for students has become rather more a commercial creature and rather less an ancillary aspect of a total education experience" (Hughes and Davis, 2002, p. 143). Investors are thought to respond to student preferences and this "is leading to new forms of privately rented accommodation which contrasts markedly with the traditional 'student house' – i.e. a privately rented 'house in multiple occupation' (HMO) let to three or more unrelated tenants who share facilities" (Hubbard, 2009, p. 1904).

In order to understand why the student population – characterized by a long history of cohousing – is increasingly opting for individualised housing within a context of new groups in society actually turning to collective housing, we need to understand student housing preferences. Existing literature on student housing preferences indicates proximity to the campus as the main reason for choosing a residence, followed by the rent and the quality of the

accommodation (Garmendia et al., 2012). Students like to live within easy walking distance of their university in order to keep travel costs low. Proximity to the city centre, good public transport links, proximity to local shops and facilities, security and the closeness of other students were also thought to be important attractions (Rugg et al., 2004; Allinson, 2006). Students for whom the quality of housing is a priority may prefer to live farther from the campus and closer to the city centre. But the closer a student accommodation is located to the campus, the more intense studentification is thought to be (Garmendia et al., 2012). The role that private versus shared amenities play in student housing preferences has remained unexamined.

This study aims to discover whether the mainly Anglo-American observations hold for the Belgian housing market. Moreover, by examining whether Flemish students prefer shared or individual living accommodation and the motivation behind their preferences, the focus of our research on collective housing is an important novelty in the student housing literature. Up to now "flat sharing as both a housing type and living arrangement is highly under-researched" (Steinführer and Haase, 2009, p. 573). Within student housing research, there has been a lack of attention to student housing preferences and the extent to which students are willing to pay for certain amenities. Some scholars do take student housing preferences into consideration, but do so from the point of view of institutions, letting and selling agents and developers, thus neglecting students' opinions. A few exceptions can be found in the works of Chatterton (1999), Steinführer and Haase (2009), Khozaei et al. (2011), Garmendia et al. (2012) and Nijënstein et al. (2015). However, our research distinguishes itself from previous work because of its focus on student housing preferences and the position of private versus shared amenities in these preferences using a stated preference experiment. Consequently, it represents added value to previous student housing research.

3. SETUP OF THE STATED PREFERENCE EXPERIMENT

3.1 Student housing market in Antwerp

In Antwerp, the absolute number of students has increased from 27,000 in 2004 to 40,000 in 2012 (Stad Antwerpen, 2011). The student housing market has grown from about 7,000 rooms in 2004 to 10,000 in 2012. This means that approximately 10,000 students live in student flats, which is not a significantly high number considering Antwerps 500,000 citizens (Meeuws, 2011). Yet, the Antwerp student population has been increasing tremendously and student housing has come under great pressure after several educational institutions moved to the city

centre (around 2005 the university decided to relocate the masters in humanities from the peripheral campus to the city center). This led to an increasing demand in affordable and high quality student housing in particular areas of the city. This is not a development unique to Antwerp. All the Flemish university cities are currently dealing with student housing shortages (Luysterman, 2011). As a consequence, the price of a student flat has increased by approximately one third between 2005 and 2010 (Telen, 2011).

The average rent of a student flat in Antwerps city centre amounts to approximately 270 euros a month. Student flats in this rent range are almost immediately occupied, but more expensive flats are rather popular too. An example of a successful, yet more expensive student housing project can be found in the recently constructed 'K-building' in the Keizerstraat (Vermeiren, 2011). The K-building consists of 123 luxurious student flats, each furnished with a bed, wardrobe, desk with chair and bookshelf, private bathroom, private kitchen, a flat screen television and internet connection. The monthly rent for the least expensive flat amounts to 380 euros, while the most expensive one, a double room with a courtyard view, amounts to 550 euros. It seems that the more affordable and high quality student flats in the city centre are almost immediately taken. Therefore, students have to act fast or settle for a higher rent or a flat of lower quality (Vermeiren, 2011).

Consequently, the city of Antwerp has an integrated policy on student housing. The objective is to offer high quality, safe and affordable houses, apartments, studio flats and rooms for students. Therefore, the 'Flemish Housing Code' and the 'Antwerp Building Code' have imposed standards for student housing. Moreover, in order to improve on the spatial organisation of student housing, the city has implemented an index for student housing density, i.e. 'the comparison between the number of student rooms and the amount of registered citizens, at building block level and expressed as percentage'. This means that no additional student housing can be created once the student housing density in a particular area of the city has been reached. The maximum allowable density amounts to 20%. However, this number does not apply to buildings that are found within 400 metres of the university or the university colleges. In these cases, the maximum allowable density equals 40%. The largest density of students living in Antwerp can be found in or near the centre (see **Figure 1**). Obviously, the traditional student district is located around the university's city campuses and several university college campuses (Meeuws, 2011).

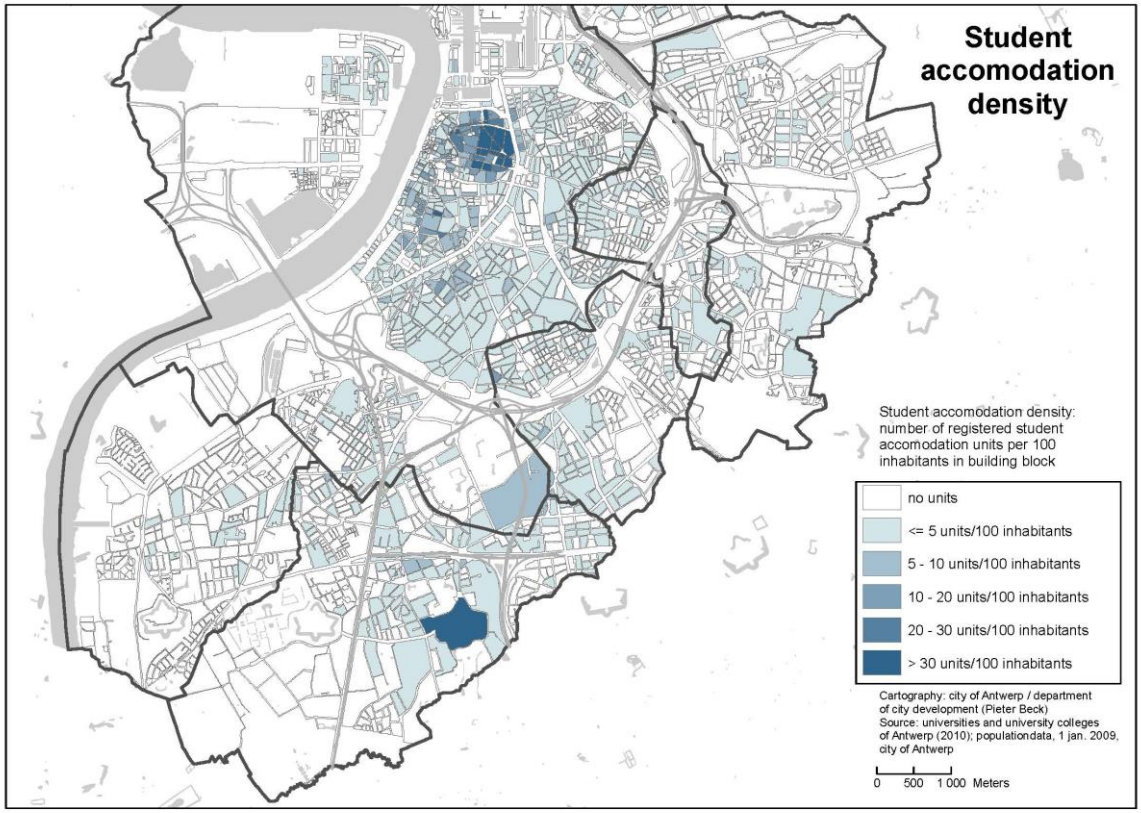

Figure 1: Student housing concentration in the city of Antwerp (2010).

3.2 Design of the stated preference experiment

We carried out a stated preference experiment to quantify the student housing preferences in the city of Antwerp. A successful stated preference experiment requires a proper selection of the attributes and their levels which have to fit the respondents' experiences and the survey's objectives. Six relevant attributes have emerged from academic literature: rent, distance to the campus, shared or private facilities, building type, size of the room and whether or not the room is furnished. The *rent* corresponds to the monthly rent (based on a twelve month contract) of the flat including all fixed costs. Based on the rent ranges found on the online student housing database 'Kotweb-Antwerpen', we distinguished the following rent levels: less than 250 euros, 300 euros, 350 euros, 400 euros and more than 450 euros (Stuvant, 2011). The *distance* of student housing to the campus is the walking distance (in minutes) between the location of the room and the educational institution. According to Jochems (2011), the majority of Antwerp students (79.3%) spend 0 to 15 minutes walking from their flat to their educational institution. A small group of students declared that they need more than 30 minutes to walk from their flat to their educational institution (7.3%). For the students in Antwerp, we defined the following five distance levels: less than 5 minutes, 10 minutes, 15 minutes, 20 minutes, and more than 25

minutes. With regard to *facilities*, our experiment distinguishes between two types of student housing, i.e. self-contained rooms (flats and studio flats) and non-self-contained rooms. The difference depends on whether or not the basic facilities (kitchen, bathroom) are shared. As there is a shared seating area in most types of student housing, this aspect will also be taken into consideration. We can distinguish four levels in the range of facilities shared: from no shared facilities, to only a shared seating area, to a shared seating area and kitchen, and finally, to sharing all facilities including sanitary. The *building type* can be classified as either a room in the same building as the homeowner, a room in a house with students only, a room in a student residence or a studio flat. The attributes *facilities* and *building type* are, however, not independent. Some building types do suggest a high level of private facilities and vice versa. As a result, we combined these attributes into one attribute in the design of our experiment. The new attribute is called *type*. The *size* of a student flat is the surface of the private area. To define the different levels for this attribute, the standards imposed by the Antwerp Building Code must be taken into account. A new building or a renovation of an existing building consists of a minimum surface of 30m². However, there are a number of student rooms with a surface of less than 12m². For the sake of completeness, our experiment will also take a range of categories between 12m² and 30m² into account. Lastly, as for the binary attribute *furnished*, a furnished room is a room with all the necessary furniture, such as a desk with a chair, a bed and a wardrobe. **Table 1** provides an overview of the five attributes and their levels used in the experiment.

Table 1: Attributes and levels included in the stated preference experiment.

Attribute (units)	Level
Rent (euros)	Less than 250 300 350 400 More than 450
Distance (minutes walking)	Less than 5 10 15 20 More than 25
Type	1: Studio flat; no shared facilities 2: Studio flat; only a shared seating area 3: Room at landlord; shared seating area and kitchen, private sanitary 4: Room in house with only students; shared seating area and kitchen, private sanitary 5: Room in residence; shared seating area and kitchen, private sanitary 6: Room at landlord; all facilities shared 7: Room in house with only students; all facilities shared 8: Room in residence; all facilities shared
Size (m and total m²)	Less than 3 by 4 (12m²)

	4 by 4 (16m²) 4 by 5 (20m²) 5 by 5 (25m²) More than 5 by 6 (30m²).
Furnished	Furnished Not furnished

The stated preference experiment presented respondents with 22 choice situations of two alternative student housing accommodations, termed "profiles" henceforth. The profiles are combinations of levels of the five attributes in **Table 1**. To limit the cognitive burden imposed on the respondents, we used "partial profiles" (Green 1974; Kessels et al. 2011a, 2015); i.e. we varied the levels of only three of the five attributes in the choice situations and kept the levels of the other attributes constant. However, the attributes whose levels are held constant differ across choice situations. Partial profiles therefore also prove useful to help prevent respondents from using simplifying lexicographic decision rules. We did show the constant attributes to the respondents because this improves the validity of the parameter estimates (Dellaert et al., 2012). To facilitate the choice tasks, we split the combined attribute 'type' back into its original attributes 'building type' and 'facilities', and highlighted the varying attributes in each choice situation in bold. **Figure 2** shows an example choice situation in which respondents had to choose between two profile accommodations A and B.

Figure 2: Screenshot of a choice situation used in the stated preference experiment.

Example of a choice situation involving one alternative (Kot A) which is located at 20 minutes walking from the campus, has a size of 20m², and a shared seating area and kitchen but private sanitary; and another alternative (Kot B) which is located at 10 minutes walking from the campus, has a size larger than 30m², and a shared seating area,

kitchen and sanitary. Both alternatives involve a room in a house with students only, are not furnished and cost more than 450 euros.

To maximize the information content of the stated preference experiment, we created two different surveys by constructing a partial profile design involving 44 choice situations and dividing it into two groups of 22 choice situations. **Appendix A** shows the two surveys, which were randomly spread among the respondents. Each choice situation of the partial profile design varies the levels of three of the attributes. We determined the varying attributes in every choice situation using the variance-balance partial profile design approach developed for attributes with differing numbers of levels (Kessels et al., 2015). Each of the two surveys varies the 2-level attribute 'furnished' in 7 choice situations, each of the 5-level attributes 'rent', 'distance' and 'size' in 13 or 14 choice situations and the 8-level attribute 'type' in 18 choice situations.

The variance balance approach of Kessels et al. (2015) builds on the rich literature on Bayesian D-optimal or D-efficient stated preference designs, which are increasingly considered state of the art (Rose and Bliemer, 2009; Bliemer and Rose, 2010; Kessels et al., 2011b,c). A key feature of the Bayesian D-optimal partial profile designs is that they take into account prior knowledge concerning the respondents' preferences. For our experiment, we know that respondents prefer low rents over high ones, prefer to have their rooms close to the educational institution, to have them larger rather than smaller and furnished rather than unfurnished. For the 8-level attribute 'type', however, we did not obtain clear prior information about the respondents' preferences. Additionally, we expected the attribute 'rent' to be more important than the attributes 'distance', 'size' and 'furnished'. In **Appendix B**, we explain how we cast all available prior information as well as the uncertainty regarding that information in a prior distribution. Bayesian D-optimal partial profile designs have successfully been used in other stated preference studies such as those by Verhetsel et al. (2015) and Kupfer et al. (2016).

The final questionnaire consisted of two parts. In the first part, we asked various general questions concerning the respondents' background. We also asked them whether or not they live or previously lived in a student room. If the respondent had given an affirmative answer, we asked him or her additional questions with regard to the room. In the second part, we asked the respondents to indicate their preferences towards the hypothetical rooms provided by the stated preference experiment. We spread the questionnaire online to the Antwerp student population, which amounted to 54,093 students. As we contacted the students through e-mail,

they established a form of self-selection. One could argue that only those respondents who were interested in the subject filled in the questionnaire, which would have led to a distorted result. As a counteraction, we offered the students movie tickets as an incentive. The data collection took up to three weeks, from March 2012 until mid-April 2012.

3.3 Modeling

The estimated model is a panel mixed multinomial logit (MMNL) model with integrated covariates. We included all five attributes with their levels in this model, and treated them as part-worth or categorical (effects coding). We assumed a normal distribution for all parameters attached to the attribute levels.

As estimation procedures, we used maximum simulated likelihood (MSL) and hierarchical Bayes (HB) estimation (Train, 2009). For the HB estimation, we set the prior variance of the HB model to 1 and the prior degrees of freedom to 1,000. In general, these settings imply that much information for the individual-level estimates is borrowed from the sample average. This is somewhat relaxed in our model through the use of covariates (see below) and 22 choice situations per individual, which is substantial. A stronger correlation with the sample average comes at the expense of a slightly lower goodness-of-fit. In the estimation, we used 100,000 iterations and saved 1 out of 50 iterations in the second half of the process (thinning = 50). We estimated the MSL and HB models in R software using the 'mlogit' package for the former model (Croissant, 2013) and the 'ChoiceModelR' package for the latter (Sermas, 2015). As for the integration of the covariates, we tested the effect of gender, age, university versus university college student, years of higher education, whether or not the student has experience with living in a student room (currently or in the recent past), and finally, whether the student's parents pay the rent or the student pays the rent him- or herself. We selected the significant covariates based on i) the sum of the absolute differences between the means of each parameter estimate for the different levels of the covariate and ii) the number of statistically significant parameter estimates from t-tests for the difference in the means.

Through stated preference studies, one is often able to estimate the Willingness to Pay (WTP). It calculates how much money students are willing to pay less or more for a certain change in student housing characteristics. The WTP can only be calculated if at least one attribute is expressed in a monetary unit (Hensher, 2005). In our case, the monthly rent of a room is expressed in euros, so that the WTP takes the following equation:

$$\text{WTP} = -\frac{\text{Difference in marginal value of two attribute levels}}{\text{Marginal value rent}}$$

4 RESULTS

4.1 Characteristics of the respondents

We obtained a response rate of about 6% from the roughly 40,000 Antwerp students we were able to contact. However, we kept only 1,047 complete and useful surveys. We removed the other surveys because they were not filled in completely, had been filled in too quickly (i.e. faster than the minimum completion time of 20 minutes), contained inconsistent answers or because the respondents did not belong to the target group (they were not university or university college students). Finally, we obtained 367 respondents to the first survey and 680 respondents to the second survey.

The first part of the questionnaire collected a number of general characteristics of the respondents: gender, age, educational career and housing history. 215 out of the 1,047 (20.5%) surveyed Antwerp students were men, 832 (79.5%) were women. Hence, significantly more women than men participated in the study. The average age of the surveyed respondents is 20.92 years (s.d.=2.83). There were more respondents from university colleges (N=742; 70.9%) than from university (N=305; 29.1%). This can be explained by the fact that there are many more university college students (N=27,458) than university students (N=12,023) in Antwerp (Agentschap voor Hoger Onderwijs, Volwassenenonderwijs en Studietoelagen, 2011). The respondents were mainly students in the field of Economics (N=265; 15.3%), followed by students in Political and Social Sciences (N=217; 12.6%). Our examination of the students' current training phase shows that most of them are in the first Bachelor year, while only 10% are Master students. Furthermore, we surveyed the housing history of the respondents: 406 students are currently living in a student room (38.7%) and 97 students (9.3%) have lived in one before. This means that 544 students (52%) are not living in a student room. The majority of the respondents have been living in a student room for one (N=125; 30.8%) or two years (N=104; 25.6%). When we inquired how they usually find a room, most respondents answered 'through friends or family'. Finally, a majority of the respondents indicated that their parents pay the rent.

4.2 Modeling results and WTP estimates

Compared to MSL estimation, HB estimation yields a much better goodness-of-fit for the panel MMNL model. For the HB model, the final log-likelihood is -5,638, and the initial log-likelihood -79,349. So, McFadden's pseudo R^2 (which is computed as 1 – the ratio of the log-likelihood values) is 0.93. In contrast, for the MSL model, McFadden's pseudo R^2 is only 0.32 and the final log-likelihood is -10,846. The root-likelihood (RLH) value for the HB model is 0.95, which suggests that in 95% of the choice situations the predicted outcome corresponds to the actual observed choice. This percentage would only be 50% in case of complete randomness, because there are two options in each choice situation of our experiment. Finally, the model is very stable. We obtained stability at 5,000 iterations after which improvements in goodness-of-fit were very modest.

Table 2 shows the marginal utility values of the attribute levels obtained from HB estimation and the significances of the attributes' effects obtained from associated likelihood ratio (LR) tests. The LR tests indicate that all five attributes are highly significant, meaning that they affect the choice of a student room. The attributes are ranked in order of importance, where the importance of an attribute is measured by the logworth statistic, i.e. $-\log_{10}$(p-value of the LR test) (JMP from SAS Institute, Cary, NC, USA). **Figure 3** shows the importance of the different attributes from MSL and HB estimation relative to the importance of the attribute 'type', which is the most important attribute for both estimation procedures. Also, the order of importance of the remaining attributes is the same for both procedures. The attribute 'rent' ranks second, followed by 'size', 'distance' and 'furnished'. Using the HB method, there is, however, a large discrepancy in importance between 'type' and the other attributes, which is not observed using the MSL method. This may be due to the fact that the HB method outperforms the MSL method in modeling the variation or heterogeneity in preferences with respect to 'type'.

Table 2: Panel MMNL model estimates using the HB method.

Attribute	Level	Est. mean	s.d.	χ2
Type	1	3.79	3.71	
	2	2.75	1.87	
	3	-1.36	2.00	
	4	2.05	1.27	43,409
	5	1.68	1.44	
	6	-4.96	2.08	
	7	-1.55	2.59	

	8	-2.40	2.48	
Rent (euros)	> 450	-5.75	3.05	
	400	-1.81	1.26	
	350	0.79	0.84	8,889
	300	2.01	1.56	
	< 250	4.75	2.53	
Size (m^2)	< 12	-4.03	1.98	
	16	-0.67	0.92	
	20	0.57	0.85	8,026
	25	1.63	1.17	
	> 30	2.50	1.40	
Distance (min)	> 25	-2.62	1.49	
	20	-0.26	1.01	
	15	0.31	0.87	4,818
	10	1.06	0.91	
	< 5	1.51	1.44	
Furnished	No	-0.65	1.37	1,409
	Yes	0.65	1.37	

Note: All numbers are significant at the 5% level.

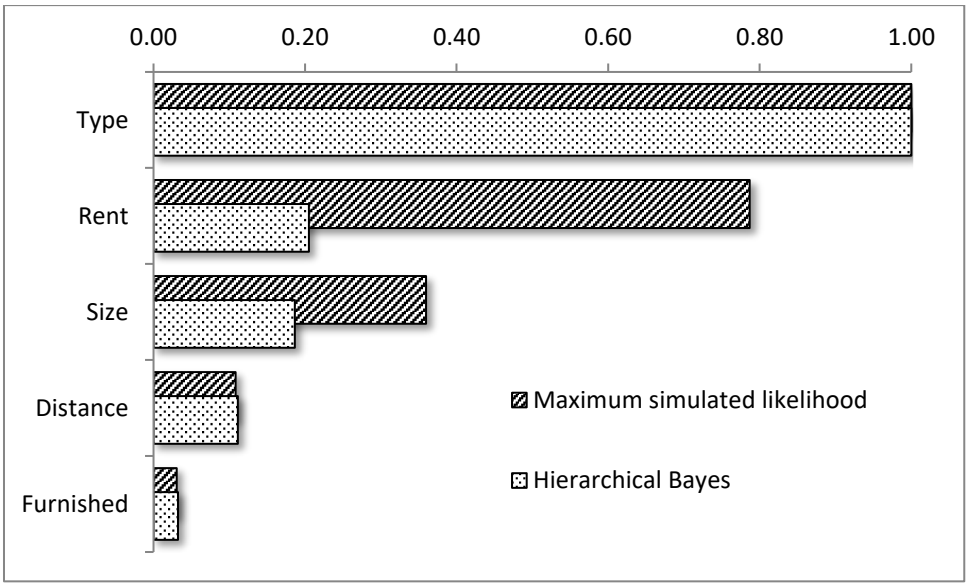

Figure 3: Relative importance of the five attributes.

The type of student housing is the main point of interest for the majority of the students. A studio flat is the most preferred type, while living in a student room in the same house as the landlord the least preferred. There is a high preference for private facilities. A studio flat with all facilities private has a higher marginal utility than a studio flat with a shared seating area (type 1 versus type 2). For all other building types, **Table 3** shows that private sanitary is preferred over all facilities shared. On average, the marginal utility decreases by 3.8 when

switching from private sanitary to all facilities shared. These results suggest that the preferred type of student housing is not student cohousing, but a studio flat or small apartment with private facilities.

Table 3: Mean marginal utilities (s.d.) for type of housing by building type and facilities.

	Facilities	
Building type	Private sanitary	All shared
Room at landlord	-1.36 (2.0)	-4.96 (2.1)
Student house	2.05 (1.3)	-1.55 (2.6)
Student residence	1.68 (1.4)	-2.40 (2.5)

As expected, the marginal utility for the monthly rent decreases with increasing rent levels: higher rents result in lower utility levels. This relationship is close to a linear relationship (R^2 = 0.97), which offers opportunities for WTP estimates (see below). Note that in the test for linearity, we assumed for ease of convenience that the open bounds of the range]< 250, > 450[can be interpreted as closed bounds [250, 450]. The slopes fitted on the individual-level part-worth estimates range from -0.118 to 0.048. About 69 respondents have a (nearly) flat line (with slopes between [-0.01, 0.01]), while for 7 respondents the slope is positive. The vast majority of respondents (97%) exhibit a negative slope.

The attributes ‘size’ and ‘distance’ are nonlinear. For the attribute ‘size’, there is a clear outlier for 12m^2, the smallest room size. This size is regarded as unacceptable for many students. For the attribute ‘distance’, the marginal utility for 25 minutes suddenly drops as if it crossed a threshold. So, a walking distance of more than 20 minutes might no longer be acceptable. However, students are not obliged to walk to the university. In fact, most students use a bicycle to get to the university (52%), while the second most important transport mode is walking (33%) (Jochems, 2011). The ability to cycle or to use public transport is a possible explanation for the limited relative importance of the attribute ‘distance’. Next, students might also be interested in other distances, like living close to the city centre, supermarket or train station. Furthermore, we observe a small preference for a furnished room compared to a non-furnished room. However, the s.d. is relatively large, which suggests preference heterogeneity or disinterest. The latter is supported by the relative small chi-square value in the LR test.

The estimates in **Table 2** are the mean utilities for the complete sample. They do not reveal any information with respect to the covariates. **Table 4** shows the mean utility estimates of the

models involving covariates that are significant: student with or without experience with living in a student room, university versus university college student, and the student's parents pay the rent or the student pays the rent him- or herself. In general, the covariates have a relatively small effect on the overall performance of our model (chi-square = 82). This is mainly due to the fact that the goodness-of-fit of the model without covariates is already excellent and hard to improve. We found the greatest differences in the mean estimates for the covariate 'pay rent', followed by 'experience' and 'education'. Whether or not the student pays the rent him- or herself turns out to be very important. However, in only 14 out of all 25 estimates the difference turns out to be significant. This is due to the limited number of students (142 out of 1,047) that have to pay for housing themselves. Note that the covariate on who pays the rent is actually only relevant for the students with student housing. We also observe that the preferences of students with experience with living in student housing differs from those without experience. This is mainly reflected in the choice of housing type. All differences for this attribute are significant. In general, we observe that the preferences of students with experience are less pronounced. These students are less inclined to reject cohousing and shared facilities. At the same time, they show a stronger price sensitivity. Finally, university students have a stronger preference for larger rooms. They more strongly reject the option of a room of 12m^2 or less.

Table 4: Mean panel MMNL model estimates for significant covariates.

		Experience		**Education**		**Pay rent**	
Attribute	**Level**	**No N=544**	**Yes N=503**	**University college N=742**	**University N=305**	**Parents N=905**	**Student N=142**
Type	1	4.33	3.20	*3.76*	*3.87*	*3.84*	*3.45*
	2	3.03	2.44	*2.68*	*2.91*	*2.75*	*2.71*
	3	-1.15	-1.59	*-1.32*	*-1.47*	-1.26	-2.00
	4	2.13	1.97	2.12	1.88	*2.06*	*1.99*
	5	1.86	1.49	2.00	0.93	1.76	1.19
	6	-5.32	-4.57	-5.12	-4.57	*-4.95*	*-5.05*
	7	-2.07	-0.98	-1.71	-1.15	-1.69	-0.60
	8	-2.81	-1.96	*-2.41*	*-2.39*	-2.51	-1.69
Rent (euros)	> 450	-5.13	-6.42	-5.44	-6.51	-5.55	-7.03
	400	-1.62	-2.01	-1.74	-1.98	-1.74	-2.24
	350	*0.80*	*0.79*	*0.76*	*0.87*	*0.80*	*0.78*
	300	1.65	2.41	1.84	2.44	1.94	2.51
	< 250	4.30	5.24	4.58	5.18	4.56	5.99
Size (m^2)	< 12	-3.92	-4.16	-3.77	-4.67	*-4.07*	*-3.81*
	16	*-0.64*	*-0.70*	*-0.67*	*-0.66*	*-0.68*	*-0.61*
	20	*0.59*	*0.56*	*0.55*	*0.63*	*0.55*	*0.69*

	25	1.55	1.72	1.49	1.97	1.67	1.36
	> 30	2.42	2.58	2.40	2.72	*2.52*	*2.37*
Distance (min)	> 25	-2.52	-2.73	*-2.67*	*-2.51*	-2.74	-1.89
	20	-0.17	-0.36	-0.20	-0.42	-0.23	-0.48
	15	0.24	0.38	0.37	0.16	0.36	-0.02
	10	*1.09*	*1.04*	*1.03*	*1.14*	*1.08*	*0.95*
	< 5	1.36	1.67	*1.46*	*1.64*	*1.52*	*1.43*
Furnished	No	*-0.59*	*-0.73*	*-0.63*	*-0.70*	-0.73	-0.15
	Yes	*0.59*	*0.73*	*0.63*	*0.70*	0.73	0.15

Note: Numbers in gray and italic indicate insignificant differences in the mean estimates at the 5% level.

Because the attribute 'rent' is monetary and its part-worth estimates are close to being linear, we can generate the WTP for a change from one housing situation to another. Using the marginal utility estimates of **Tables 2 and 3**, we find that students value a change from shared facilities to private sanitary at 69 euros in extra monthly rent. This is a median value, based on individual-level WTP estimates. The differences between the students are considerable: the 25% percentile amounts to 31 euros and the 75% percentile to 142 euros extra monthly rent.

In **Tables 5 and 6**, we present the median WTP estimates for a change in housing type and a change in room size. The matrices are symmetric in terms of absolute magnitude (i.e. anti(sym)metric or skew-symmetric), but this should be interpreted with some caution. In general, people show 'loss aversion' (Tversky and Kahneman, 1991), which implies that, for instance, a loss of 5m^2 of room size is valued more heavily (negatively) than a gain in room size in the opposite direction.

Table 5: WTP estimates (euros) for a change in type of student housing.

		TO							
	TYPE	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
FROM	**1**	–	-23	-97	-36	-40	-166	-101	-118
	2	23	–	-81	-9	-19	-146	-81	-100
	3	97	81	–	67	57	-67	1	-15
	4	36	9	-67	–	-8	-135	-66	-87
	5	40	19	-57	8	–	-121	-60	-77
	6	166	146	67	135	121	–	61	41
	7	101	81	-1	66	60	-61	–	-19
	8	118	100	15	87	77	-41	19	–

Table 6: WTP estimates (euros) for a change in room size.

		TO				
	SIZE (m^2)	**< 12**	**16**	**20**	**25**	**> 30**
	< 12	–	63	85	108	122
	16	-63	–	23	43	62
FROM	**20**	-85	-23	–	19	36
	25	-108	-43	-19	–	17
	> 30	-122	-62	-36	-17	–

5 CONCLUSION – POLICY RECOMMENDATIONS

In spite of longstanding traditions in cohousing amongst students, one can observe a shift in contemporary student housing practices towards individual dwellings with increased private comfort. Encouraged by growing student numbers, due to ever higher participation rates in higher education, private developers have entered into the market of student housing in unprecedented numbers. These developers mainly seem to opt for residences that are easy to construct, maintain and organise: i.e. single studio flats with private sanitary and kitchen facilities. One could argue that this evolution annihilates the social dimension of cohousing that has given student life its particular flavour in the past. Moreover, this observation raises the question whether this evolution has been inspired by developers' hopes to earn easy money, or, rather, whether developers are actually meeting contemporary student preferences. This research has explored the housing preferences of students through a stated preference exercise involving more than 1,000 students in Antwerp (Belgium).

All attributes of the stated preference experiment influence students' choices for housing. The type of housing (e.g. student house, residence studio flat) is the most important attribute in the selection process, followed by the rent and the size of the room. The distance to the campus and the presence or absence of furniture are relatively less important. With regard to the housing type, a studio flat is most desirable, while a room in a house shared with the landlord least desirable. Private facilities are high on the wish list. Therefore, we conclude that cohousing with shared facilities appears not to be the first choice among the Antwerp students.

Nevertheless, heterogeneity is present in the housing preferences of students. The priorities regarding the attributes and their levels might differ among students. An important nuance with respect to the preference for studios and private facilities can be made when looking at the experience with cohousing. About half of our sample actually lives in student housing. These

students are more positive towards cohousing and sharing facilities. On the other hand, studio flats might be more popular, they are also more expensive. Mainly because of the differences in costs, there is a future for the more traditional housing types. Consider, for example, the three realistic housing options below that could be found in Antwerp. On average, these options score about the same according to our model estimates. The total utility of each option, i.e. the sum of the marginal utilities, ranges from 0.77 to 0.93. This example illustrates that the future of student housing is not just unidirectionally focused on studios.

	Option 1	Option 2	Option 3
Type	Studio flat, no shared facilities	Room in residence, private sanitary	Room at landlord, all shared facilities
Rent	> 450 euros per month	400 euros per month	< 250 euros per month
Size	> 30m^2	16m^2	20m^2
Distance	20 minutes	10 minutes	10 minutes
Furnished	Yes	Yes	No

In summary, private developers mainly seem to accommodate the younger students who have enrolled for a bachelor degree only. Maybe their shorter student careers (three to four years) compensate for the relatively higher rents, which might be explored in further research. They prefer individual housing accommodations that provide higher levels of freedom and privacy. On the other hand, university students, who expect to study four to six years, seem to be looking for more traditional student housing options which incorporate some characteristics of cohousing. They are relatively less reluctant to opt for a housing situation where there is a need for decision making and negotiating skills with respect to financial, social, cultural and individual issues.

The private housing market provides high quality, safe, but rather expensive student housing facilities, while university boards remain less active in the student housing market. As student populations grow, urban policies are becoming more important. Such policies welcome the safe and high quality student housing provided by private developers. Up till now, cities mainly tackle the question of the high densities of student housing in particular neighbourhoods and the inconvenience this causes to the other inhabitants. However, the question remains with regard to the extent to which cities are willing to intervene to create environments for students that support ways of living that are more environmentally friendly, economically cheaper and socially sustainable. In conclusion, we believe that urban policies could benefit from supporting the creation of ‘families of choice’ that live in more affordable housing facilities, provide safety

and security, and present its inhabitants with fewer time spent on household tasks and a means against loneliness; options that contribute to living neighbourhoods.

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REFERENCES

Agentschap voor Hoger Onderwijs, Volwassenenonderwijs en Studietoelagen (2011). Hoger onderwijs in cijfers: Aantal inschrijvingen op 31 oktober 2011 Academiejaar 2011-2012, from http://www.ond.vlaanderen.be/hogeronderwijs/werken/studentadmin/studentengegevens/hoger_onderwijs_in_cijfers_2011-2012.pdf

Allinson, J. (2006). Over-educated, over-exuberant and over here? The impact of students on cities. *Planning Practice & Research*, 21/1, 79-94.

Baars, J. & Thomése, F. (1994). Communes of elderly people: Between independence and colonization. *Journal of Aging Studies*, 8/4, 341-356.

Balogh, C. P., Price, K. & Moser, R. (2009). ACUHO-I construction and renovation data: The latest trends in housing construction and renovation. *Journal of College & University Student Housing*, 36/2, 82-91.

Bamford, G. (2005). Cohousing for older people: Housing innovation in the Netherlands and Denmark. *Australasian Journal on Ageing*, 24/1, 44-46.

Bergman, N., Whitmarsh, L., Köhler, J., Haxeltine, A. & Schilperoord, M. (2007). Assessing transitions to sustainable housing and communities in the UK. Glasgow: International Conference on Whole Life Urban Sustainability and its Assessment.

Bliemer, M. C. J. & Rose, J. M. (2010). Construction of experimental designs for mixed logit models allowing for correlation across choice observations. *Transportation Research B*, 44/6, 720-734.

Brenner, J. & Haaken, J. (2000). Utopian thought: Revisioning gender, family and community. *Community, Work & Family*, 3/3, 333-347.

Brenton, M. (1999). Co-operative living arrangements among older women. *Local Environment: The International Journal of Justice and Sustainability*, 4/1, 79-87.

Bromley, R. (2006). On and off campus: Colleges and universities as local stakeholders. *Planning Practice & Research*, 21/1, 1-24.

Calfee, C. & Weissman, E. (2012). Permission to transition: Zoning and the transition movement, planning and environmental law. *Planning & Environmental Law: Issues and decisions that impact the built and natural environments*, 64/5, 3-10.

Chatterton, P. (1999). University students and city centres: the formation of exclusive geographies. *Geoforum*, 30/2, 117-133.

Choi, J. S. (2004). Evaluation of community planning and life of senior cohousing projects in northern European countries. *European Planning Studies*, 12/8, 1189-1216.

Choi, J. S. & Paulsson J. (2011). Evaluation of common activity and life in Swedish cohousing units. *International Journal of Human Ecology*, 12/2, 133-146.

Crabtree, L. (2005). Sustainable housing development in urban Australia: Exploring obstacles to and opportunities for ecocity efforts. *Australian Geographer*, 36/3, 333-350.

Croissant, Y. (2013). Estimation of multinomial logit models in R: the mlogit packages. Version 0.2-4. Saint-Denis: Université de la Réunion.

Dellaert, B. G. C., Donkers, B. & van Soest, A. (2012). Complexity effects in choice experiment-based models. *Journal of Marketing Research*, 49/3, 424-434.

Devlin, A. S., Donovan, S., Nicolov, A., Nold, O. & Zandan, G. (2008). Residence hall architecture and sense of community: Everything old is new again. *Environment and Behavior*, 40/4, 487-521.

De Vos, J., Derudder, B., Van Acker, V. & Witlox, F. (2012). Reducing car use: changing attitudes or relocating? The influence of residential dissonance on travel behavior. *Journal of Transport Geography*, 22, 1-9.

Dubois, A. (2004). Wonen anders bekeken. Onderzoek rond woongemeenschappen, from http://www.samenhuizen.be/docs/dubois_deel1.pdf

Garmendia, M., Coronado, J. M. & Ureña, J. M. (2012). University students sharing flats: When studentification becomes vertical. *Urban Studies*, 49/12, 2651-2668.

Glass, A. P. (2009). Aging in a community of mutual support: The emergence of an elder intentional cohousing community in the United States. *Journal of Housing For the Elderly*, 23/4, 283-303.

Glass, A. P. (2013). Lessons learned from a new elder cohousing community. *Journal of Housing For the Elderly*, 27/4, 348-363.

Green, P. E. (1974). On the design of choice experiments involving multi-factor alternatives. *Journal of Consumer Research*, 1/2, 61-68.

Heath, S. (1999). Young adults and household formation in the 1990s. *British Journal of Sociology of Education*, 20/4, 545-561.

Heath, S. & Kenyon, L. (2001). Single young professionals and shared household living. *Journal of Youth Studies*, 4/1, 83-100.

Hensher, D. A., Rose, J. M. & Greene, W. H. (2005). *Applied Choice Analysis: A Primer*. Cambridge: University Press.

Heylen, K. & De Decker, P. (2011). De evolutie van betaalbaarheid in Vlaanderen. In S. Winters (red.), *Is wonen in Vlaanderen betaalbaar?* Antwerpen: Garant Uitgevers, 93-114.

Hubbard, P. (2009). Geographies of studentification and purpose-built student accommodation: Leading separate lives? *Environment and Planning A*, 41/8, 1903-1923.

Hughes, D. & Davis, M. (2002). Student housing: A cautionary tale of one city. *Journal of Social Welfare and Family Law*, 24/2,135-155.

Huisvestingsdienst KULeuven (2012). Op Kot tijdens je eerste jaar hoger onderwijs 2012-2013: Op kot in de privé. Retrieved January 8, 2014, from http://www.kuleuven.be/studentenvoorzieningen/huisvesting/pdf/brochures/opkotEJHOprive2012.pdf

Jochems, L. (2011). Verplaatsingsgedrag van studenten naar de Antwerpse universiteit / hogeschool. Antwerpen: Universiteit MSc thesis 2010-2011.

Jonckheere, L., Kums, R., Maelstaf, H. & Maes T. (2010). Samenhuizen in België: waar staan we, waar gaan we. Gemeenschappelijk wonen: knelpunten & sporen naar oplossingen, stand van zaken en behoeften, from http://www.kbs-frb.be/uploadedFiles/KBS

Kehl, K. & Then, V. (2013). Community and civil society returns of multi-generation cohousing in Germany. *Journal of Civil Society*, 9/1, 41-57.

Kenyon, E. & Heath, S. (2001). Choosing this life: Narratives of choice amongst house sharers. *Housing Studies*, 16/5, 619-635.

Kessels, R., Jones, B., Goos, P. & Vandebroek, M. (2008). Recommendations on the use of Bayesian optimal designs for choice experiments. *Quality and Reliability Engineering International*, 24/6, 737-744.

Kessels, R., Jones, B. & Goos, P. (2011a). Bayesian optimal designs for discrete choice experiments with partial profiles. *Journal of Choice Modelling*, 4/3, 52-74.

Kessels, R., Jones, B. & Goos, P. (2015). An improved two-stage variance balance approach for constructing partial profile designs for discrete choice experiments. *Applied Stochastic Models in Business and Industry*, 31/5, 626-648.

Kessels, R., Jones, B., Goos, P. & Vandebroek, M. (2011b). The usefulness of Bayesian optimal designs for discrete choice experiments. *Applied Stochastic Models in Business and Industry*, 27/3, 173-188.

Kessels, R., Jones, B., Goos, P. & Vandebroek, M. (2011c). Rejoinder: The usefulness of Bayesian optimal designs for discrete choice experiments. *Applied Stochastic Models in Business and Industry*, 27/3, 197-203.

Khozaei F., Sanusi, A., Hassan, A. S. & Ramayah, T. (2011). The students' degree of preference for residence hall facilities and amenities: Study of a developing country. *African Journal of Business Management*, 5/17, 7335-7341.

Kupfer F., Kessels R., Goos P., Van de Voorde E. & Verhetsel A. (2016). The origin-destination airport choice for all-cargo aircraft operations in Europe. *Transportation Research Part E: Logistics and Transportation Review*, 87, 53-74.

Luysterman, P. (2011). Belg heeft kot in zijn maag. *De Tijd*, 24/08/2011, 5.

Macintyre, C. (2003). New models of student housing and their impact on local communities. *Journal of Higher Education Policy and Management*, 25/2, 109-118.

Meeuws, T. (2011). *Gids voor Antwerpse kotbazen: Alles over (ver)bouwen en verhuren van studentenhuisvesting in Antwerpen*. Antwerpen: Stad Antwerpen.

Munro, M. & Livingston, M. (2012). Student impacts on urban neighbourhoods: Policy approaches, discourses and dilemmas. *Urban Studies*, 49/8, 1679-1694.

Nagel, M. M., Contarello, A. & Wachelke, J. (2011). Social representation and stakes across borders: Studying aging in times of change. *Temas em Psicologia*, 19/1, 59-73.

Nijënstein, S., Haans A., Kemperman A. D. A. M. & Borgers, A. W. J. (2015). Beyond demographics: human value orientation as a predictor of heterogeneity in student housing preferences, *Journal of Housing and the Built Environment*, 30/2, 199-217.

Reeves La Roche, C., Flanigan, M. A. & Copeland, P. K. (2010). Student Housing: Trends, Preferences and Needs. *EABR & ETLC Conference Proceedings*, 270-275.

Rose, J. M. & Bliemer, M. C. J. (2009). Constructing efficient stated choice experimental designs. *Transport Reviews*, 29/5, 587-617.

Rugg, J., Ford, J. & Burrows, R. (2004). Housing advantage? The role of student renting in the constitution of housing biographies in the United Kingdom. *Journal of Youth Studies*, 7/1, 19-34.

Schwanen, T. & Mokhtarian P. L. (2005). What affects commute mode choice: neighbourhood physical structure or preferences toward neighborhoods? *Journal of Transport Geography*, 13/1, 83-99.

Sermas, R. (2015). Package 'ChoiceModelR' for 'R' (Version 1.2). DecisionAnalyst.

Stad Antwerpen (2011). *Stad zet sterk in op kwaliteit en spreiding studentenhuisvesting*, from http://www.deurne.be/docs/Stad/Bedrijven/Marketing_en_communicatie/MC_Com/Collegeverslgen211/Collegeverslag_20111014_39kb.pdf

Stad Gent (2012). *Gent in cijfers 2012: Gent, stad voor Gentenaars én studenten*. Gent: Stad Gent.

Steinführer, A. & Haase, A. (2009). Flexible-inflexible: Socio-demographic, spatial and temporal dimensions of flat sharing in Leipzig (Germany). *GeoJournal*, 74, 567-587.

Tchoukaleyska, R. (2011). Co-housing childhoods: Parents' mediation of urban risk through participation in intentional communities. *Children's Geographies*, 9/2, 235-246.

Telen, S. (2011). Studentenkot een derde duurder in vijf jaar tijd. *Het Nieuwsblad*, 18/06/2011.

Train, K. (2009). Discrete Choice Methods with Simulation. Cambridge, UK: Cambridge University Press.

Tversky, A. & Kahneman, D. (1991). Loss aversion in riskless choice: A reference-dependent model. *The Quarterly Journal of Economics*, 106/4, 1039-1061.

Verhetsel, A., Kessels, R., Goos, P., Zijlstra, T., Blomme, N. & Cant, J. (2015). Location of logistics companies: A stated preference study to disentangle the impact of accessibility. *Journal of Transport Geography*, 42/1, 110-121.

Vermeiren, S. (2011). Koten in binnenstad nog nooit zo populair. *Het Laatste Nieuws*, 20/08/2011, 38.

Vlaamse Vereniging van Studenten (2011). Standpunt studentenhuisvesting, from http://www.vvs.ac/attachments/article/161/20110217_standpunt_studentenhuisvesting.pdf

Williams, J. (2005a). Sun, surf and sustainable housing – cohousing, the Californian experience. *International Planning Studies*, 10/2, 145-177.

Williams, J. (2005b). Designing neighbourhoods for social interaction: The case of cohousing. *Journal of Urban Design*, 10/2, 195-227.

Appendix A: Bayesian D-optimal partial profile design consisting of two surveys for the stated preference experiment.

The entire stated preference experiment involved two surveys of 22 choice situations which appear in **Tables A.1 and A.2**. The first survey was taken by 367 respondents and the second survey by 680 respondents. The surveys contain the student accommodation profiles shown in the different choice situations. The choice situations are described by three attributes whose levels are varied and two attributes whose levels are kept constant. The levels of the constant attributes are marked in gray. The last line under each survey indicates how often each attribute is varied in the choice situations of that survey. Attributes that have many levels vary more often than attributes with fewer levels.

Table A.1: Survey 1 of the Bayesian D-optimal partial profile design.

Choice set	Rent (euros)	Distance (minutes)	Size (m x m)	Type	Furnished
1	300	> 25	< 3 x 4	7	Yes
1	300	> 25	> 5 x 6	8	No
2	< 250	20	> 5 x 6	5	Yes
2	< 250	20	5 x 5	2	No
3	300	10	4 x 4	5	No
3	300	15	4 x 4	1	Yes
4	> 450	< 5	4 x 4	1	No
4	> 450	15	4 x 4	8	Yes
5	300	> 25	4 x 5	6	Yes
5	300	15	< 3 x 4	6	No
6	300	20	> 5 x 6	3	Yes
6	300	15	5 x 5	4	Yes
7	400	< 5	4 x 5	7	No
7	400	> 25	5 x 5	5	No
8	> 450	> 25	< 3 x 4	8	Yes
8	> 450	20	4 x 4	5	Yes
9	300	< 5	4 x 4	6	No
9	300	10	5 x 5	7	No
10	< 250	15	< 3 x 4	3	No
10	> 450	15	< 3 x 4	6	Yes
11	> 450	< 5	4 x 5	3	Yes
11	400	< 5	4 x 4	8	Yes
12	300	20	< 3 x 4	6	Yes
12	350	20	4 x 4	7	Yes
13	350	> 25	4 x 5	1	No
13	> 450	> 25	> 5 x 6	3	No
14	350	> 25	> 5 x 6	1	Yes
14	300	> 25	4 x 5	7	Yes
15	< 250	10	< 3 x 4	4	Yes
15	300	10	4 x 5	6	Yes
16	400	< 5	5 x 5	7	No
16	300	20	5 x 5	7	Yes
17	> 450	< 5	4 x 4	8	Yes
17	400	15	4 x 4	6	Yes
18	< 250	> 25	4 x 4	6	Yes
18	300	20	4 x 4	2	Yes
19	400	15	4 x 4	5	No
19	350	20	4 x 4	2	No
20	350	> 25	< 3 x 4	7	No
20	> 450	10	< 3 x 4	4	No
21	> 450	< 5	< 3 x 4	8	No
21	300	> 25	4 x 4	8	No
22	300	< 5	< 3 x 4	8	Yes
22	400	10	4 x 5	8	Yes
# Varying	*13*	*14*	*14*	*18*	*7*

Table A.2: Survey 2 of the Bayesian D-optimal partial profile design.

Choice set	Rent (euros)	Distance (minutes)	Size (m x m)	Type	Furnished
1	300	< 5	5 x 5	3	Yes
1	300	< 5	> 5 x 6	4	No
2	< 250	< 5	4 x 4	1	Yes
2	< 250	< 5	> 5 x 6	8	No
3	300	> 25	> 5 x 6	4	Yes
3	300	15	> 5 x 6	1	No
4	> 450	20	4 x 5	4	No
4	> 450	10	> 5 x 6	7	No
5	> 450	10	4 x 4	4	No
5	> 450	20	4 x 5	8	No
6	350	10	4 x 4	8	Yes
6	350	> 25	> 5 x 6	2	Yes
7	< 250	20	5 x 5	7	Yes
7	< 250	10	4 x 5	2	Yes
8	350	10	5 x 5	6	No
8	350	15	4 x 5	5	No
9	400	15	4 x 4	8	Yes
9	< 250	15	4 x 4	6	No
10	< 250	> 25	4 x 4	2	Yes
10	300	> 25	4 x 4	3	No
11	400	15	< 3 x 4	4	Yes
11	< 250	15	5 x 5	4	No
12	< 250	10	4 x 4	3	Yes
12	350	10	5 x 5	5	Yes
13	400	> 25	4 x 4	2	No
13	350	> 25	4 x 5	4	No
14	400	< 5	> 5 x 6	4	No
14	< 250	< 5	< 3 x 4	5	No
15	400	20	5 x 5	3	Yes
15	> 450	20	> 5 x 6	7	Yes
16	> 450	> 25	4 x 5	7	Yes
16	300	< 5	4 x 5	7	No
17	< 250	20	< 3 x 4	5	Yes
17	350	15	< 3 x 4	3	Yes
18	350	< 5	4 x 5	5	Yes
18	< 250	20	4 x 5	1	Yes
19	300	> 25	4 x 4	1	Yes
19	350	20	4 x 4	6	Yes
20	< 250	15	5 x 5	2	No
20	> 450	10	5 x 5	1	No
21	400	< 5	< 3 x 4	7	No
21	> 450	15	4 x 4	7	No
22	350	10	< 3 x 4	4	No
22	> 450	< 5	5 x 5	4	No
# Varying	*14*	*13*	*14*	*18*	*7*

Appendix B: Multivariate normal prior parameter distribution used to construct the Bayesian D-optimal partial profile design for the stated preference experiment.

To construct the Bayesian D-optimal partial profile design for the stated preference experiment shown in **Appendix A**, we used a multivariate normal prior distribution that reflects the prior beliefs about the unknown parameter values associated with the levels of the five attributes. We ranked the five attributes in order of prior importance and specified mean parameter values and variances for the multivariate normal prior distribution accordingly.

Table B.1 shows the five attributes in order of importance and the prior mean utility values of the levels of each attribute. The more important an attribute, the larger in magnitude the a priori mean utility values of that attribute. Note that the utility values associated with the levels of each attribute sum to zero. This is because we used effects coding for the attribute levels, which means that the levels of the 2-level attribute 'furnished' are coded as 1 and -1, the levels of the 5-level attributes 'rent', 'distance' and 'size' as [1 0 0 0], [0 1 0 0], [0 0 1 0], [0 0 0 1] and [-1 -1 -1 -1], and the levels of the 8-level attribute 'type' as [1 0 0 0 0 0 0], [0 1 0 0 0 0 0], [0 0 1 0 0 0 0], [0 0 0 1 0 0 0], [0 0 0 0 1 0 0], [0 0 0 0 0 1 0], [0 0 0 0 0 0 1] and [-1 -1 -1 -1 -1 -1 -1]. The a priori mean utility values for each attribute are symmetric around zero. We assigned the highest importance to the attribute 'rent', followed by the attributes 'distance', 'size' and 'furnished', which we assigned equal weights. For the attribute 'type', we had no prior expectations which is equivalent to using prior mean values of zero.

For the prior variances around the mean utility values of the attribute levels, we used a value of 0.0625 for the levels of the attributes 'rent', 'distance' and 'size', and a value of 0.25 for the levels of the attributes 'type' and 'furnished', which we associated with more uncertainty. Also, in this way, we ensured that the multivariate normal prior distribution preserved the preference ordering for the levels of an attribute as much as possible. Following a suggestion of Kessels et al. (2008), we specified negative covariances of -0.02 for the attributes 'rent', 'distance' and 'size' and of -0.04 for the attributes 'type' and 'furnished'. If L_i denotes the number of levels of attribute i, we computed these covariances using a correlation coefficient of $-1/(L_i - 1)$. This ensures that the variances of all prior utility values corresponding to a given attribute are the same.

Table B.1: A priori order of importance of the effects of the five attributes and conversion into mean utility values used in the multivariate normal prior distribution.

Attribute with level	Prior mean	Relative importance
Rent[More than 450]	-0.6	First
Rent[400]	-0.3	
Rent[350]	0	
Rent[300]	0.3	
Rent[Less than 250]	0.6	
Distance[More than 25]	-0.5	Second
Distance[20]	-0.25	
Distance[15]	0	
Distance[10]	0.25	
Distance[Less than 5]	0.5	
Size[Less than 3 by 4]	-0.5	Second
Size[4 by 4]	-0.25	
Size[4 by 5]	0	
Size[5 by 5]	0.25	
Size[More than 5 by 6]	0.5	
Furnished[No]	-0.5	Second
Furnished[Yes]	0.5	
Type[1]	0	Third
Type[2]	0	
Type[3]	0	
Type[4]	0	
Type[5]	0	
Type[6]	0	
Type[7]	0	
Type[8]	0	