

Using Stated Preference Methods to Investigate the Effectiveness of

Alternative Transport Policies at the University of Cape Town

RISENGA SIMON MPHUZI CHAUKE

**Submitted in partial fulfilment
of the requirements for the degree of
Master of Science in Engineering**

**Department of Civil Engineering
UNIVERSITY OF CAPE TOWN**

SEPTEMBER 1999

The copyright of this thesis vests in the author. No quotation from it or information derived from it is to be published without full acknowledgement of the source. The thesis is to be used for private study or non-commercial research purposes only.

Published by the University of Cape Town (UCT) in terms of the non-exclusive license granted to UCT by the author.

ABSTRACT

In this study Stated Preference (SP) methods are used to investigate alternative transport policies at the University of Cape Town. The main purpose of the study is to investigate how commuters respond to increases in the cost of parking on campus. A sample of academic staff, support/admin staff and students was used in this study. A mixed sample of 50 respondents participated in the study. These people used private cars to campus but had occasionally commuted to campus by public transport.

The initial stage of the study involved gathering information on how commuters travel to campus. Using this information, a pilot SP study was conducted to determine any potential problems and ways to solve them before embarking on the main SP survey. Six attributes were used in the pilot survey, including the cost of parking and search time. Based on the results of the pilot survey some attributes were replaced although six attributes were again used in the main survey.

Seven logit travel demand models were estimated in the study. The final prediction model comprised nine attributes and two dummy variables. Of the nine attributes, three were constant variables but were significant at 95% confidence level. The other six attributes were those variables that were varied in the SP survey. Two dummy variables, gender and employment status were used in the final prediction model as models estimated earlier using these categories had high goodness of fit measures indicating extremely well fitted model.

The study found that parking charges do influence mode choice of commuters. It predicted that under existing conditions 92% of respondents use private cars to commute to campus. This was much closer to the observed behaviour found during the revealed preference data collection. The study also found that 50:50 modal split would be achieved when a parking charge of R10.75 per day is levied to every commuter bringing a vehicle to campus. It was also found that under improved public transport service, 67% of respondents as compared to 92%, would commute to campus by private cars. To achieve a 50:50 modal split, a charge of R4.00 would be levied to each commuter bringing the vehicle to campus.

The findings support the South African Government's objective of discouraging private car dependence, while promoting public transport patronage. According to the Moving South – Action Agenda transport policy document, a combination of controls and pricing, coupled with the improvement in public transport service, is recommended as a way to enhance public transport performance.

Finally, this study further reinforces the strengths of Stated Preference methods as a tool for assessing transport demand management options that governments, transport operators and policy analysts can use to evaluate priorities among the different policy elements and to establish accurate forecasts of behaviour in response to alternative policies.

ACKNOWLEDGEMENTS

This study would not have been possible were it not for several people who generously gave their time, expertise and guidance in the process. Firstly, I would like to extend my gratitude to those wonderful people who agreed to be part of the Stated Preference surveys. I am honestly humbled by your willingness to stand those long interviews without even a sigh of relief at the end. I would also like to thank my supervisor, Lisa Kane. Thank you for your guidance and for pushing me to the limits. This would not have been possible if you did not believe that I can do it and gave me an opportunity to do so.

My sincere gratitude goes to my mentor in Stated Preference methods, Peter Clark. Thank you for your continued guidance throughout the study. I also extend my gratitude to Mr Paul Mann for always believing in me. Thank you very much. I would also like to thank the Civil Engineering Department at UCT for their support, especially Guenevere Burke. Thank you for always having faith in me. You really made me feel at home, at UCT. Roger Behrens, thanks for your support. Louis Roodt Professor Alex Visser from the University of Pretoria, thank you for the information you made available for the purpose of this study. I would also like to thank Professor Christo Bester from the University of Stellenbosch for the support he gave me during this study.

My sincere thanks also go to Maleshoane Rapeane for all the linguistic advice and support. Lastly, I would like to sincerely thank my family who selflessly sacrificed that I undertake this postgraduate study even when it was not convenient to them for me to do so. To you I say, thank you very much.

**Dedicated to the memory
of my father,
Hlengani John Chauke**

University of Cape Town

TABLE OF CONTENTS

	PAGE
ABSTRACT	i
ACKNOWLEDGEMENTS	ii
TABLE OF CONTENTS	iii
LIST OF TABLES	viii
LIST OF FIGURES	ix
1. INTRODUCTION	1
1.1. Background	1
1.2. Focus of the study	2
1.3. Objectives of the study	3
1.4. Structure of the report	3
2. TRANSPORTATION SITUATION AT THE UNIVERSITY OF CAPE TOWN	
2.1. Introduction	5
2.2. Transport supply	5
2.2.1. Allocation of parking	7
2.3. Transport demand at the upper campus	8
2.4. Existing transport and traffic policies	11
2.5. Conclusions	13
3. COMPARISON OF TRANSPORT ASPECTS IN SOUTH AFRICAN INSTITUTIONS OF HIGHER LEARNING	
3.1. Introduction	15
3.2. Transportation at the University of the Western Cape (UWC)	16
3.2.1. Introduction	16
3.2.2. Transport Demand at UWC	16
3.2.3. Transport Supply at UWC	17
3.2.4. Towards the future	17
3.3. Transportation at the University of Stellenbosch (US)	18
3.2.1. Introduction	18
3.3.2. Transport Demand at US	19
3.3.3. Transport Supply at US	20

3.3.4. Towards the future	20
3.4. Transportation at the Cape Technikon (Capetech)	20
3.4.1. Introduction	20
3.4.2. Transport Demand at Capetech	21
3.4.3. Transport Supply at Capetech	21
3.4.4. Towards the future	22
3.5. Transportation at the University of Pretoria (UP)	22
3.5.1. Introduction	22
3.5.2. Transport Demand at UP	22
3.5.3. Transport Supply at UP	23
3.5.4. Towards the future	23
3.6. Transportation at Rand Afrikaans University (RAU)	24
3.6.1. Introduction	24
3.6.2. Transport Demand at RAU	24
3.6.3. Transport Supply at RAU	24
3.6.4. Towards the future	25
3.7. Comparison of transport aspects in South African institutions of higher learning	26
3.7.1. Public transport service	26
3.7.2. Parking provision and satisfaction	27
3.8. Conclusions	28
4. EXISTING TRAVEL PATTERNS AT THE UNIVERSITY OF CAPE TOWN	
4.1. Introduction	30
4.2. Part A – Car travel	31
4.3. Part B – Public transport travel	34
5. THEORY OF STATED PREFERENCE METHODS	
5.1. Background	39
5.2. Revealed Preference (RP) methods	40
5.3. Stated Preference (SP) methods	41
5.4. Significance of Stated Preference methods	42
5.5. Disadvantages of Stated Preference methods	43

5.6. Understanding travel behaviour	43
5.7. Experimental Design	45
5.8. Analysing Stated Preference data	46
5.9. Prediction models	49
5.10. Quick Policy analysis	51
5.10.1. Pivot Point Analysis	52
5.10.2. Demand Elasticities	53
5.11. Validation of the model	53
6. STATED PREFERENCE DATA COLLECTION	
6.1. Introduction	55
6.2. Proposed policy test	56
6.3. Attributes identification and SP experimental design	57
6.3.1. Attributes determination and attribute levels	58
6.3.2. Experimental design	64
6.4. Pilot survey and evaluation	65
6.4.1. Background	65
6.4.2. Attributes Identification	66
6.4.3. Description of the pilot survey	67
6.4.4. Analysis of results of the pilot survey	70
6.5. Main survey data collection	73
6.5.1. Introduction	73
6.5.2. Attributes Identification and levels determination	74
6.6. Conclusions	75
7. ANALYSIS OF RESULTS OF MAIN SP SURVEY	
7.1. Introduction	77
7.2. Method of estimation	77
7.3. Model estimation	79
7.3.1. Fully specified model	80
7.3.2. Fully specified car model	86
7.3.3. Fully specified public transport model	89

7.3.4. Combined car and public transport model	91
7.3.5. Male and female model	94
7.3.6. Academic and non-academic model	98
7.3.7. Proposed prediction model	102
7.4. Model application to predict the behaviour due to different policies	105
7.5. Effects of increased parking	107
7.6. Revenue maximisation: Evaluation	110
8. CONCLUSIONS	
8.1. Introduction	112
8.2. Discussion of survey method and analysis	112
8.3. Policy conclusions	114
8.4. Closing remarks	115
9. BIBLIOGRAPHY	
10. APPENDICES	
10.1. Appendix A: Photographs of parking and transport facilities at Upper campus	
10.2. Appendix B: Map of the upper campus with parking areas available	
10.3. Appendix C: Glossary	
10.4. Appendix D: Parking allocation at upper campus	
10.5. Appendix E: Revealed Preference data	
10.6. Appendix F: Stated Preference data	
10.7. Appendix G: Output of models estimated	
10.8. Appendix H: Input file into the model	
10.9. Appendix I: Actual travel data with utilities and demand elasticities	
10.10. Appendix J: Questionnaire used to gather information	

11. LIST OF TABLES

2.1: Residence bus subsidies	6
2.2: Parking allocation at upper campus	7
2.3: Results of peak hour open bay count	9
2.4: Demand for each bay type	10
2.5: Comparison of demand and provision for parking at upper campus	12
3.1: Comparison of public transport service in six SA institutions	27
3.2: Parking provision in six SA institutions	28
4.1: Average attribute values for car travel	33
4.2: Vehicle security on campus	34
4.3: Average attribute values for public transport travel	37
4.4: Perceived levels of security and comfort of public transport	39
6.1: Parking disc prices for 1995-1998	58
6.2: Attributes and levels used in the pilot survey	69
6.3: Pilot SP card for train users	71
6.4: Pilot SP card for bus users	71
6.5: Results from SST	72
6.6: Attributes and levels used in the main survey	78
7.1: Fully specified model	84
7.2: Fully specified car model	90
7.3: Fully specified public transport model	93
7.4: Combined car and public transport model	96
7.5: Male and female model	99
7.6: Academic and non-academic staff model	103
7.7: Proposed prediction model	107
7.8: Comparison of predicted and revealed mode choice under existing conditions	111
7.9: Additional revenue from increased parking charges	115

LIST OF FIGURES

4.1: Security of vehicles on campus	35
4.2: Perceived level of security of public transport	39
4.3: Perceived level of comfort of public transport	40
7.1: Response of commuters to changes in parking charges at upper campus	110
7.2: Predicted demand for parking by existing parking disc holders at different parking charges if parking spaces were guaranteed	112
7.3: Response of commuters to changes in parking charges under improved public transport service	113

University of Cape Town

CHAPTER 1:

INTRODUCTION

1.1. Background

Parking is undoubtedly an important element of the urban transport system. As an important part of the urban transportation system, it has various long-and short-term impacts on individuals, societies and transportation systems. Parking is a determining factor in terms of modal split. People having cars available will probably choose to access their destination by cars if parking is available and conveniently located at the destination, and if the cost of parking is reasonable. It can therefore be deduced that the availability of inexpensive, convenient and plentiful parking is an incentive for private car usage whereas scarce, inconvenient and expensive parking is a substantial disincentive for private car usage (Papacostas and Prevedouros, 1993).

One of the objectives for land passenger transport of National, Provincial and Local Governments in South Africa is to promote the use of public transport over private car travel, with the goal of achieving a ratio of 80:20 between public transport and private car usage (White Paper on National Transport Policy, Department of Transport, 1996). The Department of Transport and Public Works (Western Cape) identified short and long-term public parking charges, together with the levy it proposed to impose on all long-term public and private parking, as a primary source of income for Urban Transport Authorities (White Paper on Western Cape Provincial Transport Policy, 1997). The pricing of parking is one policy instrument which can be used efficiently in conjunction with complementary measures to promote efficient use of the

urban transportation infrastructure by promoting public transport patronage, protecting environmental quality, reducing congestion and managing travel demand.

1.2 Focus of the study

This study uses Stated Preference (SP) methods to investigate the likely response of people driving to the University of Cape Town (UCT) to an increase in parking charges and to changes in transport attributes. Like any other institution in the world, UCT is faced with growing numbers of cars travelling either to work or to study. Due to its geographical location at the foot of Table Mountain, it is practically impossible to provide enough parking to accommodate this demand.

Stated Preference methods potentially go a long way towards offering an effective solution for examining the urban transport problem. They are able, if undertaken properly, to provide good quality information on travel behaviour and at reasonable costs when compared to other methods available. Moreover, SP methods are very useful to transport planners and policy makers as they allow them to experiment with policies before implementing them (Pearmain et al., 1991). This is very vital as in real life a transport planner or operator cannot afford to introduce a new transport system simply to see if people will use it or not, or continually change fares or parking charges to see if the travel demand will rise or fall.

It is therefore for the reasons provided above that SP methods will be employed in this study to predict the behaviour of commuters to higher priced parking and changes in the attributes of transport at the University of Cape Town. As these methods

have been successful before it is hoped that they will be able to provide realistic results in this case as well.

1.3 Objectives of the study

As already mentioned in the preceding section, this study made use of SP methods to investigate the likely response of people who are presently driving to campus to higher priced parking and to changes in the attributes for transport at the University of Cape Town.

The main objectives of this study are:

- a) To determine how the travel demand and supply at UCT compares with other institutions of higher learning in South Africa.
- b) To determine the boundary value of parking charges below which people who are presently using public transport or walking to campus will shift to private cars.
- c) To determine the boundary value of parking charges beyond which people who are presently driving to campus will shift to public transport.
- d) Calculate how much additional revenue could be collected, using the higher parking charges.

1.4 Structure of this report

This report begins with the introduction in Chapter 1 which includes the background, the focus, objectives, scope of the study. Chapter 2 reviews the

transportation situation at the University of Cape Town. It also reviews the current state of transport and traffic policies at UCT.

Chapter 3 compares some transportation aspects in six institutions of higher learning in South Africa. Chapter 4 discusses the existing travel patterns at UCT as observed during the data collection stage. The theory of Stated Preference methods form part of Chapter 5, while Chapter 6 focuses on the data collection methods applied in the study. Chapter 7 focuses on the analysis of the SP data collected in the main SP survey. Several logit travel demand models are discussed in this chapter as well as revenue maximisation and evaluation. Conclusions of the study are dealt with in detail in Chapter 8.

CHAPTER 2:

TRANSPORTATION SITUATION AT THE UNIVERSITY OF CAPE TOWN

2.1. Introduction

The purpose of this chapter is to review the current transportation situation at the University of Cape Town (UCT). The main purpose of this chapter is to review the transportation situation at UCT, especially how the provision of parking meets the demand by the university community. To meet this objective, the demand and provision of parking at the University will be looked at in more detail. Furthermore, the number of students and staff members will be looked at to determine the ratio of parking areas to staff and students on campus. Policies governing the allocation of parking to different types of users will also be dealt with in detail. This chapter therefore purports to describe the existing transport system at the University, with more emphasis on parking as it forms a main part of this study.

2.2. Transport Supply

The purpose of this section is to review the transport supply at the University of Cape Town. Currently public transport at the university is provided by the Jammie Shuttle service contracted by the university on a tendering process to operate between the upper campus and lower campus. This service is provided by means of minibus taxis with the carrying capacity of 15 passengers, and midi buses with the carrying capacity of up to 30 passengers. Leo Marquard Hall (lower campus station of the shuttle service), therefore acts as an interchange as people coming by train had to get off at Rosebank train station and make use of the shuttle service (see Figure A11 in

Appendix A). The shuttle service also caters for the majority of the people who use buses, minibus taxis and walk from as far as Mowbray station and other residences during the periods when there are no buses available. There are also buses provided by Golden Arrow Bus Company transporting people from residences further than the lower campus such as Clarendon, Liesbeeck Gardens, Hidding Hall and Medical School. These buses are subsidised by the university to provide transport to residence students. Subsidy allocation for each residence where such facility exists is provided in Table 2.1 below:

Table 2.1. Residence bus subsidies

Residence	Annual subsidy in rands
Liesbeeck Gardens	330,000
Clarendon House	330,000
Hidding Hall	175,000
Medical School	97,000

Source: Student Housing, UCT, 1998

There are however many people, staff and students who walk to the upper campus, especially those who live within walking distance to UCT. No exact Figures are available, as no traffic impact study has been conducted in the past eight years on campus. Various parking areas exist within the University campus for the purpose of parking for both students and staff members. A discussion on the allocation of parking permits to different types of users forms part of the following section.

2.2.1. Allocation of parking

The University undertook three surveys in 1988, 1989 and 1991 to monitor parking at the University campus. The first two surveys were done prior to the University introducing access control on the upper campus in 1989. After the introduction of access control to the upper campus, the parking stock reduced from 2363 bays to 2288 (Liebenberg and Stander, 1991). Though there was a reduction, for the period 1989 to May 1991 there has been a further increase of 10%, hence increasing the total parking to well above the 1988 total of 2363. Table 2.2. below presents the changes in parking allocation for the three periods as well as 1998 parking allocation.

Table 2.2. Parking allocation on Upper Campus

Year	Numbered	Yellow	Student	Special	Residents	Visitors	Total
1988	521	683	922	94	111	32	2363
1989	509	644	929	32	79	95	2288
1991	585	618	1057	73	85	73	2491
1998	506	589	1177	-	-	-	2272

Source: Traffic Administration, 1998

There was no data available for the period 1992 to 1997. The distribution of parking by location on the upper campus is given in Table 2 (a) to (f) in Appendix D. The purpose of these data is to indicate how parking infrastructure at the Upper campus is distributed in various buildings, faculties and departments.

2.3. Transport Demand at the Upper Campus

This section deals with the demand for transport and especially for parking at the upper campus of the university (see Appendix B for the map of upper campus). Traffic counts are normally an important tool in order to find the number of vehicles travelling into and from the area during the peak period. However, due to time constraints and lack of manpower, this was not done in this study. Traffic counts conducted in 1991 found that the maximum accumulation on upper campus were in the range of 2000 to 2100 vehicles (Liebenberg and Stander, 1991). This was found to be within the same range as the 1989 traffic counts but less than the 1988 counts of over 2300 vehicles. The expressed demand for parking was investigated using an open bay count survey. Studies conducted by Liebenberg and Stander in 1991 established that the peak hour occurred around 11h00 in the morning. The open bay count was conducted during the peak parking time of the day. The results for the survey are presented in Table 2.3 below.

Table 2.3. Results of peak hour open bay count

Bay type	Colour	Open bay count#1	Open bay count#2	Total # of Open bays
Student	White	73	0	73
Academic staff	Red	27	31	58
Support staff	Yellow	4	63	67
Visitor		2	7	9
Disabled		12	10	22
Special		2	0	2
Total		120	111	231

Source: Jakoet, 1998)

The open bay count was conducted between 10h30 and 11h30 during working days. As indicated in Table 2.3 above, a total of two counts were required to cover all the parking bays on campus. The types of parking bays counted were classified as follows:

- Red – academic staff.
- Yellow – support and administration staff.
- White – students.
- Disabled parking bays.
- Visitors' bays.
- Special – all specially marked bays.

Photographs of different parking bays are provided in Appendix A. Count#1 was conducted on Monday, 12 October 1998, a normal term day. All parking bays situated in the lower half of upper campus were counted. All student parking bays were counted in the first count. Count#2 was conducted on Thursday, 22 October 1998, during exam

week. Student parking bays were not counted as it was assumed that most students would be preparing for the examination off-campus as is always the case. However, it was assumed that all staff members were in full attendance during this period. All the parking bays on upper campus not counted in the first count were counted in this survey. The data collected was compared with the available number of parking areas to determine the occupancy of different parking bays during the peak parking period. It must be mentioned here that for the results to be more realistic both open bay counts could have been done on the same day. However, as the purpose of this exercise was to provide a picture of the occupancy and utilisation of the parking bays available, that objective was therefore met by this exercise. The results of the two open bay counts are depicted in Table 2.4 provided below:

Table 2.4. Demand for each bay type

Bay type	Colour	No. of bays on upper campus	No. of open bays	Open bays as % of total
Student	White	1177	73	6%
Academic staff	Red	506	58	11%
Sup/Admin	Yellow	589	67	11%
Total		2272	231	10%

Source: Jakoet, 1998)

From the above Table it can be observed that during the peak parking period, 94% of student parking bays are occupied while both academic and support/admin parking bays are 89% occupied. This implies high utilisation of parking bays on campus. This also implies that students have to arrive early on campus to get a parking bay.

2.4. Existing transport and traffic policies

This section describes the existing transport and traffic policies at the university. All traffic related matters of the university are dealt with by the Traffic Administration Department situated at the upper campus of the university. According to the traffic rules of the university, every student who wishes to bring a motor vehicle to the university campus has to apply for a parking disc from the Traffic Administration. This parking disc has to be affixed on the top right corner of the windscreen in order for the Traffic Officers to be able to see it whenever they do the campus patrol for illegal parking. Each parking disc issued is for one vehicle only and is not transferable from one vehicle to another.

Staff members, like students are required to apply for a parking disc from the Traffic Administration should they intend bringing a motor vehicle to the university campus. Staff parking bays are divided into red bays, which are for academic staff, and yellow bays which are for administration and support staff. Red bays are reserved throughout the year, while yellow bays are reserved between 07h30 and 16h30 from Monday to Fridays inclusive, and from 07h30 to 13h00 on Saturdays, and for such other periods as may be determined (General rules for degrees and student rules, 1998). Table 2.5 below presents comparison between available parking bays and parking discs issued.

Table 2.5. Comparison of demand and provision for parking bays on upper campus

Bay type	Number of bays on upper campus	Total parking discs issued	Unmet demand for parking bays
Students	1177	3327	2150
Academic staff	506	998	492
Sup/admin staff	589	1788	1199

Source: Traffic Administration, 1998

From the above results, it can be seen that only 35 per cent of the total demand for student parking space is met by the available parking areas. It is for this reason that student parking bays operate on a first come, first served basis. It is also observed from the above results that only 33 per cent of the total demand for parking space is met for support and administration staff. It is for this reason that should a support or administration staff vacate his/her parking bay anytime during the day, there is no guarantee at all that he/she will get his/her parking bay still vacant.

According to the traffic rules on campus, any student contravening any of the traffic rules as laid down in the General rules for degrees and student rules handbook is summoned to appear at the Traffic Court. In terms of these rules, a fine not exceeding R300 for each offence can be imposed or the privilege of bringing the vehicle to the university campus can be withheld for a stated period or indefinitely. This Traffic Court has been empowered by the university to hear all cases involving traffic offences committed on the university campus, to hear evidence and make a finding, to convict a student and impose a sentence prescribed by the rules. The Traffic Court has the responsibility to refer any case which it considers of sufficient gravity to the Vice-

Chancellor of the university to be dealt with in terms of the Rules on Disciplinary Jurisdiction and Procedures, as laid down by the University Council.

Staff members, unlike students, are allowed to apply for a parking permit on the vehicle which is not registered on their name provided he/she discloses the name of the owner of the car on the application form and if he/she, rather than the owner of the vehicle is to use the vehicle. The rules allow three traffic offences to be committed by a staff member after which he/she may not be allowed to bring their vehicle on to the university campus.

2.5. Conclusion

This chapter looked at the state of transportation at the University of Cape Town. The allocation of parking bays on campus were discussed and open bay counts were done during the peak parking period to determine the occupancy of different parking bays during the peak. The last part of the chapter discussed the traffic regulations on campus. A study done as part of an undergraduate final year thesis in the Department of Civil Engineering found four areas of concern with regard to transportation on campus (Jakoet, 1998). There was a concern among students that there are inadequate parking spaces on campus. This is understandable given that the Traffic Administration issues more than 10,000 parking discs per annum. For example, by June 1998, 9000 parking discs had been issued to the university population. Although this number is for all campuses, more than half of this number travel to the upper campus where there are only 2300 bays hence creating a parking backlog. The second concern was the poor public transport facilities on campus. There was also a concern that there were few

buses providing transport on campus. However, observation during this study established that 175 bus trips are made to and from upper campus on any given day. It was also established that of the 175 bus trips, 90 bus trips are to the upper campus while only 85 bus trips are from the upper campus. The fact that less bus trips leave the upper campus as compared to those coming in might be another cause of concern to students who depend entirely on public transport. For example, 27 bus trips leave Liesbeeck Gardens to campus while only 18 leave upper campus for Liesbeeck Gardens. There was also a concern that parking discs were very expensive. It is however interesting to note that despite this claim there has been no reduction in the demand for parking on campus.

University of Cape Town

CHAPTER 3:

COMPARISON OF TRANSPORTATION IN INSTITUTIONS OF HIGHER LEARNING IN SOUTH AFRICA

3.1. Introduction

The purpose of this chapter is to briefly look at transportation aspects at other institutions of higher learning in South Africa. The reason for this is to determine how the University of Cape Town compares with other institutions in transportation; and if other institutions have transportation problems, what has been done or is being done to solve such problems. In other words, this chapter investigates if there are any policy issues in these institutions which can be learned in order to improve transportation at UCT.

It must however be noted that comparison of transportation aspects of tertiary institutions is a broad topic which could be a focus of dissertation on its own. This chapter therefore looks at only some of the transportation aspects of these institutions. The initial objective was to look at up to six top institutions in South Africa, but the lack of the appropriate data reduced the number to three universities and one technikon. The following sections briefly describe the transportation demand and supply at these institutions as well as some of the policies that are being employed, if there are any, to solve traffic related problems at these institutions.

3.2. Transportation at the University of the Western Cape

3.2.1. Introduction

The University of the Western Cape (UWC) is located outside the Bellville activity node in the Western Cape province. UWC is one of the previously called Black universities in South Africa, therefore the student profile predominantly comprises of 'Coloured' and African students. Questionnaires were sent to this institution to gather information about transportation on this campus and the little information gathered is discussed in the following sections.

3.2.2. Transport demand at UWC

The first step involved determining whether there was any transportation problems at UWC and the visit to this institution found that there were minor problems as compared to UCT. As a previously black institution, as already mentioned above, UWC does not have too much traffic into the university. This is due to low levels of car ownership on campus, especially amongst students who are predominantly black. The other reason is that UWC is on level terrain and there are vast tracts of land where members of the university community, especially students can park their vehicles. Different parking areas exist for different staff members while there are also parking areas designated for student parking. There were no numbers of staff and student enrolments at the time of the interview as there are only two people working on traffic-related issues at UWC.

3.2.3. Transport supply at UWC

A total of 1472 parking places exist at UWC, of which 1172 are tarred while the other 300 are gravel parking areas. Information about the total number of staff and students was not available for the purpose of this research. Beside this number of parking areas, there are other areas where students can park their vehicles, it was however mentioned the only problem with students is the need to park nearer their destinations and hence avoid walking far. At the present every student or member of staff wishing to bring a vehicle to campus has to register with the Campus Protection Services who will issue him/her with a valid parking disc for the year. There are no cover charges attached to these parking discs, the only qualification is that you have to be either a student or member of staff.

UWC is located along the Modderdam Road which makes public transport a viable mode of transport as people have to walk for only 1 to 5 minutes to their destinations on campus. Apart from the Road transport provided by the Modderdam Road, a railway line also exists alongside the campus with a train station available as well. There appear to be a significant number of commuters who use trains to campus. However, there was no data available to verify this claim as no transport study has ever been conducted on campus.

3.2.4. Towards the future

Although there are no policies available to deal with traffic issues on campus, it was learned that the university is working on new policies to control traffic on campus.

These policies will be implemented from the beginning of the year 2000. It is said that all parking areas will be charged for although there are no parking prices yet as discussions are still under way on campus. Penalties will also be levied on those who contravene any traffic regulation on campus, the amount of these penalties range from R20.00 for parking on the yellow bay to R50.00 for parking at the wrong parking area. The speed limit on campus will also be reduced to 30 kilometres per hour and there are various traffic calming measures that are going to be implemented, funding for which is already available.

Despite the fact that UWC has no significant parking problems, it is interesting to note that measures are being taken to deal with traffic-related issues before they become serious. This is support National Government's initiative of ensuring that potential problems are addressed before they become serious.

3.3. Transportation at the University of Stellenbosch

3.3.1. Introduction

University of Stellenbosch (US) is located within the Stellenbosch central business district. US is one of the previously 'white' institutions in South Africa. Just like with UWC, a questionnaire was sent to this institution to investigate if US has any transportation problems and what is being done to alleviate them.

3.3.2. Transport demand at Stellenbosch

A visit to the US found that there were also transportation problems at this institution. These arose mainly due to fewer parking areas as compared to the demand for parking. There were 5297 parking areas available at US in 1999 for both staff and students parking demand. However, this number also includes parking areas at student residences. Although the actual Figure was not available, it was found that more than 2600 people had applied for parking discs in 1999. The Traffic Administration at US indicated that 2621 parking discs were issued to the university community in 1998. Again, this is for all parking areas.

3.3.3. Transport supply at Stellenbosch

As already indicated above, 5297 parking areas are available at US. These parking areas are classified into yellow (academic staff), green (administration), red (students) as well as blue, white and disabled parking bays. Parking is presently provided at the cost of R40.00 per annum for students and free for staff members. Parking areas for academic staff are reserved while the rest are unreserved and are available on first come first served basis. Staff members are allowed to use up to three different vehicles to drive to campus. Private parking is also available at 'Neelsie' student centre with the first 30 minutes free and rising to R1.50 for 1 hour, R3.50 for 2 hour and R5.00 for 4 hours. This parking arrangement encourages short-term parking hence increases the turnover of the parking areas. As US is situated within the Stellenbosch central business district, general parking is also available for those willing to walk up to 15 minutes to their final destinations. Penalties are levied for different

traffic offences, R250.00 for being not registered, R80.00 (students) for not displaying the parking disc and R40.00 (students) for parking at the wrong place.

Public transport is provided by commuter trains with the train station within 10 to 15 minutes walk from the campus. Minibus taxis with the carrying capacity of up to 15 passengers also provide transportation along Merriman Avenue that passes through the campus.

3.3.4. Towards the future

The University of Stellenbosch has commissioned a study to look at transportation issues on campus. This was done to find solutions to transportation problems on campus and to determine new policies that will regulate traffic-related issues at the University of Stellenbosch. The study at US indicates the commitment of the university to provide an efficient transport system.

3.4. Transportation at Cape Technikon

3.4.1. Introduction

This section looks at transportation aspects at the Cape Technikon (Capetech). This institution is one of the previously 'white' institutions in South Africa. A questionnaire was sent to the Cape Technikon to determine the state of transportation at this institution. The following sections look at transport demand and supply as well as traffic regulations and policies in use at Capetech.

3.4.2. Transport demand at Capetech

A visit to Capetech established that this institution like other previously 'white' institutions suffers from high demand for parking areas. The problem is due to inadequate parking areas to cater for the huge parking demand due to high car ownership on campus.

3.4.3. Transport supply at Capetech

Three types of parking bays are available at Capetech. Reserved under cover parking areas are allocated on the basis of seniority. A charge of R15.00 per month is levied for these parking areas. The second type of parking bays is unreserved parking areas. These are parking areas without cover and are also available for staff members. A charge of R5.00 per month is levied for the use of these parking areas. The last type is student parking areas which are also uncovered and available for a parking charge of R50.00 per semester. Free parking provided by the Cape Town City Council is also available near the campus for people who cannot find parking on campus parking areas.

Capetech is located nearer the Cape Town central business district and public transport is readily available to the members of the Technikon community who would like to use it. Penalties are levied for contravention of traffic regulation and a fine of R50.00 is charged to release wheels clamped as a result of this.

3.4.4. Towards the future

Despite the admission that parking is a problem at Capetech, no attempts have been made to alleviate them so far. For example, parking charges have remained constant for a long time and there are no plans to increase them in the near future.

3.5. Transportation at the University of Pretoria

3.5.1. Introduction

University of Pretoria (UP) is situated in Pretoria, Gauteng Province next to Loftus Versfield rugby stadium, and is surrounded by Lynnwood Road, University Road, Prospectus Street and Duncan Street. UP is located in a level terrain. A questionnaire was sent to UP to determine transportation aspects on campus. Information was also gathered through the visit to the campus by the researcher. The following sections describe transportation aspects available from UP.

3.5.2. Transport demand at UP

The first question asked on the transportation at UP was to check whether there were any parking problems on campus or not. UP, like any other traditionally 'white' institution faces huge private vehicle traffic flow to the campus in the morning. This therefore creates a problem to accommodate this demand for parking. A count of all vehicles was conducted on campus for the purpose of this study. Four people were asked to count all the vehicles parked on designated parking areas. 4344 vehicles were

recorded on campus, 1756 for staff members and 2588 for students. 147 bicycles and 20 motor bikes were also recorded.

3.5.3. Transport supply at UP

Parking areas on campus are classified into covered and uncovered parking areas. The former are for the exclusive use of academic staff while the latter are for students. Covered parking areas are allocated based on seniority and a parking charge of R29.00 per month is payable for these parking areas. These parking areas are located within the campus fence and academic staff have to produce their staff card to access the campus premises. Students' parking areas located outside the campus premises are available for free, the only qualification being a registered student at UP. Public transport is provided by commuter trains with the railway line passing near the campus.

3.5.4. Towards the future

As it might have been observed, there is inadequate information about traffic on campus. The university has commissioned a traffic impact study on campus to look at traffic on campus and come up with policies to improve transport situation on campus. It is anticipated that pricing of parking areas will also be reviewed to use as an effective transport demand management strategy.

3.6. Transportation at Rand Afrikaans University (RAU)

3.6.1. Introduction

Rand Afrikaans University (RAU) is situated in Auckland Park in the Gauteng Province. RAU like UP is located on level terrain. A questionnaire was sent to RAU through the electronic mail to gather information about transport situation on campus. No response was returned, as a result a personal visit by the researcher was undertaken to get first-hand information about the campus. Information gathered during this visit is provided in the following sections.

3.6.2. Transport demand at RAU

As with all interviews conducted in other institutions during this study, the first question asked was whether there was any traffic problems on campus or not. RAU unlike many institutions has everything in one campus including student housing. No parking permits are issued at RAU as a result it was not possible to discover how many students bring vehicles to campus. It was however established that on a normal day (with students and personnel only), 98 per cent of the parking areas are occupied. RAU is sometimes used by outside companies to conduct their activities. It is during these abnormal days that parking becomes a big problem on campus.

3.6.3. Transport supply at RAU

Parking areas at RAU are classified into personnel (not reserved), open parking bays, hostel and reserved bays for senior personnel. Parking areas can further be

classified as covered and uncovered parking areas. Covered areas are reserved and are allocated on the basis of seniority. A parking charge of R30 per month is levied on these parking areas. Open parking bays are used by students, visitors and some personnel. A further inquiry on the total number of parking areas on campus established that there are 490 personnel parking bays, 1705 open parking bays and 764 hostel parking bays. It was also found that there are 30 reserved parking bays for senior personnel and 150 visitors' parking bays on campus. As already indicated in the preceding section, no parking permits are issued at RAU as there is only one main gate which all the vehicles and people have to use. As a result people use their student cards and staff cards to access the campus. It was however mentioned that there are about 12000 people (personnel and students) on campus.

Normal traffic regulations applied by the Traffic Department of South Africa are applicable on campus. It was however established that parking on the red or yellow line on campus results in wheels of the vehicle concerned being clamped. A charge of R100 is required to release each wheel clamped. Public transport is provided by a regular public bus service that passes in front of the main gate. There are also minibus-taxis carrying people from Johannesburg to campus.

3.6.4. Towards the future

A traffic impact study has been commissioned by RAU to look at transportation issues on campus. The purpose of this study is to identify problem areas on campus and to recommend solutions to deal with them. Although the final report is still pending, one of the recommendations is to reduce travel speeds on campus. Traffic calming

measures such as speed humps and rising speed tables are being implemented on campus as a result of the preliminary report.

3.7. Comparison of transport aspects in South African institutions of higher learning

The main of this chapter was to look at transportation issues in other South African institutions of higher learning. This was done primarily to determine if there are traffic problems in these institutions and to see if there is anything that UCT can learn from them on how to deal with transport problems on campus. This section therefore presents a brief summary of these comparisons where there were any.

3.7.1. Public transport service

This section provides a brief summary of the public transport service on institutions discussed in this chapter. This information is presented in Table 3.1 below:

Table 3.1. Comparison of public transport service in six South African institutions

Campus	Distance from CBD ¹ (Km)	Passenger rail nearby	Frequent public bus service nearby	Nearest bus stop (m)
UCT	6.4	No	Yes	800 m
US	0.8	No	No	-
UP	4.8	Yes	Yes	200 m
RAU	2.4	No	Yes	50 m
UWC	3.2 ²	No	Yes	400 m
Capetech	-	No	Yes	100 m

1. CBD stands for the central business district.

2. UWC is 3.2 km from Bellville not Cape Town.

3.7.2. Parking provision and satisfaction

One of the pieces of information gathered was the provision of parking on the institutions discussed in this study. The purpose of this information is to compare the ratio of parking areas available to the total number of students and staff on each campus.

Table 3.2. Parking provision in six South African institutions

Campus	STUDENTS		(b)/(a)	STAFF		(d)/(c)
	Total no. of students (a)	Total parking bays (b)	Ratio of parking bays to students	Total no. of staff	Total parking bays	Ratio of parking bays to staff
UCT	16462	1177	0.299	4325	1095	0.253
US	13000			2200		
UP	19846	3500	0.176	4219	1756	0.416
RAU	9000	1881	0.209	3000	1088	0.363
UWC	9500	-	-	1400	-	-
Capetech	-	-	-	-	-	-

For UCT, the numbers of students and staff given are for all campuses. It was assumed that 80 per cent of students and staff use the upper campus. For US, there was no breakdown on the number of parking areas for students and staff. It was however established that there were a total of 5297 parking areas. By adding up the number of students and staff, a ratio of 0.348 was found for the whole campus. For UP, a ratio of

0.176 was found for students. There was no information on the number of students and staff as well as the number of parking areas available from Capetech.

3.8. Conclusions

One of the most common problems found from all the institutions surveyed was the fact that students were not willing to park far from their destinations. It was also found that UCT was the only institution that charged realistic prices for parking areas. For example, at UP, UWC, RAU and Capetech parking is provided free of charge to students. At US students only pay R40 per annum for parking. Despite most of these institutions indicating that parking was a problem on their campuses, none has ever thought of realistically pricing parking as the solution to their parking problem. As already indicated, UWC intends introducing parking charges from the year 2000. It must however be mentioned that the reason for this is to raise revenue to improve public transport facilities on campus and not to alleviate any parking problems as there are none whatsoever. Therefore in terms of pricing of parking, there is nothing that UCT can learn from these institutions.

UCT is also the only institution with organised Traffic Administration with its own traffic officers to deal with traffic matters on campus. For example, at Capetech only one official is responsible for parking matters as a result, there were no information on the number of parking areas on campus. All the policies that UWC intends implementing from 2000 have been learnt from UCT.

Although there is nothing in terms of transport provision and traffic regulations that can be applied at UCT, this chapter succeeded in describing some of the transportation aspects of South African institutions discussed.

University of Cape Town

CHAPTER 4:

EXISTING TRAVEL PATTERNS AT THE UNIVERSITY OF CAPE TOWN

4.1. Introduction

The purpose of the survey was to:

- 1) Identify a mixed sample of academic staff, support staff and students who travel to the upper campus by car and at least sometimes use public transport.
- 2) Establish the current journey characteristics for each respondent while using private car and alternative transport.

As an attempt to achieve 1) above, a request was made to the Traffic Administration asking for the list of all the people who are in possession of the parking discs. This request was turned down citing invasion of privacy as the main reason. As a result a letter was sent out bearing the approval of the Head of the Civil Engineering Department, to some of the members of staff. Their addresses were found using the university's internal telephone directory. Some staff members were approached via the electronic mail requesting them to participate in the survey. A random sample of students was also obtained. Several responses were obtained indicating their willingness to participate in the survey.

To achieve 2) above, a questionnaire was sent to those who indicated that they would participate in the survey. An example of the questionnaire used is provided in Appendix J. This questionnaire had two sections, 1) when they travelled by private car and 2) when they travelled by public transport. As the survey was not a once-off survey, names and addresses were requested to facilitate further correspondence with

respondents. Their job titles were also requested in order to categorise respondents into academic, support staff and students. This would be used later in the Stated Preference survey. The components of the questionnaire will be discussed in detail below:

4.2. Part A - Car travel

(a) Type of parking bay

The first information requested was the type of the parking bay used by the respondent. The University of Cape Town categorised parking bays into red, yellow and white parking bays (Tables 2.3 and 2.4). This is because different parking bays are priced differently (Table 6.1).

(b) Leave home time (in minutes)

The time that respondents often leave home as well as when they arrived on campus was requested. From this information, the in-vehicle time of the respondents would be obtained. The average attribute values for the actual travel time are given in Table 4.1. below:

Table 4.1. Average attributes values for car travel

Attribute	Mean	Std dev.	Min	Max
Leave home time (minutes)	7:27	52	5:30	9:30
In-vehicle time (minutes)	31	16	5	75
Car travel (minutes)	40	19	12	110
Search time (minutes)	4	6	0	30
Walk time (minutes)	5	3	1	15
Parking charges (R/day)	1.41	0.24	1.30	1.96

From Table 4.2 the average leave home time was found to be 7:27 while the latest time was found to be 9:30. Given the fact that the average leave home time was as late as 7:27, respondents were able to do other things important to them before leaving for work.

(c) Preferred parking area

Information about their preferred parking area was also requested. This information gives an idea of where the respondents prefer to park. As already indicated in chapter 2, red parking bays are reserved at all times. Therefore academic staff tend to use the same parking bays daily, while support staff and students parking bays are used on first come, first served basis.

(d) Search and Walk time (in minutes)

Information was also sought of how long it takes respondents to find parking as well as the time taken to walk from the parking area to their office or lecture theatre. The average search time for all the respondents was found to be 4 minutes while the average walk time was 5 minutes. The average walk time indicates that respondents tend to park nearer their destination hence take little time to reach their destination from their vehicles.

(e) Security of the car on campus

The last information requested on car travel was the security of the vehicle while parked on the university parking area. The level of security of vehicles on campus was categorised into five classes namely; very satisfied, satisfied, not sure, dissatisfied and

very dissatisfied. Table 4.2 below presents the results of security of vehicles on campus as perceived by the 50 respondents interviewed.

Table 4.2 Vehicle security on campus

Level of Satisfaction	% of respondents
Very satisfied	12%
Satisfied	40%
Not sure	22%
Dissatisfied	22%
Very dissatisfied	4%

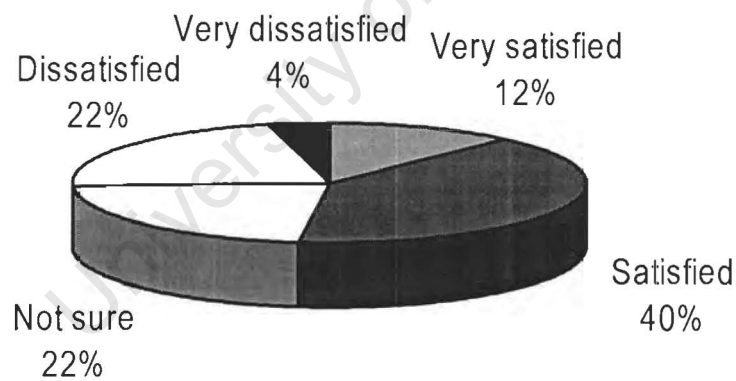


Figure 4.1. Security of vehicles on campus

From the above Figure 40% of the respondents were satisfied with the security of their vehicles while parked in the university campus. 22% of the respondents were not sure

of the security of their vehicles while another 22% were dissatisfied with the security of their vehicles on campus. 12% of the respondents indicated that they were very satisfied with the security of their vehicles while only 4% indicated that they were very dissatisfied with the security of their vehicles while parked on campus. From this data one can conclude that security of the vehicles is not a problem on campus as 52% were happy with it.

4.3. Part B – Public transport travel

(a) Alternative transport to campus

The first information requested when respondents used alternative mode of transport other than a car to campus was to determine what the mode was. Eight possible answers were given, namely; train, bus, taxi, shuttle service, motor cycle, bicycle and walk. Additional information was requested should respondents use any other mode of transport except those indicated. Should respondents use more than one mode of transport, that information was also requested.

(b) Leave home time (minutes)

The second information requested while travelling by public transport was the time they left often home and when they normally arrived on campus while leaving at that time. Average public transport attributes values are provided in Table 4.3 below.

From the Table it was found that the average leave home time for all respondents while using public transport was 7:12. This is 15 minutes earlier than when respondents use

their cars to work. The latest that respondents leave home for work was found to be 9:00, 30 minutes earlier than when respondents use their cars.

Table 4.3. Average attributes values for public transport travel.

Attributes	Mean	Std dev.	Min	Max
Leave home time (minutes)	7:12	45	5:30	9:00
Walk/travel to station (minutes)	12	9	1	35
Wait time (minutes)	8	5	0	30
In-vehicle time (minutes)	32	17	5	72
Interchange time (minutes)	6	8	0	30
Walk time to UCT (minutes)	10	10	0	40
Fare (R/day)	5.34	1.81	2.00	7.50

(c) Walk/travel time to station (in minutes)

The average time that respondents took to walk or travel to the station from the home-end of their trip to the university in the morning was found to be 12 minutes. The minimum time taken by respondents was found to be 1 minute while the maximum time was found to be 35 minutes.

(d) Wait time (in minutes)

The average time taken by respondents to wait for public transport was found to be 8 minutes. The minimum wait time was found to be as little as 0 minutes while the maximum wait time was found to be 30 minutes.

(e) In-vehicle time (in minutes)

The average time taken by the respondents in public transport was found to be 32 minutes. The minimum in-vehicle time was found to be 5 minutes while the maximum in-vehicle time was found to be as high as 72 minutes.

(f) Interchange time (in minutes)

The average time taken at the interchange walking and waiting for the public transport was found to be 6 minutes. The minimum interchange time was found to be as little as 0 minutes while 30 minutes was found to be the maximum interchange time taken by the respondents.

(g) Walk time to UCT (in minutes)

Walk time here refers to time taken by respondents to walk from their last bus/train/shuttle stop to their final destination. It therefore follows from the above statement that those who use a bus would have to walk longer to campus than those who decide to use the shuttle service available on campus. The average walk time was found to be 10 minutes. The minimum walk time was found to be as little as 0 minutes while the maximum walk time was found to be 40 minutes.

(h) Fare (in rands/day)

The average cost of the public transport was found to be R5.34 per day. The minimum fare paid was found to be R2.00 per day while the maximum fare paid was found to be R7.50 per day.

(i) Security and comfort

Information was also requested on the perceived level of security and comfort while respondents used public transport. The results obtained are given in Table 4.5 and Figures 4.2 and 4.3 below:

Table 4.4. Perceived levels of security and comfort of public transport

Attribute	Poor	Average	Good
Security	28%	62%	10%
Comfort	22%	66%	12%

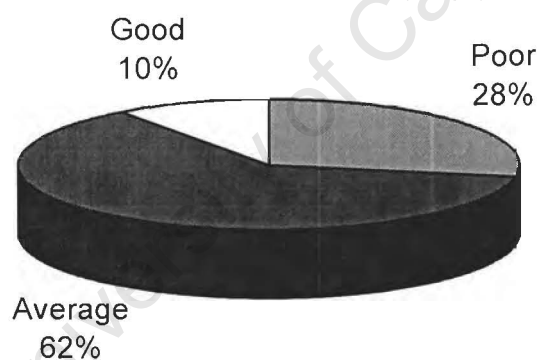


Figure 4.2. Perceived level of security of public transport

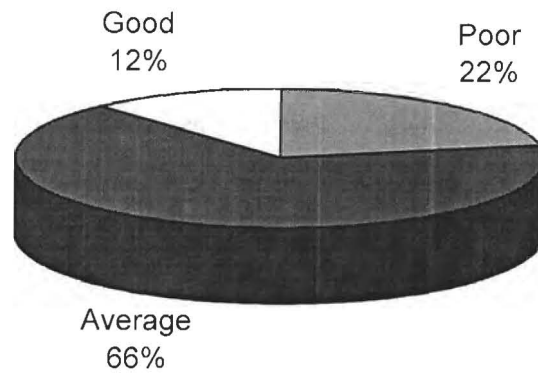


Figure 4.3. Perceived level of comfort of public transport

From Figure 4.2 above, 28% of respondents indicated that the security of the public transport was poor. However, 62% of the respondents indicated the level of security was average while only 10% perceived the security to be good. From Figure 4.3, 66% of the respondents indicated that the level of comfort was average. 22% of the respondents indicated that the level of comfort was poor while only 12% felt that it was good.

(j) Frequency and reliability of public transport

Respondents were also requested to indicate how they perceived the frequency and reliability of public transport. 64% of the respondents indicated that public transport was frequent while 36% felt that it was infrequent. It was also found that 68% of respondents felt that the public transport was reliable as compared to 32% who indicated otherwise. Of the 32% who indicated that it was unreliable, 56% were female while 44% were male respondents. However, it was also found that of the 68% who indicated that the public transport was reliable, 44% were female while 56% were male respondents.

CHAPTER 5

THEORY OF STATED PREFERENCE METHODS

5.1. Background

Long periods of weak transport planning, limited investment, emphasis on the short term and mistrust in strategic transport modelling and decision making have led to congestion, pollution, accidents and financial deficits all over the world (Ortuzar et al., 1990). Experience has however shown that old problems do not fade away under the pressure of mild attempts to reduce them through better traffic management; old problems resurface with even greater vigour, pervading wider areas, and in their new form they seem more complex and difficult to handle.

The most commonly used transport model today is referred to as the four step process. This conventional transport model consists of firstly trip generation, where an area is divided into smaller zones and socio-economic conditions and other factors are used to generate trip rates from these zones. The second step is the trip distribution. Here trips generated from the first step are distributed to all the zones using a model such as the gravity model, which takes into consideration the attractiveness of the area, some measure of production like population as well as the impedance in distributing trips to various zones. The third step is called modal split where trips are split into different modes of transport available e.g. public, private transport and walking. The last step is called assignment. Here trips are assigned to various routes within the study area.

It is however recognised that travel decisions are not actually taken in this type of sequence; a contemporary view is that the location of each sub-model depends on the form of the utility function assumed to govern all these travel choices (Ortuzar et al., 1990). It is further recognised that the four step process concentrates on only a limited range of travellers' responses. Current thinking therefore requires an analysis of a wider range of responses to transport problems and schemes. Though the four step process is the most common approach, it is also recognised that it is not the only approach available.

Development of Stated Preference (SP) methods provide an important instrument in transport planning for forecasting the behaviour of travellers to changes in transport supply. If properly undertaken, SP methods can provide good quality information on travel behaviour and at reasonable costs (Clark, 1995). The most important feature of SP methods is that they allow transport planners and analysts to experiment. These methods are the main subject of this study and will be dealt with in detail in this chapter to provide theoretical background.

5.2. Revealed Preference (RP) methods

For a long time the behaviour of travellers when faced with choices between various modes of transport was monitored through actual or observed behaviour of the individuals. This is referred to as revealed preference data. It is however interesting to note that we are seldom in a position to actually observe choice; normally we just manage to obtain data on what people report they do (or more often, what they have

done on the previous day (Ortuzar et al., 1990)). Although this provides real information on travel patterns, it has limitations:

- observations of actual choices may not provide sufficient variability for constructing good models for evaluation and forecasting.
- there may be a domination of few variables in the observed behaviour therefore making it difficult to identify the relative importance of other variables.
- data collection is very difficult where the policy is entirely new.
- very large and expensive surveys need to be conducted in order to obtain adequate observations.

These limitations therefore restrict the application of revealed preference data in evaluating and forecasting the travellers' behaviour.

5.3. Stated Preference (SP) methods

Stated Preference methods refer to a number of different approaches all of which use people's statements of how they would respond to different situations (Pearmain et al., 1991). The most commonly used methods are referred to as 'conjoint analysis', where individuals are required to state their preference in terms of ranking in order. The techniques of analysis used with SP methods share an underlying paradigm of a rational consumer maximising utility subject to a set of constraints. Further explanation of this concept is given in section 5.6. The SP approach draws its behavioural theory from a subset of decision theory known as functional measurement, which emphasises the modelling of individual preference/choice behaviour in terms of an explicit algebraic

theory of how individuals integrate information in the evaluation of predefined alternatives (Hensher et al., 1994).

A SP survey is comprised of the following features:

- it is based on the elicitation of respondents' statements of how they would respond to different hypothetical travel situations.
- each option is represented by combination of different attributes which the researcher needs to test e.g. travel time, parking price, security and so on.
- SP methods use experimental design to construct hypothetical alternatives so that the individual effect of each attribute can be estimated. Experimental design ensures that variations in the attributes in each combination are statistically independent from one another.
- the researcher has to make sure the respondents are given hypothetical alternatives they can understand and can relate to in their daily lives.
- the respondents state their preference either by ranking the options on their attractiveness, rating them on scale indicating strength of preference, or simply choosing the most preferred option from the given pair of alternatives.
- the responses given by the respondents are analysed to provide quantitative measures of the relative importance of each attribute. (Pearmain et al.; 1991)

5.4. Significance of SP methods

SP methods draw their strengths from the weaknesses of revealed preference methods. These advantages are presented below:

- the researcher has complete control over the choices presented to the respondents. SP methods can therefore ensure that the data is of sufficient quality to construct good quality statistical models.
- they provide the only practical solution where the policy is completely new and no revealed preference data available.
- SP methods provide multiple responses as compared to a single response from revealed preference methods. (Pearmain et al.; 1991)

5.5. Disadvantages of SP methods

The main weakness of SP methods is that they are based on individuals' statements on how they would respond when given hypothetical travel situations. It is therefore possible that people may not behave the way they said they would when the policy is implemented. It is therefore of utmost importance in order to obtain accurate results that the researcher provide respondents with realistic choices, and where revealed preference data of sufficient quality is available, that it be used to scale the model.

5.6. Understanding travel behaviour

Stated Preference methods can provide information on the underlying priorities that determine people's behaviour. However, travel behaviour is very complex subject area and the purpose of this section is to provide a basic definition of the processes that may be considered to determine such behaviour. Individuals choose a product based on the utility derived from the consumption of such product. From the definitions, utility

represents the satisfaction or benefit which a person enjoys when spending his or her resources on different things (Pearmain et al., 1991). There are different types of utilities but the one measured by Stated Preference methods is called indirect utility as respondents choose between the different options subject to the constraints on their resources. A good example would be where an individual perceives rail travel to be superior to coach travel but based on his or her income constraints the former is not an acceptable option. A direct utility function describes preferences independently of market phenomena because it does not reflect optimising behaviour by the traveller and it does not contain market prices (Clark, 1991).

The most common utility construct is a linear model, in which the combination of attributes is additive:

$$U_i = a_0 + a_1X_1 + a_2X_2 + \dots + a_nX_n$$

where U_i = utility of using option i

$X_1 \dots X_n$ = product attributes

$a_1 \dots a_n$ = model coefficients

a_0 = model constant

The model coefficients represent the degree of relative importance individuals attach to each product attribute. These model coefficients are also referred to as 'part-utilities'. The constant a_0 indicates the basic bias of individuals towards or against the product. The utility model above is said to be compensatory as an individual may trade off an improvement in one attribute, e.g. increase in security, against the worsening in another e.g. increase in public transport cost. More discussion about utilities and how they could be measured follows in the analysis section of this chapter.

5.7. Experimental Design

It has already been mentioned in the preceding sections that SP methods make use of experimental design to construct hypothetical travel alternatives. The design of options has three basic steps:

- a) the selection of the attribute levels and combinations constituting each alternative (experimental design);
- b) the design of the presentation of these alternatives (stimulus presentations), and
- c) the specification of the responses to be elicited from the respondents.

(Ortuzar et al.; 1990)

Experimental design is usually orthogonal, i.e. it ensures that the attribute combinations presented are varied independently of one another. This therefore ensures that the effect of each attribute can be easily identified (Ortuzar et al., 1990). Experimental design distinguishes cases where principal effects of attributes are considered and where interactions between attributes are considered. Experimental designs which use every possible combination of attribute levels are referred to as 'full factorial' designs. For example, a design with two three-level attributes and two two-level attributes would have $3^2 \times 2^2 = 36$ options. The use of full factorial design presents a problem as it restricts the number of attributes and levels to be varied. As the number of options given to respondents increase, there is a fear of an increase of response error due to fatigue of the respondents. It is therefore recommended to use a range of 9 to 16 options to avoid this problem.

Several strategies exist to reduce the number of options presented to respondents while at the same time using the same number of attributes and levels. These strategies are presented below:

- use ‘fractional factorial’ design. This approach allows the use of appreciably larger numbers of attributes and levels, while still using only one experimental design (Kocur et al., 1982). It is based on the assumption that some or all of any interactions between attributes influence the responses in a negligible manner.
- remove options that will dominate or be dominated by all other options in the choice set;
- separate the options into ‘blocks’, so that the full choice set is completed by groups of respondents, each responding to a different sub-set of options;
- carry out a series of experiments with each individual, offering different attributes, but with at least one attribute common to all, to enable comparisons;
- define attributes in terms of differences between alternatives (e.g. journey time of train = journey time + 10 minutes).

Given the fact that six attributes were varied in this study, ‘fractional factorial’ design was used. This enabled the researcher to present sixteen alternatives to respondents.

5.8. Analysing Stated Preference data

It has already been mentioned in section 5.6 of this chapter that SP methods use utility functions as a measure of the attractiveness of each option presented to an individual. In the analysis section of SP methods the main objective is to determine the values of the model coefficients or part-utilities, so as to establish the relative

importance of each attribute on the overall utility. The most commonly used utility function is again provided below.

$$U_i = a_0 + a_1X_1 + a_2X_2 + \dots + a_nX_n + e$$

where U_i = utility of using option i

$X_1 \dots X_n$ = product attributes

$a_1 \dots a_n$ = model coefficients

a_0 = model constant

e = random error disturbance term

The random term “e” in the equation is included to reflect disturbances that arise due to circumstances outside the control of the survey design. Once the model coefficients have been estimated they can be used for various purposes:

- to determine the relative importance of the attributes included in the experiment;
- to determine values-of-time (when both time and cost attributes have been included in the experiment);
- to determine monetary values for other attributes (when such attributes as cost have been included in the experiment); and
- to specify utility functions for prediction models.

Apart from the direct applications of part-utilities listed above, they can also be used indirectly, after proper scaling:

- to determine demand elasticities (especially for variables which are hard to measure in a RP context, such as service frequency);
- to update and/or complement existing demand models (e.g. making existing disaggregate mode choice models sensitive to qualitative factors which would otherwise be swamped in the mode-specific constants);

- to create disaggregate demand models for alternatives that do not yet exist (e.g. new urban or high-speed rail systems). (Pearmain et al., 1991)

Several ways exist in which the overall utilities can be decomposed into part-utilities or coefficients. However, according to Ortuzar and Willumsen (1990) the four most commonly known methods are the following:

- a) Naïve or graphical methods;
- b) Non-metric scaling;
- c) Regression analysis;
- d) Logit and probit.

The choice of which estimation method to use depends on a number of criteria, with some of the more important ones being:

- 1) the measurement scale of the preference variable
- 2) the experimental design
- 3) the desired aggregation level of the results
- 4) the type of utility function
- 5) the availability of estimation software.

For reasons outlined above, rating preferences can be analysed using naïve methods, regression analysis and logit; rank order preferences can be analysed using all four groups of methods, although the use of regression analysis can be less desirable; and choice preferences can be properly analysed using logit/probit. It is for this reason that logit models were used in this study to analyse that data.

There are various tests can be performed to inspect the results estimated from any of the four methods of analysis given above. The following four steps need to be observed in the inspection:

- are the signs of all coefficients as expected? For example, one would expect a negative for the coefficient of search time as the more people search for parking, the less likely they would choose to commute by car to their destination.
- are the relative sizes of the coefficients within reasonable bounds (for instance, values-of-time which is given by the coefficient of time divided by the coefficient of cost, such as the cost of parking)?
- is the overall goodness-of-fit of the model acceptable (check value of R-squared or Rho-squared)? Rho-squared was used as a goodness-of-fit measure in logit modelling and further discussion is given in section 6.4.4.
- are the standard errors of the coefficients not too large (observe t-statistics)? The t-statistics are very important as it is only through them that an attribute is rejected or accepted. In this study a t-statistic of ± 1.96 at 95% confidence level was used based on whether the t-statistic estimated is positive or negative. More discussion about the topic to follow later.

5.9. Prediction Models

The data obtained from the previous section can now be used to predict travel behaviour due to changes in one or more attributes of commuters' travel pattern. Recent developments in SP methods have shown that SP data can be used together with RP data to produce better quality models. The essential point is that SP models describe

the behaviour of respondents within the SP exercise, where such things as travel times and fares are clearly expressed. In practice, respondents' estimates and evaluations of these things may be much less precise and this introduces a new source of error, which may cause SP models to predict behaviour incorrectly (Pearmain et al., 1991). In order to compensate for this situation, existing RP data is used to scale the SP results.

There are two ways of scaling (transforming) the results obtained from the SP exercise, (1) sequential method and (2) simultaneous method. Simultaneous scaling involves transforming each attribute used in the utility function. However, this method needs specialised software e.g. "treelogit" in the ALOGIT package. As Statistical Software Tools was used to analyse the data, this method was not applied in this study and as a result sequential scaling was applied instead. Sequential scaling transforms the SP results using the following equation:

$$U_i' = b_1 + b_2 U_i$$

where U' = transformed utility function

U_i = utility of option i obtained from SP data

b_1 = represents the net utility of all the variables omitted from SP experiment.

b_2 = scaling factor lying between 1 and 0.

If the RP error is large, then the scaling factor is small, suppressing the impact of the SP utilities. If the error is small, then SP and RP behaviour are similar, and the scaling factor will be close to 1.

The sequential approach for estimating a prediction model is provided below:

a) first estimate a set of preference part-utilities on the results of a SP exercise;

- b) compute the total preference utility for each individual and for each alternative available using the results of the estimation.
- c) finally, scale parameters b_1 and b_2 are obtained by estimating a logit model using observed choice behaviour as the dependent variable, and the predicted total preference utilities as the independent variable.

Due to time constraints and the fact that the revealed preference data and stated preference differed slightly, this method was used to analyse the data in this study. However, it must be mentioned that where revealed preference data and stated preference data differ significantly this method need to be applied to scale the results according to RP data. This is important as it ensures that the prediction model is based on observed data.

5.10. Quick Policy Analysis

SP methods have been developed mainly to provide a new tool for policy analysis. Some policy issues such as transportation energy policy and intermodal relationships are best addressed from the travel demand point of view. Travel demand models developed using SP methods incorporate many important relationships among modes of transport. The researcher has complete control on the policies and variables he/she wishes to test. Another significant point is that these travel demand models capture the sensitivity of demand to a change in one or more variables of interest. These variables may be policy variables which the transport agency can control directly or indirectly. The advantage of these forecasting models is that they can be applied quickly to many transport problems. Therefore, these forecasting models can serve as a

powerful sketch-planning tool that allows the policy analyst to respond to a policy question quickly and meaningfully. Two methods exist for quick policy analysis and they will both be described briefly below.

5.10.1. Pivot Point Analysis

This approach is based on the incremental form of the logit model. Pivot point analysis predicts the revised mode shares of whatever modes of transport are used in the model based only on knowledge of the existing mode shares and the changes in service levels brought about through the policy being analysis. The following can be used to calculate the revised mode share:

$$P'_i = \frac{P_i e^{\Delta U_i}}{\sum_j P_j e^{\Delta U_j}}$$

Where: P'_i = revised mode share for mode i

P_i = the market share of mode i;

ΔU_j = the change in the utility function for mode j

j = an alternative among the set of variable options (Kocur et al., 1982)

From the above formula, it can be seen that it permits one to perform policy analysis, furthermore only the changes in the variables that enter a utility function as well as the base mode share for each mode are evaluated.

5.10.2. Demand Elasticities

The above section described pivot point analysis which enables the policy analyst to perform a quick forecast due to changes in one or more variables of interest. Demand elasticities are used the same way as pivot-point analysis with other demand models. Pivot-point estimates are more accurate than elasticity-based estimates in logit models, and so they are generally preferred. However, demand elasticities can be obtained quickly using the formula given in section 6.4.4. Demand elasticity is defined as the percent change in demand resulting from a one percent change in the value of one of the explanatory variables. Another type of elasticity is called cross elasticity of demand.

5.11. Validation of the Model

The last step in the SP model is the need to validate the model. Several studies have been undertaken to date using Stated Preference methods and reliable results have been obtained. However, three elements can be distinguished with regard to validity:

- reliability (the ability to reproduce the measured preferences);
- internal validity (the descriptive quality of the model);
- external validity (the ability to predict actual behaviour using the model).

Levin et al (1983) cited in Wilson and Shoup (1990), conducted a comparative study investigating the validity aspects of SP research. Sixteen studies were considered from which indications about the external validity of SP could be obtained. The results of most of these studies suggested that SP methods can predict choice behaviour for the

investigated sample with a reasonable degree of accuracy. It is therefore reassuring to note that SP methods are capable if conducted properly to yield reliable and valid results.

University of Cape Town

CHAPTER 6:

STATED PREFERENCE DATA COLLECTION

6.1. Introduction

Chapter 5 presented the theoretical background on Stated Preference methods. This was to enable the reader to fully comprehend the method employed in data collection as well as the analysis thereof. This chapter discusses the collection of the data used in this study. The objectives of this chapter are: -

- a) To describe a parking policy strategy to be tested.
- b) To discuss the attributes identification and their levels of variations, used in the pilot SP survey.
- c) To describe the selection of an appropriate Stated Preference experimental design.
- d) To describe the initial survey conducted and the analysis thereof.
- e) To discuss the collection of data for the main survey.

As already given in the first chapter, the purpose of this study is to investigate how an increase in parking charges at the University could affect the mode choice. It should, however, be mentioned that the study does not in any way form part of the University's attempts to deal with parking demand on campus. Its purpose is mainly to determine the strengths and weaknesses of Stated Preference methods in policy testing. Parking charges has been identified as one policy which plays a role in mode choice.

The sample of 50 used in the study is in no way a representative sample as more than 10000 parking discs are issued every year to the university community. The study therefore indicates the strength of SP methods in policy testing even when using a small

sample. The data used in the study was collected from students, support and academic staff of the university who availed themselves for the interviews involved.

6.2. Proposed Policy test

The main policy to be tested in this study is the effect of increased parking price on the choice of the mode of transport to those commuting to upper campus in the morning. Although six attributes were varied in this study, parking charges is the major policy variable which the University of Cape Town can use to influence mode shift from private cars to public transport. The researcher was also interested on the impact of improved service of public transport on mode choice to commuters on campus. Table 6.1 below presents the annual parking disc prices at the university for the period 1995 to 1998.

Table 6.1. Parking disc prices for 1995 – 1998 (rands per annum)

Year	Yellow/white bays	Red bay	Lower campus	Motorcycles
1995	207	312	60	42
1996	228	342	66	45
1997	246	369	72	48
1998	270	405	78	54

Source: Traffic Administration, 1998

Looking at the parking disc prices from 1995 to 1998 reveals a trend of 10% increase in parking prices per annum. Those private car users who have been commuting to upper campus for a long time are aware that the parking price will be 10% more the following year. How this trend does not deter them in any way from using their private cars, as

this increase corresponds with the inflation rate as well as the average annual increment in their income. Given this background, the effect of realistic increase in parking prices on mode choice will be tested in this study. Although these increases may be higher than what the university authorities may impose, the purpose of this test is to determine boundary values, that is, values of parking prices where private car users will migrate to public transport. It is also necessary to determine when will the present public transport users shift to private cars.

Combination of attributes varied in the SP survey will also be tested in this study. Of importance, a combination of improved service of public transport (i.e. security and reliability) provided at the university and the increased parking charges will be tested to see its impact on mode choice. This is important as it is proposed by the Moving South Africa – Action Agenda transport document as a way of enhancing public transport performance.

6.3. Attributes identification and SP experimental design

The first step in the study was to identify attributes and variation levels. Attributes identification requires an understanding of how people make travel choices, i.e. what determines their mode choice? This study focuses only on two modes of transport: private car and public transport. The underlying assumption in this study is that commuters will choose the mode of transport that offers them the highest utility relative to alternative modes.

Unlike other similar studies conducted before, such as the University College of London study (Clark, 1991), this study was not only interested in policies relating to the supply of parking. The former studies involved varying attributes for private car travel presented to respondents only. This study looked at attributes for private car travel as well as those for public transport. This enabled the researcher to identify the impact improvements in the service for public transport has on the commuters' choice for the mode of transport.

6.3.1. Attributes determination and attribute levels

As already indicated above, the first step in the design was to determine the number and nature of attributes to be varied. Informal interviews conducted with the people who used private car and also have access to public transport helped identify attributes that influence their mode choice. Approximately ten formal interviews were conducted with some members of staff of the Civil Engineering Department, other departments at the University as well as transport officials at the Cape Metropolitan Council (CMC). These interviews were done prior to the commencement of the SP survey. The second concern was to determine how many attributes of those identified should be varied. Ortuzar and Willumsen (1990) suggest that people give the most realistic responses when asked to consider simultaneous changes in up to three attributes only. Pearmain et al. (1990, 44) however suggest that an upper limit of 7 attributes should be used – perhaps lower if some are currently unfamiliar to respondents. For the purpose of this study, an upper limit of 6 attributes was used. The following attributes were addressed:

1. Private car travel

The following attributes were used in the private car travel as they describe the commuting process while using private cars. Cognisance need to be taken that some commuters' commuting process may differ slightly from the one given below, especially those who have to drop off their children at schools on their way to work. However, since these commuters have no alternative transport but to use their vehicles daily, they did qualify to participate in the survey as SP survey involves those with a choice. The commuting process given below is considered the most common to all respondents who participated in the study.

- (a) Leave home time (measured in minutes from midnight).
- (b) Travel time from home to work (minutes).
- (c) The amount of time spent searching for parking (minutes).
- (d) Walk time from the car to the office or class (minutes)
- (e) Parking charge (Rands per day)

Although five attributes were presented above, it was decided to vary only three of the above while keeping the other two constant. The reason for this was to avoid swamping respondents with many attributes which could defeat the purpose of the study, as the survey has to be as plausible and realistic as possible. However, it is common knowledge that people respond to changes in in-vehicle travel time and search time in different ways. For example, if someone had to start work at 8:30 and left home at 8:00 while the total travel was 30 minutes; the increase in travel time to say 50 minutes would lead to that person leaving at 7:40 to be on time. Or one would leave home earlier to avoid traffic congestion on the Road. The levels to which each attribute was varied depended on the degree of importance of the attribute concerned. This was informed by the interview conducted before the commencement of the surveys. The

description of each of the attributes presented above are provided below. The attributes and levels used are provided in Table 6.2 below.

(a) Leave home time

People interviewed in the survey left home to work approximately 15 minutes later when using private cars than when using public transport. This is very interesting as one expected the opposite due to traffic congestion when leaving home later than 7:00. One reason for this tendency would be the result of the low amount of time spent searching for parking on campus. The difference in the degree of traffic congestion between Cape Town and London also explains the discrepancy. A closer look on the leave home time reveals that the average leave home time for all respondents coming to the University in the morning is 7:00. Traffic flow during this time is relatively low as compared to between 8:00 and 9:30, with M3 almost at jam density at 8:00 which passes close to the upper campus (see the map on Appendix B). Leave home time was kept constant in this study. As already explained in the previous section, this was to avoid too many attributes being varied although it is understood that commuters would leave home earlier to avoid long travel times and to be on time at work as most respondents have fixed starting times.

(b) In-vehicle travel time

The amount of time that a driver is willing to spend on the Road was considered of fundamental importance in the study. This attribute was varied to three levels so as to determine the boundary values at which in-vehicle time becomes a disutility to drivers. It is not a policy variable as the researcher or the university administration has no control over it.

(c) Search time

Previous studies conducted indicated that drivers were very sensitive to the amount of time they spend searching for parking. Because of the influence it may have on the mode choice, this attribute was varied to three levels.

(d) Walk time

For the purpose of this study, walk time was kept constant. However, it is acknowledged that the change in one attribute results in the change in one or more attributes. For example, walk time depends on where a driver gets a vacant parking space, the nearer it is to his office or class, the shorter his walk time will be. The further he parks his car, the longer he will have to walk to his office or class. However, for simplicity of the survey this attribute was kept constant.

(e) Parking charges

This attribute is the main instrument of the pricing policy being tested in this study. Parking charges have been identified as one of the short-term transport demand management tools through which private car usage can be discouraged while at the same time encouraging public transport patronage. It was decided to vary this attribute to three levels i.e. current parking charges per day + R0, + R5 and + R10.

2. Public transport travel

The attributes used in the public transport travel were as follows:

(a) Leave home time

As already mentioned under private car travel, people interviewed in this study seemed to leave home approximately 15 minutes earlier when travelling by public transport than

private car. The reason for this tendency could be the fact that they had to accommodate travel or walk time to the station as well as the wait time. Leave home time was kept constant in this study mainly because travel time was kept constant to minimise the number of attributes varied in the study.

(b) Walk/travel time to station

This varied from one respondent to the other. Those who stayed nearer the stations had their walk or travel time as little as 5 minutes while those who stayed far had up to 25 minutes to make it to the station. This attribute is not a policy variable and for the purpose of this study it was kept constant.

(c) Wait time (minutes)

The amount of time people spent waiting for the public transport averaged 10 minutes. Wait time is directly related to the frequency of the public transport system. However, people who arrive at the station immediately after the departure of the public transport system will have to wait longer than those who arrive minutes before the arrival of the next public transport vehicle. Possession of a valid train or bus timetable could help reduce the amount of time spent waiting unless in cases where the train or bus is late due to unforeseen circumstances. This attribute is not a policy variable, as a result it was kept constant in this study.

(d) In-vehicle travel time (minutes)

The amount of time people spend in public transport has some influence on the mode choice. In-vehicle travel time in this study varied greatly with some people who stay in

(h) Security of public transport

Security of public transport plays a leading role in mode choice in South Africa. Many of the respondents interviewed indicated that should public transport security be improved significantly they would gladly use public transport. Of course the response differed from male to female respondents with the latter very sensitive to security. This attribute was varied to two levels. This attribute is a policy variable which UCT can influence as it may have some influence as it is contracted to Jammie Shuttle and Golden Arrow Bus Services to provide public transport on campus. Furthermore, public transport operators such as Metrorail Commuter Services can also implement measures to improve security and hence encourage patronage of public transport in the Cape Peninsula.

(i) Fare (rands per day)

The amount of money people pay on public transport determines whether people will use it or not. The higher the fares the less willing will the people be to use public transport while the lower the fares the more willing will the people be to use it. However, it needs to be mentioned that people may be willing to pay higher fares as long as the quality of service provided by the public transport exceeds their expenditure in public transport. This attribute is a policy variable and it has been varied to three levels.

6.3.2. Experimental Design

The theoretical background on experimental design was discussed at full length at section 5.7 above. In this section it is sufficient to indicate that partial factorial

experimental design was chosen to be used in this study to reduce the maximum number of alternatives to the respondents.

6.4. Pilot Survey and Evaluation

6.4.1. Background

In order to identify problems and possible changes before the final main survey was undertaken, a pilot survey was conducted on some of the sample to be used in the main survey. This, as already indicated above, was to identify possible problems and to consider ways to alleviate or possibly eliminate them. It was also to verify whether acceptable results could be obtained or not using Stated Preference methods. This chapter therefore presents the whole procedure undertaken in the pilot study, the results and analysis thereof. After much consideration based on the literature and formal and informal interviews conducted, six attributes were identified as playing a leading role in decision-making in terms of what mode of transport to use. These attributes are the cost of parking (parking charges), in-vehicle travel time for private car users, amount of time spent searching for parking (search time), cost of public transport, in-vehicle travel time for public transport users as well as security and reliability of the public transport. As this study did not distinguish between bus and train users, it was decided to use security for train users as it was found to be a very crucial factor on their mode choice but having minimal impact on bus users. For the same reason reliability was used in place of security for bus users as it had a bigger impact on their choice of bus as their mode of transport.

6.4.2. Attributes Identification

The first step in the process involved identification of the attributes and levels of variation for each attribute to be used. It was established that identification of attributes relies on the researcher's understanding of the travel behaviour and the factors determining mode choice. As already indicated above, six attributes were identified to be used in the study. The attributes and levels used for each attribute are provided in Table 6.2 below:

Table 6.2. Attributes and levels used in the Pilot survey

ATTRIBUTE	0	1	2
Parking Charge	As it is now	+ R5	+ R10
In-vehicle time	As it is now	+ 10 minutes	+ 20 minutes
Search time	As it is now	+ 10 minutes	+ 20 minutes
Fare	As it is now	- R2	+ R5
PT in-vehicle time	As it is now	- 10 minutes	+ 10 minutes
Security/reliability	As it is now	Improved	N/A

As indicated above the first 5 attributes have 3 levels while the last one is raised to 2 levels. Using full experimental SP design for five-three levels attributes and one-two levels attribute would result in $3^5 \times 2^1 = 486$ options. This would mean that each respondent be presented with 486 SP cards to complete. This would have been an impossible task to expect from respondents as they would get bored, lose concentration or get tired, hence jeopardising the validity of the results. It was therefore decided to use partial factorial experimental design (Kocur et al., 1982). Based on partial factorial

experimental design five-three levels attributes and one-two levels attribute would need a minimum of 16 alternatives per respondent. This is acceptable based on Stated Preference methods theory, as respondents are able to concentrate and avoid fatigue in the process (Kroes and Sheldon, 1988).

6.4.3. Description of the pilot survey

As already mentioned in the previous section, 16 SP cards were presented to the respondents for them to complete in the pilot survey. Due to the difficulty experienced in the beginning of acquiring a valid sample to be used in the study, the pilot study was conducted with six respondents who were interviewed. Many questionnaires were sent out to the university community to gather their actual travel patterns. Several questionnaires were returned but did not qualify for use in the study as some had mode of transport completed. It has been mentioned earlier that SP survey requires people with choice between two or more alternative modes of transport. It is for this reason that only six respondents were used in the pilot survey. Examples of the SP cards used in the pilot survey are given in Table 6.3 and 6.4 below. As already indicated earlier, the respondents using buses and trains were treated differently, i.e. train users were given security as it played a major role in their mode choice while those using buses were given reliability as it influenced their mode choice more than security.

Table 6.3. Pilot SP card for train users

In order for you to get to the University of Cape Town in the morning, you could:

Option 1:

Option 2: Snaddon01

CAR		PUBLIC TRANSPORT	
Leave home time:	9h00	Leave home time:	9h00
Travel time:	5 minutes	Walk/travel time to station:	3 minutes
Search time:	2 minutes	Wait time:	5 minutes
Walk time:	3 minutes	Total time in train:	15 minutes
Total time:	10 minutes	Interchange:	0 minutes
Parking charge:	R1.13 per day	Walk time (station to UCT):	15 minutes
		Security of public transport:	existing
		Fare:	R5.00 per day

Which option do you choose?

Option 1

Option 2

Other ()

Table 6.4. Pilot SP card for bus users

In order for you to get to the University of Cape Town in the morning, you could:

Option 1:

Option 2: September01

CAR		PUBLIC TRANSPORT	
Leave home time:	8h00	Leave home time:	7h30
Travel time:	20 minutes	Walk/travel time to station:	3 minutes
Search time:	18 minutes	Wait time:	5 minutes
Walk time:	3 minutes	Total time in bus:	15 minutes
Total time:	41 minutes	Interchange:	0 minutes
Parking charge:	R1.13 per day	Walk time (station to UCT):	15 minutes
		Reliability of public transport:	existing
		Fare:	R6.00 per day

Which option do you choose?

Option 1

Option 2

Other ()

Respondents indicated which option they would choose as the attributes were varied as indicated in Table 6.2. A third option was included ("other") to enable the respondents

to indicate if they would change to non-motorised mode of transport such as walking and cycling. The data collected from the interviews was analysed using the Statistical Software Tools (SST) to determine the contribution of each attribute to the utility of using private car and public transport. Table 6.5 below presents the results of the data from SST.

Table 6.5. Results from SST

Attributes	Estimated Coefficient	Standard Error	t-statistic	Value of time (R/h)
Parking charge	-0.291	0.083	-3.497	
Cinv. Time	-0.092	0.032	-2.892	18.97
Search time	-0.122	0.044	-2.788	25.15
Fare	-0.283	0.111	-2.553	
Pinv. Time	-0.010	0.031	-0.307	2.12
Security	0.465	0.565	0.823	
ASCCAR	6.308	2.714	2.325	
SUMMARY STATISTICS				
L(0)	-66.542			
L(c)	-66.526			
L(β)	-44.036			
ρ^2 (market share)	0.308			

6.4.4. Analysis of results of the pilot survey

The following section presents the analysis of the results obtained in the pilot survey.

Analysis of each attribute used will be discussed in detail below:

a) Parking charge (rands per day)

The estimated coefficient for the cost of parking was found to be -0.291 . The sign of the estimated coefficient is intuitively correct indicating that as the parking charges increase the utility of using the private car decreases. The t-statistic is -3.497 . This is more than the 95% confidence level of -1.96 which indicates that people place more value on the increase in parking charges than on in-vehicle time as provided below.

b) Car in-vehicle time (minutes)

The estimated coefficient for the time commuters spent in the vehicle to campus was found to be -0.092 . The sign is intuitively correct because as the amount of time drivers spend in the cars increases, the less willing are the drivers to take their cars to work. The value of the t-statistic is -2.892 , which is more than the 95% confidence level. This indicates that people perceive in-vehicle time of significance.

c) Search time (minutes)

The estimated coefficient of search time was found to be -0.122 , which indicates the contribution it has on the utility of using private car. The sign of the estimated coefficient is intuitively correct, as increase in search would lead to a decrease in the use of private cars to work. The t-statistic is -2.788 , which is greater than the 95%

confidence level. As before this implies that people perceive search time of importance in their mode choice.

d) Fare (rands per day)

The estimated coefficient for the fare was found to be -0.283 , which indicates the contribution the fare coefficient has on the utility of using public transport. The sign of the coefficient is intuitively correct, as the increase in fares would lead to a decrease in the use of public transport. The t-statistic of -2.553 is greater than the expected -1.96 . This indicates that respondents perceive fare to be significant in their mode choice.

e) Public transport in-vehicle time (minutes)

The estimated coefficient for the time commuters spent in the public transport to campus was found to be -0.010 . The sign of the coefficient is intuitively correct as the increase in the amount of time spent in the public transport would lead to a decrease in the use of public transport. The t-statistic of -0.307 is far less than the anticipated -1.96 . This indicates that respondents do not perceive in-vehicle time significant in their mode choice.

f) Security (for train)/reliability (for bus)

The estimated coefficient for the security (train users) and reliability (bus users) was found to be 0.465 . This indicates that this coefficient contributes greatly on the utility of public transport. The sign of the coefficient is intuitively correct as the positive imply that as security of the public transport improves, the utility of the public transport increases. The t-statistic of 0.823 is less than the anticipated 1.96 . This implies that the null hypothesis that the coefficient is zero at 95% confidence level can be accepted.

The reason for this finding would be the failure of the people interviewed to fully comprehend what security in this case meant. As security and reliability were used interchangeably respondents might have ignored its importance on mode choice and concentrated on other attributes. One other reason might be the fact that a very small sample was used in the pilot SP survey.

Goodness-of-fit

The goodness-of-fit for the market share was estimated to be 0.308. This is calculated using the following formula:

$$\rho^2 (m.s) = 1 - \left(\frac{\lambda\lambda(\beta)}{\lambda\lambda(\kappa)} \right)$$

Where $\rho^2 (m.s)$ = rho-squared for market share;

$\lambda\lambda(\beta)$ = log likelihood at convergence; and

$\lambda\lambda(\kappa)$ = log likelihood when only the alternative specific constant is used in the prediction model.

The value of rho-squared obtained using the formula above, indicates good estimation of the results by the Stated Preference survey. According to Wilmot (1993) a value between 0.2 and 0.3 indicates a good model. Values between 0.1 and 0.2 are 'fair' while values below 0.1 indicate a poor model.

Demand Elasticities

Demand elasticities can be interpreted as the percentage change in the dependent variable with respect to a given change in the relevant independent variable (Ortuzar et al., 1990). Ben Akiva and Lerman (1985) describe elasticity as the responsiveness of an individual's choice probability to a change in the value of some attribute. For example, if the Transport Authority wanted to find the response of private car users to increased parking charges, they could use the formula given below:

$$\eta = \beta \times Parkcost \times (1 - P_{qcar})$$

Where η	=	demand elasticity for parking space;
β	=	estimated coefficient for parking charges;
P_{qcar}	=	probability for using private car to work, and
Parkcost	=	average existing parking charge

6.5. Main survey data collection

6.5.1. Introduction

Some lessons have been learnt from the pilot survey. The purpose of this section is to incorporate those lessons in the development and administration of the main Stated Preference survey. The following section provides a description of changes to the experimental design effected based on the results of the pilot survey.

6.5.2. Attributes identification and levels determination

Looking at the results obtained in the pilot survey, it was observed that respondents were not affected by the variations in the attributes to the extent that they had a mode shift. The reason behind this can be attributed to the low margin of the variations used. For example, people might have not perceived seriously the impact of an additional 10 minutes to their existing search time and in-vehicle travel time. Similarly, addition of R5 and R10 might not have been clearly perceived as significant by the respondents. The pilot survey also found that the t-statistic of in-vehicle travel time in the public transport was negligible as compared to the anticipated 1.96. This, it was concluded in the previous section that it indicated that people did not perceive it to be important in their mode choice. It was therefore decided to keep this attribute constant in the main survey.

In the pilot survey, reliability and security were used interchangeably for bus and train users respectively. It was decided that these attributes be varied independently in the main survey. This was to enable the researcher to identify the value respondents place on each of them. As a result, it was decided to raise each of these attributes to two levels of variation. Based on the reason given above, six attributes were identified for use in the main survey. These attributes together with the levels of variation for each attribute are given in Table 6.6 below.

Table 6.6. Attributes and levels used in the Main survey

Attributes	0	1	2
Parking charge	As it is now	+ R8	+ R12
In-vehicle time	As it is now	+ 15 minutes	+ 25 minutes
Search time	As it is now	+ 15 minutes	+ 25 minutes
Fare	As it is now	- R2	+ R5
Reliability	As it is now	Improved	
Security	As it is now	Improved	

Four-three levels attributes and two-two levels attributes would lead to $3^4 \times 2^2 = 324$ alternatives to be presented to each respondent. This would mean, if 50 people were interviewed, $50 \times 324 = 16\,200$ lines of data to be put into the computer and analysed. Apart from respondents' fatigue as discussed above, this would be very difficult for the researcher to carry out. As a result, as in the pilot survey partial factorial experimental design was used. Using factorial design, four-three levels attributes and two-two levels attributes would need a minimum of 16 attributes per respondents (Kocur et al., 1982).

6.6. Conclusion

This chapter presented the background theory on the method of data collection used in the Stated Preference survey. Of importance in this chapter was the discussion of the pilot survey conducted prior the main SP survey. This was very significant in the study as it enabled the researcher to experiment with the attributes identified and levels chosen for each attribute. As a result some attributes were discarded in the main survey while others were introduced in the main survey. The researcher also improved on the

interviewing skills which was important for the main study. Furthermore, assistance was sought from some people for the collection of revealed preference data in the main survey.

In conclusion, this chapter laid a foundation for the coming chapter which will concentrate on the analysis of the SP results obtained when the data was processed through the Statistical Software Tools available for the purpose of this study.

University of Cape Town

CHAPTER 7:

ANALYSIS OF RESULTS OF MAIN SP SURVEY

7.1. Introduction

The purpose of this chapter is to present and discuss the results of the Stated Preference survey as described in the previous chapter. Table 6.6 above provides the attributes used in the main survey as well as levels of variation for each attribute. This chapter also presents several models that were estimated in the study. The final section of the chapter will provide the prediction model chosen from the models estimated in the study.

7.2. Method of estimation

As already mentioned in the preceding section, the purpose of this chapter is present and discuss the results obtained in the study. One of the most important steps in the process is the method used to estimate the results obtained. This section presents methods used to estimate the results. Several models were estimated in the study and they are discussed in full in the following section.

The first model estimated was the fully specified model. This model included all the 13 attributes used in the study. As already mentioned in the data collection stage, only 6 attributes were varied to minimise complexity of the study. However, this model included attributes which were held constant to estimated their effect on mode choice. The results of this model are discussed on section 7.3.1 below. The second model estimated was the fully specified car model. This model included all the attributes used

in the car travel. Both varied and non-varied attributes were estimated to determine their effect on the utility for car travel. Results of this model are presented and discussed on section 7.3.2 below. The third model included all the attributes used in the public transport travel; hence the fully specified public transport model. The findings of this model are discussed at length in section 7.3.3 below.

Section 7.3.4 discusses the combined car and public transport model. This model differs from the other three models discussed above as it only includes attributes which were varied in the study. The purpose of this model was to find the contribution of these attributes on the utility for car and public transport travel. Looking at the combined car and public transport model and the other fully specified models, some lessons were learned on the nature of the proposed prediction model to be used in the study. There were three attributes which were not varied in the study which had significant coefficients and more especially, t-statistic values. It was decided to include these attributes in the final prediction model. As a result, the prediction model had nine attributes, three non-varied and six varied attributes.

Beside the models described above, it was decided to determine how different sexes responded to the same attributes. The SP data was categorised into male and female data and coefficients estimated using the nine attributes described above. The results of this model were then compared to determine any discrepancy. These results are presented and discussed in section 7.3.5 below. The sixth model categorised the data into two classes, academic staff and non-academic staff, and students. Non-academic staff were grouped with students as they paid the same amount for parking. This was done precisely because income levels were not used in the study, should that have been

the case the data could have categorised into three groups. Results obtained using this model are discussed on section 7.6. It must be noted that the final two models, one based on sex and that on class only were estimated nine attributes (six varied and three constant which had significant t-statistics at 95% confidence level). The reason behind this was that the goodness-of-fit measures of the other models were found to be negligible. The two models described above had high good of fit measures as a result it was decided to include them in the final prediction model as dummy variables. This model is discussed in detail in section 7.3.7.

7.3. Model Estimation

The following equation was used for model estimation in the study:

$$P_i = \frac{e^{V_i}}{\sum_j e^{V_j}}$$

Where: V_i = the utility for using mode i

V_j = the utility for using mode j

Utility functions for car and public transport travel are described by the following equations:

$$V_{qcar} = \beta_1 \times CLT + \beta_2 \times CVT + \beta_3 \times CST + \beta_4 \times CC + \beta_5 \times SEX + \beta_6 \times RC$$

$$V_{qpt} = \beta_0 + \beta_7 \times PLT + \beta_8 \times PWT + \beta_9 \times SEC + \beta_{10} \times REL + \beta_{11} \times FARE$$

Where:

V_{qcar} = the probability that respondent q will choose car to commute to Upper campus;

V_{qpt}	=	the probability that respondent q will choose public transport to commute to Upper campus;
β_0	=	alternative specific constant for public transport;
$\beta_1, \dots, \beta_{11}$	=	coefficients of attributes estimated;
CLT	=	car leave home time (in minutes);
CVT	=	car in-vehicle time (in minutes);
CST	=	search time (in minutes);
CC	=	cost of parking (in rands per day);
SEX	=	gender category of the respondent;
RC	=	employment category of respondent;
PLT	=	public transport leave home time (in minutes);
PWT	=	public transport wait time (in minutes);
SEC	=	security of public transport;
REL	=	reliability of public transport; and
PTC	=	cost of public transport (rands per day)

7.3.1. Fully specified model

This model involved all 13 attributes used in the SP survey. Of the 13 attributes used in the model above, six were varied while the other eight were kept constant. The purpose of this model is to determine the effect of each of the 13 attributes in the utility of using the car to upper campus in the morning. The results for this model is presented in Table 7.1 provided below.

Table 7.1. Fully Specified Model

Attributes	Estimated coefficient	t-statistic	Value of time (R/hour)
Leave home time (mins)	0.0213	5.9192	R4.60
Car in-vehicle time (mins)	-0.0056	-0.8530	R1.21
Car search time (mins)	-0.0626	-6.1763	R13.52
Car walk time (mins)	0.0218	0.5972	R4.71
Parking cost (R/day)	-0.2778	-10.6533	
PT leave home time (mins)	0.0211	4.6283	R3.78
W/travel to station (mins)	-0.0032	-0.2396	R0.57
Wait time (mins)	-0.0551	-2.7762	R9.86
In-vehicle time (mins)	-0.0053	-0.7510	R0.95
Interchange time (mins)	0.0124	0.8739	R2.22
Security	0.9114	4.3651	
Reliability	0.8641	4.1025	
Fare (R/day)	-0.3352	-9.7964	
ASCPT	-0.4417	-0.8184	

SUMMARY STATISTICS

LL (β)	-305.77
LL (0)	-554.52
LL (κ)	-498.43
ρ^2 (market share)	0.387
No. of observations	800
No. of respondents	50

Discussion of the results

a) Car leave home time (in minutes from midnight)

The coefficient of the car leave home is positive indicating that the time respondents leave while using private cars contributes significantly to their choice of the mode of transport. Revealed Preference data collected at the beginning of the study indicate that the average leave home time is 7:27 a.m. when using private cars, while the same people have to leave home at 7:12 while using public transport. The fact that these people are able to leave 15 minutes later while using their private cars shows that the later people are able to leave home by car for work at UCT, increases the utility of car travel relative to public transport. This is important as it supports the activity based modelling approach i.e. people are able to use the additional time to do things important to them. The t-statistic of this attribute is significant at 5.9192 indicating that the null hypothesis that the coefficient of car leave home time is zero at the 95% confidence level, can be rejected.

b) Car in-vehicle time (in minutes)

The coefficient for in-vehicle time while using cars to campus is negative. This indicates that as the time spent in the vehicle increases there is a reduction in the utility for using cars to work. The t-statistic of -0.8530 is far less than -1.96 at 95% confidence level. Therefore, the null hypothesis that the coefficient is zero at 95% confidence level is accepted. This implies that people do not perceive in-vehicle time significant in their mode choice. The RP data reveals that the average in-vehicle time to be 31 minutes.

c) Search time (in minutes)

The sign of the coefficient is negative which is intuitively correct indicating a reduction in the utility of car travel as search time increases. The t-statistic of -6.1763 indicates the search time plays a major role in their mode choice.

d) Car walk time (in minutes)

The coefficient of the walk time is 0.0218 . The positive sign here indicates that walk time does not discourage people from using their private cars. In this study the average walk time was found to be 5 minutes while the minimum time recorded was 1 minutes and the maximum 15 minutes. The fact that time is negligible could have led to people ignoring its influence on their mode choice.

e) Cost of parking (in rands per day)

The coefficient of parking charges was -0.2778 and the sign was intuitively correct. The significant value estimated indicates that parking charges plays a major role in the utility of using private cars to campus. The negative sign indicates that as parking charges increase there is a reduction in the probability of using private cars to campus. The t-statistic of -10.6533 was far greater than -1.96 at 95% confidence level. This indicates that people perceive parking charges significant in mode choice.

f) Leave home time by public transport (in minutes from midnight)

The estimated coefficient was 0.0211 . Of interest here is the huge t-statistic of 4.6283 which exceeds 1.96 at 95% confidence level. This indicates that leave home time has a positive contribution on the mode of transport chosen.

g) Walk/travel time to the station (in minutes)

The estimated coefficient was found to be -0.0032 . The sign is intuitively correct indicating that the increase in walk/travel to the station leads to the reduction in the probability of using public transport. The t-statistic of -0.2396 is very negligible as compared to -1.96 at 95% confidence level. This implies that the null hypothesis that the coefficient is zero at 95% confidence level can be accepted.

h) Wait time (in minutes)

The estimated coefficient of wait time is -0.0551 . The sign of the coefficient is intuitively correct indicating that as the wait time increases, there is a reduction in the probability for using public transport. The t-statistic is -2.7762 which indicates that the null hypothesis the coefficient is zero at 95% confidence level can be rejected.

i) In-vehicle time in public transport (in minutes)

The estimated coefficient is -0.0053 . The sign is intuitively correct indicating that an increase in the spent in the public transport results in the decrease in the utility for using public transport. The t-statistic is -0.751 . Since it is less than the anticipated -1.96 at 95% confidence level, the hypothesis that the coefficient is zero at this confidence level is accepted.

j) The interchange time (in minutes)

The estimated coefficient of the interchange time was found to be 0.0124 . Naturally it was anticipated that the sign would be negative indicating that the presence of the interchange is a disincentive to public transport. However, the finding is very interesting as it implies that the people interviewed did not view interchange as critical

in their mode choice. The t-statistic is 0.8739 which is less than 1.96 indicating that the coefficient is zero at 95% confidence level.

k) Security of public transport

The estimated coefficient of security was found to be 0.9114. The sign was intuitively correct indicating that an improvement in security would result in the increase in the utility for using public transport. The bigger value estimated indicates that security plays a significant role in the utility of using public transport. The t-statistic is 4.3651 which indicates that people perceive security important while choosing a mode of transport to use to campus.

l) Reliability of public transport

The estimated coefficient was found to be 0.8641 indicating a huge contribution of reliability on the utility of using public transport. The positive sign indicates that as reliability improves so would the utility of using public transport. The t-statistic is 4.1025 which is far greater than 1.96 at 95% confidence level. The hypothesis that the coefficient is zero at 95% confidence is rejected.

m) Cost of public transport (in rands per day)

As expected the estimated coefficient for the cost of public transport is huge and indicate at -0.3352 . This indicates that cost of public transport is very crucial in mode choice and that an increase in the cost of public transport would lead to the reduction in the utility for using public transport to campus. The t-statistic of -9.7964 estimated is far greater than -1.96 at 95% confidence level indicating that people perceive the cost of public transport significant in their choice of which mode to use to campus.

n) Alternative Specific Constant (ASCPT)

The ASCPT indicates that utility of public transport is 0.4417 less than the utility of travelling by car other factors being equal. This indicates that respondents perceive some unspecified benefit from commuting by car to campus than public transport.

o) Goodness-of-fit measure

The ρ^2 market share was found to be 0.387. According to Wilmot (1993) this value indicates an extremely well fitted model.

7.3.2. Fully Specified Car Model

The following model involved estimating coefficients of all the attributes used when respondents chose to commute to campus by their private cars. The results estimated are presented in Table 7.2 below:

Table 7.2. Fully Specified Car Model

Attributes	Estimated Coefficient	t-statistic	Value of time (R/hr)
Car in-vehicle time (mins)	-0.0081	-1.6670	R2.34
Car search time (mins)	-0.0513	-6.0404	R14.83
Car walk time (mins)	0.0593	1.9865	R17.14
Parking cost (R/day)	-0.2076	-10.5499	
ASCPT	-1.0369	-3.2869	

SUMMARY STATISTICS	
LL (β)	-417.39
LL (0)	-554.52
LL (κ)	-498.43
ρ^2 (market share)	0.163
No. of observations	800
No. of respondents	50

Discussion of the results

1. Attributes varied under SP exercise

The coefficient of the in-vehicle time shows that for every minute that respondents spend in the vehicle while travelling to upper campus in the morning, the probability of choosing to travel by car declines by 0.81 per cent. The finding is in line with other studies conducted in the Cape Metropolitan Area (Clark et al., 1995). The t-statistic was found to be -1.6670 indicating that it was insignificant at 95% confidence level. However, it was found that though the t-statistic was insignificant at 95% confidence level, it was significant at 90% confidence level. The reason behind the insignificance of the t-statistic at 95% confidence level could be attributed to the fact that six attributes were varied in the study, and may be respondents could have disregarded in-vehicle time for other attributes such as search time and security of public transport.

The coefficient for the time respondents spend searching for a vacant parking spot while on campus was found to be -0.0513 . The coefficient has an intuitively correct sign indicating that the longer respondents have to take searching for a vacant

parking spot, the less likely they will choose commuting by car. It was also found that the coefficient for search time was about 6.3 times that of in-vehicle time. This indicates that respondents value search time more than in-vehicle time.

The coefficient for the cost of parking was found to be highly significant at 95% confidence level and has an intuitively correct sign. This indicates that the more respondents have to pay for parking the less likely they would choose commuting by car to upper campus.

2. Attributes not varied under SP exercise

The coefficient for walk time from the parking area to the office or lecture theatre was found to be 0.0593. Naturally, a negative was anticipated indicating a reduction in the utility for commuting by car as the walk time increases. The t-statistic was found to be significant at 95% confidence level. However, the fact that a positive sign was obtained instead of a negative could be attributed to having used six attributes in the study; as a result respondents could have concentrated on attributes they thought were very important to them and disregard the effect of walk time in their travel.

Alternative Specific Constant (ASCPT)

The alternative specific constant for public transport (ASCPT) indicates that the utility of public transport is 1.0369 less than that of car travel other factors being equal. This implies as already mentioned in the preceding sections that respondents perceive some unspecified benefit from commuting by car than public transport.

Goodness-of-fit measure

The ρ^2 market share was found to be 0.163. According to Wilmot (1993), values between 0.1 and 0.2 are fair though not indicating a good model. Comparing this model with the first model estimated above indicates a less well specified model than the other model.

7.3.3. Fully Specified Public Transport Model

The following model uses all the attributes of the public transport. This includes both varied and non-varied attributes. The results of the model are presented in Table 7.3. below:

Table 7.3. Fully Specified Public Transport Model

Attributes	Estimated coefficient	t-statistic	Value of time (R/hr)
Leave home time (mins)	0.0005	0.2210	
Walk/travel to station (mins)	-0.0138	-1.2980	R2.34
Wait time (mins)	-0.0385	-2.1953	R14.83
Interchange time (mins)	0.0072	0.5926	R17.14
In-vehicle time (mins)	-0.0058	-1.0420	R1.34
Walk time (mins)	-0.0017	-0.1869	R0.39
Security	0.6503	3.8118	
Reliability	0.7339	4.2890	
Fare (R/day)	-0.2602	-9.4088	

ASCPT	2.1516	2.0530	
-------	--------	--------	--

SUMMARY STATISTIC

LL (β)	-421.78
LL (0)	-554.52
LL (κ)	-498.43
ρ^2 (market share)	0.154
No. of observations	800
No. of respondents	50

Discussion of the results

1. Attributes varied under SP exercise

The coefficient for the security of public transport was highly significant at 95% confidence level and has an intuitively correct sign. This indicates that improvement in the security of public transport would result in respondents choosing public transport to campus. The coefficient for the reliability of public transport was also found to be highly significant at 95% confidence level indicating an increase in the utility of public transport as reliability improves. The coefficient for the cost of public transport was found to be -0.2602 . This indicates that an increase in the cost of public transport, the less likely respondents will use public transport to campus.

2. Attributes not varied under SP exercise

Of all the attributes held constant in this study, only wait time was significant at 95% confidence level. The other five attributes had t-statistics less than -1.96 or 1.96 indicating that we can accept the null hypothesis that the coefficients are zero at 95% confidence level.

Alternative Specific Constant (ASCPT)

The ASCPT indicates that the utility for using public transport is 2.1516 more than for car travel other factors being equal. This implies that respondents perceive some unspecified benefit for using public transport than car travel.

Goodness-of-fit measures

The ρ^2 for the market share was found to be 0.154. The value between 0.1 and 0.2 indicates a fair model. Comparing this model with the other two models discussed above indicates a less well specified model than other models.

7.3.4. Combined car and public transport model

The following section describes the results of the combined car and public transport model. The attributes used in this model are those attributes that were varied in the study. The tabulated results are provided in Table 7.4 below and the detailed discussion of each attribute is provided immediately after.

Table 7.4. Combined Car and Public Transport Model

Attributes	Estimated coefficient	t-statistic	Value of time (R/hr)
Car in-vehicle time (mins)	-0.0029	-0.5311	R0.71
Car search time (mins)	-0.0497	-5.3372	R12.20
Parking cost (R/day)	-0.2445	-10.4059	
Security	0.8188	4.1410	
Reliability	0.7266	3.6837	
Fare (R/day)	-0.3133	-10.1773	
ASCPT	-1.019	-2.5525	

SUMMARY STATISTICS

LL (β)	-340.45
LL (θ)	-554.52
LL (κ)	-498.43
ρ^2 (market share)	0.317
No. of observations	800
No. of respondents	50

Discussion of the results

1. Car attributes

The coefficient for in-vehicle time was found to be insignificant at 95% confidence level. This is in line the findings obtained so far in this study. The coefficient for search time was found to be -0.0497 and has an intuitively correct sign, indicating an

increase in search time would result in the reduction in the utility for commuting by car to campus. The value of time for search was found to be R12.20 per hour. The coefficient of the cost of parking was found to be highly significant at 95% confidence level and has an intuitively correct sign indicating that the higher the cost of parking, the less likely respondents will choose to commute by car to campus.

2. Public transport attributes

The coefficients for security and reliability of public transport were again found to be highly significant at 95% confidence level. These indicate that an improvement in security and reliability of public transport, the more likely respondents will choose commuting to campus by public transport. The coefficient for the cost of public transport was found to be highly significant at 95% confidence level and has an intuitively correct sign, indicating that the higher the cost of public transport, the less likely respondents will choose to commute to campus by public transport.

Alternative Specific Constant (ASCPT)

The ASCPT estimated indicates that the utility of the public transport is 1.0189 less than the utility of car travel other factors being equal. This indicates that respondents perceive some unspecified benefit from using private car to campus than public transport.

Goodness-of-fit measures

The ρ^2 market share estimated was found to be 0.317 which indicates a well-fitted model. However, comparing this model with the fully specified model discussed earlier indicates that this model is less well fitted than the fully specified model.

7.3.5. Male and female model

A closer look at the fully specified model discussed in section 7.3.1 found that three constant attributes had t-statistics significant at 95% confidence level. It was therefore decided to include these attributes while classifying the data in terms of gender and employment status. This section therefore classifies the data into male and female respondents respectively. The purpose of this section is to investigate how male and female respondents fared in the study and to determine whether these variables are worth inclusion in the final prediction model or not. As a result, nine attributes are used in this model and the tabulated results are presented in Table 7.5. below. The values of time for the attributes estimated are given in brackets.

Table 7.5. Male and Female Model

Attributes	MALE		FEMALE	
	Estimated Coefficient	t-statistic	Estimated Coefficient	t-statistic
Car leave time (mins)	0.0197 (3.83)	4.3452	0.0218 (5.68)	3.7931
Car inv time (mins)	-0.0084 (1.63)	-0.9071	-0.0135 (3.52)	-1.4538
Car search time (mins)	-0.0645 (12.55)	-4.4031	-0.0722 (18.82)	-4.6395
Parking cost (R/day)	-0.3083	-7.9534	-0.2302	-6.9494
PT leave time (mins)	0.0234 (4.44)	4.2399	0.0193 (3.01)	2.4342
PT wait time (mins)	-0.0120 (2.28)	-0.4889	-0.1829 (28.54)	-4.0931
Security	0.5490	1.8750	1.3724	4.3321
Reliability	0.9861	3.2116	0.7862	2.5915
Fare (R/day)	-0.3159	-6.5373	-0.3845	-7.6342
ASCPT	-2.9753	-1.7435	0.9673	0.4018

SUMMARY STATISTICS

LL (β)	-151.76	-146.97
LL (0)	-277.26	-277.26
LL (κ)	-246.02	-252.23
ρ^2 (market share)	0.383	0.417
No. of observations	400	400
No. of respondents	25	25

Discussion of results

1. Attributes varied under SP exercise

The coefficients for car in-vehicle time for both male and respondents were found to be insignificant at 95% confidence level. However the value of time for in-vehicle time for female respondents was found to be 2.16 times that of male respondents. The estimated coefficients for search time for both male and female respondents respectively were found to be highly significant at 95% confidence level. It was however found that the coefficient for search time for female respondents was 1.12 times that of male respondents. This indicates that female respondents are more sensitive to car in-vehicle time and search time than male respondents.

The estimated coefficients for the cost of parking for both male and female respondents respectively were found to be highly significant at 95% confidence level and have intuitively correct signs, indicating the higher the cost of parking, the less likely respondents will choose to commute to campus by car. Unlike with in-vehicle and search time, the coefficient for the cost of parking for male respondents was 1.34 times that of female respondents. This indicates that male respondents are more sensitive to increase in the cost of parking than female respondents. The coefficient for security of public transport for female respondents was found to be highly significant at 95% confidence level and have intuitively correct signs. This indicates that an improvement in security of public transport will result in the increase in the utility for using public transport to campus. The coefficient for security for male respondents was found to be insignificant at 95% confidence level but significant at 90% confidence level. It was also found that the coefficient for female respondents was to be 2.5 times that of male

respondents. This indicates that female respondents are more sensitive to security of public transport than male respondents. The coefficients for reliability for both male and female respondents were found to be significant at 95% confidence level and have intuitively correct signs. These indicate that an improvement in reliability of public transport will result in the increase of the utility of commuting by public transport. Unlike with security, the coefficient of reliability for male respondents was found to be 1.25 times that of female respondents. This indicates that male respondents are more sensitive to reliability of public transport than female respondents. The coefficients for the cost of public transport for both male and female respondents were found to be highly significant at 95% confidence level and have intuitively correct signs. These indicate that the higher the cost of public transport, the less likely respondents will choose to commute to campus by public transport. However, the coefficient for female respondents was found to be 1.22 times that of male respondents. This indicates that female respondents are more sensitive to increase in the cost of public transport than male respondents.

2. Attributes not varied under SP exercise

All the 3 constant attributes were found to be significant at 95% confidence level for the male respondents. However, for the female respondents wait time was found to be insignificant at 95% confidence level while car leave home time and public transport leave home time were highly significant at 95% confidence level. The coefficient for car leave home time for female respondents was found to be 1.11 times that of male respondents indicating that car leave home time was more beneficial to female respondents than male respondents. This supports activity based modelling approach as

female respondents would use additional time at home to do some things that are important to them such as taking kids to school before leaving for work or preparing breakfast for the family.

Alternative Specific Constant (ASCPT)

The ASCPT for male respondents indicates that the utility of commuting by public transport is 2.9753 less than the utility of using car to campus other factors being equal. This indicates that male respondents perceive some unspecified benefit from using car than public transport. However, the ASCPT for female respondents indicates that the utility for commuting by public transport is 0.9673 more than the utility of using car to campus. This indicates that unlike male respondents, female respondents perceive some unspecified benefit from using public transport than car to campus.

Goodness-of-fit measures

The ρ^2 market share for both male and female respondents were found to be 0.383 and 0.417 respectively. Both models indicate extremely well fitted models.

7.3.6. Academic Staff and Non-academic Staff/Students Model.

The following model uses the same attributes used in the male and female model described in section 7.3.5 above. The only difference between this model and the model discussed above is that the data is classified into academic and non-academic staff. Non-academic staff include students as they both pay the same amount of the cost of parking per day. Tabulated results of the model are presented in Table 7.6 below:

Table 7.6. Academic and Non-academic staff Model

Attributes	ACADEMIC STAFF		NON-ACAD. STAFF	
	Estimated Coefficient	t-statistic	Estimated Coefficient	t-statistic
Car leave time (mins)	0.0391 (8.29)	4.2788	0.0193 (4.09)	5.0687
Car inv time (mins)	-0.0157 (3.33)	-0.7278	-0.0051 (1.08)	-0.7730
Car search time (mins)	-0.0581 (12.31)	-2.0447	-0.0611 (12.94)	-5.4463
Parking cost (R/day)	-0.2831	-4.1617	-0.2834	-9.8221
PT leave time (mins)	0.0608 (10.10)	4.0059	0.0163 (2.85)	3.6334
PT wait time (mins)	-0.0222 (3.69)	-0.4123	-0.0838 (14.64)	-3.5581
Security	1.8293	3.3265	0.7485	3.2293
Reliability	0.2797	0.5384	0.9515	4.0633
Fare (R/day)	-0.3613	-4.0803	-0.3434	-9.1473
ASCPT	-10.6042	-2.3405	0.8634	0.5807

SUMMARY STATISTICS

LL (β)	-50.875	-249.58
LL (θ)	-88.723	-465.79
LL (κ)	-87.154	-407.40
ρ^2 (market share)	0.416	0.387
No. of observations	128	672
No. of respondents	8	42

Discussion of results

1. Attributes varied under SP exercise

The coefficients for car in-vehicle time for both academic and non-academic staff were found to be insignificant at 95% confidence level. However, the value of time for academic staff was R3.33 per hour while that of non-academic staff and students was R1.08 per hour. This indicates that despite its insignificance at 95% confidence level, academic staff value car in-vehicle time more than non-academic staff and students. The coefficients for search for both academic and non-academic staff were found to be significant at 95% confidence level. The coefficients for the cost of parking for both academic and non-academic staff were found to -0.2831 and -0.2834 respectively. The t-statistics for both coefficients were highly significant at 95% confidence level.

The estimated coefficients for security of public transport for both academic and non-academic staff were highly significant at 95% confidence level. However, the coefficient for security for academic staff was found to be 2.44 times than that of non-academic staff, indicating that academic staff are more sensitive to security of public transport than non-academic staff. The coefficient for reliability of public transport for academic staff was found to be insignificant at 95% confidence level while that of non-academic staff was found to be highly significant. However, the coefficient for non-academic staff was found to be 3.4 times that of academic staff indicating that unlike with security, non-academic staff were sensitive to reliability than academic staff. The estimated coefficients for the cost of public transport for both academic and non-academic staff were found to be highly significant at 95% confidence level indicating

that the higher the cost of public transport, the less likely respondents will choose to commute to campus by public transport.

2. Attributes not varied under SP exercise

All the three constant attributes were highly significant at 95% confidence level for non-academic staff while only car leave home time and public transport leave home were highly significant at 95% confidence level for academic staff. Wait time was found to be insignificant at 95% confidence level for academic staff.

Alternative Specific Constant (ASCPT)

The ASCPT for academic staff indicates that the utility of public transport is 10.6042 less than the utility of commuting to campus by car other factors being equal. This indicates that academic staff perceive some unspecified benefit from commuting to campus by car than public transport. However, the ASCPT for non-academic staff indicates that the utility of public transport is 0.8634 more than the utility for using car to campus other factors being equal. This indicates that non-academic staff unlike academic staff perceive some unspecified benefit from commuting to campus by public transport than car.

Goodness-of-fit measures

The ρ^2 market share for both academic and non-academic staff indicate extremely well fitted models.

7.3.7. Proposed Prediction Model

The following model includes both car and public transport attributes. A closer look at the fully specified car and public transport model reveals that of the 13 attributes used, only 8 were significant as they have t-statistics greater than 1.96 or -1.96 at 95% confidence level. Of the 8 attributes mentioned above, 3 were attributes which were held constant in the study. Because of their significance in this model, it was decided to include them in the proposed prediction model. This model includes the six attributes varied in the study as well as the three constant attributes mentioned above. Also, both male and female model and academic and non-academic staff had ρ^2 market share greater than 0.3 which indicates extremely well fitted models. It was therefore decided to include some dummy variables for sex and class in the final prediction model. The tabulated results of the proposed model are presented in Table 7.7. below:

Table 7.7. Proposed Prediction Model

Attributes	Estimated coefficient	t-statistic	Value of time (R/h)
Sex	0.4538	2.0868	
Class	0.3551	1.2303	
Car leave time (mins)	0.0210	5.9320	R4.48
Car in-vehicle time (mins)	-0.0093	-1.4573	R1.98
Car search time (mins)	-0.0600	-5.8553	R12.80
Parking cost (R/day)	-0.2813	-10.6499	
PT leave time (mins)	0.0230	5.1666	R4.05
PT wait time (mins)	-0.0558	-2.8046	R9.82
Security	0.9148	4.3687	
Reliability	0.8686	4.1083	
Fare (R/day)	-0.3408	-10.0006	
ASCPT	-1.4188	-1.0508	

SUMMARY STATISTICS

LL (β)	-307.46
LL (0)	-554.52
LL (κ)	-498.43
ρ^2 (market share)	0.383
No. of observations	800
No. of respondents	50

Discussion of results

1. Attributes varied under SP exercise

Of all the varied attributes only the coefficient for car in-vehicle time was insignificant at 95% confidence level. The coefficient for search time was highly significant at 95% confidence level and has an intuitively correct sign, indicating a reduction in the utility of car travel as search time increases. It was also found that the coefficient for search time was 6.45 times that of in-vehicle time. This indicates that respondents perceive search time more important in their mode choice than in-vehicle. This could imply that we are valuing in-vehicle time too highly in cost benefit evaluations of road projects.

The coefficient for the cost of parking was highly significant at 95% confidence level, indicating that the higher the cost of parking, the less likely will respondents be willing to commute to campus by car. The coefficient for security of public transport was highly significant at 95% confidence level. This implies that an improvement in the security of public transport will result in the increase in the utility for public transport. The coefficient for reliability for public transport was also highly significant at 95% confidence level indicating like security that an improvement in reliability will lead to the increase in the utility of public transport. The coefficient for public transport fare

was highly significant at 95% confidence level and has an intuitively correct sign indicating that the higher the cost of public transport, the less likely will respondents choose to commute by public transport to campus.

2. Attributes not varied under SP exercise

The coefficient for car leave home time was highly significant at 95% confidence level. The coefficient for leave home time was also highly significant at 95% confidence level. Both car and public transport leave home times were positive indicating that the later respondents left home for work enabled them to do other things important to them. The coefficient for wait time was found to be -0.0558 and significant at 95% confidence level. This indicates that the longer respondents wait for the public transport, the less likely they will choose to commute by public transport to campus.

Both dummy variables for sex and class of respondents were positive indicating their contribution to the utility of car travel. However, the dummy variable for class was insignificant at 95% confidence level.

Alternative Specific Constant (ASCPT)

The ASCPT indicates that the utility of the public transport is 1.4188 less than the utility of car travel other factors being equal. This indicates that the respondents perceive some unspecified benefit from commuting by car than public transport.

Goodness-of-fit measures

The value of ρ^2 for market share was found to be 0.383. The value of ρ^2 greater than 0.3 indicates a well-fitted model. It can be seen that comparing all the 5 models discussed so far, this model has the greatest value of ρ^2 .

7.4. Model application to predict the behaviour due to different policies

This chapter discussed several models estimated from the Stated Preference data. The purpose of this section is to use the proposed prediction model to test different policies on campus. The response of commuters to changes in parking charges is presented in Figure 7.1 below. The other five attributes were kept constant at their average values while only parking charges were varied. From Figure 7.1 it is observed that at average parking price of R1.41 per day, 92% of respondents would choose to commute to campus by car.

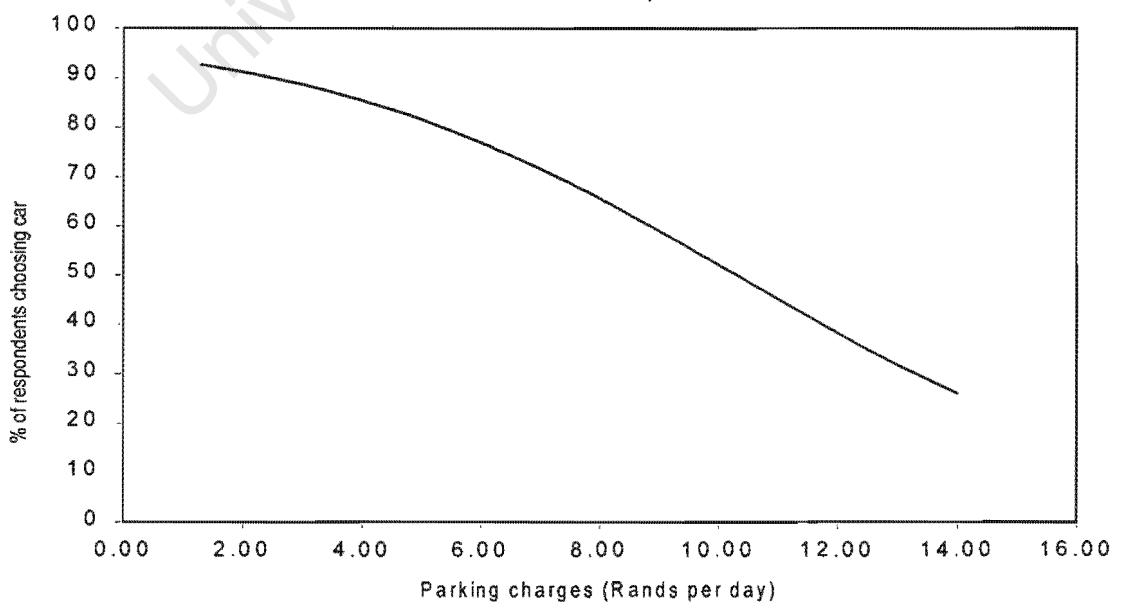


Figure 7.1. Response of commuters to changes in parking charges at upper campus

It is also observed from the above Figure that 50:50 modal split between public and private transport is achieved when parking charges are R10.25 per day. Table 7.8 below presents observed and predicted mode choice under existing parking charges.

Table 7.8. Comparison of predicted and revealed mode choice under existing conditions

	% choosing car	% choosing public transport
Predicted	92	8
Revealed Preference	98	2

From Table 7.8, it can be seen that 98% of respondents indicated that they used private cars to campus while only 2% indicated that they used public transport. However, from the logit model 92% were predicted as using private cars to campus under existing conditions. Looking closely at the results one can conclude that increasing parking charges to R10.75 per day with other attributes kept constant would result in 50% of commuters choosing private car and 50% choosing public transport.

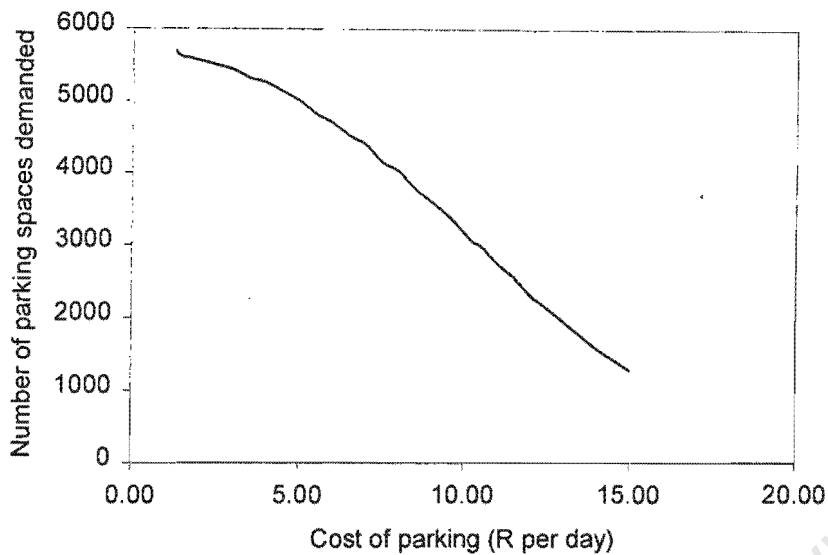


Figure 7.2. Predicted demand for parking by existing parking disc holders at different parking charges if parking spaces were guaranteed.

Figure 7.2 above presents number of parking spaces demanded by respondents at different parking charges. Information obtained from the Traffic Administration indicate that a total of 6113 parking discs were issued for upper campus in 1999 and this value was used in calculating the demands presented on Figure 7.2. The number of spaces demanded by commuters was obtained by multiplying the probability for using private car to Upper campus at different parking charges by the total number of discs issued in 1999.

7.5. Effect of increased parking charges and improved service of public transport

Apart from the above model that depicts the effect of changes in parking charges on mode choice, another important policy model was to determine the effect of changes in

parking charges on the improved service of public transport. This model therefore uses improved security and reliability of public transport while the other three attributes are held constant at average values. The response of changes in parking charges on improved service of public transport is presented in Figure 7.3 below.

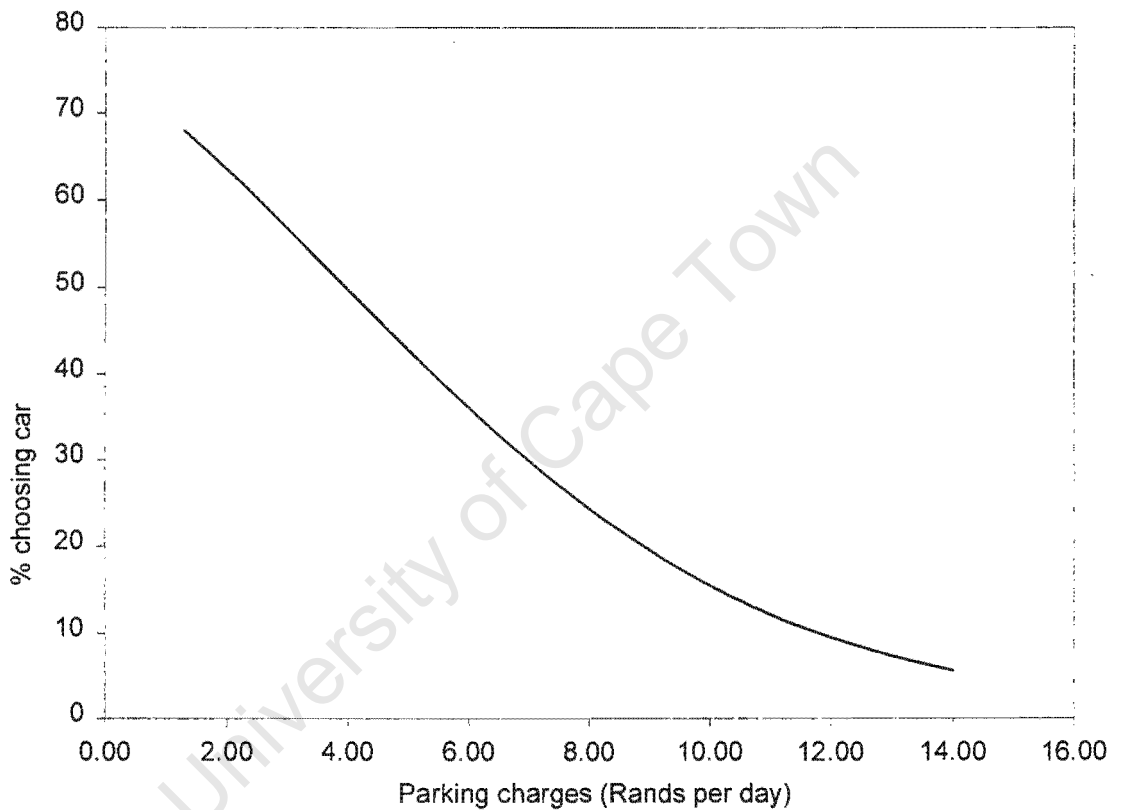


Figure 7.3. Response of commuters to changes in parking charges under improved public transport service

It has been found that with the existing service of public transport 92% commuters used private cars to campus and 8% used public transport. With improved security and reliability of public transport, 67% of commuters would choose using private cars to campus while 33% would use public transport at parking charges of R1.41 per day. Another important finding is that 50% of commuters would choose private cars and

50% public transport when parking charges are R4.00 per day. This is a very important finding as while using the existing service of public transport, it was found that a 50:50 modal split would be achieved when parking charges are R10.25 per day. This finding reinforces the fact that parking charges alone without the accompanying improvement in the service of public transport is a worthless exercise. Moving South Africa – Action Agenda document endorses that in order to improve public transport performance, tough management of car use, especially during the peak hour is required. This document recommends a combination of controls and pricing, backed up by improvements in the public transport service. Other policies can also be applied to predict the travel behaviour such as search time and in-vehicle time but it would be meaningless for the purpose of this study as the university cannot influence them.

It has already been mentioned that the objective of the National Department of Transport is to achieve an 80:20 modal split in favour of public transport by 2020 (White Paper on National Transport Policy, 1996). From Figure 7.1 above, it can be seen that to achieve this objective at the University of Cape Town other factors constant, a parking charge of about R14.75 per day would be required. This implies an increase of R13.45 per day for students and support staff and an increase of R12.79 per day for academic staff. This seems unlikely as the current trend is increasing the parking charges by about 10% per annum. However, from Figure 7.3 different observation can be made. To achieve an 80:20 modal split in favour of public transport at UCT as required by the National Department of Transport, a parking charge of R9.00 per day is required. This is an increase of R7.70 for students and support staff and an increase of R7.04 for academic staff. Figure 7.3 indicates that improving the service of

public transport reduces the amount of parking charges required to achieve the government's objective.

7.6. Revenue maximisation: Evaluation

The government has identified realistic short-term and long-term parking charges as a primary source of income that could accrue directly to urban transport authorities (White Paper on Western Cape Transport Policy, 1997). As such one of the importance of SP methods is the ability to maximise revenue which could accrue from parking charges. This revenue maximisation exists when the elasticity of parking charges is ± 1.000 . In this study, this elasticity is achieved when the parking charges are R8.90 per day. Table 2.2 indicates that there are a total of 2272 parking bays at the upper campus out of which 1177 are for students, 589 for support staff and 506 for academic staff. Table 7.9 presents the additional revenue that can be generated from increased parking charges.

Table 7.9. Additional revenue from increased parking charges

Bay type	Existing Parking charges	A parking charge of R8.90 per day	Additional revenue generated
Students	R 335,445	R2,304,566	R1,969,121
Yellow	R 167,865	R1,153,262	R 985,397
Red	R 217,074	R 990,748	R 773,674
Total	R 720,384	R4,448,576	R3,728,192

The above Table indicates that increasing parking charges to R8.90 per day would result in an additional R3.7 million per annum generated by the Traffic Administration. In its 20-year strategic framework for transport in South Africa, the government proposes ring-fencing of revenue generated from transport (Moving South Africa – Action Agenda, 1999). This implies that revenue generated from pricing must be used to improve public transport. Therefore, this additional revenue generated from increased parking charges on campus could be used to improve public transport facilities on campus and hence encourage commuters to make use of public transport.

University of Cape Town

CHAPTER 8:

CONCLUSIONS

8.1. Introduction

This chapter provides conclusions on the findings of the Stated Preference survey conducted at the University of Cape Town for the 1998/99. This chapter discusses various steps taken in the study as well as challenges and problems encountered during the survey.

8.2. Discussion of survey method and analysis

The SP survey began by acquiring commuters' actual travel patterns on campus. Questionnaires were sent to members of the university community requesting them to indicate their travel patterns. This questionnaire comprised of two sections, private car and public transport travel and respondents were asked to complete both sections. This was a very important qualification for participation in the study as Stated Preference methods provide respondents with a choice of mode of transport. More than 200 questionnaires were returned but many of them were invalid as most of them had only one section completed or insufficient information on the respondents. Another difficulty experienced during the surveys was the attitude of respondents to questionnaires, most people are unwilling to participate in surveys or those who do hardly take them seriously. These present problems to potential researchers as they have to gather the data.

Stated Preference surveys were conducted after gathering revealed preference data. As indicated in the study, sixteen alternatives were presented to respondents. The study involved varying six attributes. The fact that all the SP interviews were conducted by one researcher, uniformity of the survey method was maintained. A concern was raised on the number of attributes varied in this study. However, to encourage respondents to complete the surveys as honestly as possible, the researcher spent time with them explaining the importance of this exercise. As most of them were concerned about pollution created by automobile dependence, they were able to buy into the process and therefore made the exercise a wonderful experience. Many of them had a lot of ideas on how to make this study a success.

Several models were estimated using the Statistical Software Tools package. The final prediction model involved six varied attributes and three attributes that were kept constant. As the two models on gender classification and employment status were extremely well fitted, these two attributes were included in the final prediction model as dummy variables.

The study found that an increase in parking charges would result in the reduction of the utility for commuting by car to campus. This is in agreement with other SP studies conducted before. It also found highly significant coefficients of security and reliability of public transport. The increase in the cost of public transport was also found to result in reduction in the utility for commuting with public transport to campus. A model for female and male respondents was also estimated. Female respondents were found to highly value the security of public transport. This was in agreement with the perception indicated by female respondents during the surveys and informal interview. They

indicated that security was very important in their mode choice. They also indicated that security included the time spent waiting for the public transport at the station. However, male respondents were found to value reliability more than security.

A model for academic and support staff was also estimated. The model found that academic staff valued the security of public transport more than support staff and students. The alternative specific constant for public transport for academic staff was found to be -10.6042 . This indicates that for commuters the utility for private car travel is 10.6042 more than that of public transport implying that commuters enjoy some unspecified benefit from using private car relative to public transport. The study also found that revenue maximisation occurs when parking charges are R8.90 per day.

8.3. Policy conclusions

One of the objectives of this study was to use stated preference methods to test alternative transport policies at UCT. The study found that increase of parking charges to R10.75 per day when other attributes are constant result in a 50:50 modal split. It was also found that to get the 80:20 modal split in favour of public transport a parking charge of R14.50 per day would be required. It was however found that improvement in the service of public transport result in a 50:50 modal split at R3.87 per day and an 80:20 modal split at R9.00 per day. This indicates that improved service of public transport is very important in achieving the required modal split.

8.4. Closing remarks

There has been no research done on traffic situation at the University of Cape Town for the past 10 years. Transportation has changed significantly on campus for the past 10 years and these changes need to be accompanied by a change in policies that regulate traffic on campus. Apart from lack of changes to meet changing travel demand, there is also poor data on parking discs allocation. The Traffic Administration hardly have information on how many parking discs they issue per annum and for which categories they are. It is also shocking to find that whatever data they have for a particular year, it is literally thrown away at the end of the year. As a result, there is no data of how many parking discs were issued for example in 1997. This is unacceptable and needs to be looked at and rectified. A proper database needs to be created that will have the information of parking discs issued on campus. This will be crucial in influencing policies for regulating traffic in the future.

There is a concern by students and staff that parking discs are very expensive at UCT. This is confirmed by comparing UCT with other institutions of higher learning in South Africa. Cognisance however needs to be taken of the uniqueness of each institution. For example, while other institutions have vast tracts of undeveloped land to build additional parking areas, the same cannot be said about UCT where its geographical location restricts any further development and therefore calls for effective transport demand management strategies. Parking charges is one policy instrument that the university can use to reduce demand for parking. For example, an increase of parking charges to R5 per day under existing conditions would result in 82% of respondents choosing to commute to campus by car and 18% commuting by public transport. These

would in addition to reducing the demand for parking also result in additional revenue that could be used to improve public transport and public transport facilities on campus. The latter would result in more commuters choosing to commute by public transport as suggested by the model on improved service of public transport.

The study also found that data collection in SP surveys is very difficult. There is also a trade-off between the complexity of the study and the reliability of the results. Using more variables and levels of variations would result in more reliable results, however the larger the number of alternatives presented to respondents, the less likely that they will be completed properly as respondents may get bored or tired in the process of completion. It must however be mentioned that SP methods are able to predict changes in behaviour due to changes in the attributes of transport, in particular parking charges. SP is of fundamental importance to the future of transport planning as it allows transport planners and policy-analysts to experiment first before implementing policies. Of particular importance is the policy modelling where existing travel patterns are used to predict behaviour due to attributes used in the study. This enables transport planners to prioritise transport investment.

This study was done to assess how SP methods could be tested at UCT to determine the likely response of staff and students to changes in UCT parking policy and also to improvements to public transport services at UCT. Although this study does not form part of the University attempts to solve transport demand problems, the study does indicate means of solving them should they be applied.

BIBLIOGRAPHY

Ben Akiva, M. and Lerman, S. R. (1985). *Discrete choice analysis*. MIT Press, Cambridge, Massachusetts

Clark, P. M. E (1991). 'Use of Stated Preference techniques to investigate likely responses to changes in parking supply.' Unpublished MSc (Eng) dissertation. University College of London.

Clark, P. M. E. and Allsop, R. E (1993). The use of Stated Preference techniques to investigate likely responses to changes in workplace parking supply. *Traffic Engineering and Control*. **34** (7/8), July/August, 350-354.

Clark, P. M E. (1995). *Using Stated Preference techniques to investigate travel choices*, paper presented at the South African Transportation Convention.

Department of Transport (1999). *Moving South Africa – Action Agenda*. Pretoria.

Department of Transport. *White Paper on National Transport Policy*, Pretoria, September 1996.

Dubin and Rivers (1984). *Statistical Software Tools* manuals.

Hensher, D. A. (1994). Stated preference analysis of travel choices: the state of practice. *Transportation* **21**: 107-133.

Jakoet, J (1998). *Transport policy equity analysis of the University of Cape Town*. Unpublished B.Sc (Eng) dissertation, University of Cape Town.

Kocur, G., Adler, T., Hyman, W. and Audet, B (1982). *Guide to forecasting travel demand with direct utility assessment*. US Department of Transportation, UMTA, Washington D.C.

Kroes, E. P. and Sheldon, R. J. (1988). Stated Preference Methods. *Journal of Transport Economics and Policy*. **22**(1), 12-25.

- Liebenberg and Stander (1991). Monitoring of parking and access: Groote Schuur campus, University of Cape Town.
- Ortuzar, J. de D. and Willumsen, L. G (1990). *Modelling transport*. John Wiley, Chichester.
- Papacostas, C. C. and Prevedouros, P. D (1993). *Transportation Engineering and Planning*. Prentice Hall, Englewood Cliffs, New Jersey.
- Pearmain, D., Swanson, J., Kroes, E. and Bradley, M (1991). *Stated preference techniques: a guide to practice*. Steer Davies Gleave / Hague Consulting Group, Richmond (UK) / Den Haag (Netherlands).
- Van Zyl, N. J. W (1992). Guidelines for using Statistical Software Tools (SST) to calibrate multinomial mode choice logit models. TRC/19/92.
- Wall, K. C. (1971). Some aspects of transportation in Southern African universities. University of Cape Town. Unpublished M.Sc (Eng) dissertation.
- Western Cape Department of Transport and Public Works. White Paper on Western Cape Provincial Transport Policy, June 1997.
- Wilmot, C (instructor). *Course on Logit Modelling*, course notes, 28-29 April, 7 May 1993.
- Wilson, R. W. and Shoup, D. C. (1990). Parking subsidies and travel choices: assessing the evidence. *Transportation* 17: 141-80.

Appendix A:

Photographs of parking and
transport facilities at Upper
Campus

APPENDIX A: Parking supply at the Upper Campus



Figure A1. Student parking at P4 parking area



Figure A2. Bus stop on Ring road, Upper campus



Figure A3. Academic staff parking at P10 parking area



Figure A4. Support/admin staff parking at P12 parking area



Figure A5. Jammie Shuttle bus stop at the Lower Campus



Figure A6. Jammie Shuttle bus stop at the University Plaza, Upper Campus



Figure A7. Rosebank railway station



Figure A8. Motor cycle parking area at the Upper Campus

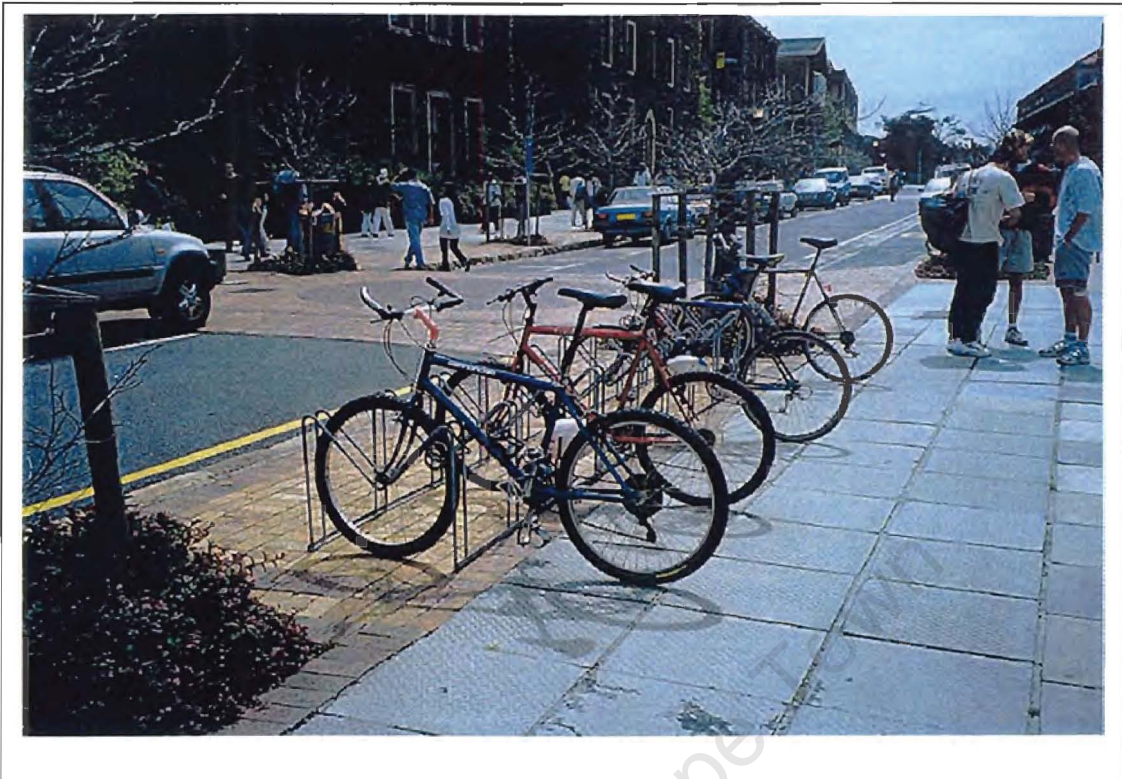


Figure A9. Bicycle parking area at the Upper Campus



Figure A10. P6 student parking area during the peak parking hour



Figure A11. Traffic calming measures at the Upper Campus

University of Cape

Appendix B:

Map of the Upper Campus
with parking areas available

APPENDIX B: MAP OF THE UPPER CAMPUS, UNIVERSITY OF CAPE TOWN

Legend:

P1:	Student parking area
P2	Student parking area
P3	Reserved parking areas for residents of Smuts and Fuller Hall
P4	Student parking area
P5	Student parking area
P6	Student parking area
P7	Parking area for support/admin staff
P8	Parking area for support/admin staff
P9	Parking area for academic staff
P10	Parking area for academic staff
P11	Parking area for academic staff
P12	Parking area for support/admin staff
P14	Parking area for support/admin staff
P15	Parking area for sup/admin staff and students
P16	Parking area for support/admin staff
P17	Parking area for students

Appendix C:

Glossary

University of Cape Town

APPENDIX C: GLOSSARY

- Attribute:** A characteristic of a good or service. It may be defined as a singular item or a composite of different items. Sometimes referred to as a variable.
- Attribute level:** A particular value of an attribute (e.g. journey time, level 1 = 20 mins, level 2 = 30 mins).
- Boundary value:** A term which indicates the points at which an individual will switch from one alternative to another on the basis of the rate of trade-off between attributes.
- Choice set:** The set of alternative options presented to individuals.
- Coefficient:** The element in a model which indicates the value (part-utility) placed by individuals on a particular attribute.
- Collinearity:** A relationship between two attributes which ensures that they change simultaneously in similar ways. If this occurs between more than two attributes, the term becomes multi-collinearity.
- Constant:** An element in a model which indicates individual's basic bias, irrespective of the effect of the attributes.
- Discrete choice:** Stated preference expressed as categories (e.g. "Yes/No"; "choose A", "neither", "choose B").
- Dominance:** The situation where an option in a stated preference exercise dominates one or more of the other options in the choice set. That is, it is better than or equal to the other option(s) along every attribute.

- Dummy variable: A categorical variable (usually represented by 0 = not present, 1 = present) which is used in mathematical models to represent a single attribute level.
- Experiment: When related to stated preference techniques, a general term often used to refer to a stated preference exercise as a whole.
- Experimental instrument: The underlying structure of a stated preference survey design instrument, which ensures that the attributes vary independently from one another.
- Homogeneity: A characteristic said to exist when a group of individuals exhibit very similar preferences.
- Interaction: An effect resulting from the combined influences of two or more attributes which are greater (or less) than the sum of the individual effects of each attribute.
- Linear model: A model which assumes that the utility function is composed of additive relationship (e.g. $U = a_0 + a_1T + a_2C$). The attributes themselves need not necessarily be linear.
- Linear variable: A variable in a model which progresses in a straight line (e.g. a_1T).
- Logit model: A probabilistic model developed for the analysis of discrete choice data. Assumes that the error terms conform to a "Weibull" distribution.
- Main effects: The individual effects of each attribute used in the experimental design (i.e. not interactions).

- Non linear model: A model which assumes that the utility function is composed of non-additive relationships between attributes (e.g. $U = a_0 + a_1T + a_2C$).
- Option: One combination of attribute levels presented to individuals, as defined by the researcher.
- Orthogonality: The property of an experimental design which ensures that the attributes vary independently of one another.
- Paired choice: Options presented in pairs, in which the respondent simply chooses the preferred one (i.e. discrete choice) or expresses a degree of preference on a scale (i.e. rating response).
- Pilot survey: A survey designed to inform the researcher of the suitability of his or her stated preference design, in advance of the main survey.
- Polynomial term: Where a variable (attribute) is represented in a model raised to a power of 2 or more (e.g. X^3).
- Probit model: A probabilistic model only occasionally used at present for the analysis of stated preferences. Assumes that the error terms conform to a normal distribution.
- Respondent: An individual who participates in a stated preference exercises and provides responses to the hypothetical situations.
- Revealed Preferences: An observation of the way an individual expresses his or her liking for one alternative over another, as revealed in their real life behaviour.
- Stated: A statement by an individual of his or her liking for one

Preference	alternative over another.
Trade off:	The process of sacrificing the quality of one or more attributes in return for improvements to others.
Utility:	A concept which expresses the value an individual attaches to a particular good or service.
Utility function:	The way in which attributes combine to create a particular level of utility, as hypothesised by the researcher.
Validation:	The process by which the researcher assesses the realism and reliability of stated preference data against other data, such as revealed preferences.
Value of time:	A widely-used measure in transport research which indicates the amount of money travellers are willing to pay in return for savings in journey time.
Variable:	An alternative term for attribute, often used in the context of mathematical modelling.

(Pearmin et al., 1991)

Appendix D:

Parking allocation at Upper Campus

APPENDIX D: PARKING ALLOCATION AT UPPER CAMPUS

Table 2(a): Parking Allocation for Green Zone

<u>Green Zone:</u>							
University							
Ave (S)							
Old	71	-	-	6	-	-	77
Education							
Centlivres							
Library Road	67	-	-	3	-	4	74
P12	17	45	-	-	-	-	62
P11	84	-	-	6	-	7	97
Sub-Total	239	45	-	15	-	11	310

Table 2(b): Parking Allocation for Orange Zone

	Red	Yellow	Student	Special	Residents	Visitors	Total
<u>Orange Zone:</u>							
North Lane (P9)	51	5	-	2	-	1	59
South Lane (P10)	51	10	-	1	-	6	68
	102	15	-	3	-	7	127

Table 2(c): Parking Allocation for Blue zone:

	Red	Yellow	Student	Special	Residents	Visitors	Total
<u>Blue Zone:</u>							
University Ave	24	-	-	2	-	-	26
(N):							
Chemistry	22	-	-	2	-	7	31
Molecular Bldg	6	-	-	-	-	-	6
P8	19	39	-	-	-	4	62
P7	15	33	-	-	-	3	51
Sub-Total	86	72	-	4	-	14	176

Table 2(d): Parking Allocation for Red Zone:

	Red	Yellow	Student	Special	Residents	Visitors	Total
<u>Red Zone:</u>							
Rugby Rd	4	-	52	-	-	-	56
Residence Rd + Beattie	76	-	-	2	-	10	88
James 1 + 2	22	-	-	1	-	2	25
P3	-	-	-	2	85	-	87
Sub-Total	102	-	52	5	85	12	256
Ring Road	529	132	52	27	85	44	869

**Table 2(e): Parking Allocation around Ring Road (excluding Southern Exit Road,
Woolsack Drive, P1)**

	Red	Yellow	Student	Special	Residents	Visitors	Total
Ring Rd	10	250	-	19	-	13	292
Main/Nurse/	18	56	-	1	-	3	78
Mar							
P4	-	-	112	-	-	-	91
P5	-	-	81	10	-	-	73
P14	2	61	-	10	-	-	73
P6	-	-	224	4	-	-	228
P15	-	105	64	-	-	-	169
Sub-Total	30	472	481	44	-	16	1043

Table 2(f): Parking Allocation in Peripheral Parking Areas on the Upper Campus

	Red	Yellow	Student	Special	Residents	Visitors	Total
Southern Exit Rd	-	-	54	-	-	-	54
Woolsack Drive	-	-	71	-	-	-	71
Gravelled Area	-	-	56	-	-	-	56
P1	26	14	343	2	-	13	398
Sub-Total	26	14	524	2	-	13	579
Grand Total:	585	618	1057	73	85	73	2491
Upper Campus							

Appendix E:

Revealed Preference data

University of Cape Town

REVEALED PREFERENCE DATA																												
RESP	SP	SEX	CLASS	CLEAVE	CARRIVE	CINV	CTRVEL	CSEARCH	CWALK	PARK	PLEAVE	PARRIVE	PINV	PTRAVEL	PW/T-STA	PWAIT	PINTERC	PWALK	PCOST	SECURITY	RELIABILITY	CHOICE	Ucar	Upt	Pcar	Ppt	search el	park el
1	1	0	0	510	525	15	20	1	4	1.30	480	560	50	80	2	5	15	8	5.80	0	0	1	10.1448	7.3656	94	6	-0.0035	-0.0214
2	1	1	0	505	540	35	46	4	7	1.30	450	525	35	75	5	10	0	25	5.00	0	0	1	10.1276	6.6692	97	3	-0.0073	-0.0112
3	1	0	0	330	350	20	26	1	5	1.30	330	440	25	110	15	30	0	40	5.00	0	0	1	6.3183	2.7932	97	3	-0.0017	-0.0105
4	1	0	0	360	405	45	47	0	2	1.30	350	410	29	60	1	10	0	20	6.00	0	0	1	6.7758	4.0284	94	6	0.0000	-0.0220
5	1	1	0	420	440	20	22	0	2	1.30	420	468	35	48	5	5	0	3	5.00	0	0	1	8.7221	6.2582	92	8	0.0000	-0.0287
6	1	0	1	480	515	35	37	1	1	1.96	465	540	40	75	10	0	0	25	5.50	0	0	1	9.4983	7.4018	89	11	-0.0066	-0.0603
7	1	1	0	450	495	45	52	1	6	1.30	390	482	40	92	20	10	20	2	7.00	0	0	1	9.0596	4.6076	99	1	-0.0007	-0.0042
8	1	0	0	360	390	30	35	0	5	1.30	360	440	40	80	15	10	0	15	5.50	0	0	1	6.9153	4.4288	92	8	0.0000	-0.0281
9	1	0	0	450	495	45	47	0	2	1.30	420	500	25	80	10	5	20	20	7.00	0	0	1	8.6658	5.5766	96	4	0.0000	-0.0159
10	1	1	0	500	510	10	14	1	3	1.30	480	512	10	32	15	5	0	2	2.00	0	0	1	10.4351	8.6606	86	14	-0.0087	-0.0530
11	1	1	0	455	470	15	22	0	7	1.30	450	485	19	35	6	5	0	5	4.20	0	0	1	9.5036	7.2208	91	9	0.0000	-0.0338
12	1	0	1	555	585	30	40	0	10	1.96	465	570	60	105	20	5	0	20	5.00	0	0	1	11.1798	7.2932	98	2	0.0000	-0.0111
13	1	1	1	460	495	35	37	0	2	1.96	435	495	20	60	10	10	15	5	6.00	0	0	1	9.5921	5.9834	97	3	0.0000	-0.0145
14	1	0	0	390	422	32	45	3	10	1.30	360	450	47	90	20	10	8	5	6.00	0	0	1	7.3467	4.2584	96	4	-0.0078	-0.0159
15	1	0	0	390	440	50	56	1	5	1.30	360	465	25	105	30	10	15	25	7.00	0	0	1	7.2993	3.9176	97	3	-0.0020	-0.0120
16	1	1	0	465	510	45	62	15	2	1.30	480	523	25	43	10	0	5	3	5.00	0	0	1	8.5346	7.9172	65	35	-0.3153	-0.1281
17	1	1	0	450	490	40	47	2	5	1.30	420	510	25	90	5	15	30	15	6.50	0	0	1	9.0461	5.1890	98	2	-0.0025	-0.0076
18	1	1	0	465	510	45	57	2	10	1.30	435	505	25	70	25	5	0	15	7.00	0	0	1	9.3146	5.9216	97	3	-0.0039	-0.0119
19	1	0	0	480	510	30	40	5	5	1.30	420	488	35	68	5	5	20	3	7.00	0	0	1	9.1353	5.5766	97	3	-0.0083	-0.0101
20	1	0	0	420	480	60	72	5	7	1.30	465	510	15	45	15	10	0	5	2.00	0	0	1	7.5963	8.0366	39	61	-0.1825	-0.2225
21	1	0	0	420	465	45	55	5	5	1.30	390	465	32	75	5	10	13	15	7.00	0	0	1	7.7358	4.6076	96	4	-0.0126	-0.0153
22	1	0	0	420	495	75	110	30	5	1.30	390	495	65	105	10	10	15	5	7.50	0	0	1	5.9568	4.4372	82	18	-0.3231	-0.0656
23	1	1	0	510	555	45	55	5	5	1.30	480	570	55	90	10	5	15	5	7.00	0	0	1	10.0796	6.9566	96	4	-0.0127	-0.0154
24	1	1	0	405	450	45	55	0	10	1.30	420	510	35	90	15	10	20	10	6.00	0	0	1	8.1746	5.6384	93	7	0.0000	-0.0268
25	1	1	0	490	510	20	28	3	5	1.30	460	520	25	60	7	3	0	25	4.00	0	0	1	10.0121	7.6306	92	8	-0.0152	-0.0309
26	1	1	0	450	510	60	70	5	5	1.30	450	535	35	85	15	10	0	25	5.00	0	0	1	8.6801	6.6692	88	12	-0.0354	-0.0432
27	1	1	0	450	457	7	12	2	3	1.30	445	470	10	25	10	5	0	0	2.00	0	0	1	9.3530	7.8556	82	18	-0.0219	-0.0669
28	1	1	1	445	495	50	54	1	3	1.96	450	510	25	60	10	5	0	20	7.00	0	0	1	9.0776	6.2666	94	6	-0.0034	-0.0313

29	1	1	0	450	465	15	23	5	3	1.30	450	480	10	30	5	10	0	5	2.00	0	0	1	9.0986	7.6916	80	20	-0.0590	-0.0719
30	1	1	0	480	505	25	35	5	5	1.30	450	500	5	50	35	10	0	0	2.00	0	0	1	9.6356	7.6916	87	13	-0.0376	-0.0458
31	1	1	0	430	450	20	24	1	3	1.30	420	450	10	30	3	2	0	15	5.00	0	0	2	8.8721	6.4256	92	8	-0.0048	-0.0291
32	1	0	1	420	440	20	23	0	3	1.96	420	480	25	60	10	10	0	15	6.00	0	0	1	8.4378	5.6384	94	6	0.0000	-0.0316
33	1	0	1	570	600	30	40	5	5	1.96	510	630	50	120	20	20	0	30	6.00	0	0	1	11.1948	7.1504	98	2	-0.0052	-0.0095
34	1	1	0	450	470	20	25	0	5	1.30	450	487	10	37	15	10	0	2	2.00	0	0	1	9.3521	7.6916	84	16	0.0000	-0.0584
35	1	1	0	390	425	35	39	2	2	1.30	390	495	60	105	20	10	12	3	5.00	0	0	1	7.8326	5.2892	93	7	-0.0087	-0.0266
36	1	0	0	465	475	10	20	5	5	1.30	435	500	30	65	30	0	0	5	7.00	0	0	1	9.0063	6.2006	94	6	-0.0171	-0.0209
37	1	1	0	370	420	50	55	0	5	1.30	370	480	72	110	5	10	20	3	7.00	0	0	1	7.3931	4.1476	96	4	0.0000	-0.0137
38	1	0	0	380	395	15	18	0	3	1.30	465	508	15	43	10	15	0	3	5.00	0	0	1	7.4748	6.7352	68	32	0.0000	-0.1182
39	1	0	0	465	480	15	22	1	6	1.30	450	480	19	30	1	5	0	5	2.00	0	0	1	9.1998	7.9706	77	23	-0.0136	-0.0828
40	1	0	1	470	495	25	32	1	6	1.96	450	492	20	42	3	10	7	2	7.00	0	0	1	9.3813	5.9876	97	3	-0.0019	-0.0179
41	1	0	0	420	435	15	28	10	3	1.30	420	510	55	90	30	5	0	0	7.00	0	0	1	7.7148	5.5766	89	11	-0.0633	-0.0386
42	1	0	0	460	470	10	20	5	5	1.30	470	495	10	25	5	5	0	5	2.00	0	0	1	8.9013	8.4306	62	38	-0.1153	-0.1406
43	1	1	0	510	515	5	30	20	5	1.30	510	537	10	27	5	10	0	2	2.00	0	0	1	9.5516	9.0716	62	38	-0.4587	-0.1398
44	1	0	0	420	465	45	58	3	10	1.30	540	589	30	49	5	2	12	0	7.50	0	0	1	7.8558	8.3336	38	62	-0.1111	-0.2257
45	1	0	0	450	470	20	24	0	4	1.30	420	480	30	60	20	10	0	0	5.00	0	0	1	8.8983	5.9792	95	5	0.0000	-0.0187
46	1	1	0	400	430	30	43	10	3	1.30	390	465	45	75	10	5	10	5	7.00	0	0	1	7.6091	4.8866	94	6	-0.0370	-0.0225
47	1	0	0	390	430	40	60	5	15	1.30	360	420	15	60	25	5	0	15	7.00	0	0	1	7.1523	4.1966	95	5	-0.0148	-0.0181
48	1	1	0	570	600	30	60	20	10	1.30	480	572	55	92	5	15	15	2	7.00	0	0	1	10.5791	6.3986	98	2	-0.0181	-0.0055
49	1	0	0	420	435	15	17	0	2	1.30	420	505	59	85	5	10	10	1	5.00	0	0	1	8.3148	5.9792	91	9	0.0000	-0.0323
50	1	1	1	480	525	45	46	0	1	1.96	405	500	40	95	20	5	0	30	6.50	0	0	1	9.9191	5.4020	99	1	0.0000	-0.0060
MEAN	1	0	0	447	478	31	40	4	5	1.41	432	500	32	68	12	8	6	10	5.34	0	0	1	8.7519	6.2486	92	8	-0.0173	-0.0300
STDEV	1	0	0	52	51	16	19	6	3	0.24	45	42	17	26	9	5	8	10	1.81	0	0	0	0.8730	-1.2972	90	10	-0.0366	-0.0070
MIN	0	0	0	330	350	5	12	0	1	1.30	330	410	5	25	1	0	0	0	2.00	0	0	1	6.5178	5.4896	74	26	0.0000	-0.0963
MAX	1	1	1	570	600	75	110	30	15	1.96	540	630	72	120	35	30	30	40	7.50	0	0	2	9.7301	6.7712	95	5	-0.0888	-0.0272
MEDIAN	1	0	0	450	478	30	40	2	5	1.30	435	498	30	69	10	10	0	5	5.90	0	0	1	8.9422	6.0175	95	5	-0.0046	-0.0186

Appendix F:
Stated Preference data

University of Cape Town

STATED PREFERENCE DATA

RESP	SP	SEX	CLASS	CLH	CLM	CLEAVE	CAH	CAM	CARRIVE	CINV	CTRAVEL	CSEARCH	CWALK	PARK	PLH	PLM	PLEAVE	PAH	PAM	PARRIVE	PINV	PTRAVEL	PWT-STA	PWAIT	PINTERC	PWALK	PCOST	SECURITY	RELIABILITY	CHOICE
1	1	0	0	8	30	510	8	45	525	15	20	1	4	1.30	8	0	480	9	20	560	50	80	2	5	15	8	5.80	0	0	1
1	2	0	0	8	30	510	9	0	540	30	50	16	4	1.30	8	0	480	9	20	560	50	80	2	5	15	8	10.80	1	0	1
1	3	0	0	8	30	510	9	10	550	40	70	26	4	1.30	8	0	480	9	20	560	50	80	2	5	15	8	3.80	1	1	2
1	4	0	0	8	30	510	9	0	540	30	50	16	4	1.30	8	0	480	9	20	560	50	80	2	5	15	8	3.80	0	1	2
1	5	0	0	8	30	510	8	45	525	15	35	16	4	9.30	8	0	480	9	20	560	50	80	2	5	15	8	3.80	1	1	2
1	6	0	0	8	30	510	9	0	540	30	35	1	4	9.30	8	0	480	9	20	560	50	80	2	5	15	8	3.80	0	1	2
1	7	0	0	8	30	510	9	10	550	40	60	16	4	9.30	8	0	480	9	20	560	50	80	2	5	15	8	10.80	0	0	2
1	8	0	0	8	30	510	9	0	540	30	60	26	4	9.30	8	0	480	9	20	560	50	80	2	5	15	8	5.80	1	0	2
1	9	0	0	8	30	510	8	45	525	15	45	26	4	13.30	8	0	480	9	20	560	50	80	2	5	15	8	10.80	0	1	2
1	10	0	0	8	30	510	9	0	540	30	50	16	4	13.30	8	0	480	9	20	560	50	80	2	5	15	8	5.80	1	1	2
1	11	0	0	8	30	510	9	10	550	40	45	1	4	13.30	8	0	480	9	20	560	50	80	2	5	15	8	3.80	1	0	2
1	12	0	0	8	30	510	9	0	540	30	50	16	4	13.30	8	0	480	9	20	560	50	80	2	5	15	8	3.80	0	0	2
1	13	0	0	8	30	510	8	45	525	15	35	16	4	9.30	8	0	480	9	20	560	50	80	2	5	15	8	3.80	1	0	1
1	14	0	0	8	30	510	9	0	540	30	60	26	4	9.30	8	0	480	9	20	560	50	80	2	5	15	8	3.80	0	0	2
1	15	0	0	8	30	510	9	10	550	40	60	16	4	9.30	8	0	480	9	20	560	50	80	2	5	15	8	5.80	0	1	2
1	16	0	0	8	30	510	9	0	540	30	35	1	4	9.30	8	0	480	9	20	560	50	80	2	5	15	8	10.80	1	1	1
2	1	1	0	8	25	505	9	0	540	35	46	4	7	1.30	7	30	450	8	45	525	35	75	5	10	0	25	5.00	0	0	1
2	2	1	0	8	25	505	9	15	555	50	76	19	7	1.30	7	30	450	8	45	525	35	75	5	10	0	25	10.00	1	0	1
2	3	1	0	8	25	505	9	25	565	60	96	29	7	1.30	7	30	450	8	45	525	35	75	5	10	0	25	3.00	1	1	1
2	4	1	0	8	25	505	9	15	555	50	76	19	7	1.30	7	30	450	8	45	525	35	75	5	10	0	25	3.00	0	1	1
2	5	1	0	8	25	505	9	0	540	35	61	19	7	9.30	7	30	450	8	45	525	35	75	5	10	0	25	3.00	1	1	2
2	6	1	0	8	25	505	9	15	555	50	61	4	7	9.30	7	30	450	8	45	525	35	75	5	10	0	25	3.00	0	1	2
2	7	1	0	8	25	505	9	25	565	60	86	19	7	9.30	7	30	450	8	45	525	35	75	5	10	0	25	10.00	0	0	1
2	8	1	0	8	25	505	9	15	555	50	86	29	7	9.30	7	30	450	8	45	525	35	75	5	10	0	25	5.00	1	0	1
2	9	1	0	8	25	505	9	0	540	35	71	29	7	13.30	7	30	450	8	45	525	35	75	5	10	0	25	10.00	0	1	1
2	10	1	0	8	25	505	9	15	555	50	76	19	7	13.30	7	30	450	8	45	525	35	75	5	10	0	25	5.00	1	1	2
2	11	1	0	8	25	505	9	25	565	60	71	4	7	13.30	7	30	450	8	45	525	35	75	5	10	0	25	3.00	1	0	2
2	12	1	0	8	25	505	9	15	555	50	76	19	7	13.30	7	30	450	8	45	525	35	75	5	10	0	25	3.00	0	0	2
2	13	1	0	8	25	505	9	0	540	35	61	19	7	9.30	7	30	450	8	45	525	35	75	5	10	0	25	3.00	1	0	2

2	14	1	0	8	25	505	9	15	555	50	86	29	7	9.30	7	30	450	8	45	525	35	75	5	10	0	25	3.00	0	0	2
2	15	1	0	8	25	505	9	25	565	60	86	19	7	9.30	7	30	450	8	45	525	35	75	5	10	0	25	5.00	0	1	1
2	16	1	0	8	25	505	9	10	550	45	56	4	7	9.30	7	30	450	8	45	525	35	75	5	10	0	25	10.00	1	1	1
3	1	0	0	5	30	330	5	50	350	20	26	1	5	1.30	5	30	330	7	20	440	25	110	15	30	0	40	5.00	0	0	1
3	2	0	0	5	30	330	6	5	365	35	56	16	5	1.30	5	30	330	7	20	440	25	110	15	30	0	40	10.00	1	0	1
3	3	0	0	5	30	330	6	15	375	45	76	26	5	1.30	5	30	330	7	20	440	25	110	15	30	0	40	3.00	1	1	2
3	4	0	0	5	30	330	6	5	365	35	56	16	5	1.30	5	30	330	7	20	440	25	110	15	30	0	40	3.00	0	1	2
3	5	0	0	5	30	330	5	50	350	20	41	16	5	9.30	5	30	330	7	20	440	25	110	15	30	0	40	3.00	1	1	2
3	6	0	0	5	30	330	6	5	365	35	41	1	5	9.30	5	30	330	7	20	440	25	110	15	30	0	40	3.00	0	1	2
3	7	0	0	5	30	330	6	15	375	45	66	16	5	9.30	5	30	330	7	20	440	25	110	15	30	0	40	10.00	0	0	1
3	8	0	0	5	30	330	6	5	365	35	66	26	5	9.30	5	30	330	7	20	440	25	110	15	30	0	40	5.00	1	0	2
3	9	0	0	5	30	330	5	50	350	20	51	26	5	13.30	5	30	330	7	20	440	25	110	15	30	0	40	10.00	0	1	2
3	10	0	0	5	30	330	6	5	365	35	56	16	5	13.30	5	30	330	7	20	440	25	110	15	30	0	40	5.00	1	1	2
3	11	0	0	5	30	330	6	15	375	45	51	1	5	13.30	5	30	330	7	20	440	25	110	15	30	0	40	3.00	1	0	2
3	12	0	0	5	30	330	6	5	365	35	56	16	5	13.30	5	30	330	7	20	440	25	110	15	30	0	40	3.00	0	0	2
3	13	0	0	5	30	330	5	50	350	20	41	16	5	9.30	5	30	330	7	20	440	25	110	15	30	0	40	3.00	1	0	2
3	14	0	0	5	30	330	6	5	365	35	66	26	5	9.30	5	30	330	7	20	440	25	110	15	30	0	40	3.00	0	0	2
3	15	0	0	5	30	330	6	15	375	45	66	16	5	9.30	5	30	330	7	20	440	25	110	15	30	0	40	5.00	0	1	2
3	16	0	0	5	30	330	6	5	365	35	41	1	5	9.30	5	30	330	7	20	440	25	110	15	30	0	40	10.00	1	1	1
4	1	0	0	6	0	360	6	45	405	45	47	0	2	1.30	5	50	350	6	50	410	29	60	1	10	0	20	6.00	0	0	1
4	2	0	0	6	0	360	7	0	420	60	77	15	2	1.30	5	50	350	6	50	410	29	60	1	10	0	20	11.00	1	0	2
4	3	0	0	6	0	360	7	10	430	70	97	25	2	1.30	5	50	350	6	50	410	29	60	1	10	0	20	4.00	1	1	2
4	4	0	0	6	0	360	7	0	420	60	77	15	2	1.30	5	50	350	6	50	410	29	60	1	10	0	20	4.00	0	1	2
4	5	0	0	6	0	360	6	45	405	45	62	15	2	9.30	5	50	350	6	50	410	29	60	1	10	0	20	4.00	1	1	2
4	6	0	0	6	0	360	7	0	420	60	62	0	2	9.30	5	50	350	6	50	410	29	60	1	10	0	20	4.00	0	1	2
4	7	0	0	6	0	360	7	10	430	70	87	15	2	9.30	5	50	350	6	50	410	29	60	1	10	0	20	11.00	0	0	2
4	8	0	0	6	0	360	7	0	420	60	87	25	2	9.30	5	50	350	6	50	410	29	60	1	10	0	20	6.00	1	0	2
4	9	0	0	6	0	360	6	45	405	45	72	25	2	13.30	5	50	350	6	50	410	29	60	1	10	0	20	11.00	0	1	2
4	10	0	0	6	0	360	7	0	420	60	77	15	2	13.30	5	50	350	6	50	410	29	60	1	10	0	20	6.00	1	1	2
4	11	0	0	6	0	360	7	10	430	70	72	0	2	13.30	5	50	350	6	50	410	29	60	1	10	0	20	4.00	1	0	2
4	12	0	0	6	0	360	7	0	420	60	77	15	2	13.30	5	50	350	6	50	410	29	60	1	10	0	20	4.00	0	0	2
4	13	0	0	6	0	360	6	45	405	45	62	15	2	9.30	5	50	350	6	50	410	29	60	1	10	0	20	4.00	1	0	2
4	14	0	0	6	0	360	7	0	420	60	87	25	2	9.30	5	50	350	6	50	410	29	60	1	10	0	20	4.00	0	0	2
4	15	0	0	6	0	360	7	10	430	70	87	15	2	9.30	5	50	350	6	50	410	29	60	1	10	0	20	6.00	0	1	2
4	16	0	0	6	0	360	7	0	420	60	62	0	2	9.30	5	50	350	6	50	410	29	60	1	10	0	20	11.00	1	1	1
5	1	1	0	7	0	420	7	20	440	20	22	0	2	1.30	7	0	420	7	48	468	35	48	5	5	0	3	5.00	0	0	1

5	2	1	0	7	0	420	7	35	455	35	52	15	2	1.30	7	0	420	7	48	468	35	48	5	5	0	3	10.00	1	0	1
5	3	1	0	7	0	420	7	45	465	45	72	25	2	1.30	7	0	420	7	48	468	35	48	5	5	0	3	3.00	1	1	1
5	4	1	0	7	0	420	7	35	455	35	52	15	2	1.30	7	0	420	7	48	468	35	48	5	5	0	3	3.00	0	1	1
5	5	1	0	7	0	420	7	20	440	20	37	15	2	9.30	7	0	420	7	48	468	35	48	5	5	0	3	3.00	1	1	2
5	6	1	0	7	0	420	7	35	455	35	37	0	2	9.30	7	0	420	7	48	468	35	48	5	5	0	3	3.00	0	1	2
5	7	1	0	7	0	420	7	45	465	45	62	15	2	9.30	7	0	420	7	48	468	35	48	5	5	0	3	10.00	0	0	1
5	8	1	0	7	0	420	7	35	455	35	62	25	2	9.30	7	0	420	7	48	468	35	48	5	5	0	3	5.00	1	0	2
5	9	1	0	7	0	420	7	20	440	20	47	25	2	13.30	7	0	420	7	48	468	35	48	5	5	0	3	10.00	0	1	2
5	10	1	0	7	0	420	7	35	455	35	52	15	2	13.30	7	0	420	7	48	468	35	48	5	5	0	3	5.00	1	1	2
5	11	1	0	7	0	420	7	45	465	45	47	0	2	13.30	7	0	420	7	48	468	35	48	5	5	0	3	3.00	1	0	2
5	12	1	0	7	0	420	7	35	455	35	52	15	2	13.30	7	0	420	7	48	468	35	48	5	5	0	3	3.00	0	0	2
5	13	1	0	7	0	420	7	20	440	20	37	15	2	9.30	7	0	420	7	48	468	35	48	5	5	0	3	3.00	1	0	2
5	14	1	0	7	0	420	7	35	455	35	62	25	2	9.30	7	0	420	7	48	468	35	48	5	5	0	3	3.00	0	0	2
5	15	1	0	7	0	420	7	45	465	45	62	15	2	9.30	7	0	420	7	48	468	35	48	5	5	0	3	5.00	0	1	2
5	16	1	0	7	0	420	7	35	455	35	37	0	2	9.30	7	0	420	7	48	468	35	48	5	5	0	3	10.00	1	1	2
6	1	0	1	8	0	480	8	35	515	35	37	1	1	1.96	7	45	465	9	0	540	40	75	10	0	0	25	5.50	0	0	1
6	2	0	1	8	0	480	8	50	530	50	67	16	1	1.96	7	45	465	9	0	540	40	75	10	0	0	25	10.50	1	0	2
6	3	0	1	8	0	480	9	0	540	60	87	26	1	1.96	7	45	465	9	0	540	40	75	10	0	0	25	3.50	1	1	2
6	4	0	1	8	0	480	8	50	530	50	67	16	1	1.96	7	45	465	9	0	540	40	75	10	0	0	25	3.50	0	1	2
6	5	0	1	8	0	480	8	35	515	35	52	16	1	9.96	7	45	465	9	0	540	40	75	10	0	0	25	3.50	1	1	1
6	6	0	1	8	0	480	8	50	530	50	52	1	1	9.96	7	45	465	9	0	540	40	75	10	0	0	25	3.50	0	1	2
6	7	0	1	8	0	480	9	0	540	60	77	16	1	9.96	7	45	465	9	0	540	40	75	10	0	0	25	10.50	0	0	2
6	8	0	1	8	0	480	8	50	530	50	77	26	1	9.96	7	45	465	9	0	540	40	75	10	0	0	25	5.50	1	0	2
6	9	0	1	8	0	480	8	35	515	35	62	26	1	13.96	7	45	465	9	0	540	40	75	10	0	0	25	10.50	0	1	2
6	10	0	1	8	0	480	8	50	530	50	67	16	1	13.96	7	45	465	9	0	540	40	75	10	0	0	25	5.50	1	1	2
6	11	0	1	8	0	480	9	0	540	60	62	1	1	13.96	7	45	465	9	0	540	40	75	10	0	0	25	3.50	1	0	2
6	12	0	1	8	0	480	8	50	530	50	67	16	1	13.96	7	45	465	9	0	540	40	75	10	0	0	25	3.50	0	0	2
6	13	0	1	8	0	480	8	35	515	35	52	16	1	9.96	7	45	465	9	0	540	40	75	10	0	0	25	3.50	1	0	2
6	14	0	1	8	0	480	8	50	530	50	77	26	1	9.96	7	45	465	9	0	540	40	75	10	0	0	25	3.50	0	0	2
6	15	0	1	8	0	480	9	0	540	60	77	16	1	9.96	7	45	465	9	0	540	40	75	10	0	0	25	5.50	0	1	2
6	16	0	1	8	0	480	8	50	530	50	52	1	1	9.96	7	45	465	9	0	540	40	75	10	0	0	25	10.50	1	1	2
7	1	1	0	7	30	450	8	15	495	45	52	1	6	1.30	6	30	390	8	2	482	40	92	20	10	20	2	7.00	0	0	1
7	2	1	0	7	30	450	8	30	510	60	82	16	6	1.30	6	30	390	8	2	482	40	92	20	10	20	2	12.00	1	0	1
7	3	1	0	7	30	450	8	40	520	70	102	26	6	1.30	6	30	390	8	2	482	40	92	20	10	20	2	5.00	1	1	2
7	4	1	0	7	30	450	8	30	510	60	82	16	6	1.30	6	30	390	8	2	482	40	92	20	10	20	2	5.00	0	1	1
7	5	1	0	7	30	450	8	15	495	45	67	16	6	9.30	6	30	390	8	2	482	40	92	20	10	20	2	5.00	1	1	2

7	6	1	0	7	30	450	8	30	510	60	67	1	6	9.30	6	30	390	8	2	482	40	92	20	10	20	2	5.00	0	1	2
7	7	1	0	7	30	450	8	40	520	70	92	16	6	9.30	6	30	390	8	2	482	40	92	20	10	20	2	12.00	0	0	1
7	8	1	0	7	30	450	8	30	510	60	92	26	6	9.30	6	30	390	8	2	482	40	92	20	10	20	2	7.00	1	0	1
7	9	1	0	7	30	450	8	15	595	145	177	26	6	13.30	6	30	390	8	2	482	40	92	20	10	20	2	12.00	0	1	1
7	10	1	0	7	30	450	8	30	510	60	82	16	6	13.30	6	30	390	8	2	482	40	92	20	10	20	2	7.00	1	1	2
7	11	1	0	7	30	450	8	40	520	70	77	1	6	13.30	6	30	390	8	2	482	40	92	20	10	20	2	5.00	1	0	1
7	12	1	0	7	30	450	8	30	510	60	82	16	6	13.30	6	30	390	8	2	482	40	92	20	10	20	2	5.00	0	0	1
7	13	1	0	7	30	450	8	15	495	45	67	16	6	9.30	6	30	390	8	2	482	40	92	20	10	20	2	5.00	1	0	1
7	14	1	0	7	30	450	8	30	510	60	92	26	6	9.30	6	30	390	8	2	482	40	92	20	10	20	2	5.00	0	0	1
7	15	1	0	7	30	450	8	40	520	70	92	16	6	9.30	6	30	390	8	2	482	40	92	20	10	20	2	7.00	0	1	1
7	16	1	0	7	30	450	8	30	510	60	67	1	6	9.30	6	30	390	8	2	482	40	92	20	10	20	2	12.00	1	1	2
8	1	0	0	6	0	360	6	30	390	30	35	0	5	1.30	6	0	360	7	20	440	40	80	15	10	0	15	5.50	0	0	1
8	2	0	0	6	0	360	6	45	405	45	65	15	5	1.30	6	0	360	7	20	440	40	80	15	10	0	15	10.50	1	0	1
8	3	0	0	6	0	360	6	55	415	55	85	25	5	1.30	6	0	360	7	20	440	40	80	15	10	0	15	3.50	1	1	1
8	4	0	0	6	0	360	6	45	405	45	65	15	5	1.30	6	0	360	7	20	440	40	80	15	10	0	15	3.50	0	1	1
8	5	0	0	6	0	360	6	30	390	30	50	15	5	9.30	6	0	360	7	20	440	40	80	15	10	0	15	3.50	1	1	2
8	6	0	0	6	0	360	6	45	405	45	50	0	5	9.30	6	0	360	7	20	440	40	80	15	10	0	15	3.50	0	1	1
8	7	0	0	6	0	360	6	55	415	55	75	15	5	9.30	6	0	360	7	20	440	40	80	15	10	0	15	10.50	0	0	1
8	8	0	0	6	0	360	6	40	400	40	70	25	5	9.30	6	0	360	7	20	440	40	80	15	10	0	15	5.50	1	0	1
8	9	0	0	6	0	360	6	30	390	30	60	25	5	13.30	6	0	360	7	20	440	40	80	15	10	0	15	10.50	0	1	1
8	10	0	0	6	0	360	6	40	400	40	60	15	5	13.30	6	0	360	7	20	440	40	80	15	10	0	15	5.50	1	1	1
8	11	0	0	6	0	360	6	50	410	50	55	0	5	13.30	6	0	360	7	20	440	40	80	15	10	0	15	3.50	1	0	1
8	12	0	0	6	0	360	6	40	400	40	60	15	5	13.30	6	0	360	7	20	440	40	80	15	10	0	15	3.50	0	0	1
8	13	0	0	6	0	360	6	30	390	30	50	15	5	9.30	6	0	360	7	20	440	40	80	15	10	0	15	3.50	1	0	1
8	14	0	0	6	0	360	6	40	400	40	70	25	5	9.30	6	0	360	7	20	440	40	80	15	10	0	15	3.50	0	0	1
8	15	0	0	6	0	360	6	50	410	50	70	15	5	9.30	6	0	360	7	20	440	40	80	15	10	0	15	5.50	0	1	1
8	16	0	0	6	0	360	6	40	400	40	45	0	5	9.30	6	0	360	7	20	440	40	80	15	10	0	15	10.50	1	1	2
9	1	0	0	7	30	450	8	15	495	45	47	0	2	1.30	7	0	420	8	20	500	25	80	10	5	20	20	7.00	0	0	1
9	2	0	0	7	30	450	8	30	510	60	77	15	2	1.30	7	0	420	8	20	500	25	80	10	5	20	20	12.00	1	0	1
9	3	0	0	7	30	450	8	40	520	70	97	25	2	1.30	7	0	420	8	20	500	25	80	10	5	20	20	5.00	1	1	2
9	4	0	0	7	30	450	8	30	510	60	77	15	2	1.30	7	0	420	8	20	500	25	80	10	5	20	20	5.00	0	1	1
9	5	0	0	7	30	450	8	15	495	45	62	15	2	9.30	7	0	420	8	20	500	25	80	10	5	20	20	5.00	1	1	2
9	6	0	0	7	30	450	8	30	510	60	62	0	2	9.30	7	0	420	8	20	500	25	80	10	5	20	20	5.00	0	1	2
9	7	0	0	7	30	450	8	40	520	70	87	15	2	9.30	7	0	420	8	20	500	25	80	10	5	20	20	12.00	0	0	1
9	8	0	0	7	30	450	8	30	510	60	87	25	2	9.30	7	0	420	8	20	500	25	80	10	5	20	20	7.00	1	0	2
9	9	0	0	7	30	450	8	15	495	45	72	25	2	13.30	7	0	420	8	20	500	25	80	10	5	20	20	12.00	0	1	2

9	10	0	0	7	30	450	8	30	510	60	77	15	2	13.30	7	0	420	8	20	500	25	80	10	5	20	20	7.00	1	1	2
9	11	0	0	7	30	450	8	40	520	70	72	0	2	13.30	7	0	420	8	20	500	25	80	10	5	20	20	5.00	1	0	2
9	12	0	0	7	30	450	8	30	510	60	77	15	2	13.30	7	0	420	8	20	500	25	80	10	5	20	20	5.00	0	0	2
9	13	0	0	7	30	450	8	15	495	45	62	15	2	9.30	7	0	420	8	20	500	25	80	10	5	20	20	5.00	1	0	2
9	14	0	0	7	30	450	8	30	510	60	87	25	2	9.30	7	0	420	8	20	500	25	80	10	5	20	20	5.00	0	0	2
9	15	0	0	7	30	450	8	40	520	70	87	15	2	9.30	7	0	420	8	20	500	25	80	10	5	20	20	7.00	0	1	2
9	16	0	0	7	30	450	8	30	510	60	62	0	2	9.30	7	0	420	8	20	500	25	80	10	5	20	20	12.00	1	1	1
10	1	1	0	8	20	500	8	30	510	10	14	1	3	1.30	8	0	480	8	32	512	10	32	15	5	0	2	2.00	0	0	1
10	2	1	0	8	20	500	8	45	525	25	44	16	3	1.30	8	0	480	8	32	512	10	32	15	5	0	2	7.00	1	0	1
10	3	1	0	8	20	500	8	55	535	35	64	26	3	1.30	8	0	480	8	32	512	10	32	15	5	0	2	0.00	1	1	2
10	4	1	0	8	20	500	8	45	525	25	44	16	3	1.30	8	0	480	8	32	512	10	32	15	5	0	2	0.00	0	1	1
10	5	1	0	8	20	500	8	30	510	10	29	16	3	9.30	8	0	480	8	32	512	10	32	15	5	0	2	0.00	1	1	2
10	6	1	0	8	20	500	8	45	525	25	29	1	3	9.30	8	0	480	8	32	512	10	32	15	5	0	2	0.00	0	1	2
10	7	1	0	8	20	500	8	55	535	35	54	16	3	9.30	8	0	480	8	32	512	10	32	15	5	0	2	7.00	0	0	2
10	8	1	0	8	20	500	8	45	525	25	54	26	3	9.30	8	0	480	8	32	512	10	32	15	5	0	2	2.00	1	0	2
10	9	1	0	8	20	500	8	30	510	10	39	26	3	13.30	8	0	480	8	32	512	10	32	15	5	0	2	7.00	0	1	2
10	10	1	0	8	20	500	8	45	525	25	44	16	3	13.30	8	0	480	8	32	512	10	32	15	5	0	2	2.00	1	1	2
10	11	1	0	8	20	500	8	55	535	35	39	1	3	13.30	8	0	480	8	32	512	10	32	15	5	0	2	0.00	1	0	2
10	12	1	0	8	20	500	8	45	525	25	44	16	3	13.30	8	0	480	8	32	512	10	32	15	5	0	2	0.00	0	0	2
10	13	1	0	8	20	500	8	30	510	10	29	16	3	9.30	8	0	480	8	32	512	10	32	15	5	0	2	0.00	1	0	2
10	14	1	0	8	20	500	8	45	525	25	54	26	3	9.30	8	0	480	8	32	512	10	32	15	5	0	2	0.00	0	0	2
10	15	1	0	8	20	500	8	55	535	35	54	16	3	9.30	8	0	480	8	32	512	10	32	15	5	0	2	2.00	0	1	2
10	16	1	0	8	20	500	8	45	525	25	29	1	3	9.30	8	0	480	8	32	512	10	32	15	5	0	2	7.00	1	1	2
11	1	1	0	7	35	455	7	50	470	15	22	0	7	1.30	7	30	450	8	5	485	19	35	6	5	0	5	4.20	0	0	1
11	2	1	0	7	35	455	8	5	485	30	52	15	7	1.30	7	30	450	8	5	485	19	35	6	5	0	5	9.20	1	0	1
11	3	1	0	7	35	455	8	15	495	40	72	25	7	1.30	7	30	450	8	5	485	19	35	6	5	0	5	2.20	1	1	1
11	4	1	0	7	35	455	8	5	485	30	52	15	7	1.30	7	30	450	8	5	485	19	35	6	5	0	5	2.20	0	1	1
11	5	1	0	7	35	455	7	45	465	10	32	15	7	9.30	7	30	450	8	5	485	19	35	6	5	0	5	2.20	1	1	2
11	6	1	0	7	35	455	8	5	485	30	37	0	7	9.30	7	30	450	8	5	485	19	35	6	5	0	5	2.20	0	1	2
11	7	1	0	7	35	455	8	15	495	40	62	15	7	9.30	7	30	450	8	5	485	19	35	6	5	0	5	9.20	0	0	1
11	8	1	0	7	35	455	8	5	485	30	62	25	7	9.30	7	30	450	8	5	485	19	35	6	5	0	5	4.20	1	0	2
11	9	1	0	7	35	455	7	45	465	10	42	25	7	13.30	7	30	450	8	5	485	19	35	6	5	0	5	9.20	0	1	2
11	10	1	0	7	35	455	8	5	485	30	52	15	7	13.30	7	30	450	8	5	485	19	35	6	5	0	5	4.20	1	1	2
11	11	1	0	7	35	455	8	15	495	40	47	0	7	13.30	7	30	450	8	5	485	19	35	6	5	0	5	2.20	1	0	2
11	12	1	0	7	35	455	8	5	485	30	52	15	7	13.30	7	30	450	8	5	485	19	35	6	5	0	5	2.20	0	0	2
11	13	1	0	7	35	455	7	45	465	10	32	15	7	9.30	7	30	450	8	5	485	19	35	6	5	0	5	2.20	1	0	2

11	14	1	0	7	35	455	8	5	485	30	62	25	7	9.30	7	30	450	8	5	485	19	35	6	5	0	5	2.20	0	0	2
11	15	1	0	7	35	455	8	15	495	40	62	15	7	9.30	7	30	450	8	5	485	19	35	6	5	0	5	4.20	0	1	2
11	16	1	0	7	35	455	8	5	485	30	37	0	7	9.30	7	30	450	8	5	485	19	35	6	5	0	5	9.20	1	1	1
12	1	0	1	9	15	555	9	45	585	30	40	0	10	1.96	7	45	465	9	30	570	60	105	20	5	0	20	5.00	0	0	1
12	2	0	1	9	15	555	10	0	600	45	70	15	10	1.96	7	45	465	9	30	570	60	105	20	5	0	20	10.00	1	0	1
12	3	0	1	9	15	555	10	10	610	55	90	25	10	1.96	7	45	465	9	30	570	60	105	20	5	0	20	3.00	1	1	2
12	4	0	1	9	15	555	10	0	600	45	70	15	10	1.96	7	45	465	9	30	570	60	105	20	5	0	20	3.00	0	1	1
12	5	0	1	9	15	555	9	45	585	30	55	15	10	9.96	7	45	465	9	30	570	60	105	20	5	0	20	3.00	1	1	2
12	6	0	1	9	15	555	10	0	600	45	55	0	10	9.96	7	45	465	9	30	570	60	105	20	5	0	20	3.00	0	1	1
12	7	0	1	9	15	555	10	10	610	55	80	15	10	9.96	7	45	465	9	30	570	60	105	20	5	0	20	10.00	0	0	1
12	8	0	1	9	15	555	10	0	600	45	80	25	10	9.96	7	45	465	9	30	570	60	105	20	5	0	20	5.00	1	0	1
12	9	0	1	9	15	555	9	45	585	30	65	25	10	13.96	7	45	465	9	30	570	60	105	20	5	0	20	10.00	0	1	1
12	10	0	1	9	15	555	10	0	600	45	70	15	10	13.96	7	45	465	9	30	570	60	105	20	5	0	20	5.00	1	1	2
12	11	0	1	9	15	555	10	10	610	55	65	0	10	13.96	7	45	465	9	30	570	60	105	20	5	0	20	3.00	1	0	1
12	12	0	1	9	15	555	10	0	600	45	70	15	10	13.96	7	45	465	9	30	570	60	105	20	5	0	20	3.00	0	0	1
12	13	0	1	9	15	555	9	45	585	30	55	15	10	9.96	7	45	465	9	30	570	60	105	20	5	0	20	3.00	1	0	1
12	14	0	1	9	15	555	10	0	600	45	80	25	10	9.96	7	45	465	9	30	570	60	105	20	5	0	20	3.00	0	0	1
12	15	0	1	9	15	555	10	10	610	55	80	15	10	9.96	7	45	465	9	30	570	60	105	20	5	0	20	5.00	0	1	1
12	16	0	1	9	15	555	10	0	600	45	55	0	10	9.96	7	45	465	9	30	570	60	105	20	5	0	20	10.00	1	1	2
13	1	1	1	7	40	460	8	15	495	35	37	0	2	1.96	7	15	435	8	15	495	20	60	10	10	15	5	6.00	0	0	1
13	2	1	1	7	40	460	8	30	510	50	67	15	2	1.96	7	15	435	8	15	495	20	60	10	10	15	5	11.00	1	0	1
13	3	1	1	7	40	460	8	40	520	60	87	25	2	1.96	7	15	435	8	15	495	20	60	10	10	15	5	4.00	1	1	2
13	4	1	1	7	40	460	8	30	510	50	67	15	2	1.96	7	15	435	8	15	495	20	60	10	10	15	5	4.00	0	1	1
13	5	1	1	7	40	460	8	15	495	35	52	15	2	9.96	7	15	435	8	15	495	20	60	10	10	15	5	4.00	1	1	2
13	6	1	1	7	40	460	8	30	510	50	52	0	2	9.96	7	15	435	8	15	495	20	60	10	10	15	5	4.00	0	1	1
13	7	1	1	7	40	460	8	40	520	60	77	15	2	9.96	7	15	435	8	15	495	20	60	10	10	15	5	11.00	0	0	1
13	8	1	1	7	40	460	8	30	510	50	77	25	2	9.96	7	15	435	8	15	495	20	60	10	10	15	5	6.00	1	0	2
13	9	1	1	7	40	460	8	15	495	35	62	25	2	13.96	7	15	435	8	15	495	20	60	10	10	15	5	11.00	0	1	1
13	10	1	1	7	40	460	8	30	510	50	67	15	2	13.96	7	15	435	8	15	495	20	60	10	10	15	5	6.00	1	1	2
13	11	1	1	7	40	460	8	40	520	60	62	0	2	13.96	7	15	435	8	15	495	20	60	10	10	15	5	4.00	1	0	2
13	12	1	1	7	40	460	8	30	510	50	67	15	2	13.96	7	15	435	8	15	495	20	60	10	10	15	5	4.00	0	0	2
13	13	1	1	7	40	460	8	15	495	35	52	15	2	9.96	7	15	435	8	15	495	20	60	10	10	15	5	4.00	1	0	2
13	14	1	1	7	40	460	8	30	510	50	77	25	2	9.96	7	15	435	8	15	495	20	60	10	10	15	5	4.00	0	0	2
13	15	1	1	7	40	460	8	40	520	60	77	15	2	9.96	7	15	435	8	15	495	20	60	10	10	15	5	6.00	0	1	1
13	16	1	1	7	40	460	8	30	510	50	52	0	2	9.96	7	15	435	8	15	495	20	60	10	10	15	5	11.00	1	1	1
14	1	0	0	6	30	390	7	2	422	32	45	3	10	1.30	6	0	360	7	30	450	47	90	20	10	8	5	6.00	0	0	1

14	2	0	0	6	30	390	7	17	437	47	75	18	10	1.30	6	0	360	7	30	450	47	90	20	10	8	5	11.00	1	0	1
14	3	0	0	6	30	390	7	27	447	57	95	28	10	1.30	6	0	360	7	30	450	47	90	20	10	8	5	4.00	1	1	2
14	4	0	0	6	30	390	7	17	437	47	75	18	10	1.30	6	0	360	7	30	450	47	90	20	10	8	5	4.00	0	1	1
14	5	0	0	6	30	390	7	2	422	32	60	18	10	9.30	6	0	360	7	30	450	47	90	20	10	8	5	4.00	1	1	2
14	6	0	0	6	30	390	7	17	437	47	60	3	10	9.30	6	0	360	7	30	450	47	90	20	10	8	5	4.00	0	1	2
14	7	0	0	6	30	390	7	27	447	57	85	18	10	9.30	6	0	360	7	30	450	47	90	20	10	8	5	11.00	0	0	1
14	8	0	0	6	30	390	7	17	437	47	85	28	10	9.30	6	0	360	7	30	450	47	90	20	10	8	5	6.00	1	0	2
14	9	0	0	6	30	390	7	2	422	32	70	28	10	13.30	6	0	360	7	30	450	47	90	20	10	8	5	11.00	0	1	2
14	10	0	0	6	30	390	7	17	437	47	75	18	10	13.30	6	0	360	7	30	450	47	90	20	10	8	5	6.00	1	1	2
14	11	0	0	6	30	390	7	27	447	57	70	3	10	13.30	6	0	360	7	30	450	47	90	20	10	8	5	4.00	1	0	2
14	12	0	0	6	30	390	7	17	437	47	75	18	10	13.30	6	0	360	7	30	450	47	90	20	10	8	5	4.00	0	0	2
14	13	0	0	6	30	390	7	2	422	32	60	18	10	9.30	6	0	360	7	30	450	47	90	20	10	8	5	4.00	1	0	2
14	14	0	0	6	30	390	7	17	437	47	85	28	10	9.30	6	0	360	7	30	450	47	90	20	10	8	5	4.00	0	0	2
14	15	0	0	6	30	390	7	27	447	57	85	18	10	9.30	6	0	360	7	30	450	47	90	20	10	8	5	6.00	0	1	2
14	16	0	0	6	30	390	7	17	437	47	60	3	10	9.30	6	0	360	7	30	450	47	90	20	10	8	5	11.00	1	1	2
15	1	0	0	6	30	390	7	20	440	50	56	1	5	1.30	6	0	360	7	45	465	25	105	30	10	15	25	7.00	0	0	1
15	2	0	0	6	30	390	7	35	455	65	86	16	5	1.30	6	0	360	7	45	465	25	105	30	10	15	25	12.00	1	0	1
15	3	0	0	6	30	390	7	45	465	75	106	26	5	1.30	6	0	360	7	45	465	25	105	30	10	15	25	5.00	1	1	1
15	4	0	0	6	30	390	7	35	455	65	86	16	5	1.30	6	0	360	7	45	465	25	105	30	10	15	25	5.00	0	1	2
15	5	0	0	6	30	390	7	20	440	50	71	16	5	9.30	6	0	360	7	45	465	25	105	30	10	15	25	5.00	1	1	2
15	6	0	0	6	30	390	7	35	455	65	71	1	5	9.30	6	0	360	7	45	465	25	105	30	10	15	25	5.00	0	1	2
15	7	0	0	6	30	390	7	45	465	75	96	16	5	9.30	6	0	360	7	45	465	25	105	30	10	15	25	12.00	0	0	1
15	8	0	0	6	30	390	7	35	455	65	96	26	5	9.30	6	0	360	7	45	465	25	105	30	10	15	25	7.00	1	0	2
15	9	0	0	6	30	390	7	20	440	50	81	26	5	13.30	6	0	360	7	45	465	25	105	30	10	15	25	12.00	0	1	2
15	10	0	0	6	30	390	7	35	455	65	86	16	5	13.30	6	0	360	7	45	465	25	105	30	10	15	25	7.00	1	1	2
15	11	0	0	6	30	390	7	45	465	75	81	1	5	13.30	6	0	360	7	45	465	25	105	30	10	15	25	5.00	1	0	2
15	12	0	0	6	30	390	7	35	455	65	86	16	5	13.30	6	0	360	7	45	465	25	105	30	10	15	25	5.00	0	0	2
15	13	0	0	6	30	390	7	20	440	50	71	16	5	9.30	6	0	360	7	45	465	25	105	30	10	15	25	5.00	1	0	2
15	14	0	0	6	30	390	7	35	455	65	96	26	5	9.30	6	0	360	7	45	465	25	105	30	10	15	25	5.00	0	0	2
15	15	0	0	6	30	390	7	45	465	75	96	16	5	9.30	6	0	360	7	45	465	25	105	30	10	15	25	7.00	0	1	2
15	16	0	0	6	30	390	7	35	455	65	71	1	5	9.30	6	0	360	7	45	465	25	105	30	10	15	25	12.00	1	1	1
16	1	1	0	7	45	465	8	30	510	45	62	15	2	1.30	8	0	480	8	43	523	25	43	10	0	5	3	5.00	0	0	1
16	2	1	0	7	45	465	8	45	525	60	92	30	2	1.30	8	0	480	8	43	523	25	43	10	0	5	3	10.00	1	0	2
16	3	1	0	7	45	465	8	55	535	70	112	40	2	1.30	8	0	480	8	43	523	25	43	10	0	5	3	3.00	1	1	2
16	4	1	0	7	45	465	8	45	525	60	92	30	2	1.30	8	0	480	8	43	523	25	43	10	0	5	3	3.00	0	1	2
16	5	1	0	7	45	465	8	30	510	45	77	30	2	9.30	8	0	480	8	43	523	25	43	10	0	5	3	3.00	1	1	2

16	6	1	0	7	45	465	8	45	525	60	77	15	2	9.30	8	0	480	8	43	523	25	43	10	0	5	3	3.00	0	1	2
16	7	1	0	7	45	465	8	55	535	70	102	30	2	9.30	8	0	480	8	43	523	25	43	10	0	5	3	10.00	0	0	2
16	8	1	0	7	45	465	8	45	525	60	102	40	2	9.30	8	0	480	8	43	523	25	43	10	0	5	3	5.00	1	0	2
16	9	1	0	7	45	465	8	30	510	45	87	40	2	13.30	8	0	480	8	43	523	25	43	10	0	5	3	10.00	0	1	2
16	10	1	0	7	45	465	8	45	525	60	92	30	2	13.30	8	0	480	8	43	523	25	43	10	0	5	3	5.00	1	1	2
16	11	1	0	7	45	465	8	55	535	70	87	15	2	13.30	8	0	480	8	43	523	25	43	10	0	5	3	3.00	1	0	2
16	12	1	0	7	45	465	8	45	525	60	92	30	2	13.30	8	0	480	8	43	523	25	43	10	0	5	3	3.00	0	0	2
16	13	1	0	7	45	465	8	30	510	45	77	30	2	9.30	8	0	480	8	43	523	25	43	10	0	5	3	3.00	1	0	2
16	14	1	0	7	45	465	8	45	525	60	102	40	2	9.30	8	0	480	8	43	523	25	43	10	0	5	3	3.00	0	0	2
16	15	1	0	7	45	465	8	55	535	70	102	30	2	9.30	8	0	480	8	43	523	25	43	10	0	5	3	5.00	0	1	2
16	16	1	0	7	45	465	8	45	525	60	77	15	2	9.30	8	0	480	8	43	523	25	43	10	0	5	3	10.00	1	1	1
17	1	1	0	7	30	450	8	10	490	40	47	2	5	1.30	7	0	420	8	30	510	25	90	5	15	30	15	6.50	0	0	1
17	2	1	0	7	30	450	8	25	505	55	77	17	5	1.30	7	0	420	8	30	510	25	90	5	15	30	15	11.50	1	0	1
17	3	1	0	7	30	450	8	35	515	65	97	27	5	1.30	7	0	420	8	30	510	25	90	5	15	30	15	4.50	1	1	2
17	4	1	0	7	30	450	8	25	505	55	77	17	5	1.30	7	0	420	8	30	510	25	90	5	15	30	15	4.50	0	1	1
17	5	1	0	7	30	450	8	10	490	40	62	17	5	9.30	7	0	420	8	30	510	25	90	5	15	30	15	4.50	1	1	2
17	6	1	0	7	30	450	8	25	505	55	62	2	5	9.30	7	0	420	8	30	510	25	90	5	15	30	15	4.50	0	1	1
17	7	1	0	7	30	450	8	35	515	65	87	17	5	9.30	7	0	420	8	30	510	25	90	5	15	30	15	11.50	0	0	1
17	8	1	0	7	30	450	8	25	505	55	87	27	5	9.30	7	0	420	8	30	510	25	90	5	15	30	15	6.50	1	0	2
17	9	1	0	7	30	450	8	10	490	40	72	27	5	13.30	7	0	420	8	30	510	25	90	5	15	30	15	11.50	0	1	1
17	10	1	0	7	30	450	8	25	505	55	77	17	5	13.30	7	0	420	8	30	510	25	90	5	15	30	15	6.50	1	1	2
17	11	1	0	7	30	450	8	35	515	65	72	2	5	13.30	7	0	420	8	30	510	25	90	5	15	30	15	4.50	1	0	2
17	12	1	0	7	30	450	8	25	505	55	77	17	5	13.30	7	0	420	8	30	510	25	90	5	15	30	15	4.50	0	0	2
17	13	1	0	7	30	450	8	10	490	40	62	17	5	9.30	7	0	420	8	30	510	25	90	5	15	30	15	4.50	1	0	2
17	14	1	0	7	30	450	8	25	505	55	87	27	5	9.30	7	0	420	8	30	510	25	90	5	15	30	15	4.50	0	0	1
17	15	1	0	7	30	450	8	35	515	65	87	17	5	9.30	7	0	420	8	30	510	25	90	5	15	30	15	6.50	0	1	1
17	16	1	0	7	30	450	8	25	505	55	62	2	5	9.30	7	0	420	8	30	510	25	90	5	15	30	15	11.50	1	1	1
18	1	1	0	7	45	465	8	30	510	45	57	2	10	1.30	7	15	435	8	25	505	25	70	25	5	0	15	7.00	0	0	1
18	2	1	0	7	45	465	8	45	525	60	87	17	10	1.30	7	15	435	8	25	505	25	70	25	5	0	15	12.00	1	0	2
18	3	1	0	7	45	465	8	55	535	70	107	27	10	1.30	7	15	435	8	25	505	25	70	25	5	0	15	5.00	1	1	2
18	4	1	0	7	45	465	8	45	525	60	87	17	10	1.30	7	15	435	8	25	505	25	70	25	5	0	15	5.00	0	1	2
18	5	1	0	7	45	465	8	30	510	45	72	17	10	9.30	7	15	435	8	25	505	25	70	25	5	0	15	5.00	1	1	2
18	6	1	0	7	45	465	8	45	525	60	72	2	10	9.30	7	15	435	8	25	505	25	70	25	5	0	15	5.00	0	1	2
18	7	1	0	7	45	465	8	55	535	70	97	17	10	9.30	7	15	435	8	25	505	25	70	25	5	0	15	12.00	0	0	2
18	8	1	0	7	45	465	8	45	525	60	97	27	10	9.30	7	15	435	8	25	505	25	70	25	5	0	15	7.00	1	0	2
18	9	1	0	7	45	465	8	30	510	45	82	27	10	13.30	7	15	435	8	25	505	25	70	25	5	0	15	12.00	0	1	2

18	10	1	0	7	45	465	8	45	525	60	87	17	10	13.30	7	15	435	8	25	505	25	70	25	5	0	15	7.00	1	1	2
18	11	1	0	7	45	465	8	55	535	70	82	2	10	13.30	7	15	435	8	25	505	25	70	25	5	0	15	5.00	1	0	2
18	12	1	0	7	45	465	8	45	525	60	87	17	10	13.30	7	15	435	8	25	505	25	70	25	5	0	15	5.00	0	0	2
18	13	1	0	7	45	465	8	30	510	45	72	17	10	9.30	7	15	435	8	25	505	25	70	25	5	0	15	5.00	1	0	2
18	14	1	0	7	45	465	8	45	525	60	97	27	10	9.30	7	15	435	8	25	505	25	70	25	5	0	15	5.00	0	0	2
18	15	1	0	7	45	465	8	55	535	70	97	17	10	9.30	7	15	435	8	25	505	25	70	25	5	0	15	7.00	0	1	2
18	16	1	0	7	45	465	8	45	525	60	72	2	10	9.30	7	15	435	8	25	505	25	70	25	5	0	15	12.00	1	1	2
19	1	0	0	8	0	480	8	30	510	30	40	5	5	1.30	7	0	420	8	8	488	35	68	5	5	20	3	7.00	0	0	1
19	2	0	0	8	0	480	8	45	525	45	70	20	5	1.30	7	0	420	8	8	488	35	68	5	5	20	3	12.00	1	0	1
19	3	0	0	8	0	480	8	55	535	55	90	30	5	1.30	7	0	420	8	8	488	35	68	5	5	20	3	5.00	1	1	2
19	4	0	0	8	0	480	8	45	525	45	70	20	5	1.30	7	0	420	8	8	488	35	68	5	5	20	3	5.00	0	1	1
19	5	0	0	8	0	480	8	30	510	30	55	20	5	9.30	7	0	420	8	8	488	35	68	5	5	20	3	5.00	1	1	2
19	6	0	0	8	0	480	8	45	525	45	55	5	5	9.30	7	0	420	8	8	488	35	68	5	5	20	3	5.00	0	1	2
19	7	0	0	8	0	480	8	55	535	55	80	20	5	9.30	7	0	420	8	8	488	35	68	5	5	20	3	12.00	0	0	1
19	8	0	0	8	0	480	8	45	525	45	80	30	5	9.30	7	0	420	8	8	488	35	68	5	5	20	3	7.00	1	0	1
19	9	0	0	8	0	480	8	30	510	30	65	30	5	13.30	7	0	420	8	8	488	35	68	5	5	20	3	12.00	0	1	1
19	10	0	0	8	0	480	8	45	525	45	70	20	5	13.30	7	0	420	8	8	488	35	68	5	5	20	3	7.00	1	1	2
19	11	0	0	8	0	480	8	55	535	55	65	5	5	13.30	7	0	420	8	8	488	35	68	5	5	20	3	5.00	1	0	2
19	12	0	0	8	0	480	8	45	525	45	70	20	5	13.30	7	0	420	8	8	488	35	68	5	5	20	3	5.00	0	0	2
19	13	0	0	8	0	480	8	30	510	30	55	20	5	9.30	7	0	420	8	8	488	35	68	5	5	20	3	5.00	1	0	2
19	14	0	0	8	0	480	8	45	525	45	80	30	5	9.30	7	0	420	8	8	488	35	68	5	5	20	3	5.00	0	0	2
19	15	0	0	8	0	480	8	55	535	55	80	20	5	9.30	7	0	420	8	8	488	35	68	5	5	20	3	7.00	0	1	1
19	16	0	0	8	0	480	8	45	525	45	55	5	5	9.30	7	0	420	8	8	488	35	68	5	5	20	3	12.00	1	1	1
20	1	0	0	7	0	420	8	0	480	60	72	5	7	1.30	7	45	465	8	30	510	15	45	15	10	0	5	2.00	0	0	1
20	2	0	0	7	0	420	8	15	495	75	102	20	7	1.30	7	45	465	8	30	510	15	45	15	10	0	5	7.00	1	0	2
20	3	0	0	7	0	420	8	25	505	85	122	30	7	1.30	7	45	465	8	30	510	15	45	15	10	0	5	0.00	1	1	2
20	4	0	0	7	0	420	8	15	495	75	102	20	7	1.30	7	45	465	8	30	510	15	45	15	10	0	5	0.00	0	1	1
20	5	0	0	7	0	420	8	0	480	60	87	20	7	9.30	7	45	465	8	30	510	15	45	15	10	0	5	0.00	1	1	2
20	6	0	0	7	0	420	8	15	495	75	87	5	7	9.30	7	45	465	8	30	510	15	45	15	10	0	5	0.00	0	1	2
20	7	0	0	7	0	420	8	25	505	85	112	20	7	9.30	7	45	465	8	30	510	15	45	15	10	0	5	7.00	0	0	1
20	8	0	0	7	0	420	8	15	495	75	112	30	7	9.30	7	45	465	8	30	510	15	45	15	10	0	5	2.00	1	0	2
20	9	0	0	7	0	420	8	0	480	60	97	30	7	13.30	7	45	465	8	30	510	15	45	15	10	0	5	7.00	0	1	2
20	10	0	0	7	0	420	8	15	495	75	102	20	7	13.30	7	45	465	8	30	510	15	45	15	10	0	5	2.00	1	1	2
20	11	0	0	7	0	420	8	25	505	85	97	5	7	13.30	7	45	465	8	30	510	15	45	15	10	0	5	0.00	1	0	2
20	12	0	0	7	0	420	8	15	495	75	102	20	7	13.30	7	45	465	8	30	510	15	45	15	10	0	5	0.00	0	0	2
20	13	0	0	7	0	420	8	0	480	60	87	20	7	9.30	7	45	465	8	30	510	15	45	15	10	0	5	0.00	1	0	2

20	14	0	0	7	0	420	8	15	495	75	112	30	7	9.30	7	45	465	8	30	510	15	45	15	10	0	5	0.00	0	0	2
20	15	0	0	7	0	420	8	25	505	85	112	20	7	9.30	7	45	465	8	30	510	15	45	15	10	0	5	2.00	0	1	2
20	16	0	0	7	0	420	8	15	495	75	87	5	7	9.30	7	45	465	8	30	510	15	45	15	10	0	5	7.00	1	1	1
21	1	0	0	7	0	420	7	45	465	45	55	5	5	1.30	6	30	390	7	45	465	32	75	5	10	13	15	7.00	0	0	1
21	2	0	0	7	0	420	8	0	480	60	85	20	5	1.30	6	30	390	7	45	465	32	75	5	10	13	15	12.00	1	0	1
21	3	0	0	7	0	420	8	10	490	70	105	30	5	1.30	6	30	390	7	45	465	32	75	5	10	13	15	5.00	1	1	2
21	4	0	0	7	0	420	8	0	480	60	85	20	5	1.30	6	30	390	7	45	465	32	75	5	10	13	15	5.00	0	1	2
21	5	0	0	7	0	420	7	45	465	45	70	20	5	9.30	6	30	390	7	45	465	32	75	5	10	13	15	5.00	1	1	2
21	6	0	0	7	0	420	8	0	480	60	70	5	5	9.30	6	30	390	7	45	465	32	75	5	10	13	15	5.00	0	1	2
21	7	0	0	7	0	420	8	10	490	70	95	20	5	9.30	6	30	390	7	45	465	32	75	5	10	13	15	12.00	0	0	1
21	8	0	0	7	0	420	8	0	480	60	95	30	5	9.30	6	30	390	7	45	465	32	75	5	10	13	15	7.00	1	0	2
21	9	0	0	7	0	420	7	45	465	45	80	30	5	13.30	6	30	390	7	45	465	32	75	5	10	13	15	12.00	0	1	2
21	10	0	0	7	0	420	8	0	480	60	85	20	5	13.30	6	30	390	7	45	465	32	75	5	10	13	15	7.00	1	1	2
21	11	0	0	7	0	420	8	10	490	70	80	5	5	13.30	6	30	390	7	45	465	32	75	5	10	13	15	5.00	1	0	2
21	12	0	0	7	0	420	8	0	480	60	85	20	5	13.30	6	30	390	7	45	465	32	75	5	10	13	15	5.00	0	0	2
21	13	0	0	7	0	420	7	45	465	45	70	20	5	9.30	6	30	390	7	45	465	32	75	5	10	13	15	5.00	1	0	2
21	14	0	0	7	0	420	8	0	480	60	95	30	5	9.30	6	30	390	7	45	465	32	75	5	10	13	15	5.00	0	0	1
21	15	0	0	7	0	420	8	10	490	70	95	20	5	9.30	6	30	390	7	45	465	32	75	5	10	13	15	7.00	0	1	2
21	16	0	0	7	0	420	8	0	480	60	70	5	5	9.30	6	30	390	7	45	465	32	75	5	10	13	15	12.00	1	1	1
22	1	0	0	7	0	420	8	15	495	75	110	30	5	1.30	6	30	390	8	15	495	65	105	10	10	15	5	7.50	0	0	1
22	2	0	0	7	0	420	8	30	510	90	140	45	5	1.30	6	30	390	8	15	495	65	105	10	10	15	5	12.50	1	0	1
22	3	0	0	7	0	420	8	40	520	100	160	55	5	1.30	6	30	390	8	15	495	65	105	10	10	15	5	5.50	1	1	2
22	4	0	0	7	0	420	8	30	510	90	140	45	5	1.30	6	30	390	8	15	495	65	105	10	10	15	5	5.50	0	1	2
22	5	0	0	7	0	420	8	15	495	75	125	45	5	9.30	6	30	390	8	15	495	65	105	10	10	15	5	5.50	1	1	2
22	6	0	0	7	0	420	8	30	510	90	125	30	5	9.30	6	30	390	8	15	495	65	105	10	10	15	5	5.50	0	1	2
22	7	0	0	7	0	420	8	40	520	100	150	45	5	9.30	6	30	390	8	15	495	65	105	10	10	15	5	12.50	0	0	1
22	8	0	0	7	0	420	8	30	510	90	150	55	5	9.30	6	30	390	8	15	495	65	105	10	10	15	5	7.50	1	0	2
22	9	0	0	7	0	420	8	15	495	75	135	55	5	13.30	6	30	390	8	15	495	65	105	10	10	15	5	12.50	0	1	2
22	10	0	0	7	0	420	8	30	510	90	140	45	5	13.30	6	30	390	8	15	495	65	105	10	10	15	5	7.50	1	1	2
22	11	0	0	7	0	420	8	40	520	100	135	30	5	13.30	6	30	390	8	15	495	65	105	10	10	15	5	5.50	1	0	2
22	12	0	0	7	0	420	8	30	510	90	140	45	5	13.30	6	30	390	8	15	495	65	105	10	10	15	5	5.50	0	0	2
22	13	0	0	7	0	420	8	15	495	75	125	45	5	9.30	6	30	390	8	15	495	65	105	10	10	15	5	5.50	1	0	2
22	14	0	0	7	0	420	8	30	510	90	150	55	5	9.30	6	30	390	8	15	495	65	105	10	10	15	5	5.50	0	0	2
22	15	0	0	7	0	420	8	40	520	100	150	45	5	9.30	6	30	390	8	15	495	65	105	10	10	15	5	7.50	0	1	2
22	16	0	0	7	0	420	8	30	510	90	125	30	5	9.30	6	30	390	8	15	495	65	105	10	10	15	5	12.50	1	1	1
23	1	1	0	8	30	510	9	15	555	45	55	5	5	1.30	8	0	480	9	30	570	55	90	10	5	15	5	7.00	0	0	1

23	2	1	0	8	30	510	9	30	570	60	85	20	5	1.30	8	0	480	9	30	570	55	90	10	5	15	5	12.00	1	0	1
23	3	1	0	8	30	510	9	40	580	70	105	30	5	1.30	8	0	480	9	30	570	55	90	10	5	15	5	5.00	1	1	2
23	4	1	0	8	30	510	9	30	570	60	85	20	5	1.30	8	0	480	9	30	570	55	90	10	5	15	5	5.00	0	1	2
23	5	1	0	8	30	510	9	15	555	45	70	20	5	9.30	8	0	480	9	30	570	55	90	10	5	15	5	5.00	1	1	2
23	6	1	0	8	30	510	9	30	570	60	70	5	5	9.30	8	0	480	9	30	570	55	90	10	5	15	5	5.00	0	1	2
23	7	1	0	8	30	510	9	40	580	70	95	20	5	9.30	8	0	480	9	30	570	55	90	10	5	15	5	12.00	0	0	1
23	8	1	0	8	30	510	9	30	570	60	95	30	5	9.30	8	0	480	9	30	570	55	90	10	5	15	5	7.00	1	0	2
23	9	1	0	8	30	510	9	15	555	45	80	30	5	13.30	8	0	480	9	30	570	55	90	10	5	15	5	12.00	0	1	1
23	10	1	0	8	30	510	9	30	570	60	85	20	5	13.30	8	0	480	9	30	570	55	90	10	5	15	5	7.00	1	1	2
23	11	1	0	8	30	510	9	40	580	70	80	5	5	13.30	8	0	480	9	30	570	55	90	10	5	15	5	5.00	1	0	2
23	12	1	0	8	30	510	9	30	570	60	85	20	5	13.30	8	0	480	9	30	570	55	90	10	5	15	5	5.00	0	0	2
23	13	1	0	8	30	510	9	15	555	45	70	20	5	9.30	8	0	480	9	30	570	55	90	10	5	15	5	5.00	0	0	2
23	14	1	0	8	30	510	9	30	570	60	95	30	5	9.30	8	0	480	9	30	570	55	90	10	5	15	5	5.00	0	0	2
23	15	1	0	8	30	510	9	40	580	70	95	20	5	9.30	8	0	480	9	30	570	55	90	10	5	15	5	7.00	0	1	2
23	16	1	0	8	30	510	9	30	570	60	70	5	5	9.30	8	0	480	9	30	570	55	90	10	5	15	5	12.00	1	1	1
24	1	1	0	6	45	405	7	30	450	45	55	0	10	1.30	7	0	420	8	30	510	35	90	15	10	20	10	6.00	0	0	1
24	2	1	0	6	45	405	7	45	465	60	85	15	10	1.30	7	0	420	8	30	510	35	90	15	10	20	10	11.00	1	0	1
24	3	1	0	6	45	405	7	55	475	70	105	25	10	1.30	7	0	420	8	30	510	35	90	15	10	20	10	4.00	1	1	2
24	4	1	0	6	45	405	7	45	465	60	85	15	10	1.30	7	0	420	8	30	510	35	90	15	10	20	10	4.00	0	1	2
24	5	1	0	6	45	405	7	30	450	45	70	15	10	9.30	7	0	420	8	30	510	35	90	15	10	20	10	4.00	1	1	2
24	6	1	0	6	45	405	7	45	465	60	70	0	10	9.30	7	0	420	8	30	510	35	90	15	10	20	10	4.00	0	1	2
24	7	1	0	6	45	405	7	55	475	70	95	15	10	9.30	7	0	420	8	30	510	35	90	15	10	20	10	11.00	0	0	1
24	8	1	0	6	45	405	7	45	465	60	95	25	10	9.30	7	0	420	8	30	510	35	90	15	10	20	10	6.00	1	0	2
24	9	1	0	6	45	405	7	30	450	45	80	25	10	13.30	7	0	420	8	30	510	35	90	15	10	20	10	11.00	0	1	2
24	10	1	0	6	45	405	7	45	465	60	85	15	10	13.30	7	0	420	8	30	510	35	90	15	10	20	10	6.00	1	1	2
24	11	1	0	6	45	405	7	55	475	70	80	0	10	13.30	7	0	420	8	30	510	35	90	15	10	20	10	4.00	1	0	2
24	12	1	0	6	45	405	7	45	465	60	85	15	10	13.30	7	0	420	8	30	510	35	90	15	10	20	10	4.00	0	0	2
24	13	1	0	6	45	405	7	30	450	45	70	15	10	9.30	7	0	420	8	30	510	35	90	15	10	20	10	4.00	1	0	2
24	14	1	0	6	45	405	7	45	465	60	95	25	10	9.30	7	0	420	8	30	510	35	90	15	10	20	10	4.00	0	0	2
24	15	1	0	6	45	405	7	55	475	70	95	15	10	9.30	7	0	420	8	30	510	35	90	15	10	20	10	6.00	0	1	2
24	16	1	0	6	45	405	7	45	465	60	70	0	10	9.30	7	0	420	8	30	510	35	90	15	10	20	10	11.00	1	1	1
25	1	1	0	8	10	490	8	30	510	20	28	3	5	1.30	7	40	460	8	40	520	25	60	7	3	0	25	4.00	0	0	1
25	2	1	0	8	10	490	8	45	525	35	58	18	5	1.30	7	40	460	8	40	520	25	60	7	3	0	25	9.00	1	0	1
25	3	1	0	8	10	490	8	55	535	45	78	28	5	1.30	7	40	460	8	40	520	25	60	7	3	0	25	2.00	1	1	2
25	4	1	0	8	10	490	8	45	525	35	58	18	5	1.30	7	40	460	8	40	520	25	60	7	3	0	25	2.00	0	1	2
25	5	1	0	8	10	490	8	30	510	20	43	18	5	9.30	7	40	460	8	40	520	25	60	7	3	0	25	2.00	1	1	2

25	6	1	0	8	10	490	8	45	525	35	43	3	5	9.30	7	40	460	8	40	520	25	60	7	3	0	25	2.00	0	1	2
25	7	1	0	8	10	490	8	55	535	45	68	18	5	9.30	7	40	460	8	40	520	25	60	7	3	0	25	9.00	0	0	2
25	8	1	0	8	10	490	8	45	525	35	68	28	5	9.30	7	40	460	8	40	520	25	60	7	3	0	25	4.00	1	0	2
25	9	1	0	8	10	490	8	30	510	20	53	28	5	13.30	7	40	460	8	40	520	25	60	7	3	0	25	9.00	0	1	2
25	10	1	0	8	10	490	8	45	525	35	58	18	5	13.30	7	40	460	8	40	520	25	60	7	3	0	25	4.00	1	1	2
25	11	1	0	8	10	490	8	55	535	45	53	3	5	13.30	7	40	460	8	40	520	25	60	7	3	0	25	2.00	1	0	2
25	12	1	0	8	10	490	8	45	525	35	58	18	5	13.30	7	40	460	8	40	520	25	60	7	3	0	25	2.00	0	0	2
25	13	1	0	8	10	490	8	30	510	20	43	18	5	9.30	7	40	460	8	40	520	25	60	7	3	0	25	2.00	1	0	2
25	14	1	0	8	10	490	8	45	525	35	68	28	5	9.30	7	40	460	8	40	520	25	60	7	3	0	25	2.00	0	0	2
25	15	1	0	8	10	490	8	55	535	45	68	18	5	9.30	7	40	460	8	40	520	25	60	7	3	0	25	4.00	0	1	2
25	16	1	0	8	10	490	8	45	525	35	43	3	5	9.30	7	40	460	8	40	520	25	60	7	3	0	25	9.00	1	1	2
26	1	1	0	7	30	450	8	30	510	60	70	5	5	1.30	7	30	450	8	55	535	35	85	15	10	0	25	5.00	0	0	1
26	2	1	0	7	30	450	8	45	525	75	100	20	5	1.30	7	30	450	8	55	535	35	85	15	10	0	25	10.00	1	0	1
26	3	1	0	7	30	450	8	55	535	85	120	30	5	1.30	7	30	450	8	55	535	35	85	15	10	0	25	3.00	1	1	2
26	4	1	0	7	30	450	8	45	525	75	100	20	5	1.30	7	30	450	8	55	535	35	85	15	10	0	25	3.00	0	1	2
26	5	1	0	7	30	450	8	30	510	60	85	20	5	9.30	7	30	450	8	55	535	35	85	15	10	0	25	3.00	1	1	2
26	6	1	0	7	30	450	8	45	525	75	85	5	5	9.30	7	30	450	8	55	535	35	85	15	10	0	25	3.00	0	1	2
26	7	1	0	7	30	450	8	55	535	85	110	20	5	9.30	7	30	450	8	55	535	35	85	15	10	0	25	10.00	0	0	1
26	8	1	0	7	30	450	8	45	525	75	110	30	5	9.30	7	30	450	8	55	535	35	85	15	10	0	25	5.00	1	0	2
26	9	1	0	7	30	450	8	30	510	60	95	30	5	13.30	7	30	450	8	55	535	35	85	15	10	0	25	10.00	0	1	1
26	10	1	0	7	30	450	8	45	525	75	100	20	5	13.30	7	30	450	8	55	535	35	85	15	10	0	25	5.00	1	1	2
26	11	1	0	7	30	450	8	55	535	85	95	5	5	13.30	7	30	450	8	55	535	35	85	15	10	0	25	3.00	1	0	2
26	12	1	0	7	30	450	8	45	525	75	100	20	5	13.30	7	30	450	8	55	535	35	85	15	10	0	25	3.00	0	0	2
26	13	1	0	7	30	450	8	30	510	60	85	20	5	9.30	7	30	450	8	55	535	35	85	15	10	0	25	3.00	1	0	2
26	14	1	0	7	30	450	8	45	525	75	110	30	5	9.30	7	30	450	8	55	535	35	85	15	10	0	25	3.00	0	0	2
26	15	1	0	7	30	450	8	55	535	85	110	20	5	9.30	7	30	450	8	55	535	35	85	15	10	0	25	5.00	0	1	2
26	16	1	0	7	30	450	8	45	525	75	85	5	5	9.30	7	30	450	8	55	535	35	85	15	10	0	25	10.00	1	1	2
27	1	1	0	7	30	450	7	37	457	7	12	2	3	1.30	7	25	445	7	50	470	10	25	10	5	0	0	2.00	0	0	1
27	2	1	0	7	30	450	7	52	472	22	42	17	3	1.30	7	25	445	7	50	470	10	25	10	5	0	0	7.00	1	0	2
27	3	1	0	7	30	450	8	2	482	32	62	27	3	1.30	7	25	445	7	50	470	10	25	10	5	0	0	0.00	1	1	2
27	4	1	0	7	30	450	7	52	472	22	42	17	3	1.30	7	25	445	7	50	470	10	25	10	5	0	0	0.00	0	1	2
27	5	1	0	7	30	450	7	37	457	7	27	17	3	9.30	7	25	445	7	50	470	10	25	10	5	0	0	0.00	1	1	2
27	6	1	0	7	30	450	7	52	472	22	27	2	3	9.30	7	25	445	7	50	470	10	25	10	5	0	0	0.00	0	1	2
27	7	1	0	7	30	450	8	2	482	32	52	17	3	9.30	7	25	445	7	50	470	10	25	10	5	0	0	7.00	0	0	2
27	8	1	0	7	30	450	7	52	472	22	52	27	3	9.30	7	25	445	7	50	470	10	25	10	5	0	0	2.00	1	0	2
27	9	1	0	7	30	450	7	37	457	7	37	27	3	13.30	7	25	445	7	50	470	10	25	10	5	0	0	7.00	0	1	2

27	10	1	1	0	7	30	450	7	52	472	22	42	17	3	13.30	7	25	445	7	50	470	10	25	10	5	0	0	2.00	1	1	1	2
27	11	1	1	0	7	30	450	8	2	482	32	37	2	3	13.30	7	25	445	7	50	470	10	25	10	5	0	0	0.00	1	0	2	
27	12	1	1	0	7	30	450	7	52	472	22	42	17	3	13.30	7	25	445	7	50	470	10	25	10	5	0	0	0.00	0	0	2	
27	13	1	1	0	7	30	450	7	37	457	7	27	17	3	9.30	7	25	445	7	50	470	10	25	10	5	0	0	0.00	1	0	2	
27	14	1	1	0	7	30	450	7	52	472	22	52	27	3	9.30	7	25	445	7	50	470	10	25	10	5	0	0	0.00	0	0	2	
27	15	1	1	0	7	30	450	8	2	482	32	52	17	3	9.30	7	25	445	7	50	470	10	25	10	5	0	0	0.00	0	0	2	
27	16	1	1	0	7	30	450	7	52	472	22	27	2	3	9.30	7	25	445	7	50	470	10	25	10	5	0	0	2.00	0	1	2	
28	1	1	1	1	7	25	445	8	15	495	50	54	1	3	1.96	7	30	450	8	30	510	25	60	10	5	0	0	7.00	1	1	1	
28	2	1	1	1	7	25	445	8	30	510	65	84	16	3	1.96	7	30	450	8	30	510	25	60	10	5	0	20	7.00	0	0	1	
28	3	1	1	1	7	25	445	8	40	520	75	104	26	3	1.96	7	30	450	8	30	510	25	60	10	5	0	20	5.00	1	1	2	
28	4	1	1	1	7	25	445	8	30	510	65	84	16	3	1.96	7	30	450	8	30	510	25	60	10	5	0	20	5.00	0	1	1	
28	5	1	1	1	7	25	445	8	15	495	50	69	16	3	9.96	7	30	450	8	30	510	25	60	10	5	0	20	5.00	1	1	2	
28	6	1	1	1	7	25	445	8	30	510	65	69	1	3	9.96	7	30	450	8	30	510	25	60	10	5	0	20	5.00	0	1	2	
28	7	1	1	1	7	25	445	8	40	520	75	94	16	3	9.96	7	30	450	8	30	510	25	60	10	5	0	20	5.00	0	1	2	
28	8	1	1	1	7	25	445	8	30	510	65	94	26	3	9.96	7	30	450	8	30	510	25	60	10	5	0	20	12.00	0	0	1	
28	9	1	1	1	7	25	445	8	15	495	50	79	26	3	13.96	7	30	450	8	30	510	25	60	10	5	0	20	7.00	1	0	2	
28	10	1	1	1	7	25	445	8	30	510	65	84	16	3	13.96	7	30	450	8	30	510	25	60	10	5	0	20	7.00	1	1	2	
28	11	1	1	1	7	25	445	8	40	520	75	79	1	3	13.96	7	30	450	8	30	510	25	60	10	5	0	20	5.00	1	0	2	
28	12	1	1	1	7	25	445	8	30	510	65	84	16	3	13.96	7	30	450	8	30	510	25	60	10	5	0	20	5.00	0	0	2	
28	13	1	1	1	7	25	445	8	15	495	50	69	16	3	9.96	7	30	450	8	30	510	25	60	10	5	0	20	5.00	1	0	2	
28	14	1	1	1	7	25	445	8	30	510	65	94	26	3	9.96	7	30	450	8	30	510	25	60	10	5	0	20	5.00	0	0	2	
28	15	1	1	1	7	25	445	8	40	520	75	94	16	3	9.96	7	30	450	8	30	510	25	60	10	5	0	20	5.00	0	0	2	
28	16	1	1	1	7	25	445	8	30	510	65	69	1	3	9.96	7	30	450	8	30	510	25	60	10	5	0	20	7.00	0	1	2	
29	1	1	1	0	7	30	450	7	45	465	15	23	5	3	1.30	7	30	450	8	0	480	10	30	5	10	0	5	2.00	0	0	1	
29	2	1	1	0	7	30	450	8	0	480	30	53	20	3	1.30	7	30	450	8	0	480	10	30	5	10	0	5	7.00	1	0	2	
29	3	1	1	0	7	30	450	8	10	490	40	73	30	3	1.30	7	30	450	8	0	480	10	30	5	10	0	5	0.00	1	1	2	
29	4	1	1	0	7	30	450	8	0	480	30	53	20	3	1.30	7	30	450	8	0	480	10	30	5	10	0	5	0.00	0	1	2	
29	5	1	1	0	7	30	450	7	45	465	15	38	20	3	9.30	7	30	450	8	0	480	10	30	5	10	0	5	0.00	1	1	2	
29	6	1	1	0	7	30	450	8	0	480	30	38	5	3	9.30	7	30	450	8	0	480	10	30	5	10	0	5	0.00	0	1	2	
29	7	1	1	0	7	30	450	8	10	490	40	63	20	3	9.30	7	30	450	8	0	480	10	30	5	10	0	5	7.00	0	0	2	
29	8	1	1	0	7	30	450	8	0	480	30	63	30	3	9.30	7	30	450	8	0	480	10	30	5	10	0	5	2.00	1	0	2	
29	9	1	1	0	7	30	450	7	45	465	15	48	30	3	13.30	7	30	450	8	0	480	10	30	5	10	0	5	7.00	0	1	2	
29	10	1	1	0	7	30	450	8	0	480	30	53	20	3	13.30	7	30	450	8	0	480	10	30	5	10	0	5	2.00	1	1	2	
29	11	1	1	0	7	30	450	8	10	490	40	48	5	3	13.30	7	30	450	8	0	480	10	30	5	10	0	5	0.00	1	0	2	
29	12	1	1	0	7	30	450	8	0	480	30	53	20	3	13.30	7	30	450	8	0	480	10	30	5	10	0	5	0.00	0	0	2	
29	13	1	1	0	7	30	450	7	45	465	15	38	20	3	9.30	7	30	450	8	0	480	10	30	5	10	0	5	0.00	1	0	2	

29	14	1	0	7	30	450	8	0	480	30	63	30	3	9.30	7	30	450	8	0	480	10	30	5	10	0	5	0.00	0	0	2
29	15	1	0	7	30	450	8	10	490	40	63	20	3	9.30	7	30	450	8	0	480	10	30	5	10	0	5	2.00	0	1	2
29	16	1	0	7	30	450	8	0	480	30	38	5	3	9.30	7	30	450	8	0	480	10	30	5	10	0	5	7.00	1	1	2
30	1	1	0	8	0	480	8	25	505	25	35	5	5	1.30	7	30	450	8	20	500	5	50	35	10	0	0	2.00	0	0	1
30	2	1	0	8	0	480	8	40	520	40	65	20	5	1.30	7	30	450	8	20	500	5	50	35	10	0	0	7.00	1	0	2
30	3	1	0	8	0	480	8	50	530	50	85	30	5	1.30	7	30	450	8	20	500	5	50	35	10	0	0	0.00	1	1	2
30	4	1	0	8	0	480	8	40	520	40	65	20	5	1.30	7	30	450	8	20	500	5	50	35	10	0	0	0.00	0	1	2
30	5	1	0	8	0	480	8	25	505	25	50	20	5	9.30	7	30	450	8	20	500	5	50	35	10	0	0	0.00	1	1	2
30	6	1	0	8	0	480	8	40	520	40	50	5	5	9.30	7	30	450	8	20	500	5	50	35	10	0	0	0.00	0	1	2
30	7	1	0	8	0	480	8	50	530	50	75	20	5	9.30	7	30	450	8	20	500	5	50	35	10	0	0	7.00	0	0	2
30	8	1	0	8	0	480	8	40	520	40	75	30	5	9.30	7	30	450	8	20	500	5	50	35	10	0	0	2.00	1	0	2
30	9	1	0	8	0	480	8	25	505	25	60	30	5	13.30	7	30	450	8	20	500	5	50	35	10	0	0	7.00	0	1	2
30	10	1	0	8	0	480	8	40	520	40	65	20	5	13.30	7	30	450	8	20	500	5	50	35	10	0	0	2.00	1	1	2
30	11	1	0	8	0	480	8	50	530	50	60	5	5	13.30	7	30	450	8	20	500	5	50	35	10	0	0	0.00	1	0	2
30	12	1	0	8	0	480	8	40	520	40	65	20	5	13.30	7	30	450	8	20	500	5	50	35	10	0	0	0.00	0	0	2
30	13	1	0	8	0	480	8	25	505	25	50	20	5	9.30	7	30	450	8	20	500	5	50	35	10	0	0	0.00	1	0	2
30	14	1	0	8	0	480	8	40	520	40	75	30	5	9.30	7	30	450	8	20	500	5	50	35	10	0	0	0.00	0	0	2
30	15	1	0	8	0	480	8	50	530	50	75	20	5	9.30	7	30	450	8	20	500	5	50	35	10	0	0	2.00	0	1	2
30	16	1	0	8	0	480	8	40	520	40	50	5	5	9.30	7	30	450	8	20	500	5	50	35	10	0	0	7.00	1	1	1
31	1	1	0	7	10	430	7	30	450	20	24	1	3	1.30	7	0	420	7	30	450	10	30	3	2	0	15	5.00	0	0	2
31	2	1	0	7	10	430	7	45	465	35	54	16	3	1.30	7	0	420	7	30	450	10	30	3	2	0	15	10.00	1	0	1
31	3	1	0	7	10	430	7	55	475	45	74	26	3	1.30	7	0	420	7	30	450	10	30	3	2	0	15	3.00	1	1	2
31	4	1	0	7	10	430	7	45	465	35	54	16	3	1.30	7	0	420	7	30	450	10	30	3	2	0	15	3.00	0	1	2
31	5	1	0	7	10	430	7	30	450	20	39	16	3	9.30	7	0	420	7	30	450	10	30	3	2	0	15	3.00	1	1	2
31	6	1	0	7	10	430	7	45	465	35	39	1	3	9.30	7	0	420	7	30	450	10	30	3	2	0	15	3.00	0	1	2
31	7	1	0	7	10	430	7	55	475	45	64	16	3	9.30	7	0	420	7	30	450	10	30	3	2	0	15	10.00	0	0	1
31	8	1	0	7	10	430	7	45	465	35	64	26	3	9.30	7	0	420	7	30	450	10	30	3	2	0	15	5.00	1	0	2
31	9	1	0	7	10	430	7	30	450	20	49	26	3	13.30	7	0	420	7	30	450	10	30	3	2	0	15	10.00	0	1	2
31	10	1	0	7	10	430	7	45	465	35	54	16	3	13.30	7	0	420	7	30	450	10	30	3	2	0	15	5.00	1	1	2
31	11	1	0	7	10	430	7	55	475	45	49	1	3	13.30	7	0	420	7	30	450	10	30	3	2	0	15	3.00	1	0	2
31	12	1	0	7	10	430	7	45	465	35	54	16	3	13.30	7	0	420	7	30	450	10	30	3	2	0	15	3.00	0	0	2
31	13	1	0	7	10	430	7	30	450	20	39	16	3	9.30	7	0	420	7	30	450	10	30	3	2	0	15	3.00	1	0	2
31	14	1	0	7	10	430	7	45	465	35	64	26	3	9.30	7	0	420	7	30	450	10	30	3	2	0	15	3.00	0	0	2
31	15	1	0	7	10	430	7	55	475	45	64	16	3	9.30	7	0	420	7	30	450	10	30	3	2	0	15	5.00	0	1	2
31	16	1	0	7	10	430	7	45	465	35	39	1	3	9.30	7	0	420	7	30	450	10	30	3	2	0	15	10.00	1	1	1
32	1	0	1	7	0	420	7	20	440	20	23	0	3	1.96	7	0	420	8	0	480	25	60	10	10	0	15	6.00	0	0	1

32	2	0	1	7	0	420	7	35	455	35	53	15	3	1.96	7	0	420	8	0	480	25	60	10	10	0	15	11.00	1	0	1
32	3	0	1	7	0	420	7	45	465	45	73	25	3	1.96	7	0	420	8	0	480	25	60	10	10	0	15	4.00	1	1	1
32	4	0	1	7	0	420	7	35	455	35	53	15	3	1.96	7	0	420	8	0	480	25	60	10	10	0	15	4.00	0	1	1
32	5	0	1	7	0	420	7	20	440	20	38	15	3	9.96	7	0	420	8	0	480	25	60	10	10	0	15	4.00	1	1	2
32	6	0	1	7	0	420	7	35	455	35	38	0	3	9.96	7	0	420	8	0	480	25	60	10	10	0	15	4.00	0	1	2
32	7	0	1	7	0	420	7	45	465	45	63	15	3	9.96	7	0	420	8	0	480	25	60	10	10	0	15	11.00	0	0	1
32	8	0	1	7	0	420	7	35	455	35	63	25	3	9.96	7	0	420	8	0	480	25	60	10	10	0	15	6.00	1	0	2
32	9	0	1	7	0	420	7	20	440	20	48	25	3	13.96	7	0	420	8	0	480	25	60	10	10	0	15	11.00	0	1	1
32	10	0	1	7	0	420	7	35	455	35	53	15	3	13.96	7	0	420	8	0	480	25	60	10	10	0	15	6.00	1	1	2
32	11	0	1	7	0	420	7	45	465	45	48	0	3	13.96	7	0	420	8	0	480	25	60	10	10	0	15	4.00	1	0	2
32	12	0	1	7	0	420	7	35	455	35	53	15	3	13.96	7	0	420	8	0	480	25	60	10	10	0	15	4.00	0	0	2
32	13	0	1	7	0	420	7	20	440	20	38	15	3	9.96	7	0	420	8	0	480	25	60	10	10	0	15	4.00	1	0	2
32	14	0	1	7	0	420	7	35	455	35	63	25	3	9.96	7	0	420	8	0	480	25	60	10	10	0	15	4.00	0	0	2
32	15	0	1	7	0	420	7	45	465	45	63	15	3	9.96	7	0	420	8	0	480	25	60	10	10	0	15	6.00	0	1	2
32	16	0	1	7	0	420	7	35	455	35	38	0	3	9.96	7	0	420	8	0	480	25	60	10	10	0	15	11.00	1	1	1
33	1	0	1	9	30	570	10	0	600	30	40	5	5	1.96	8	30	510	10	30	630	50	120	20	20	0	30	6.00	0	0	1
33	2	0	1	9	30	570	10	15	615	45	70	20	5	1.96	8	30	510	10	30	630	50	120	20	20	0	30	11.00	1	0	1
33	3	0	1	9	30	570	10	25	625	55	90	30	5	1.96	8	30	510	10	30	630	50	120	20	20	0	30	4.00	1	1	1
33	4	0	1	9	30	570	10	15	615	45	70	20	5	1.96	8	30	510	10	30	630	50	120	20	20	0	30	4.00	0	1	1
33	5	0	1	9	30	570	10	0	600	30	55	20	5	9.96	8	30	510	10	30	630	50	120	20	20	0	30	4.00	1	1	2
33	6	0	1	9	30	570	10	15	615	45	55	5	5	9.96	8	30	510	10	30	630	50	120	20	20	0	30	4.00	0	1	2
33	7	0	1	9	30	570	10	25	625	55	80	20	5	9.96	8	30	510	10	30	630	50	120	20	20	0	30	11.00	0	0	1
33	8	0	1	9	30	570	10	15	615	45	80	30	5	9.96	8	30	510	10	30	630	50	120	20	20	0	30	6.00	1	0	2
33	9	0	1	9	30	570	10	0	600	30	65	30	5	13.96	8	30	510	10	30	630	50	120	20	20	0	30	11.00	0	1	2
33	10	0	1	9	30	570	10	15	615	45	70	20	5	13.96	8	30	510	10	30	630	50	120	20	20	0	30	6.00	1	1	2
33	11	0	1	9	30	570	10	25	625	55	65	5	5	13.96	8	30	510	10	30	630	50	120	20	20	0	30	4.00	1	0	2
33	12	0	1	9	30	570	10	15	615	45	70	20	5	13.96	8	30	510	10	30	630	50	120	20	20	0	30	4.00	0	0	2
33	13	0	1	9	30	570	10	0	600	30	55	20	5	9.96	8	30	510	10	30	630	50	120	20	20	0	30	4.00	1	0	2
33	14	0	1	9	30	570	10	15	615	45	80	30	5	9.96	8	30	510	10	30	630	50	120	20	20	0	30	4.00	0	0	2
33	15	0	1	9	30	570	10	25	625	55	80	20	5	9.96	8	30	510	10	30	630	50	120	20	20	0	30	6.00	0	1	2
33	16	0	1	9	30	570	10	15	615	45	55	5	5	9.96	8	30	510	10	30	630	50	120	20	20	0	30	11.00	1	1	1
34	1	1	0	7	30	450	7	50	470	20	25	0	5	1.30	7	30	450	8	7	487	10	37	15	10	0	2	2.00	0	0	1
34	2	1	0	7	30	450	8	5	485	35	55	15	5	1.30	7	30	450	8	7	487	10	37	15	10	0	2	7.00	1	0	1
34	3	1	0	7	30	450	8	15	495	45	75	25	5	1.30	7	30	450	8	7	487	10	37	15	10	0	2	0.00	1	1	2
34	4	1	0	7	30	450	8	5	485	35	55	15	5	1.30	7	30	450	8	7	487	10	37	15	10	0	2	0.00	0	1	1
34	5	1	0	7	30	450	7	50	470	20	40	15	5	9.30	7	30	450	8	7	487	10	37	15	10	0	2	0.00	1	1	2

34	6	1	0	7	30	450	8	5	485	35	40	0	5	9.30	7	30	450	8	7	487	10	37	15	10	0	2	0.00	0	1	1
34	7	1	0	7	30	450	8	15	495	45	65	15	5	9.30	7	30	450	8	7	487	10	37	15	10	0	2	7.00	0	0	1
34	8	1	0	7	30	450	8	5	485	35	65	25	5	9.30	7	30	450	8	7	487	10	37	15	10	0	2	2.00	1	0	1
34	9	1	0	7	30	450	7	50	470	20	50	25	5	13.30	7	30	450	8	7	487	10	37	15	10	0	2	7.00	0	1	1
34	10	1	0	7	30	450	8	5	485	35	55	15	5	13.30	7	30	450	8	7	487	10	37	15	10	0	2	2.00	1	1	2
34	11	1	0	7	30	450	8	15	495	45	50	0	5	13.30	7	30	450	8	7	487	10	37	15	10	0	2	0.00	1	0	1
34	12	1	0	7	30	450	8	5	485	35	55	15	5	13.30	7	30	450	8	7	487	10	37	15	10	0	2	0.00	0	0	1
34	13	1	0	7	30	450	7	50	470	20	40	15	5	9.30	7	30	450	8	7	487	10	37	15	10	0	2	0.00	1	0	1
34	14	1	0	7	30	450	8	5	485	35	65	25	5	9.30	7	30	450	8	7	487	10	37	15	10	0	2	0.00	0	0	1
34	15	1	0	7	30	450	8	15	495	45	65	15	5	9.30	7	30	450	8	7	487	10	37	15	10	0	2	2.00	0	1	1
34	16	1	0	7	30	450	8	5	485	35	40	0	5	9.30	7	30	450	8	7	487	10	37	15	10	0	2	7.00	1	1	2
35	1	1	0	6	30	390	7	5	425	35	39	2	2	1.30	6	30	390	8	15	495	60	105	20	10	12	3	5.00	0	0	1
35	2	1	0	6	30	390	7	20	440	50	69	17	2	1.30	6	30	390	8	15	495	60	105	20	10	12	3	10.00	1	0	1
35	3	1	0	6	30	390	7	30	450	60	89	27	2	1.30	6	30	390	8	15	495	60	105	20	10	12	3	3.00	1	1	2
35	4	1	0	6	30	390	7	20	440	50	69	17	2	1.30	6	30	390	8	15	495	60	105	20	10	12	3	3.00	0	1	2
35	5	1	0	6	30	390	7	5	425	35	54	17	2	9.30	6	30	390	8	15	495	60	105	20	10	12	3	3.00	1	1	2
35	6	1	0	6	30	390	7	20	440	50	54	2	2	9.30	6	30	390	8	15	495	60	105	20	10	12	3	3.00	0	1	2
35	7	1	0	6	30	390	7	30	450	60	79	17	2	9.30	6	30	390	8	15	495	60	105	20	10	12	3	10.00	0	0	1
35	8	1	0	6	30	390	7	20	440	50	79	27	2	9.30	6	30	390	8	15	495	60	105	20	10	12	3	5.00	1	0	2
35	9	1	0	6	30	390	7	5	425	35	64	27	2	13.30	6	30	390	8	15	495	60	105	20	10	12	3	10.00	0	1	2
35	10	1	0	6	30	390	7	20	440	50	69	17	2	13.30	6	30	390	8	15	495	60	105	20	10	12	3	5.00	1	1	2
35	11	1	0	6	30	390	7	30	450	60	64	2	2	13.30	6	30	390	8	15	495	60	105	20	10	12	3	3.00	1	0	2
35	12	1	0	6	30	390	7	20	440	50	69	17	2	13.30	6	30	390	8	15	495	60	105	20	10	12	3	3.00	0	0	2
35	13	1	0	6	30	390	7	5	425	35	54	17	2	9.30	6	30	390	8	15	495	60	105	20	10	12	3	3.00	1	0	2
35	14	1	0	6	30	390	7	20	440	50	79	27	2	9.30	6	30	390	8	15	495	60	105	20	10	12	3	3.00	0	0	2
35	15	1	0	6	30	390	7	30	450	60	79	17	2	9.30	6	30	390	8	15	495	60	105	20	10	12	3	3.00	0	0	2
35	16	1	0	6	30	390	7	20	440	50	54	2	2	9.30	6	30	390	8	15	495	60	105	20	10	12	3	5.00	0	1	2
36	1	0	0	7	45	465	7	55	475	10	20	5	5	1.30	7	15	435	8	20	500	30	65	30	0	0	5	7.00	0	0	1
36	2	0	0	7	45	465	8	10	490	25	50	20	5	1.30	7	15	435	8	20	500	30	65	30	0	0	5	12.00	1	0	1
36	3	0	0	7	45	465	8	20	500	35	70	30	5	1.30	7	15	435	8	20	500	30	65	30	0	0	5	5.00	1	1	2
36	4	0	0	7	45	465	8	10	490	25	50	20	5	1.30	7	15	435	8	20	500	30	65	30	0	0	5	5.00	0	1	2
36	5	0	0	7	45	465	7	55	475	10	35	20	5	9.30	7	15	435	8	20	500	30	65	30	0	0	5	5.00	1	1	2
36	6	0	0	7	45	465	8	10	490	25	35	5	5	9.30	7	15	435	8	20	500	30	65	30	0	0	5	5.00	0	1	2
36	7	0	0	7	45	465	8	20	500	35	60	20	5	9.30	7	15	435	8	20	500	30	65	30	0	0	5	12.00	0	0	2
36	8	0	0	7	45	465	8	10	490	25	60	30	5	9.30	7	15	435	8	20	500	30	65	30	0	0	5	7.00	1	0	2
36	9	0	0	7	45	465	7	55	475	10	45	30	5	13.30	7	15	435	8	20	500	30	65	30	0	0	5	12.00	0	1	2

36	10	0	0	7	45	465	8	10	490	25	50	20	5	13.30	7	15	435	8	20	500	30	65	30	0	0	5	7.00	1	1	2
36	11	0	0	7	45	465	8	20	500	35	45	5	5	13.30	7	15	435	8	20	500	30	65	30	0	0	5	5.00	1	0	2
36	12	0	0	7	45	465	8	10	490	25	50	20	5	13.30	7	15	435	8	20	500	30	65	30	0	0	5	5.00	0	0	2
36	13	0	0	7	45	465	7	55	475	10	35	20	5	9.30	7	15	435	8	20	500	30	65	30	0	0	5	5.00	1	0	2
36	14	0	0	7	45	465	8	10	490	25	60	30	5	9.30	7	15	435	8	20	500	30	65	30	0	0	5	5.00	0	0	1
36	15	0	0	7	45	465	8	20	500	35	60	20	5	9.30	7	15	435	8	20	500	30	65	30	0	0	5	7.00	0	1	2
36	16	0	0	7	45	465	8	10	490	25	35	5	5	9.30	7	15	435	8	20	500	30	65	30	0	0	5	12.00	1	1	1
37	1	1	0	6	10	370	7	0	420	50	55	0	5	1.30	6	10	370	8	0	480	72	110	5	10	20	3	7.00	0	0	1
37	2	1	0	6	10	370	7	15	435	65	85	15	5	1.30	6	10	370	8	0	480	72	110	5	10	20	3	12.00	1	0	1
37	3	1	0	6	10	370	7	25	445	75	105	25	5	1.30	6	10	370	8	0	480	72	110	5	10	20	3	5.00	1	1	2
37	4	1	0	6	10	370	7	15	435	65	85	15	5	1.30	6	10	370	8	0	480	72	110	5	10	20	3	5.00	0	1	1
37	5	1	0	6	10	370	7	0	420	50	70	15	5	9.30	6	10	370	8	0	480	72	110	5	10	20	3	5.00	1	1	2
37	6	1	0	6	10	370	7	15	435	65	70	0	5	9.30	6	10	370	8	0	480	72	110	5	10	20	3	5.00	0	1	2
37	7	1	0	6	10	370	7	25	445	75	95	15	5	9.30	6	10	370	8	0	480	72	110	5	10	20	3	12.00	0	0	1
37	8	1	0	6	10	370	7	15	435	65	95	25	5	9.30	6	10	370	8	0	480	72	110	5	10	20	3	7.00	1	0	1
37	9	1	0	6	10	370	7	0	420	50	80	25	5	13.30	6	10	370	8	0	480	72	110	5	10	20	3	12.00	0	1	2
37	10	1	0	6	10	370	7	15	435	65	85	15	5	13.30	6	10	370	8	0	480	72	110	5	10	20	3	7.00	1	1	2
37	11	1	0	6	10	370	7	25	445	75	80	0	5	13.30	6	10	370	8	0	480	72	110	5	10	20	3	5.00	1	0	2
37	12	1	0	6	10	370	7	15	435	65	85	15	5	13.30	6	10	370	8	0	480	72	110	5	10	20	3	5.00	0	0	2
37	13	1	0	6	10	370	7	0	420	50	70	15	5	9.30	6	10	370	8	0	480	72	110	5	10	20	3	5.00	1	0	2
37	14	1	0	6	10	370	7	15	435	65	95	25	5	9.30	6	10	370	8	0	480	72	110	5	10	20	3	5.00	0	0	2
37	15	1	0	6	10	370	7	25	445	75	95	15	5	9.30	6	10	370	8	0	480	72	110	5	10	20	3	7.00	0	1	2
37	16	1	0	6	10	370	7	15	435	65	70	0	5	9.30	6	10	370	8	0	480	72	110	5	10	20	3	12.00	1	1	1
38	1	0	0	6	20	380	6	35	395	15	18	0	3	1.30	7	45	465	8	28	508	15	43	10	15	0	3	5.00	0	0	1
38	2	0	0	6	20	380	6	50	410	30	48	15	3	1.30	7	45	465	8	28	508	15	43	10	15	0	3	10.00	1	0	2
38	3	0	0	6	20	380	7	0	420	40	68	25	3	1.30	7	45	465	8	28	508	15	43	10	15	0	3	3.00	1	1	2
38	4	0	0	6	20	380	6	50	410	30	48	15	3	1.30	7	45	465	8	28	508	15	43	10	15	0	3	3.00	0	1	2
38	5	0	0	6	20	380	6	35	495	115	133	15	3	9.30	7	45	465	8	28	508	15	43	10	15	0	3	3.00	1	1	2
38	6	0	0	6	20	380	6	50	410	30	33	0	3	9.30	7	45	465	8	28	508	15	43	10	15	0	3	3.00	0	1	2
38	7	0	0	6	20	380	7	0	420	40	58	15	3	9.30	7	45	465	8	28	508	15	43	10	15	0	3	10.00	0	0	2
38	8	0	0	6	20	380	6	50	410	30	58	25	3	9.30	7	45	465	8	28	508	15	43	10	15	0	3	5.00	1	0	2
38	9	0	0	6	20	380	6	35	395	15	43	25	3	13.30	7	45	465	8	28	508	15	43	10	15	0	3	10.00	0	1	2
38	10	0	0	6	20	380	6	50	395	15	33	15	3	13.30	7	45	465	8	28	508	15	43	10	15	0	3	5.00	1	1	2
38	11	0	0	6	20	380	7	0	420	40	43	0	3	13.30	7	45	465	8	28	508	15	43	10	15	0	3	3.00	1	0	2
38	12	0	0	6	20	380	6	50	410	30	48	15	3	13.30	7	45	465	8	28	508	15	43	10	15	0	3	3.00	0	0	2
38	13	0	0	6	20	380	6	35	395	15	33	15	3	9.30	7	45	465	8	28	508	15	43	10	15	0	3	3.00	1	0	2

38	14	0	0	6	20	380	6	50	410	30	58	25	3	9.30	7	45	465	8	28	508	15	43	10	15	0	3	3.00	0	0	2
38	15	0	0	6	20	380	7	0	420	40	58	15	3	9.30	7	45	465	8	28	508	15	43	10	15	0	3	5.00	0	1	2
38	16	0	0	6	20	380	6	50	410	30	33	0	3	9.30	7	45	465	8	28	508	15	43	10	15	0	3	10.00	1	1	1
39	1	0	0	7	45	465	8	0	480	15	22	1	6	1.30	7	30	450	8	0	480	19	30	1	5	0	5	2.00	0	0	1
39	2	0	0	7	45	465	8	15	495	30	52	16	6	1.30	7	30	450	8	0	480	19	30	1	5	0	5	7.00	1	0	1
39	3	0	0	7	45	465	8	25	505	40	72	26	6	1.30	7	30	450	8	0	480	19	30	1	5	0	5	0.00	1	1	2
39	4	0	0	7	45	465	8	15	495	30	52	16	6	1.30	7	30	450	8	0	480	19	30	1	5	0	5	0.00	0	1	2
39	5	0	0	7	45	465	8	0	480	15	37	16	6	9.30	7	30	450	8	0	480	19	30	1	5	0	5	0.00	1	1	2
39	6	0	0	7	45	465	8	15	495	30	37	1	6	9.30	7	30	450	8	0	480	19	30	1	5	0	5	0.00	0	1	2
39	7	0	0	7	45	465	8	25	505	40	62	16	6	9.30	7	30	450	8	0	480	19	30	1	5	0	5	7.00	0	0	2
39	8	0	0	7	45	465	8	15	495	30	62	26	6	13.30	7	30	450	8	0	480	19	30	1	5	0	5	2.00	1	0	2
39	9	0	0	7	45	465	8	0	480	15	47	26	6	13.30	7	30	450	8	0	480	19	30	1	5	0	5	7.00	0	1	2
39	10	0	0	7	45	465	8	15	495	30	52	16	6	13.30	7	30	450	8	0	480	19	30	1	5	0	5	2.00	1	0	2
39	11	0	0	7	45	465	8	25	505	40	47	1	6	13.30	7	30	450	8	0	480	19	30	1	5	0	5	0.00	1	0	2
39	12	0	0	7	45	465	8	15	495	30	52	16	6	13.30	7	30	450	8	0	480	19	30	1	5	0	5	0.00	0	0	2
39	13	0	0	7	45	465	8	0	480	15	37	16	6	9.30	7	30	450	8	0	480	19	30	1	5	0	5	0.00	1	0	2
39	14	0	0	7	45	465	8	15	495	30	62	26	6	9.30	7	30	450	8	0	480	19	30	1	5	0	5	0.00	0	0	2
39	15	0	0	7	45	465	8	25	505	40	62	16	6	9.30	7	30	450	8	0	480	19	30	1	5	0	5	2.00	0	1	2
39	16	0	0	7	45	465	8	15	495	30	37	1	6	9.30	7	30	450	8	0	480	19	30	1	5	0	5	7.00	1	1	2
40	1	0	1	7	50	470	8	15	495	25	32	1	6	1.96	7	30	450	8	12	492	20	42	3	10	7	2	7.00	0	0	1
40	2	0	1	7	50	470	8	30	510	40	62	16	6	1.96	7	30	450	8	12	492	20	42	3	10	7	2	12.00	1	0	1
40	3	0	1	7	50	470	8	40	520	50	82	26	6	1.96	7	30	450	8	12	492	20	42	3	10	7	2	5.00	1	1	2
40	4	0	1	7	50	470	8	30	510	40	62	16	6	1.96	7	30	450	8	12	492	20	42	3	10	7	2	5.00	0	1	2
40	5	0	1	7	50	470	8	15	495	25	47	16	6	9.96	7	30	450	8	12	492	20	42	3	10	7	2	5.00	1	1	2
40	6	0	1	7	50	470	8	30	510	40	47	1	6	9.96	7	30	450	8	12	492	20	42	3	10	7	2	5.00	0	1	2
40	7	0	1	7	50	470	8	40	520	50	72	16	6	9.96	7	30	450	8	12	492	20	42	3	10	7	2	12.00	0	0	2
40	8	0	1	7	50	470	8	30	510	40	72	26	6	9.96	7	30	450	8	12	492	20	42	3	10	7	2	7.00	1	0	2
40	9	0	1	7	50	470	8	15	495	25	57	26	6	13.96	7	30	450	8	12	492	20	42	3	10	7	2	12.00	0	1	2
40	10	0	1	7	50	470	8	30	510	40	62	16	6	13.96	7	30	450	8	12	492	20	42	3	10	7	2	7.00	1	1	2
40	11	0	1	7	50	470	8	40	520	50	57	1	6	13.96	7	30	450	8	12	492	20	42	3	10	7	2	5.00	1	0	2
40	12	0	1	7	50	470	8	30	510	40	62	16	6	13.96	7	30	450	8	12	492	20	42	3	10	7	2	5.00	0	0	2
40	13	0	1	7	50	470	8	15	495	25	47	16	6	9.96	7	30	450	8	12	492	20	42	3	10	7	2	5.00	1	0	2
40	14	0	1	7	50	470	8	30	510	40	72	26	6	9.96	7	30	450	8	12	492	20	42	3	10	7	2	5.00	0	0	2
40	15	0	1	7	50	470	8	40	520	50	72	16	6	9.96	7	30	450	8	12	492	20	42	3	10	7	2	7.00	0	1	2
40	16	0	1	7	50	470	8	30	510	40	47	1	6	9.96	7	30	450	8	12	492	20	42	3	10	7	2	12.00	1	1	2
41	1	0	0	7	0	420	7	15	435	15	28	10	3	1.30	7	0	420	8	30	510	55	90	30	5	0	0	7.00	0	0	1

41	2	0	0	7	0	420	7	30	450	30	58	25	3	1.30	7	0	420	8	30	510	55	90	30	5	0	0	12.00	1	0	1
41	3	0	0	7	0	420	7	40	460	40	73	30	3	1.30	7	0	420	8	30	510	55	90	30	5	0	0	5.00	1	1	1
41	4	0	0	7	0	420	7	30	450	30	58	25	3	1.30	7	0	420	8	30	510	55	90	30	5	0	0	5.00	0	1	1
41	5	0	0	7	0	420	7	15	435	15	43	25	3	9.30	7	0	420	8	30	510	55	90	30	5	0	0	5.00	1	1	2
41	6	0	0	7	0	420	7	30	450	30	43	10	3	9.30	7	0	420	8	30	510	55	90	30	5	0	0	5.00	0	1	2
41	7	0	0	7	0	420	7	40	460	40	68	25	3	9.30	7	0	420	8	30	510	55	90	30	5	0	0	12.00	0	0	1
41	8	0	0	7	0	420	7	30	450	30	68	35	3	9.30	7	0	420	8	30	510	55	90	30	5	0	0	7.00	1	0	2
41	9	0	0	7	0	420	7	15	435	15	53	35	3	13.30	7	0	420	8	30	510	55	90	30	5	0	0	12.00	0	1	2
41	10	0	0	7	0	420	7	30	450	30	58	25	3	13.30	7	0	420	8	30	510	55	90	30	5	0	0	7.00	1	1	2
41	11	0	0	7	0	420	7	40	460	40	53	10	3	13.30	7	0	420	8	30	510	55	90	30	5	0	0	5.00	1	0	2
41	12	0	0	7	0	420	7	30	450	30	58	25	3	13.30	7	0	420	8	30	510	55	90	30	5	0	0	5.00	0	0	2
41	13	0	0	7	0	420	7	15	435	15	43	25	3	9.30	7	0	420	8	30	510	55	90	30	5	0	0	5.00	1	0	2
41	14	0	0	7	0	420	7	30	450	30	68	35	3	9.30	7	0	420	8	30	510	55	90	30	5	0	0	5.00	0	0	2
41	15	0	0	7	0	420	7	40	460	40	68	25	3	9.30	7	0	420	8	30	510	55	90	30	5	0	0	7.00	0	1	2
41	16	0	0	7	0	420	7	30	450	30	43	10	3	9.30	7	0	420	8	30	510	55	90	30	5	0	0	12.00	1	1	1
42	1	0	0	7	40	460	7	50	470	10	20	5	5	1.30	7	50	470	8	15	495	10	25	5	5	0	5	2.00	0	0	1
42	2	0	0	7	40	460	8	5	485	25	50	20	5	1.30	7	50	470	8	15	495	10	25	5	5	0	5	7.00	1	0	1
42	3	0	0	7	40	460	8	15	495	35	70	30	5	1.30	7	50	470	8	15	495	10	25	5	5	0	5	0.00	1	1	2
42	4	0	0	7	40	460	8	5	485	25	50	20	5	1.30	7	50	470	8	15	495	10	25	5	5	0	5	0.00	0	1	2
42	5	0	0	7	40	460	7	50	470	10	35	20	5	9.30	7	50	470	8	15	495	10	25	5	5	0	5	0.00	1	1	2
42	6	0	0	7	40	460	8	5	485	25	35	5	5	9.30	7	50	470	8	15	495	10	25	5	5	0	5	0.00	0	1	2
42	7	0	0	7	40	460	8	15	495	35	60	20	5	9.30	7	50	470	8	15	495	10	25	5	5	0	5	7.00	0	0	2
42	8	0	0	7	40	460	8	5	485	25	60	30	5	9.30	7	50	470	8	15	495	10	25	5	5	0	5	2.00	1	0	2
42	9	0	0	7	40	460	7	50	470	10	45	30	5	13.30	7	50	470	8	15	495	10	25	5	5	0	5	7.00	0	1	2
42	10	0	0	7	40	460	8	5	485	25	50	20	5	13.30	7	50	470	8	15	495	10	25	5	5	0	5	2.00	1	1	2
42	11	0	0	7	40	460	8	15	495	35	45	5	5	13.30	7	50	470	8	15	495	10	25	5	5	0	5	0.00	1	0	2
42	12	0	0	7	40	460	8	5	485	25	50	20	5	13.30	7	50	470	8	15	495	10	25	5	5	0	5	0.00	0	0	2
42	13	0	0	7	40	460	7	50	470	10	35	20	5	9.30	7	50	470	8	15	495	10	25	5	5	0	5	0.00	1	0	2
42	14	0	0	7	40	460	8	5	485	25	60	30	5	9.30	7	50	470	8	15	495	10	25	5	5	0	5	0.00	0	0	2
42	15	0	0	7	40	460	8	15	495	35	60	20	5	9.30	7	50	470	8	15	495	10	25	5	5	0	5	2.00	0	1	2
42	16	0	0	7	40	460	8	5	485	25	35	5	5	9.30	7	50	470	8	15	495	10	25	5	5	0	5	7.00	1	1	2
43	1	1	0	8	30	510	8	35	515	5	30	20	5	1.30	8	30	510	8	57	537	10	27	5	10	0	2	2.00	0	0	1
43	2	1	0	8	30	510	8	50	530	20	60	35	5	1.30	8	30	510	8	57	537	10	27	5	10	0	2	7.00	1	0	1
43	3	1	0	8	30	510	9	0	540	30	80	45	5	1.30	8	30	510	8	57	537	10	27	5	10	0	2	0.00	1	1	2
43	4	1	0	8	30	510	8	50	530	20	60	35	5	1.30	8	30	510	8	57	537	10	27	5	10	0	2	0.00	0	1	2
43	5	1	0	8	30	510	8	35	515	5	45	35	5	9.30	8	30	510	8	57	537	10	27	5	10	0	2	0.00	1	1	2

43	6	1	0	8	30	510	8	50	530	20	45	20	5	9.30	8	30	510	8	57	537	10	27	5	10	0	2	0.00	0	1	1	2
43	7	1	0	8	30	510	9	0	540	30	70	35	5	9.30	8	30	510	8	57	537	10	27	5	10	0	2	7.00	0	0	0	2
43	8	1	0	8	30	510	8	50	530	20	70	45	5	9.30	8	30	510	8	57	537	10	27	5	10	0	2	2.00	1	0	0	2
43	9	1	0	8	30	510	8	35	515	5	55	45	5	13.30	8	30	510	8	57	537	10	27	5	10	0	2	7.00	0	1	1	2
43	10	1	0	8	30	510	8	50	530	20	60	35	5	13.30	8	30	510	8	57	537	10	27	5	10	0	2	2.00	1	1	1	2
43	11	1	0	8	30	510	9	0	540	30	55	20	5	13.30	8	30	510	8	57	537	10	27	5	10	0	2	0.00	1	0	0	2
43	12	1	0	8	30	510	8	50	530	20	60	35	5	13.30	8	30	510	8	57	537	10	27	5	10	0	2	0.00	0	0	0	2
43	13	1	0	8	30	510	8	35	515	5	45	35	5	9.30	8	30	510	8	57	537	10	27	5	10	0	2	0.00	1	0	0	2
43	14	1	0	8	30	510	8	50	530	20	70	45	5	9.30	8	30	510	8	57	537	10	27	5	10	0	2	0.00	0	0	0	2
43	15	1	0	8	30	510	9	0	540	30	70	35	5	9.30	8	30	510	8	57	537	10	27	5	10	0	2	2.00	0	1	1	2
43	16	1	0	8	30	510	8	50	530	20	45	20	5	9.30	8	30	510	8	57	537	10	27	5	10	0	2	7.00	1	1	1	2
44	1	1	0	7	0	420	7	45	465	45	58	3	10	1.30	9	0	540	9	49	589	30	49	5	2	12	0	7.50	0	0	1	1
44	2	1	0	7	0	420	8	0	480	60	88	18	10	1.30	9	0	540	9	49	589	30	49	5	2	12	0	12.50	1	0	0	2
44	3	1	0	7	0	420	8	10	490	70	108	28	10	1.30	9	0	540	9	49	589	30	49	5	2	12	0	5.50	1	1	1	2
44	4	1	0	7	0	420	8	0	480	60	88	18	10	1.30	9	0	540	9	49	589	30	49	5	2	12	0	5.50	0	1	1	2
44	5	1	0	7	0	420	7	45	465	45	73	18	10	9.30	9	0	540	9	49	589	30	49	5	2	12	0	5.50	1	1	1	2
44	6	1	0	7	0	420	8	0	480	60	73	3	10	9.30	9	0	540	9	49	589	30	49	5	2	12	0	5.50	0	1	1	2
44	7	1	0	7	0	420	8	10	490	70	98	18	10	9.30	9	0	540	9	49	589	30	49	5	2	12	0	12.50	0	0	0	2
44	8	1	0	7	0	420	8	0	480	60	98	28	10	9.30	9	0	540	9	49	589	30	49	5	2	12	0	7.50	1	0	0	2
44	9	1	0	7	0	420	7	45	465	45	83	28	10	13.30	9	0	540	9	49	589	30	49	5	2	12	0	12.50	0	1	1	2
44	10	1	0	7	0	420	8	0	480	60	88	18	10	13.30	9	0	540	9	49	589	30	49	5	2	12	0	7.50	1	1	1	2
44	11	1	0	7	0	420	8	10	490	70	83	3	10	13.30	9	0	540	9	49	589	30	49	5	2	12	0	5.50	1	0	0	2
44	12	1	0	7	0	420	8	0	480	60	88	18	10	13.30	9	0	540	9	49	589	30	49	5	2	12	0	5.50	0	0	0	2
44	13	1	0	7	0	420	7	45	465	45	73	18	10	9.30	9	0	540	9	49	589	30	49	5	2	12	0	5.50	1	0	0	2
44	14	1	0	7	0	420	8	0	480	60	98	28	10	9.30	9	0	540	9	49	589	30	49	5	2	12	0	5.50	0	0	0	2
44	15	1	0	7	0	420	8	10	490	70	98	18	10	9.30	9	0	540	9	49	589	30	49	5	2	12	0	7.50	0	1	1	2
44	16	1	0	7	0	420	8	0	480	60	73	3	10	9.30	9	0	540	9	49	589	30	49	5	2	12	0	12.50	1	1	1	2
45	1	0	0	7	30	450	7	50	470	20	24	0	4	1.30	7	0	420	8	0	480	30	60	20	10	0	0	5.00	0	0	0	1
45	2	0	0	7	30	450	8	5	485	35	54	15	4	1.30	7	0	420	8	0	480	30	60	20	10	0	0	10.00	1	0	1	1
45	3	0	0	7	30	450	8	15	495	45	74	25	4	1.30	7	0	420	8	0	480	30	60	20	10	0	0	3.00	1	1	1	1
45	4	0	0	7	30	450	8	5	485	35	54	15	4	1.30	7	0	420	8	0	480	30	60	20	10	0	0	3.00	0	1	1	1
45	5	0	0	7	30	450	7	50	470	20	39	15	4	9.30	7	0	420	8	0	480	30	60	20	10	0	0	3.00	1	1	1	2
45	6	0	0	7	30	450	8	5	485	35	39	0	4	9.30	7	0	420	8	0	480	30	60	20	10	0	0	3.00	0	1	1	2
45	7	0	0	7	30	450	8	15	495	45	64	15	4	9.30	7	0	420	8	0	480	30	60	20	10	0	0	10.00	0	0	1	1
45	8	0	0	7	30	450	8	5	485	35	64	25	4	9.30	7	0	420	8	0	480	30	60	20	10	0	0	5.00	1	0	0	2
45	9	0	0	7	30	450	7	50	470	20	49	25	4	13.30	7	0	420	8	0	480	30	60	20	10	0	0	10.00	0	1	1	2

45	10	0	0	7	30	450	8	5	485	35	54	15	4	13.30	7	0	420	8	0	480	30	60	20	10	0	0	5.00	1	1	2
45	11	0	0	7	30	450	8	15	495	45	49	0	4	13.30	7	0	420	8	0	480	30	60	20	10	0	0	3.00	1	0	2
45	12	0	0	7	30	450	8	5	485	35	54	15	4	13.30	7	0	420	8	0	480	30	60	20	10	0	0	3.00	0	0	2
45	13	0	0	7	30	450	7	50	470	20	39	15	4	9.30	7	0	420	8	0	480	30	60	20	10	0	0	3.00	1	0	2
45	14	0	0	7	30	450	8	5	485	35	64	25	4	9.30	7	0	420	8	0	480	30	60	20	10	0	0	3.00	0	0	2
45	15	0	0	7	30	450	8	15	495	45	64	15	4	9.30	7	0	420	8	0	480	30	60	20	10	0	0	5.00	0	1	2
45	16	0	0	7	30	450	8	5	485	35	39	0	4	9.30	7	0	420	8	0	480	30	60	20	10	0	0	10.00	1	1	1
46	1	1	0	6	40	400	7	10	430	30	43	10	3	1.30	6	30	390	7	45	465	45	75	10	5	10	5	7.00	0	0	1
46	2	1	0	6	40	400	7	25	445	45	73	25	3	1.30	6	30	390	7	45	465	45	75	10	5	10	5	12.00	1	0	1
46	3	1	0	6	40	400	7	35	455	55	88	30	3	1.30	6	30	390	7	45	465	45	75	10	5	10	5	5.00	1	1	2
46	4	1	0	6	40	400	7	25	445	45	73	25	3	1.30	6	30	390	7	45	465	45	75	10	5	10	5	5.00	0	1	2
46	5	1	0	6	40	400	7	10	430	30	58	25	3	9.30	6	30	390	7	45	465	45	75	10	5	10	5	5.00	1	1	2
46	6	1	0	6	40	400	7	25	445	45	58	10	3	9.30	6	30	390	7	45	465	45	75	10	5	10	5	5.00	0	1	2
46	7	1	0	6	40	400	7	35	455	55	83	25	3	9.30	6	30	390	7	45	465	45	75	10	5	10	5	12.00	0	0	2
46	8	1	0	6	40	400	7	25	445	45	83	35	3	9.30	6	30	390	7	45	465	45	75	10	5	10	5	7.00	1	0	2
46	9	1	0	6	40	400	7	10	430	30	68	35	3	13.30	6	30	390	7	45	465	45	75	10	5	10	5	12.00	0	1	2
46	10	1	0	6	40	400	7	25	445	45	73	25	3	13.30	6	30	390	7	45	465	45	75	10	5	10	5	7.00	1	1	2
46	11	1	0	6	40	400	7	35	455	55	68	10	3	13.30	6	30	390	7	45	465	45	75	10	5	10	5	5.00	1	0	2
46	12	1	0	6	40	400	7	25	445	45	73	25	3	13.30	6	30	390	7	45	465	45	75	10	5	10	5	5.00	0	0	2
46	13	1	0	6	40	400	7	10	430	30	58	25	3	9.30	6	30	390	7	45	465	45	75	10	5	10	5	5.00	1	0	2
46	14	1	0	6	40	400	7	25	445	45	83	35	3	9.30	6	30	390	7	45	465	45	75	10	5	10	5	5.00	0	0	2
46	15	1	0	6	40	400	7	35	455	55	83	25	3	9.30	6	30	390	7	45	465	45	75	10	5	10	5	7.00	0	1	2
46	16	1	0	6	40	400	7	25	445	45	58	10	3	9.30	6	30	390	7	45	465	45	75	10	5	10	5	12.00	1	1	2
47	1	0	0	6	30	390	7	10	430	40	60	5	15	1.30	6	0	360	7	0	420	15	60	25	5	0	15	7.00	0	0	1
47	2	0	0	6	30	390	7	25	445	55	90	20	15	1.30	6	0	360	7	0	420	15	60	25	5	0	15	12.00	1	0	1
47	3	0	0	6	30	390	7	35	455	65	110	30	15	1.30	6	0	360	7	0	420	15	60	25	5	0	15	5.00	1	1	2
47	4	0	0	6	30	390	7	25	445	55	90	20	15	1.30	6	0	360	7	0	420	15	60	25	5	0	15	5.00	0	1	1
47	5	0	0	6	30	390	7	10	430	40	75	20	15	9.30	6	0	360	7	0	420	15	60	25	5	0	15	5.00	1	1	2
47	6	0	0	6	30	390	7	25	445	55	75	5	15	9.30	6	0	360	7	0	420	15	60	25	5	0	15	5.00	0	1	2
47	7	0	0	6	30	390	7	35	455	65	100	20	15	9.30	6	0	360	7	0	420	15	60	25	5	0	15	12.00	0	0	1
47	8	0	0	6	30	390	7	25	445	55	100	30	15	9.30	6	0	360	7	0	420	15	60	25	5	0	15	7.00	1	0	1
47	9	0	0	6	30	390	7	10	430	40	85	30	15	13.30	6	0	360	7	0	420	15	60	25	5	0	15	12.00	0	1	2
47	10	0	0	6	30	390	7	25	445	55	90	20	15	13.30	6	0	360	7	0	420	15	60	25	5	0	15	7.00	1	1	2
47	11	0	0	6	30	390	7	35	455	65	85	5	15	13.30	6	0	360	7	0	420	15	60	25	5	0	15	5.00	1	0	2
47	12	0	0	6	30	390	7	25	445	55	90	20	15	13.30	6	0	360	7	0	420	15	60	25	5	0	15	5.00	0	0	2
47	13	0	0	6	30	390	7	10	430	40	75	20	15	9.30	6	0	360	7	0	420	15	60	25	5	0	15	5.00	1	0	2

47	14	0	0	6	30	390	7	25	445	55	100	30	15	9.30	6	0	360	7	0	420	15	60	25	5	0	15	5.00	0	0	2
47	15	0	0	6	30	390	7	35	455	65	100	20	15	9.30	6	0	360	7	0	420	15	60	25	5	0	15	7.00	0	1	1
47	16	0	0	6	30	390	7	25	445	55	75	5	15	9.30	6	0	360	7	0	420	15	60	25	5	0	15	12.00	1	1	1
48	1	1	0	9	30	570	10	0	600	30	60	20	10	1.30	8	0	480	9	32	572	55	92	5	15	15	2	7.00	0	0	1
48	2	1	0	9	30	570	10	15	615	45	90	35	10	1.30	8	0	480	9	32	572	55	92	5	15	15	2	12.00	1	0	1
48	3	1	0	9	30	570	10	25	625	55	110	45	10	1.30	8	0	480	9	32	572	55	92	5	15	15	2	5.00	1	1	1
48	4	1	0	9	30	570	10	15	615	45	90	35	10	1.30	8	0	480	9	32	572	55	92	5	15	15	2	5.00	0	1	1
48	5	1	0	9	30	570	10	0	600	30	75	35	10	9.30	8	0	480	9	32	572	55	92	5	15	15	2	5.00	1	1	2
48	6	1	0	9	30	570	10	15	615	45	75	20	10	9.30	8	0	480	9	32	572	55	92	5	15	15	2	5.00	0	1	2
48	7	1	0	9	30	570	10	25	625	55	100	35	10	9.30	8	0	480	9	32	572	55	92	5	15	15	2	12.00	0	0	1
48	8	1	0	9	30	570	10	15	615	45	100	45	10	9.30	8	0	480	9	32	572	55	92	5	15	15	2	7.00	1	0	1
48	9	1	0	9	30	570	10	0	600	30	85	45	10	13.30	8	0	480	9	32	572	55	92	5	15	15	2	12.00	0	1	1
48	10	1	0	9	30	570	10	15	615	45	90	35	10	13.30	8	0	480	9	32	572	55	92	5	15	15	2	7.00	1	1	2
48	11	1	0	9	30	570	10	25	625	55	85	20	10	13.30	8	0	480	9	32	572	55	92	5	15	15	2	5.00	1	0	2
48	12	1	0	9	30	570	10	15	615	45	90	35	10	13.30	8	0	480	9	32	572	55	92	5	15	15	2	5.00	0	0	2
48	13	1	0	9	30	570	10	0	600	30	75	35	10	9.30	8	0	480	9	32	572	55	92	5	15	15	2	5.00	1	0	2
48	14	1	0	9	30	570	10	15	615	45	100	45	10	9.30	8	0	480	9	32	572	55	92	5	15	15	2	5.00	0	0	1
48	15	1	0	9	30	570	10	25	625	55	100	35	10	9.30	8	0	480	9	32	572	55	92	5	15	15	2	7.00	0	1	1
48	16	1	0	9	30	570	10	15	615	45	75	20	10	9.30	8	0	480	9	32	572	55	92	5	15	15	2	12.00	1	1	1
49	1	0	0	7	0	420	7	15	435	15	17	0	2	1.30	7	0	420	8	25	505	59	85	5	10	10	1	5.00	0	0	1
49	2	0	0	7	0	420	7	30	450	30	47	15	2	1.30	7	0	420	8	25	505	59	85	5	10	10	1	10.00	1	0	1
49	3	0	0	7	0	420	7	40	460	40	67	25	2	1.30	7	0	420	8	25	505	59	85	5	10	10	1	3.00	1	1	2
49	4	0	0	7	0	420	7	30	450	30	47	15	2	1.30	7	0	420	8	25	505	59	85	5	10	10	1	3.00	0	1	1
49	5	0	0	7	0	420	7	15	435	15	32	15	2	9.30	7	0	420	8	25	505	59	85	5	10	10	1	3.00	1	1	2
49	6	0	0	7	0	420	7	30	450	30	32	0	2	9.30	7	0	420	8	25	505	59	85	5	10	10	1	3.00	0	1	2
49	7	0	0	7	0	420	7	40	460	40	57	15	2	9.30	7	0	420	8	25	505	59	85	5	10	10	1	10.00	0	0	2
49	8	0	0	7	0	420	7	30	450	30	57	25	2	9.30	7	0	420	8	25	505	59	85	5	10	10	1	5.00	1	0	2
49	9	0	0	7	0	420	7	15	435	15	42	25	2	13.30	7	0	420	8	25	505	59	85	5	10	10	1	10.00	0	1	2
49	10	0	0	7	0	420	7	30	450	30	47	15	2	13.30	7	0	420	8	25	505	59	85	5	10	10	1	5.00	1	1	2
49	11	0	0	7	0	420	7	40	460	40	42	0	2	13.30	7	0	420	8	25	505	59	85	5	10	10	1	3.00	1	0	2
49	12	0	0	7	0	420	7	30	450	30	47	15	2	13.30	7	0	420	8	25	505	59	85	5	10	10	1	3.00	0	0	2
49	13	0	0	7	0	420	7	15	435	15	32	15	2	9.30	7	0	420	8	25	505	59	85	5	10	10	1	3.00	1	0	2
49	14	0	0	7	0	420	7	30	450	30	57	25	2	9.30	7	0	420	8	25	505	59	85	5	10	10	1	3.00	0	0	2
49	15	0	0	7	0	420	7	40	460	40	57	15	2	9.30	7	0	420	8	25	505	59	85	5	10	10	1	5.00	0	1	2
49	16	0	0	7	0	420	7	30	450	30	32	0	2	9.30	7	0	420	8	25	505	59	85	5	10	10	1	10.00	1	1	1
50	1	1	1	8	0	480	8	45	525	45	46	0	1	1.96	6	45	405	8	20	500	40	95	20	5	0	30	6.50	0	0	1

50	2	1	1	8	0	480	9	0	540	60	76	15	1	1.96	6	45	405	8	20	500	40	95	20	5	0	30	11.50	1	0	1
50	3	1	1	8	0	480	9	10	550	70	96	25	1	1.96	6	45	405	8	20	500	40	95	20	5	0	30	4.50	1	1	2
50	4	1	1	8	0	480	9	0	540	60	76	15	1	1.96	6	45	405	8	20	500	40	95	20	5	0	30	4.50	0	1	1
50	5	1	1	8	0	480	8	45	525	45	61	15	1	9.96	6	45	405	8	20	500	40	95	20	5	0	30	4.50	1	1	1
50	6	1	1	8	0	480	9	0	540	60	61	0	1	9.96	6	45	405	8	20	500	40	95	20	5	0	30	4.50	0	1	1
50	7	1	1	8	0	480	9	10	550	70	86	15	1	9.96	6	45	405	8	20	500	40	95	20	5	0	30	11.50	0	0	1
50	8	1	1	8	0	480	9	0	540	60	86	25	1	9.96	6	45	405	8	20	500	40	95	20	5	0	30	6.50	1	0	2
50	9	1	1	8	0	480	8	45	525	45	71	25	1	13.96	6	45	405	8	20	500	40	95	20	5	0	30	11.50	0	1	1
50	10	1	1	8	0	480	9	0	540	60	76	15	1	13.96	6	45	405	8	20	500	40	95	20	5	0	30	6.50	1	1	2
50	11	1	1	8	0	480	9	10	550	70	71	0	1	13.96	6	45	405	8	20	500	40	95	20	5	0	30	4.50	1	0	2
50	12	1	1	8	0	480	9	0	540	60	76	15	1	13.96	6	45	405	8	20	500	40	95	20	5	0	30	4.50	0	0	1
50	13	1	1	8	0	480	8	45	525	45	61	15	1	9.96	6	45	405	8	20	500	40	95	20	5	0	30	4.50	1	0	2
50	14	1	1	8	0	480	9	0	540	60	86	25	1	9.96	6	45	405	8	20	500	40	95	20	5	0	30	4.50	0	0	1
50	15	1	1	8	0	480	9	10	550	70	86	15	1	9.96	6	45	405	8	20	500	40	95	20	5	0	30	6.50	0	1	1
50	16	1	1	8	0	480	9	0	540	60	61	0	1	9.96	6	45	405	8	20	500	40	95	20	5	0	30	11.50	1	1	1

City of Cape Town

Appendix G:

Output of models estimated

University of Cape Town

Test# 1
SST Results

```
rem          cova          var[cinv,cse cov
REM          car          and          public  transport MODEL
mnl          dep[prefmod ivalt[gentim  ptravel\
gencost:cpa pcost\
ascpt:zero one]          censor  [availcar  availpt]
```

***** MULTINOMI LOGIT *****

```
Dependent variable:  prefmode

Value      Label      Count      Percent
          1          252          31.5
          2          548          68.5
```

```
ITERATION      01:00 OLD      LLF      =      -554.5180 STEP      =      1.5107
NEW      LLF      =      -359.3430 GRAD*DI      =      323.3610

ITERATION      02:00 OLD      LLF      =      -359.3430 STEP      =      1.0030
NEW      LLF      =      -359.0430 GRAD*DI      =      0.5988

At      convergenc grad      *      dir      =      0.0002
```

Independent Variable	Estimated Coefficient	Standard Error	t-Statistic
gentime	-0.0190	0.0035	-5.4629
gencost	-0.2654	0.0208	-12.7773
ascpt	0.3523	0.0969	3.6363

```
auxiliary      statistics      at      convergen initial
log      likelihood      -359.04      -554.52
number      of      observation      800
percent      correctly      predicted      80
```

```
REM          car          and          public  transport MODEL
mnl          dep[prefmod ivalt[gentim  pinv\
gencost:cpa pcost\
ascpt:zero one]          censor  [availcar  availpt]
```

***** MULTINOMI LOGIT *****

```
Dependent variable:  prefmode

Value      Label      Count      Percent
          1          252          31.5
```

2 548 68.5

ITERATION 01:00 OLD LLF = -554.5180 STEP = 1.4494
 NEW LLF = -372.2840 GRAD*DI = 307.3390

ITERATION 02:00 OLD LLF = -372.2840 STEP = 1.0039
 NEW LLF = -372.0680 GRAD*DI = 0.4312

At convergenc grad * dir = 0.0001

Independent Variable	Estimated Coefficient	Standard Error	t-Statistic
gentime	-0.0106	0.0043	-2.4558
gencost	-0.2626	0.0203	-12.9043
ascpt	0.1709	0.1097	1.5571

auxiliary statistics at convergen initial
 log likelihood -372.07 -554.52
 number of observation 800
 percent correctly predicted 78.125

REM car and public transport MODEL
 mnl dep[prefmod ivalt[cleave: zero\
 carinv:cinv zero\
 carsearch:cs zero\
 carwalk:cwal zero\
 parkcost:cpa zero\
 pleave:zero pleave\
 pswalk:zero pswalk\
 pwait:zero pwait\
 pinv:zero pinv\
 pint:zero pint\
 security:zer sec\
 reliability:zer rel\
 ptcost:zero pcost\
 ascpt:zero one] censor [availcar availpt]

***** MULTINOMI LOGIT *****
 Dependent variable: prefmode

Value	Label	Count	Percent
1		252	31.5
2		548	68.5

ITERATION 01:00 OLD LLF = -554.5180 STEP = 1.5845
 NEW LLF = -312.2740 GRAD*DI = 390.5080

```

ITERATION      02:00 OLD      LLF      =      -312.2740 STEP      =      1.0603
NEW           LLF      =      -309.1010 GRAD*DI =      6.1030

ITERATION      03:00 OLD      LLF      =      -309.1010 STEP      =      1.0116
NEW           LLF      =      -309.0810 GRAD*DI =      0.0410

At      convergenc grad      *      dir      =      0.0000

```

Independent Variable	Estimated Coefficient	Standard Error	t-Statistic
cleave	0.0213	0.0036	5.9192
carinv	-0.0056	0.0066	-0.8530
carsearch	-0.0626	0.0101	-6.1763
carwalk	0.0218	0.0366	0.5972
parkcost	-0.2778	0.0261	-10.6533
pleave	0.0211	0.0046	4.6283
pswalk	-0.0032	0.0133	-0.2396
pwait	-0.0551	0.0198	-2.7762
pinv	-0.0053	0.0071	-0.7510
pint	0.0124	0.0142	0.8739
security	0.9114	0.2088	4.3651
reliability	0.8641	0.2106	4.1025
ptcost	-0.3352	0.0342	-9.7964
ascpt	-0.4417	1.3226	-0.3340

```

auxiliary      statistics      at      convergen initial
log            likelihood      -309.08 -554.52
number        of      observation      800
percent      correctly      predicted      83.625

```

```

REM      car      and      public      transport
mnl      dep[prefmod ivalt[carinv: zero\
carsearch:cs zero\
carwalk:cwal zero\
parkcost:cpa zero\
ascpt:zero one]      censor      [availcar availpt]

```

***** MULTINOMI LOGIT *****

Dependent variable: prefmode

Value	Label	Count	Percent
1		252	31.5
2		548	68.5

```

ITERATION      01:00 OLD      LLF      =      -554.5180 STEP      =      1.2855
NEW           LLF      =      -417.8590 GRAD*DI =      242.9240

```

ITERATION 02:00 OLD LLF = -417.8590 STEP = 0.9947
 NEW LLF = -417.3860 GRAD*DI = 0.9486
 At convergenc grad * dir = 2.96E-04

Independent Variable	Estimated Coefficient	Standard Error	t-Statistic
carinv	0.0081	0.0048	1.6670
carsearch	-0.0513	0.0085	-6.0404
carwalk	0.0593	0.0298	1.9865
parkcost	-0.2076	0.0197	-10.5499
ascpt	-1.0369	0.3155	-3.2869

auxiliary statistics at convergen initial
 log likelihood -417.39 -554.52
 number of observation 800
 percent correctly predicted 75.375

REM car and public transport
 mnl dep[prefmod ivalt[carinv: zero\
 carsearch:cs zero\
 parkcost:cpa zero\
 ascpt:zero one] censor [availcar availpt]

***** MULTINOMI LOGIT *****

Dependent variable: prefmode

Value	Label	Count	Percent
1		252	31.5
2		548	68.5

ITERATION 01:00 OLD LLF = -554.5180 STEP = 1.2786
 NEW LLF = -419.8480 GRAD*DI = 239.9670

ITERATION 02:00 OLD LLF = -419.8480 STEP = 0.9945
 NEW LLF = -419.3520 GRAD*DI = 0.9962

At convergenc grad * dir = 0.0003

Independent Variable	Estimated Coefficient	Standard Error	t-Statistic
carinv	0.0095	0.0048	1.9928
carsearch	-0.0505	0.0085	-5.9693
parkcost	-0.2067	0.0196	-10.5580
ascpt	-1.2510	0.2967	-4.2164

auxiliary statistics at convergen initial
 log likelihood -419.35 -554.52
 number of observation 800
 percent correctly predicted 75

REM car and public transport
 mnl dep[prefmod ivalt[ptcost:z pcost\
 security:zer sec\
 reliability:zer rel\
 ascpt:zero one] censor [availcar availpt]

***** MULTINOMI LOGIT *****

Dependent variable: prefmode

Value	Label	Count	Percent
		1	252 31.5
		2	548 68.5

ITERATION 01:00 OLD LLF = -554.5180 STEP = 1.2814
 NEW LLF = -427.2590 GRAD*DI = 226.4550

ITERATION 02:00 OLD LLF = -427.2590 STEP = 0.9996
 NEW LLF = -427.1040 GRAD*DI = 0.3109

At convergenc grad * dir = 0.0000

Independent Variable	Estimated Coefficient	Standard Error	t-Statistic
ptcost	-0.2603	0.0263	-9.8945
security	0.6419	0.1694	3.7894
reliability	0.7245	0.1699	4.2641
ascpt	1.6997	0.2023	8.4017

auxiliary statistics at convergen initial
 log likelihood -427.1 -554.52
 number of observation 800
 percent correctly predicted 75

REM car and public transport
 mnl dep[prefmod ivalt[cleave: zero\
 carinv:cinv zero\
 carsearch:cs zero\
 parkcost:cpa zero\
 pleave:zero pleave\
 pwait:zero pwait\

reliability:zer rel\
 security:zer sec\
 ptcost:zero pcost\
 asccar:one zero] censor [availcar availpt]

***** MULTINOMI LOGIT *****

Dependent variable: .prefmode

Value	Label	Count	Percent
	1	252	31.5
	2	548	68.5

ITERATION 01:00 OLD LLF = -554.5180 STEP = 1.3023
 NEW LLF = -422.5980 GRAD*DI = 232.9200

ITERATION 02:00 OLD LLF = -422.5980 STEP = 1.0010
 NEW LLF = -422.3610 GRAD*DI = 0.4724

At convergenc grad * dir = 0.0000

Independent Variable	Estimated Coefficient	Standard Error	t-Statistic
----------------------	-----------------------	----------------	-------------

pleave	0.0005	0.0020	0.2287
pswalk	-0.0154	0.0102	-1.5095
pwait	-0.0380	0.0173	-2.1941
pwalk	-0.0026	0.0089	-0.2950
reliability	0.7335	0.1710	4.2886
security	0.6500	0.1705	3.8115
ptcost	-0.2619	0.0268	-9.7677
asccar	-2.0401	0.9996	-2.0410

auxiliary statistics at convergen initial
 log likelihood -422.36 -554.52
 number of observation 800
 percent correctly predicted 75.25

REM car and public transport
 mnl dep[prefmod ivalt[carinv: zero\
 carsearch:cs zero\
 parkcost:cpa zero\
 security:zer sec\
 reliability:zer rel\
 ptcost:zero pcost\
 ascpt:zero one] censor [availcar availpt]

***** MULTINOMI LOGIT *****

Dependent variable: prefmode

Value	Label	Count	Percent
		1	252 31.5
		2	548 68.5

ITERATION 01:00 OLD LLF = -554.5180 STEP = 1.4620
NEW LLF = -340.9540 GRAD*DI = 359.0190

ITERATION 02:00 OLD LLF = -340.9540 STEP = 0.9973
NEW LLF = -340.4470 GRAD*DI = 1.0159

At convergenc grad * dir = 0.0006

Independent Variable	Estimated Coefficient	Standard Error	t-Statistic
carinv	-0.0029	0.0055	-0.5311
carsearch	-0.0497	0.0093	-5.3372
parkcost	-0.2445	0.0235	-10.4059
security	0.8188	0.1977	4.1410
reliability	0.7266	0.1973	3.6837
ptcost	-0.3133	0.0308	-10.1773
ascpt	-1.0189	0.3992	-2.5525

auxiliary statistics at convergen initial
log likelihood -340.45 -554.52
number of observation 800
percent correctly predicted 82.375

REM ASC.
mnl dep[premod ivalt[ascpt:z one] censor [availcar availpt]

***** MULTINOMI LOGIT *****
Dependent variable: prefmode

Value	Label	Count	Percent
		1	252 31.5
		2	548 68.5

ITERATION 01:00 OLD LLF = -554.5180 STEP = 1.0552
NEW LLF = -498.4360 GRAD*DI = 109.5200

ITERATION 02:00 OLD LLF = -498.4360 STEP = 0.9993
NEW LLF = -498.4340 GRAD*DI = 0.0028

At convergenc grad * dir = 0.0000

Independent Variable	Estimated Coefficient	Standard Error	t-Statistic
ascpt	0.7769	0.0761	10.2066
auxiliary log number percent	statistics likelihood of correctly	at observation predicted	convergen initial -498.43 800 68.5
spool	out	off	

University of Cape Town

Test #1 - Proposed Prediction model
SST Results

```
rem      cova      var[cinv,cse cov
REM      car      and      public      transport MODEL
mnl      dep[prefmod ivalt[gentim ptravel\
gencost:cpa pcost\
ascpt:zero one]      censor      [availcar availpt]
```

```
***** MULTINOMI LOGIT *****
Dependent variable:      prefmode
```

Value	Label	Count	Percent	
		1	252	31.5
		2	548	68.5

```
ITERATION      01:00 OLD      LLF      =      -554.5180 STEP      =      1.5107
NEW      LLF      =      -359.3430 GRAD*DI =      323.3610
```

```
ITERATION      02:00 OLD      LLF      =      -359.3430 STEP      =      1.0030
NEW      LLF      =      -359.0430 GRAD*DI =      0.5988
```

```
At      convergenc grad      *      dir      =      0.0002
```

Independent Variable	Estimated Coefficient	Standard Error	t-Statistic
gentime	-0.0190	0.0035	-5.4629
gencost	-0.2654	0.0208	-12.7773
ascpt	0.3523	0.0969	3.6363

```
auxiliary      statistics      at      convergenc      initial
log      likelihood      -359.04      -554.52
number      of      observation      800
percent      correctly      predicted      80
```

```
REM      car      and      public      transport MODEL
mnl      dep[prefmod ivalt[gentim pinv\
gencost:cpa pcost\
ascpt:zero one]      censor      [availcar availpt]
```

```
***** MULTINOMI LOGIT *****
Dependent variable:      prefmode
```

Value	Label	Count	Percent	
		1	252	31.5

2 548 68.5

ITERATION 01:00 OLD LLF = -554.5180 STEP = 1.4494
 NEW LLF = -372.2840 GRAD*DI = 307.3390

ITERATION 02:00 OLD LLF = -372.2840 STEP = 1.0039
 NEW LLF = -372.0680 GRAD*DI = 0.4312

At convergenc grad * dir = 0.0001

Independent Variable	Estimated Coefficient	Standard Error	t-Statistic
gentime	-0.0106	0.0043	-2.4558
gencost	-0.2626	0.0203	-12.9043
ascpt	0.1709	0.1097	1.5571

auxiliary statistics at convergenc initial
 log likelihood -372.07 -554.52
 number of observation 800
 percent correctly predicted 78.125

REM car and public transport MODEL
 mnl dep[prefmod ivalt[cleave: zero\
 carinv:cinv zero\
 carsearch:cs zero\
 carwalk:cwal zero\
 parkcost:cpa zero\
 pleave:zero pleave\
 pswalk:zero pswalk\
 pwait:zero pwait\
 pinv:zero pinv\
 pint:zero pint\
 security:zer sec\
 reliability:zer rel\
 ptcost:zero pcost\
 ascpt:zero one] censor [availcar availpt]

***** MULTINOMI LOGIT *****
 Dependent variable: prefmode

Value	Label	Count	Percent
1		252	31.5
2		548	68.5

ITERATION 01:00 OLD LLF = -554.5180 STEP = 1.5845
 NEW LLF = -312.2740 GRAD*DI = 390.5080

```

ITERATION      02:00 OLD      LLF      =      -312.2740 STEP      =      1.0603
                NEW      LLF      =      -309.1010 GRAD*DI =      6.1030

ITERATION      03:00 OLD      LLF      =      -309.1010 STEP      =      1.0116
                NEW      LLF      =      -309.0810 GRAD*DI =      0.0410

At      convergenc grad      *      dir      =      0.0000

```

Independent Variable	Estimated Coefficient	Standard Error	t-Statistic
cleave	0.0213	0.0036	5.9192
carinv	-0.0056	0.0066	-0.8530
carsearch	-0.0626	0.0101	-6.1763
carwalk	0.0218	0.0366	0.5972
parkcost	-0.2778	0.0261	-10.6533
pleave	0.0211	0.0046	4.6283
pswalk	-0.0032	0.0133	-0.2396
pwait	-0.0551	0.0198	-2.7762
pinv	-0.0053	0.0071	-0.7510
pint	0.0124	0.0142	0.8739
security	0.9114	0.2088	4.3651
reliability	0.8641	0.2106	4.1025
ptcost	-0.3352	0.0342	-9.7964
ascpt	-0.4417	1.3226	-0.3340

```

auxiliary      statistics      at      convergenc initial
log            likelihood      -309.08      -554.52
number        of      observation      800
percent      correctly      predicted      83.625

```

```

REM      car      and      public      transport
mnl      dep[prefmod ivalt[carinv: zero\
          carsearch:cs zero\
          carwalk:cwal zero\
          parkcost:cpa zero\
          ascpt:zero one]      censor      [availcar availpt]

```

```

***** MULTINOMI LOGIT *****
Dependent variable:      prefmode

Value      Label      Count      Percent
          1          252          31.5
          2          548          68.5

```

```

ITERATION      01:00 OLD      LLF      =      -554.5180 STEP      =      1.2855
                NEW      LLF      =      -417.8590 GRAD*DI =      242.9240

```

ITERATION 02:00 OLD LLF = -417.8590 STEP = 0.9947
 NEW LLF = -417.3860 GRAD*DI = 0.9486

At convergenc grad * dir = 0.0003

Independent Variable	Estimated Coefficient	Standard Error	t-Statistic
carinv	0.0081	0.0048	1.6670
carsearch	-0.0513	0.0085	-6.0404
carwalk	0.0593	0.0298	1.9865
parkcost	-0.2076	0.0197	-10.5499
ascpt	-1.0369	0.3155	-3.2869

auxiliary statistics at convergenc initial
 log likelihood -417.39 -554.52
 number of observation 800
 percent correctly predicted 75.375

REM car and public transport
 mnl dep[prefmod ivalt[carinv: zero\
 carsearch:cs zero\
 parkcost:cpa zero\
 ascpt:zero one] censor [availcar availpt]

***** MULTINOMI LOGIT *****

Dependent variable: prefmode

Value	Label	Count	Percent
1		252	31.5
2		548	68.5

ITERATION 01:00 OLD LLF = -554.5180 STEP = 1.2786
 NEW LLF = -419.8480 GRAD*DI = 239.9670

ITERATION 02:00 OLD LLF = -419.8480 STEP = 0.9945
 NEW LLF = -419.3520 GRAD*DI = 0.9962

At convergenc grad * dir = 0.0003

Independent Variable	Estimated Coefficient	Standard Error	t-Statistic
carinv	9.48E-03	4.76E-03	1.99275
carsearch	-5.05E-02	8.46E-03	-5.96929
parkcost	-0.20673	1.96E-02	-10.55795
ascpt	-1.25097	0.29669	-4.21642

auxiliary statistics at convergenc initial
 log likelihood -419.35 -554.52
 number of observation 800
 percent correctly predicted 75

REM car and public transport
 mnl dep[prefmod ivalt[ptcost:z pcost\
 security:zer sec\
 reliability:zer rel\
 ascpt:zero one] censor [availcar availpt]

***** MULTINOMI LOGIT *****

Dependent variable: prefmode

Value	Label	Count	Percent
	1	252	31.5
	2	548	68.5

ITERATION 01:00 OLD LLF = -554.5180 STEP = 1.2814
 NEW LLF = -427.2590 GRAD*DI = 226.4550

ITERATION 02:00 OLD LLF = -427.2590 STEP = 0.9996
 NEW LLF = -427.1040 GRAD*DI = 0.3109

At convergenc grad * dir = 0.0000

Independent Variable	Estimated Coefficient	Standard Error	t-Statistic
ptcost	-0.2603	0.0263	-9.8945
security	0.6419	0.1694	3.7894
reliability	0.7245	0.1699	4.2641
ascpt	1.6997	0.2023	8.4017

auxiliary statistics at convergenc initial
 log likelihood -427.1 -554.52
 number of observation 800
 percent correctly predicted 75

REM car and public transport
 mnl dep[prefmod ivalt[sex:sex zero\
 class:class zero\
 cleave:cleav zero\
 carinv:cinv zero\
 carsearch:cs zero\
 parkcost:cpa zero\
]

pleave:zero pleave\
 pwait:zero pwait\
 security:zer sec\
 reliability:zer rel\
 ptcost:zero pcost\
 ascpt:zero one] censor [availcar availpt]

***** MULTINOMI LOGIT *****
 Dependent variable: premode

Value	Label	Count	Percent
	1	252	31.5
	2	548	68.5

ITERATION 01:00 OLD LLF = -554.5180 STEP = 1.5911
 NEW LLF = -311.1670 GRAD*DI = 390.9970

ITERATION 02:00 OLD LLF = -311.1670 STEP = 1.0931
 NEW LLF = -307.4810 GRAD*DI = 6.9523

ITERATION 03:00 OLD LLF = -307.4810 STEP = 1.0119
 NEW LLF = -307.4550 GRAD*DI = 0.0514

At convergenc grad * dir = 0.0000

Independent Variable	Estimated Coefficient	Standard Error	t-Statistic
sex	0.4538	0.2175	2.0868
class	0.3551	0.2886	1.2303
cleave	0.0210	0.0035	5.9320
carinv	-0.0093	0.0064	-1.4573
carsearch	-0.0600	0.0102	-5.8553
parkcost	-0.2813	0.0264	-10.6499
pleave	0.0230	0.0044	5.1666
pwait	-0.0558	0.0199	-2.8046
security	0.9148	0.2094	4.3687
reliability	0.8686	0.2114	4.1083
ptcost	-0.3408	0.0341	-10.0006
ascpt	-1.4188	1.3503	-1.0508

auxiliary statistics at convergenc initial
 log likelihood -307.46 -554.52
 number of observation 800
 percent correctly predicted 82.75

REM car and public transport

```

mnl      dep[prefmod ivalt[pleave: pleave\
pswalk:zero pswalk\
pwait:zero pwait\
pinv:zero pinv\
pint:zero pint\
pwalk:zero pwalk\
reliability:zer rel\
security:zer sec\
ptcost:zero pcost\
ascpt:zero one]      censor      [availcar availpt]

```

```

***** MULTINOMI LOGIT *****
Dependent variable:  prefmode

```

Value	Label	Count	Percent
	1	252	31.5
	2	548	68.5

```

ITERATION      01:00 OLD      LLF      =      -554.5180 STEP      =      1.3019
NEW      LLF      =      -422.2190 GRAD*DI =      233.6220

```

```

ITERATION      02:00 OLD      LLF      =      -422.2190 STEP      =      0.9987
NEW      LLF      =      -421.7810 GRAD*DI =      0.8770

```

```

At      convergenc grad      *      dir      =      0.0002

```

Independent Variable	Estimated Coefficient	Standard Error	t-Statistic
pleave	0.0005	0.0021	0.2210
pswalk	-0.0138	0.0106	-1.2980
pwait	-0.0385	0.0175	-2.1953
pinv	-0.0058	0.0056	-1.0420
pint	0.0072	0.0121	0.5926
pwalk	-0.0017	0.0093	-0.1869
reliability	0.7339	0.1711	4.2890
security	0.6503	0.1706	3.8118
ptcost	-0.2602	0.0277	-9.4088
ascpt	2.1516	1.0480	2.0530

```

auxiliary      statistics      at      convergenc initial
log      likelihood      -421.78      -554.52
number      of      observation      800
percent      correctly      predicted      75.125

```

```

REM      car      and      public      transport
mnl      dep[prefmod ivalt[carinv: zero\
carsearch:cs zero\

```

parkcost:cpa zero\
 security:zer sec\
 reliability:zer rel\
 ptcost:zero pcost\
 ascpt:zero one] censor [availcar availpt]

***** MULTINOMI LOGIT *****
 Dependent variable: prefmode

Value	Label	Count	Percent
	1	252	31.5
	2	548	68.5

ITERATION 01:00 OLD LLF = -554.5180 STEP = 1.4620
 NEW LLF = -340.9540 GRAD*DI = 359.0190

ITERATION 02:00 OLD LLF = -340.9540 STEP = 0.9973
 NEW LLF = -340.4470 GRAD*DI = 1.0159

At convergenc grad * dir = 0.0006

Independent Variable **Estimated Coefficient** **Standard Error** **t-Statistic**

carinv	-0.0029	0.0055	-0.5311
carsearch	-0.0497	0.0093	-5.3372
parkcost	-0.2445	0.0235	-10.4059
security	0.8188	0.1977	4.1410
reliability	0.7266	0.1973	3.6837
ptcost	-0.3133	0.0308	-10.1773
ascpt	-1.0189	0.3992	-2.5525

auxiliary statistics at convergenc initial
 log likelihood -340.45 -554.52
 number of observation 800
 percent correctly predicted 82.375

REM ASC.
 mnl dep[prefmod ivalt[ascpt:z one] censor [availcar availpt]

***** MULTINOMI LOGIT *****
 Dependent variable: prefmode

Value	Label	Count	Percent
	1	252	31.5
	2	548	68.5

ITERATION	01:00	OLD	LLF	=	-554.5180	STEP	=	1.0552
	NEW	LLF	=	-498.4360	GRAD*DI	=	109.5200	
ITERATION	02:00	OLD	LLF	=	-498.4360	STEP	=	0.9993
	NEW	LLF	=	-498.4340	GRAD*DI	=	0.0028	
At	convergen	grad	*	dir	=	0.0000		

Independent Variable	Estimated Coefficient	Standard Error	t-Statistic
ascpt	0.7769	0.0761	10.2066
auxiliary log likelihood	statistics at	convergen	initial
number of observations	correctly predicted	800	-498.43
percent		68.5	-554.52
spool	out	off	

University of Cape Town

Test#3 - MALE RESPONDENTS

SST Results

```
rem          cova          var[cinv,c cov
REM          car          and          public  transport MODEL
mnl          dep[prefmode ivalt[genti ptravel\
            gencost:cpark pcost\
            ascpt:zero  one]  censor  [availcar availpt]
```

```
***** MULTINOMI LOGIT *****
Dependent variable:  prefmode
```

Value	Label	Count	Percent
		1	30.5
		2	69.5

```
ITERATION      01:00 OLD      LLF      =      -277.2590 STEP      =      1.56317
NEW            LLF      =      -170.2300 GRAD*DI =      173.4090
```

```
ITERATION      02:00 OLD      LLF      =      -170.2300 STEP      =      1.02442
NEW            LLF      =      -169.8250 GRAD*DI =      0.79712
```

```
At convergence grad * dir = 0.0008
```

Independent Variable	Estimated Coefficient	Standard Error	t-Statistic
gentime	-0.0221	0.0048	-4.6225
gencost	-0.2884	0.0313	-9.2264
ascpt	0.6050	0.1432	4.2246

```
auxiliary      statistics at convergen initial
log            likelihood      -169.82 -277.26
number of      observatio      400
percent correctly predicted      81.5
```

```
REM          car          and          public  transport MODEL
mnl          dep[prefmode ivalt[genti pinv\
            gencost:cpark pcost\
            ascpt:zero  one]  censor  [availcar availpt]
```

```
***** MULTINOMI LOGIT *****
Dependent variable:  prefmode
```

Value	Label	Count	Percent
		1	30.5

2 278 69.5

ITERATION 01:00 OLD LLF = -277.2590 STEP = 1.52327
 NEW LLF = -177.3550 GRAD*DI = 164.8990

ITERATION 02:00 OLD LLF = -177.3550 STEP = 1.00506
 NEW LLF = -177.0540 GRAD*DI = 0.60153

At convergence grad * dir = 0.0004

Independent Variable Estimated Coefficient Standard Error t-Statistic

gentime -0.0181 0.0059 -3.0425
 gencost -0.2827 0.0307 -9.2217
 ascpt 0.2702 0.1453 1.8590

auxiliary statistics at convergen initial
 log likelihood -177.05 -277.26
 number of observatio 400
 percent correctly predicted 78.75

REM car and public transport MODEL
 mnl dep[prefmode ivalt[cleav zero\
 carinv:cinv zero\
 carsearch:cse zero\
 carwalk:cwalk zero\
 parkcost:cpar zero\
 pleave:zero pleave\
 pswalk:zero pswalk\
 pwait:zero pwait\
 pinv:zero pinv\
 pint:zero pint\
 security:zero sec\
 reliability:zero rel\
 ptcost:zero pcost\
 ascpt:zero one] censor [availcar availpt]

***** MULTINOMI LOGIT *****
 Dependent variable: prefmode

Value Label Count Percent
 1 122 30.5
 2 278 69.5

ITERATION 01:00 OLD LLF = -277.2590 STEP = 1.62797
 NEW LLF = -145.5060 GRAD*DI = 208.8610

```

ITERATION      02:00 OLD      LLF      =      -145.5060 STEP      =      1.13081
NEW           LLF      =      -143.2280 GRAD*DI =      4.19317

ITERATION      03:00 OLD      LLF      =      -143.2280 STEP      =      1.02125
NEW           LLF      =      -143.1970 GRAD*DI =      0.0601

At      convergence grad      *      dir      =      0.0000

```

Independent Variable Estimated Coefficient Standard Error t-Statistic

```

cleave          0.0145   0.0049   2.9685
carinv         -0.0027   0.0101  -0.2710
carsearch     -0.0754   0.0155  -4.8698
carwalk        0.0701   0.0509   1.3785
parkcost     -0.3251   0.0406  -8.0124
pleave         0.0197   0.0058   3.3664
pswalk       -0.0125   0.0189  -0.6576
pwait        -0.0046   0.0257  -0.1802
pinv         -0.0330   0.0119  -2.7768
pint          0.0507   0.0258   1.9619
security       0.5827   0.3029   1.9236
reliability    1.0370   0.3184   3.2572
ptcost       -0.3351   0.0513  -6.5390
ascpt        -2.2528   1.7915  -1.2575

```

```

auxiliary      statistics      at      convergen initial
log            likelihood      -143.20 -277.26
number        of      observatio      400
percent       correctly      predicted      84.75

```

```

REM           car      and      public      transport
mnl           dep[premode ivalt[carin zero\
              carsearch:cse zero\
              carwalk:cwalk zero\
              parkcost:cpar zero\
              ascpt:zero one]      censor      [availcar availpt]

```

```

*****      MULTINOMI      LOGIT      *****
Dependent   variable:      premode

Value       Label      Count      Percent
           1          122       30.5
           2          278       69.5

```

```

ITERATION      01:00 OLD      LLF      =      -277.2590 STEP      =      1.333
NEW           LLF      =      -197.7730 GRAD*DI =      138.9040

```

ITERATION 02:00 OLD LLF = -197.7730 STEP = 0.99889
 NEW LLF = -197.4200 GRAD*DI = 0.70497
 At convergence grad * dir = 0.0005

Independent Variable	Estimated Coefficient	Standard Error	t-Statistic
carinv	0.0009	0.0073	0.1206
carsearch	-0.0562	0.0129	-4.3425
carwalk	0.0812	0.0398	2.0365
parkcost	-0.2353	0.0291	-8.0743
ascpt	-1.4399	0.4548	-3.1662

auxiliary statistics at convergen initial
 log likelihood -197.42 -277.26
 number of observatio 400
 percent correctly predicted 76.75

REM car and public transport
 mnl dep[prefmode ivalt[carin zero\
 carsearch:cse zero\
 parkcost:cpa zero\
 ascpt:zero one] censor [availcar availpt]

***** MULTINOMI LOGIT *****

Dependent variable: prefmode

Value	Label	Count	Percent
1		122	30.5
2		278	69.5

ITERATION 01:00 OLD LLF = -277.2590 STEP = 1.31671
 NEW LLF = -199.8120 GRAD*DI = 136.1250

ITERATION 02:00 OLD LLF = -199.8120 STEP = 0.99536
 NEW LLF = -199.4920 GRAD*DI = 0.64294

At convergence grad * dir = 0.0004

Independent Variable	Estimated Coefficient	Standard Error	t-Statistic
carinv	0.0034	0.0071	0.4812
carsearch	-0.0552	0.0128	-4.3163
parkcost	-0.2325	0.0288	-8.0706
ascpt	-1.7280	0.4315	-4.0047

auxiliary statistics at convergen initial
 log likelihood -199.49 -277.26
 number of observatio 400
 percent correctly predicted 76.75

REM car and public transport
 mnl dep[prefmode ivalt[ptcos pcost\
 security:zero sec\
 reliability:zero rel\
 ascpt:zero one] censor [availcar availpt]

***** MULTINOMI LOGIT *****
 Dependent variable: prefmode

Value	Label	Count	Percent
	1	122	30.5
	2	278	69.5

ITERATION 01:00 OLD LLF = -277.2590 STEP = 1.25021
 NEW LLF = -217.0980 GRAD*DI = 108.3620

ITERATION 02:00 OLD LLF = -217.0980 STEP = 0.99953
 NEW LLF = -217.0180 GRAD*DI = 0.15918

At convergence grad * dir = 0.0000

Independent Variable	Estimated Coefficient	Standard Error	t-Statistic
ptcost	-0.2374	0.0369	-6.4358
security	0.3850	0.2357	1.6333
reliability	0.7650	0.2384	3.2091
ascpt	1.7930	0.2977	6.0232

auxiliary statistics at convergen initial
 log likelihood -217.02 -277.26
 number of observatio 400
 percent correctly predicted 71.75

```

REM      car      and      public      transport
mnl      dep[prefmode ivalt[cleav zero\
          carinv:cin\  zero\
          carsearch:cse zero\
          parkcost:cpar zero\
          pleave:zero pleave\
          pwait:zero  pwait\
          security:zero sec\
          reliability:zero rel\
          ptcost:zero  pcost\
          ascpt:zero  one]  censor  [availcar  availpt]

```

```

***** MULTINOMI LOGIT *****
Dependent variable:  prefmode

```

Value	Label	Count	Percent	
		1	122	30.5
		2	278	69.5

```

ITERATION      01:00 OLD      LLF      =      -277.2590 STEP      =      1.58049
NEW            LLF      =      -154.0040 GRAD*DI =      198.9350

ITERATION      02:00 OLD      LLF      =      -154.0040 STEP      =      1.14211
NEW            LLF      =      -151.7890 GRAD*DI =      4.04585

ITERATION      03:00 OLD      LLF      =      -151.7890 STEP      =      1.01953
NEW            LLF      =      -151.7610 GRAD*DI =      0.0554

At convergence grad * dir = 0.0000

```

Independent Variable	Estimated Coefficient	Standard Error	t-Statistic
cleave	0.0197	0.0045	4.3452
carinv	-0.0084	0.0093	-0.9071
carsearch	-0.0645	0.0147	-4.4031
parkcost	-0.3083	0.0388	-7.9534
pleave	0.0234	0.0055	4.2399
pwait	-0.0120	0.0246	-0.4889
security	0.5490	0.2928	1.8750
reliability	0.9861	0.3070	3.2116
ptcost	-0.3159	0.0483	-6.5373
ascpt	-2.9753	1.7066	-1.7435

```

auxiliary      statistics      at      convergen initial
log            likelihood      -151.76 -277.26
number        of      observatio      400
percent      correctly      predicted      84

```

```

REM      car      and      public      transport
mnl     dep[premode ivalt[pleav pleave\
        pswalk:zero pswalk\
        pwait:zero  pwait\
        pwalk:zero  pwalk\
        reliability:zero rel\
        security:zero sec\
        ptcost:zero  pcost\
        asccar:one  zero]  censor  [availcar availpt]

```

```

***** MULTINOMI LOGIT *****
Dependent variable: premode

```

Value	Label	Count	Percent
1		122	30.5
2		278	69.5

```

ITERATION      01:00 OLD      LLF      =      -277.2590 STEP      =      1.29755
NEW            LLF      =      -212.5510 GRAD*DI =      114.4150

```

```

ITERATION      02:00 OLD      LLF      =      -212.5510 STEP      =      1.00321
NEW            LLF      =      -212.4100 GRAD*DI =      0.28199

```

```

At convergence grad * dir = 0.0000

```

Independent Variable	Estimated Coefficient	Standard Error	t-Statistic
pleave	0.0022	0.0025	0.8825
pswalk	-0.0282	0.0133	-2.1245
pwait	0.0046	0.0227	0.2042
pwalk	-0.0123	0.0132	-0.9362
reliability	0.7832	0.2414	3.2440
security	0.3943	0.2386	1.6524
ptcost	-0.2346	0.0380	-6.1809
asccar	-1.3253	1.2320	-1.0758

```

auxiliary      statistics      at      convergen initial
log            likelihood      -212.41 -277.26
number         of      observatio      400
percent        correctly      predicted      73.5

```

REM car and public transport
 mnl dep[prefmode ivalt[carin zero\
 carsearch:cse zero\
 parkcost:cpar zero\
 security:zero sec\
 reliability:zero rel\
 ptcost:zero pcost\
 ascpt:zero one] censor [availcar availpt]

***** MULTINOMI LOGIT *****
 Dependent variable: prefmode

Value	Label	Count	Percent	
		1	122	30.5
		2	278	69.5

ITERATION 01:00 OLD LLF = -277.2590 STEP = 1.46449
 NEW LLF = -165.9000 GRAD*DI = 187.3100

ITERATION 02:00 OLD LLF = -165.9000 STEP = 1.00667
 NEW LLF = -165.7510 GRAD*DI = 0.29567

At convergence grad * dir = 0.0002

Independent Variable	Estimated Coefficient	Standard Error	t-Statistic
carinv	-0.0046	0.0082	-0.5551
carsearch	-0.0552	0.0138	-4.0028
parkcost	-0.2715	0.0346	-7.8445
security	0.4977	0.2800	1.7776
reliability	0.8085	0.2859	2.8278
ptcost	-0.2944	0.0441	-6.6721
ascpt	-1.2323	0.5966	-2.0654

auxiliary statistics at convergen initial
 log likelihood -165.75 -277.26
 number of observatio 400
 percent correctly predicted 83

REM ASC.
 mnl dep[prefmode ivalt[ascpt one] censor [availcar availpt]

***** MULTINOMI LOGIT *****

Dependent variable: prefmode

Value	Label	Count	Percent
1		122	30.5
2		278	69.5

ITERATION 01:00 OLD LLF = -277.2590 STEP = 1.06187
 NEW LLF = -246.0180 GRAD*DI = 60.84

ITERATION 02:00 OLD LLF = -246.0180 STEP = 0.99909
 NEW LLF = -246.0170 GRAD*DI = 0.0018

At convergence grad * dir = 0.0000

Independent Variable **Estimated Coefficient** **Standard Error** **t-Statistic**

ascpt 0.8236 0.1086 7.58383

auxiliary statistics at convergen initial
 log likelihood -246.02 -277.26
 number of observatio 400
 percent correctly predicted 69.5

spool out off

University of Cape Town

Test#4 - FEMALE RESPONDENTS
SST Results

```
rem      cova      var[cinv,c cov
REM      car      and      public      transport MODEL
mnl      dep[prefm ivalt[genti ptravel\
          gencost:c pcost\
          ascpt:zero one]      censor      [availcar availpt]
```

***** MULTINO LOGIT *****

Dependen variable: prefmode

Value	Label	Count	Percent
	1	130	32.5
	2	270	67.5

```
ITERATIO 01:00 OLD LLF = -277.2590 STEP = 1.4612
          NEW LLF = -185.1680 GRAD*DI = 154.7440
```

```
ITERATIO 02:00 OLD LLF = -185.1680 STEP = 1.0059
          NEW LLF = -185.1080 GRAD*DI = 0.1192
```

```
At convergen grad * dir = 0.0000
```

Independ Variable **Estimated Coefficie** **Standard Error** **t-Statistic**

gentime	-0.0202	0.0057	-3.5131
gencost	-0.2530	0.0285	-8.8739
ascpt	0.1197	0.1388	0.8627

```
auxiliary statistics at convergen initial
log likelihood -185.11 -277.26
number of observatio 400
percent correctly predicted 77.5
```

```
REM      car      and      public      transport MODEL
mnl      dep[prefm ivalt[genti pinv\
          gencost:c pcost\
          ascpt:zero one]      censor      [availcar availpt]
```

***** MULTINO LOGIT *****

Dependen variable: prefmode

Value	Label	Count	Percent	
		1	130	32.5
		2	270	67.5

ITERATIO 01:00 OLD LLF = -277.2590 STEP = 1.4056
 NEW LLF = -191.5880 GRAD*DI = 146.3940

ITERATIO 02:00 OLD LLF = -191.5880 STEP = 1.0038
 NEW LLF = -191.5440 GRAD*DI = 0.0873

At convergen grad * dir = 0.0000

Independ Variable **Estimated Coefficie** **Standard Error** **t-Statistic**

gentime	-0.0039	0.0068	-0.5690
gencost	-0.2532	0.0278	-9.0946
ascpt	0.1076	0.1743	0.6175

auxiliary statistics at convergen initial
 log likelihood -191.54 -277.26
 number of observatio 400
 percent correctly predicted 78.25

REM car and public transport MODEL
 mnl dep[prefrm ivalt[cleav zero\
 carinv:cin zero\
 carsearch: zero\
 carwalk:c zero\
 parkcost:c zero\
 pleave:zer pleave\
 pswalk:zer pswalk\
 pwait:zero pwait\
 pinv:zero pinv\
 pint:zero pint\
 security:ze sec\
 reliability:z rel\
 ptcost:zer pcost\
 ascpt:zero one] censor [availcar availpt]

***** MULTINO LOGIT *****

Dependen variable: prefm mode

Value	Label	Count	Percent	
		1	130	32.5
		2	270	67.5

ITERATIO 01:00 OLD LLF = -277.2590 STEP = 1.6552

```

NEW LLF = -143.6320 GRAD*DI = 209.7350
ITERATIO 02:00 OLD LLF = -143.6320 STEP = 1.0855
NEW LLF = -141.6420 GRAD*DI = 3.7719
ITERATIO 03:00 OLD LLF = -141.6420 STEP = 1.0119
NEW LLF = -141.6300 GRAD*DI = 0.0224
At convergen grad * dir = 0.0000

```

Independ Variable **Estimated Coefficie** **Standard Error** **t-Statistic**

cleave	0.0258	0.0062	4.1531
carinv	-0.0029	0.0103	-0.2794
carsearch	-0.0713	0.0160	-4.4596
carwalk	-0.1581	0.0722	-2.1907
parkcost	-0.2711	0.0384	-7.0670
pleave	0.0253	0.0094	2.6805
pswalk	0.0288	0.0229	1.2577
pwait	-0.2804	0.0619	-4.5294
pinv	0.0082	0.0119	0.6915
pint	0.0391	0.0247	1.5846
security	1.4099	0.3236	4.3567
reliability	0.7896	0.3095	2.5512
ptcost	-0.4186	0.0539	-7.7598
ascpt	-0.0661	2.9899	-0.0221

auxiliary statistics at convergen initial
 log likelihood -141.63 -277.26
 number of observatio 400
 percent correctly predicted 85.75

REM car and public transport
 mnl dep[prefrm ivalt[carin zero\
 carsearch: zero\
 carwalk:c zero\
 parkcost:c zero\
 ascpt:zero one] censor [availcar availpt]

***** MULTINO LOGIT *****

Dependen variable: prefmode

Value	Label	Count	Percent
1		130	32.5
2		270	67.5

```

ITERATIO 01:00 OLD LLF = -277.2590 STEP = 1.2579

```

NEW LLF = -217.5970 GRAD*DI = 107.1030

ITERATIO 02:00 OLD LLF = -217.5970 STEP = 0.9954
 NEW LLF = -217.3870 GRAD*DI = 0.4217

At convergen grad * dir = 0.0001

Independ Variable **Estimated Coefficie** **Standard Error** **t-Statistic**

carinv 0.0141 0.0066 2.1196
 carsearch -0.0457 0.0115 -3.9634
 carwalk 0.0433 0.0470 0.9218
 parkcost -0.1846 0.0270 -6.8439
 ascpt -0.6453 0.4493 -1.4362

auxiliary statistics at convergen initial
 log likelihood -217.39 -277.26
 number of observatio 400
 percent correctly predicted 73.5

REM car and public transport
 mnl dep[prefrm ivalt[carin zero\
 carsearch: zero\
 parkcost:c zero\
 ascpt:zero one] censor [availcar availpt]

***** MULTINO LOGIT *****
 Dependen variable: prefmode

Value	Label	Count	Percent
1		130	32.5
2		270	67.5

ITERATIO 01:00 OLD LLF = -277.2590 STEP = 1.2559
 NEW LLF = -218.0410 GRAD*DI = 106.3640

ITERATIO 02:00 OLD LLF = -218.0410 STEP = 0.9956
 NEW LLF = -217.8110 GRAD*DI = 0.4603

At convergen grad * dir = 0.0001

Independ Variable **Estimated Coefficie** **Standard Error** **t-Statistic**

carinv 0.0150 0.0066 2.2812
 carsearch -0.0449 0.0115 -3.9053

parkcost -0.1846 0.0269 -6.8580
 ascpt -0.7945 0.4198 -1.8925

auxiliary statistics at convergen initial
 log likelihood -217.81 -277.26
 number of observatio 400
 percent correctly predicted 73.25

REM car and public transport
 mnl dep[prefm ivalt[ptcos pcost\
 security:ze sec\
 reliability:z rel\
 ascpt:zero one] censor [availcar availpt]

***** MULTINO LOGIT *****

Dependen variable: prefmode

Value	Label	Count	Percent
	1	130	32.5
	2	270	67.5

ITERATIO 01:00 OLD LLF = -277.2590 STEP = 1.3291
 NEW LLF = -206.8600 GRAD*DI = 123.1500

ITERATIO 02:00 OLD LLF = -206.8600 STEP = 0.9992
 NEW LLF = -206.7710 GRAD*DI = 0.1781

At convergen grad * dir = 0.0000

Independ Estimated Standard t-
Variable Coefficie Error Statistic

ptcost	-0.2953	0.0386	-7.6478
security	0.9228	0.2472	3.7330
reliability	0.6954	0.2448	2.8414
ascpt	1.6450	0.2788	5.9006

auxiliary statistics at convergen initial
 log likelihood -206.77 -277.26
 number of observatio 400
 percent correctly predicted 76.25

REM car and public transport
 mnl dep[prefm ivalt[cleav zero\
 carinv:cin zero\
 carsearch: zero\
 parkcost:c zero\
 security:ze sec\
 reliability:z rel\
 ascpt:zero one]

pleave:zer pleave\
 pwait:zero pwait\
 security:ze sec\
 reliability:z rel\
 ptcost:zer pcost\
 ascpt:zero one] censor [availcar availpt]

***** MULTINO LOGIT *****

Dependen variable: pefmode

Value	Label	Count	Percent
		1	32.5
		2	67.5

ITERATIO 01:00 OLD LLF = -277.2590 STEP = 1.6321
 NEW LLF = -148.6400 GRAD*DI = 203.5850

ITERATIO 02:00 OLD LLF = -148.6400 STEP = 1.0598
 NEW LLF = -146.9780 GRAD*DI = 3.2014

ITERATIO 03:00 OLD LLF = -146.9780 STEP = 1.0099
 NEW LLF = -146.9710 GRAD*DI = 0.0149

At convergen grad * dir = 1.08E-07

Independ Variable **Estimated Coefficie** **Standard Error** **t-Statistic**

cleave	0.0218	0.0058	3.7931
carinv	-0.0135	0.0093	-1.4538
carsearch	-0.0722	0.0156	-4.6395
parkcost	-0.2602	0.0374	-6.9494
pleave	0.0193	0.0079	2.4342
pwait	-0.1829	0.0447	-4.0931
security	1.3724	0.3168	4.3321
reliability	0.7862	0.3034	2.5915
ptcost	-0.3845	0.0504	-7.6342
ascpt	0.9673	2.4071	0.4018

auxiliary statistics at convergen initial
 log likelihood -146.97 -277.26
 number of observatio 400
 percent correctly predicted 84.75

REM car and public transport
 mnl dep[prefm ivalt[pleav pleave\
 pswalk:zer pswalk\

pwait:zero pwait\
 pwalk:zero pwalk\
 reliability:z rel\
 security:ze sec\
 ptcost:zer pcost\
 asccar:on zero] censor [availcar availpt]

***** MULTINO LOGIT *****

Dependen variable: prefmode

Value	Label	Count	Percent
1		130	32.5
2		270	67.5

ITERATIO 01:00 OLD LLF = -277.2590 STEP = 1.4009
 NEW LLF = -197.0280 GRAD*DI = 137.1470

ITERATIO 02:00 OLD LLF = -197.0280 STEP = 1.0026
 NEW LLF = -196.8160 GRAD*DI = 0.4238

At convergen grad * dir = 0.0001

Independ Variable **Estimated Coefficie** **Standard Error** **t-Statistic**

pleave	-0.0009	0.0038	-0.2322
pswalk	0.0022	0.0170	0.1287
pwait	-0.1499	0.0353	-4.2517
pwalk	-0.0131	0.0137	-0.9582
reliability	0.7359	0.2523	2.9163
security	0.9762	0.2552	3.8254
ptcost	-0.3035	0.0410	-7.4044
asccar	-3.3155	1.8520	-1.7903

auxiliary statistics at convergen initial
 log likelihood -196.82 -277.26
 number of observatio 400
 percent correctly predicted 78.5

REM car and public transport
 mnl dep[prefm ivalt[carin zero\
 carsearch: zero\
 parkcost:c zero\
 security:ze sec\
 reliability:z rel\
 ptcost:zer pcost\
 ascpt:zero one] censor [availcar availpt]

***** MULTINO LOGIT *****

Dependen variable: prefmode

Value	Label	Count	Percent	
		1	130	32.5
		2	270	67.5

ITERATIO 01:00 OLD LLF = -277.2590 STEP = 1.4784
 NEW LLF = -170.5050 GRAD*DI = 178.7530

ITERATIO 02:00 OLD LLF = -170.5050 STEP = 0.9903
 NEW LLF = -169.9190 GRAD*DI = 1.1805

ITERATIO 03:00 OLD LLF = -169.9190 STEP = 1.0032
 NEW LLF = -169.9180 GRAD*DI = 0.0017

At convergen grad * dir = 0.0000

Independ Variable **Estimated Coefficie** **Standard Error** **t-Statistic**

carinv	-0.0046	0.0078	-0.5907
carsearch	-0.0461	0.0131	-3.5229
parkcost	-0.2248	0.0330	-6.8073
security	1.1452	0.2862	4.0008
reliability	0.6796	0.2796	2.4303
ptcost	-0.3483	0.0445	-7.8266
ascpt	-0.9698	0.5588	-1.7356

auxiliary statistics at convergen initial
 log likelihood -169.92 -277.26
 number of observatio 400
 percent correctly predicted 80.75

REM ASC.
 mnl dep[prefm ivalt[ascpt one] censor [availcar availpt]

***** MULTINO LOGIT *****

Dependen variable: prefmode

Value	Label	Count	Percent	
		1	130	32.5
		2	270	67.5

ITERATIO 01:00 OLD LLF = -277.2590 STEP = 1.0490
 NEW LLF = -252.2330 GRAD*DI = 49.0000

ITERATIO 02:00 OLD LLF = -252.2330 STEP = 0.9994
 NEW LLF = -252.2320 GRAD*DI = 0.0010
 At convergen grad * dir = 0.0000

Independ **Estimated Standard t-**
Variable **Coefficie** **Error** **Statistic**

ascpt 0.7309 0.1068 6.8466

auxiliary statistics at convergen initial
 log likelihood -252.23 -277.26
 number of observatio 400
 percent correctly predicted 67.5

spool out off

University of Cape Town

**Test#4 - Students and Non-Academic Staff Model
SST Results**

```
rem          cov          var[cinv,c cov
REM          car          and          public  transport MODEL
mnl          dep[prefmod ivalt[genti  ptravel\
             gencost:cpa pcost\
             ascpt:zero  one]      censor  [availcar  availpt]
```

```
***** MULTINOMI LOGIT *****
Dependent variable:  prefmode
```

Value	Label	Count	Percent
1		198	29.46
2		474	70.54

```
ITERATION      01:00 OLD      LLF      =      -465.7950 STEP      =      1.5419
NEW            LLF      =      -289.5700 GRAD*DI =      288.6520
```

```
ITERATION      02:00 OLD      LLF      =      -289.5700 STEP      =      1.0168
NEW            LLF      =      -289.3030 GRAD*DI =      0.5291
```

```
At      convergenc grad      *      dir      =      0.0002
```

Independent Variable	Estimated Coefficient	Standard Error	t-Statistic
----------------------	-----------------------	----------------	-------------

gentime	-0.0153	0.0039	-3.9401
gencost	-0.2756	0.0233	-11.8196
ascpt	0.4362	0.1062	4.1082

```
auxiliary      statistics      at      convergen initial
log            likelihood      -289.3  -465.79
number        of      observatio      672
percent       correctly      predicted      80.506
```

```
REM          car          and          public  transport MODEL
mnl          dep[prefmod ivalt[genti  pinv\
             gencost:cpa pcost\
             ascpt:zero  one]      censor  [availcar  availpt]
```

```
***** MULTINOMI LOGIT *****
Dependent variable:  prefmode
```

Value	Label	Count	Percent
1		198	29.46

2 474 70.54

ITERATION 01:00 OLD LLF = -465.7950 STEP = 1.5171
 NEW LLF = -296.4060 GRAD*DI = 280.7130

ITERATION 02:00 OLD LLF = -296.4060 STEP = 1.0049
 NEW LLF = -296.1900 GRAD*DI = 0.4290

At convergenc grad * dir = 0.0001

Independent Variable Estimated Coefficient Standard Error t-Statistic

gentime -0.0076 0.0048 -1.5895
 gencost -0.2760 0.0231 -11.9501
 ascpt 0.3274 0.1216 2.6929

auxiliary statistics at convergen initial
 log likelihood -296.19 -465.79
 number of observatio 672
 percent correctly predicted 78.869

REM car and public transport MODEL
 mnl dep[prefmod ivalt[cleav zero\
 carinv:cinv zero\
 carsearch:cs zero\
 carwalk:cwal zero\
 parkcost:cpa zero\
 pleave:zero pleave\
 pswalk:zero pswalk\
 pwait:zero pwait\
 pinv:zero pinv\
 pint:zero pint\
 security:zer sec\
 reliability:zer rel\
 ptcost:zero pcost\
 ascpt:zero one] censor [availcar availpt]

***** MULTINOMI LOGIT *****

Dependent variable: prefmode

Value Label Count Percent
 1 198 29.46
 2 474 70.54

ITERATION 01:00 OLD LLF = -465.7950 STEP = 1.5879
 NEW LLF = -251.3670 GRAD*DI = 345.8320

```

ITERATION      02:00 OLD      LLF      =      -251.3670 STEP      =      1.0516
NEW           LLF      =      -248.9130 GRAD*DI =      4.7453

ITERATION      03:00 OLD      LLF      =      -248.9130 STEP      =      1.0117
NEW           LLF      =      -248.8970 GRAD*DI =      0.0314

At      convergenc grad      *      dir      =      0.0000

```

Independent Variable Estimated Coefficient Standard Error t-Statistic

```

cleave      0.0191      0.0040      4.7377
carinv      -0.0052      0.0074      -0.7045
carsearch   -0.0629      0.0114      -5.4941
carwalk      0.0385      0.0433      0.8886
parkcost    -0.2841      0.0289      -9.8152
pleave      0.0159      0.0047      3.3644
pswalk      0.0005      0.0144      0.0321
pwait       -0.0842      0.0241      -3.4980
pinv        -0.0048      0.0082      -0.5818
pint        0.0100      0.0165      0.6074
security     0.7514      0.2322      3.2360
reliability  0.9594      0.2352      4.0785
ptcost      -0.3420      0.0382      -8.9463
ascpt       1.1564      1.6369      0.7064

```

```

auxiliary    statistics      at      convergen initial
log          likelihood      -248.9      -465.79
number      of      observatio      672
percent     correctly      predicted      84.821

```

```

REM      car      and      public      transport
mnl      dep[prefmod ivalt[carin zero\
carsearch:cs zero\
carwalk:cwal zero\
parkcost:cpa zero\
ascpt:zero one]      censor      [availcar      availpt]

```

***** MULTINOMI LOGIT *****

Dependent

variable: prefmode

```

Value      Label      Count      Percent
           1      198      29.46
           2      474      70.54

```

```

ITERATION      01:00 OLD      LLF      =      -465.7950 STEP      =      1.3203
NEW           LLF      =      -336.4850 GRAD*DI =      227.1260

```

ITERATION 02:00 OLD LLF = -336.4850 STEP = 0.9939
 NEW LLF = -335.9700 GRAD*DI = 1.0332
 At convergenc grad * dir = 0.0006

Independent Variable	Estimated Coefficient	Standard Error	t-Statistic
carinv	0.0073	0.0053	1.3694
carsearch	-0.0498	0.0094	-5.3032
carwalk	0.0710	0.0344	2.0654
parkcost	-0.2193	0.0220	-9.9779
ascpt	-0.9450	0.3396	-2.7831

auxiliary statistics at convergen initial
 log likelihood -335.97 -465.79
 number of observatio 672
 percent correctly predicted 77.083

REM car and public transport
 mnl dep[prefmod ivalt[carin zero\
 carsearch:cs zero\
 parkcost:cpa zero\
 ascpt:zero one] censor [availcar availpt]

***** MULTINOMI LOGIT *****

Dependent variable: prefmode

Value	Label	Count	Percent
1		198	29.46
2		474	70.54

ITERATION 01:00 OLD LLF = -465.7950 STEP = 1.3120
 NEW LLF = -338.6400 GRAD*DI = 223.9700

ITERATION 02:00 OLD LLF = -338.6400 STEP = 0.9934
 NEW LLF = -338.0910 GRAD*DI = 1.1019

At convergenc grad * dir = 0.0007

Independent Variable	Estimated Coefficient	Standard Error	t-Statistic
carinv	0.0097	0.0051	1.8977
carsearch	-0.0493	0.0093	-5.2791
parkcost	-0.2179	0.0218	-9.9773
ascpt	-1.1901	0.3178	-3.7446

auxiliary statistics at convergen initial
 log likelihood -338.09 -465.79
 number of observatio 672
 percent correctly predicted 76.042

REM car and public transport
 mnl dep[prefmod ivalt[ptcos pcost\
 security:zer sec\
 reliability:zer rel\
 ascpt:zero one] censor [availcar availpt]

***** MULTINOMI LOGIT *****
 Dependent variable: prefmode

Value	Label	Count	Percent
	1	198	29.46
	2	474	70.54

ITERATION 01:00 OLD LLF = -465.7950 STEP = 1.3158
 NEW LLF = -346.1440 GRAD*DI = 210.3890

ITERATION 02:00 OLD LLF = -346.1440 STEP = 1.0027
 NEW LLF = -345.9270 GRAD*DI = 0.4333

At convergenc grad * dir = 0.0001

Independent Variable	Estimated Coefficient	Standard Error	t-Statistic
ptcost	-0.2642	0.0289	-9.1360
security	0.5226	0.1884	2.7734
reliability	0.8660	0.1910	4.5344
ascpt	1.7983	0.2230	8.0654

auxiliary statistics at convergen initial
 log likelihood -345.93 -465.79
 number of observatio 672
 percent correctly predicted 76.042

REM car and public transport
 mnl dep[prefmod ivalt[cleav zero\
 carinv:cinv zero\
 carsearch:cs zero\
 parkcost:cpa zero\
 pleave:zero pleave\
 pwait:zero pwait\
 security:zer sec\
 reliability:zer rel\
 ascpt:zero one]

reliability:zer rel\
 security:zer sec\
 ptcost:zero pcost\
 asccar:one zero] censor [availcar availpt]

***** MULTINOMI LOGIT *****
 Dependent variable: prefmodes

Value	Label	Count	Percent
1		198	29.46
2		474	70.54

ITERATION 01:00 OLD LLF = -465.7950 STEP = 1.3425
 NEW LLF = -339.8900 GRAD*DI = 219.3710

ITERATION 02:00 OLD LLF = -339.8900 STEP = 1.0023
 NEW LLF = -339.5780 GRAD*DI = 0.6237

At convergenc grad * dir = 0.0001

Independent Variable **Estimated Coefficient** **Standard Error** **t-Statistic**

pleave	0.0018	0.0025	0.7260
pswalk	-0.0015	0.0112	-0.1356
pwait	-0.0651	0.0212	-3.0792
pwalk	0.0217	0.0120	1.8094
reliability	0.8843	0.1932	4.5763
security	0.5336	0.1905	2.8011
ptcost	-0.2714	0.0298	-9.1062
asccar	-1.4336	1.2410	-1.1552

auxiliary statistics at convergen initial
 log likelihood -339.58 -465.79
 number of observatio 672
 percent correctly predicted 75.893

REM car and public transport
 mnl dep[prefmodes] ivalt[carin zero\
 carsearch:cs zero\
 parkcost:cpa zero\
 security:zer sec\
 reliability:zer rel\
 ptcost:zero pcost\
 ascpt:zero one] censor [availcar availpt]

***** MULTINOMI LOGIT *****

Dependent variable: prefmode

Value	Label	Count	Percent
	1	198	29.46
	2	474	70.54

ITERATION 01:00 OLD LLF = -465.7950 STEP = 1.5159
 NEW LLF = -270.9010 GRAD*DI = 323.2690

ITERATION 02:00 OLD LLF = -270.9010 STEP = 0.9932
 NEW LLF = -270.3860 GRAD*DI = 1.0351

At convergenc grad * dir = 0.0008

Independent Variable **Estimated Coefficient** **Standard Error** **t-Statistic**

carinv	-0.0035	0.0060	-0.5885
carsearch	-0.0477	0.0104	-4.5985
parkcost	-0.2590	0.0266	-9.7227
security	0.6805	0.2216	3.0710
reliability	0.8420	0.2218	3.7960
ptcost	-0.3234	0.0348	-9.3040
ascpt	-0.9503	0.4285	-2.2177

auxiliary statistics at convergen initial
 log likelihood -270.39 -465.79
 number of observatio 672
 percent correctly predicted 83.482

REM ASC.
 mnl dep[premod ivalt[ascpt one] censor [availcar availpt]

***** MULTINOMI LOGIT *****
 Dependent variable: prefmode

Value	Label	Count	Percent
	1	198	29.46
	2	474	70.54

ITERATION 01:00 OLD LLF = -465.7950 STEP = 1.0693
 NEW LLF = -407.4060 GRAD*DI = 113.3570

ITERATION 02:00 OLD LLF = -407.4060 STEP = 0.9989
 NEW LLF = -407.4040 GRAD*DI = 0.0040

At convergenc grad * dir = 0.0000

Independent Variable	Estimated Coefficient	Standard Error	t-Statistic
ascpt	0.8729	0.0846	10.3163
auxiliary log number percent	statistics likelihood of correctly	at observatio predicted	convergen initial -407.4 672 70.536
spool	out	off	

University of Cape Town

Test#5 - Academic Staff Model
SST Results

```
rem      cova      var[cinv,c cov
REM      car      and      public      transport MODEL
mnl      dep[prefmod ivalt[genti ptravel\
          gencost:cpa pcost\
          ascpt:zero one]      censor      [availcar availpt]
```

***** MULTINOMI LOGIT *****
Dependent variable: prefmode

Value	Label	Count	Percent
		1	54 42.19
		2	74 57.81

ITERATION 01:00 OLD LLF = -88.7228 STEP = 1.34981
NEW LLF = -65.3038 GRAD*DI = 40.70577

ITERATION 02:00 OLD LLF = -65.3038 STEP = 1.00691
NEW LLF = -65.2603 GRAD*DI = 8.66E-02

At convergenc grad * dir = 1.80E-05

Independent Variable	Estimated Coefficient	Standard Error	t-Statistic
gentime	-0.0295	0.0086	-3.4282
gencost	-0.2497	0.0503	-4.9667
ascpt	0.0477	0.2527	0.1888

auxiliary statistics at convergen initial
log likelihood -65.26 -88.723
number of observatio 128
percent correctly predicted 72.656

```
REM      car      and      public      transport MODEL
mnl      dep[prefmod ivalt[genti pinv\
          gencost:cpa pcost\
          ascpt:zero one]      censor      [availcar availpt]
```

***** MULTINOMI LOGIT *****
Dependent variable: prefmode

Value	Label	Count	Percent
		1	54 42.19

```

ITERATION      02:00 OLD      LLF      =      -40.5716 STEP      =      1.3757
NEW           LLF      =      -38.9513 GRAD*DI =      2.6383

ITERATION      03:00 OLD      LLF      =      -38.9513 STEP      =      1.0185
NEW           LLF      =      -38.9298 GRAD*DI =      0.0424

At      convergenc grad      *      dir      =      0.0000

```

Independent Variable	Estimated Coefficient	Standard Error	t-Statistic
cleave	-0.0448	0.0352	-1.2749
carinv	-0.0641	0.0353	-1.8173
carsearch	-0.0805	0.0353	-2.2814
carwalk	0.5314	0.1959	2.7121
parkcost	-0.4118	0.0993	-4.1483
pleave	-0.0331	0.0288	-1.1508
pswalk	-0.8987	0.2791	-3.2196
pwait	0.2018	0.1433	1.4080
pinv	0.1540	0.1659	0.9283
pint	-0.1724	0.1156	-1.4912
security	2.3702	0.6737	3.5180
reliability	0.6440	0.6392	1.0076
ptcost	-0.5141	0.1218	-4.2194
ascpt	-5.2649	9.8153	-0.5364

```

auxiliary      statistics      at      convergen initial
log            likelihood      -38.93      -88.723
number        of      observatio      128
percent       correctly      predicted      88.281

```

```

REM      car      and      public      transport
mnl      dep[prefmod ivalt[carin zero\
carsearch:cs zero\
carwalk:cwal zero\
parkcost:cpa zero\
ascpt:zero one]      censor      [availcar availpt]

```

```

***** MULTINOMI LOGIT *****
Dependent variable:      prefmode

```

Value	Label	Count	Percent
1		54	42.19
2		74	57.81

```

ITERATION      01:00 OLD      LLF      =      -88.7228 STEP      =      1.1703
NEW           LLF      =      -75.4109 GRAD*DI =      24.7473

```

2 74 57.81

ITERATION 01:00 OLD LLF = -88.7228 STEP = 1.2953
 NEW LLF = -69.1332 GRAD*DI = 34.7043

ITERATION 02:00 OLD LLF = -69.1332 STEP = 1.0001
 NEW LLF = -69.1106 GRAD*DI = 0.0451

At convergenc grad * dir = 0.0000

Independent Variable Estimated Coefficient Standard Error t-Statistic

gentime -0.0269 0.0114 -2.3618
 gencost -0.2354 0.0482 -4.8885
 ascpt -0.5665 0.2858 -1.9819

auxiliary statistics at convergen initial
 log likelihood -69.111 -88.723
 number of observatio 128
 percent correctly predicted 73.438

REM car and public transport MODEL
 mnl dep[prefmod ivalt[cleav zero\
 carinv:cinv zero\
 carsearch:cs zero\
 carwalk:cwal zero\
 parkcost:cpa zero\
 pleave:zero pleave\
 pswalk:zero pswalk\
 pwait:zero pwait\
 pinv:zero pinv\
 pint:zero pint\
 security:zer sec\
 reliability:zer rel\
 ptcost:zero pcost\
 ascpt:zero one] censor [availcar availpt]

***** MULTINOMI LOGIT *****
 Dependent variable: prefmode

Value	Label	Count	Percent
1		54	42.19
2		74	57.81

ITERATION 01:00 OLD LLF = -88.7228 STEP = 1.8479
 NEW LLF = -40.5716 GRAD*DI = 69.8947

ITERATION 02:00 OLD LLF = -75.4109 STEP = 0.9981
 NEW LLF = -75.4004 GRAD*DI = 0.0209
 At convergenc grad * dir = 0.0000

Independent Variable	Estimated Coefficient	Standard Error	t-Statistic
carinv	0.0074	0.0162	0.4565
carsearch	-0.0475	0.0220	-2.1585
carwalk	0.1097	0.0726	1.5120
parkcost	-0.1852	0.0473	-3.9125
ascpt	-1.2247	1.0581	-1.1574

auxiliary statistics at convergen initial
 log likelihood -75.4 -88.723
 number of observatio 128
 percent correctly predicted 69.531

REM car and public transport
 mnl dep[prefmod ivalt[carin zero\
 carsearch:cs zero\
 parkcost:cpa zero\
 ascpt:zero one] censor [availcar availpt]

***** MULTINOMI LOGIT *****

Dependent variable: prefmode

Value	Label	Count	Percent
1		54	42.19
2		74	57.81

ITERATION 01:00 OLD LLF = -88.7228 STEP = 1.1442
 NEW LLF = -76.5743 GRAD*DI = 22.8387

ITERATION 02:00 OLD LLF = -76.5743 STEP = 0.9970
 NEW LLF = -76.5667 GRAD*DI = 0.0152

At convergenc grad * dir = 0.0000

Independent Variable	Estimated Coefficient	Standard Error	t-Statistic
carinv	0.0000	0.0152	0.0027
carsearch	-0.0461	0.0218	-2.1133
parkcost	-0.1819	0.0469	-3.8822
ascpt	-1.9588	0.9460	-2.0706

auxiliary statistics at convergen initial
 log likelihood -76.567 -88.723
 number of observatio 128
 percent correctly predicted 68.75

REM car and public transport
 mnl dep[prefmod ivalt[ptcos pcost\
 security:zer sec\
 reliability:zer rel\
 ascpt:zero one] censor [availcar availpt]

***** MULTINOMI LOGIT *****

Dependent variable: prefmode

Value	Label	Count	Percent
1		54	42.19
2		74	57.81

ITERATION 01:00 OLD LLF = -88.7228 STEP = 1.1660
 NEW LLF = -76.3152 GRAD*DI = 23.1468

ITERATION 02:00 OLD LLF = -76.3152 STEP = 0.9984
 NEW LLF = -76.3117 GRAD*DI = 0.0070

At convergenc grad * dir = 0.0000

Independent Variable	Estimated Coefficient	Standard Error	t-Statistic
ptcost	-0.2382	0.0688	-3.4640
security	1.1785	0.3992	2.9523
reliability	0.1526	0.3909	0.3904
ascpt	1.2109	0.5213	2.3227

auxiliary statistics at convergen initial
 log likelihood -76.312 -88.723
 number of observatio 128
 percent correctly predicted 73.438

REM car and public transport
 mnl dep[prefmod ivalt[cleav zero\
 carinv:cinv zero\
 carsearch:cs zero\
 parkcost:cpa zero\
 pleave:zero pleave\
 pwait:zero pwait\
 security:zer sec\
 reliability:zer rel\
 ascpt:zero one] censor [availcar availpt]

reliability:zer rel\
 security:zer sec\
 ptcost:zero pcost\
 asccar:one zero] censor [availcar availpt]

***** MULTINOMI LOGIT *****

Dependent variable: prefmode

Value	Label	Count	Percent
1		54	42.19
2		74	57.81

ITERATION 01:00 OLD LLF = -88.7228 STEP = 1.5165
 NEW LLF = -59.2987 GRAD*DI = 48.6518

ITERATION 02:00 OLD LLF = -59.2987 STEP = 1.0025
 NEW LLF = -59.2277 GRAD*DI = 0.1417

At convergenc grad * dir = 0.0000

Independent Variable **Estimated Coefficient** **Standard Error** **t-Statistic**

pleave	0.0130	0.0092	1.4170
pswalk	-0.3360	0.0746	-4.5032
pwait	0.0392	0.0510	0.7690
pwalk	0.1052	0.0413	2.5462
reliability	0.2066	0.4554	0.4537
security	1.6078	0.4888	3.2897
ptcost	-0.3654	0.0873	-4.1841
asccar	1.9081	3.8598	0.4944

auxiliary statistics at convergen initial
 log likelihood -59.228 -88.723
 number of observatio 128
 percent correctly predicted 75.781

REM car and public transport
 mnl dep[premod ivalt[carin zero\
 carsearch:cs zero\
 parkcost:cpa zero\
 security:zer sec\
 reliability:zer rel\
 ptcost:zero pcost\
 ascpt:zero one] censor [availcar availpt]

***** MULTINOMI LOGIT *****

Dependent variable: prefmode

Value	Label	Count	Percent
1		54	42.19
2		74	57.81

ITERATION 01:00 OLD LLF = -88.7228 STEP = 1.2924
 NEW LLF = -64.5721 GRAD*DI = 42.9352

ITERATION 02:00 OLD LLF = -64.5721 STEP = 0.9955
 NEW LLF = -64.4701 GRAD*DI = 0.2047

At convergenc grad * dir = 0.0002

Independent Variable **Estimated Coefficient** **Standard Error** **t-Statistic**

carinv	-0.0060	0.0174	-0.3419
carsearch	-0.0492	0.0239	-2.0601
parkcost	-0.2169	0.0557	-3.8964
security	1.3829	0.4538	3.0471
reliability	0.2818	0.4511	0.6248
ptcost	-0.2546	0.0719	-3.5420
ascpt	-1.7776	1.3258	-1.3408

auxiliary statistics at convergen initial
 log likelihood -64.47 -88.723
 number of observatio 128
 percent correctly predicted 74.219

REM ASC.
 mnl dep[prefmod ivalt[ascpt one] censor [availcar availpt]

***** MULTINOMI LOGIT *****
 Dependent variable: prefmode

Value	Label	Count	Percent
1		54	42.19
2		74	57.81

ITERATION 01:00 OLD LLF = -88.7228 STEP = 1.0093
 NEW LLF = -87.1539 GRAD*DI = 3.1250

At convergenc grad * dir = 0.0000

Independent Variable **Estimated Coefficient** **Standard Error** **t-Statistic**

ascpt	0.3154	0.1790	1.7622	
auxiliary	statistics	at	convergen	initial
log	likelihood		-87.154	-88.723
number	of	observatio	128	
percent	correctly	predicted	57.812	
spool	out	off		

University of Cape Town

Appendix H:

Input file into the model

```

config more[off] echo [off]
range obs[1-5000]
read to[sex class cleave cinv ctravel csearch cwalk cpark pleave pinv
  ptravel pswalk pwait pint pwalk pcost sec rel prefmode] \
file[simonsp.txt]

```

```

set availcar=0 ;if[cinv==-1]
set availcar=1 ;if[cinv!=-1]
set availpt=0 ;if[ptravel==-1]
set availpt=1 ;if[ptravel!=-1]
rem set availoth=0 ;if[po==-1]
rem set availoth=1 ;if[po!=-1]

```

```

recode var[premode] map[1=1,2=2]
label var[premode] val[1 car 2 ptransport]

```

```

set zero=0
set one=1

```

```

spool out file[simout.xls]

```

```

rem cova var[cinv,csearch,cpark,pcost,sec,rel] cov

```

```

REM car and public transport MODEL

```

```

mnl dep[premode] ivalt[gentime:cinv ptravel\
                    gencost:cpark pcost\
                    ascpt:zero one] censor [availcar availpt]

```

```

REM car and public transport MODEL

```

```

mnl dep[premode] ivalt[cleave:cleave zero\
                    carinv:cinv zero\
                    carsearch:csearch zero\
                    carwalk:cwalk zero\
                    cartravel:ctravel zero\
                    parkcost:cpark zero\
                    pleave:zero pleave\
                    pswalk:zero pswalk\
                    pwait:zero pwait\
                    ptinv:zero pinv\
                    ptravel:zero ptravel\
                    pinterc:zero pint\
                    security:zero sec\
                    reliability:zero rel\
                    ptcost:zero pcost\
                    ascpt:zero one] censor [availcar availpt]

```

```

REM car and public transport

```

```

mnl dep[premode] ivalt[carinv:cinv zero\
                    carsearch:csearch zero\
                    parkcost:cpark zero\
                    ascpt:zero one] censor [availcar availpt]

```

```

REM car and public transport

```

```

mnl dep[premode] ivalt[ptcost:zero pcost\
                    security:zero sec\
                    reliability:zero rel\

```

```
                                ascpt:zero one] censor [availcar availpt]
REM ASC.
mn1 dep[prefmode] ivalt[ascpt:zero one] censor [availcar availpt]
spool out off
QUIT
```

University of Cape Town

Appendix I:

Actual travel data with utilities and demand elasticities

ACTUAL TRAVEL DATA WITH UTILITIES AND DEMAND ELASTICITIES

RESP	SP	SEX	CLASS	CLEAVE	CARRIVE	CINV	CTRAVEL	CSEARCH	CWALK	PARK	PLEAVE	PARRIVE	PINV	PTRAVEL	PW/T-STA	PWAIT	PINTERC	PWALK	PCOST	SECURITY	RELIABILITY	CHOICE	Ucar	Upt	Pcar	Ppt	search el	park el
1	1	0	0	510	525	15	20	1	4	1.30	480	560	50	80	2	5	15	8	5.80	0	0	1	10.1448	7.3656	94	6	-0.0035	-0.0214
2	1	1	0	505	540	35	46	4	7	1.30	450	525	35	75	5	10	0	25	5.00	0	0	1	10.1276	6.6692	97	3	-0.0073	-0.0112
3	1	0	0	330	350	20	26	1	5	1.30	330	440	25	110	15	30	0	40	5.00	0	0	1	6.3183	2.7932	97	3	-0.0017	-0.0105
4	1	0	0	360	405	45	47	0	2	1.30	350	410	29	60	1	10	0	20	6.00	0	0	1	6.7758	4.0284	94	6	0.0000	-0.0220
5	1	1	0	420	440	20	22	0	2	1.30	420	468	35	48	5	5	0	3	5.00	0	0	1	8.7221	6.2582	92	8	0.0000	-0.0287
6	1	0	1	480	515	35	37	1	1	1.96	465	540	40	75	10	0	0	25	5.50	0	0	1	9.4983	7.4018	89	11	-0.0066	-0.0603
7	1	1	0	450	495	45	52	1	6	1.30	390	482	40	92	20	10	20	2	7.00	0	0	1	9.0596	4.6076	99	1	-0.0007	-0.0042
8	1	0	0	360	390	30	35	0	5	1.30	360	440	40	80	15	10	0	15	5.50	0	0	1	6.9153	4.4288	92	8	0.0000	-0.0281
9	1	0	0	450	495	45	47	0	2	1.30	420	500	25	80	10	5	20	20	7.00	0	0	1	8.6658	5.5766	96	4	0.0000	-0.0159
10	1	1	0	500	510	10	14	1	3	1.30	480	512	10	32	15	5	0	2	2.00	0	0	1	10.4351	8.6606	86	14	-0.0087	-0.0530
11	1	1	0	455	470	15	22	0	7	1.30	450	485	19	35	6	5	0	5	4.20	0	0	1	9.5036	7.2208	91	9	0.0000	-0.0338
12	1	0	1	555	585	30	40	0	10	1.96	465	570	60	105	20	5	0	20	5.00	0	0	1	11.1798	7.2932	98	2	0.0000	-0.0111
13	1	1	1	460	495	35	37	0	2	1.96	435	495	20	60	10	10	15	5	6.00	0	0	1	9.5921	5.9834	97	3	0.0000	-0.0145
14	1	0	0	390	422	32	45	3	10	1.30	360	450	47	90	20	10	8	5	6.00	0	0	1	7.3467	4.2584	96	4	-0.0078	-0.0159
15	1	0	0	390	440	50	56	1	5	1.30	360	465	25	105	30	10	15	25	7.00	0	0	1	7.2993	3.9176	97	3	-0.0020	-0.0120
16	1	1	0	465	510	45	62	15	2	1.30	480	523	25	43	10	0	5	3	5.00	0	0	1	8.5346	7.9172	65	35	-0.3153	-0.1281
17	1	1	0	450	490	40	47	2	5	1.30	420	510	25	90	5	15	30	15	6.50	0	0	1	9.0461	5.1890	98	2	-0.0025	-0.0076
18	1	1	0	465	510	45	57	2	10	1.30	435	505	25	70	25	5	0	15	7.00	0	0	1	9.3146	5.9216	97	3	-0.0039	-0.0119
19	1	0	0	480	510	30	40	5	5	1.30	420	488	35	68	5	5	20	3	7.00	0	0	1	9.1353	5.5766	97	3	-0.0083	-0.0101
20	1	0	0	420	480	60	72	5	7	1.30	465	510	15	45	15	10	0	5	2.00	0	0	1	7.5963	8.0366	39	61	-0.1825	-0.2225
21	1	0	0	420	465	45	55	5	5	1.30	390	465	32	75	5	10	13	15	7.00	0	0	1	7.7358	4.6076	96	4	-0.0126	-0.0153
22	1	0	0	420	495	75	110	30	5	1.30	390	495	65	105	10	10	15	5	7.50	0	0	1	5.9568	4.4372	82	18	-0.3231	-0.0656
23	1	1	0	510	555	45	55	5	5	1.30	480	570	55	90	10	5	15	5	7.00	0	0	1	10.0796	6.9566	96	4	-0.0127	-0.0154
24	1	1	0	405	450	45	55	0	10	1.30	420	510	35	90	15	10	20	10	6.00	0	0	1	8.1746	5.6384	93	7	0.0000	-0.0268
25	1	1	0	490	510	20	28	3	5	1.30	460	520	25	60	7	3	0	25	4.00	0	0	1	10.0121	7.6306	92	8	-0.0152	-0.0309
26	1	1	0	450	510	60	70	5	5	1.30	450	535	35	85	15	10	0	25	5.00	0	0	1	8.6801	6.6692	88	12	-0.0354	-0.0432
27	1	1	0	450	457	7	12	2	3	1.30	445	470	10	25	10	5	0	0	2.00	0	0	1	9.3530	7.8556	82	18	-0.0219	-0.0669
28	1	1	1	445	495	50	54	1	3	1.96	450	510	25	60	10	5	0	20	7.00	0	0	1	9.0776	6.2666	94	6	-0.0034	-0.0313
29	1	1	0	450	465	15	23	5	3	1.30	450	480	10	30	5	10	0	5	2.00	0	0	1	9.0986	7.6916	80	20	-0.0590	-0.0719
30	1	1	0	480	505	25	35	5	5	1.30	450	500	5	50	35	10	0	0	2.00	0	0	1	9.6356	7.6916	87	13	-0.0376	-0.0458

10/10/2010 10:10:10 AM

31	1	1	0	430	450	20	24	1	3	1.30	420	450	10	30	3	2	0	15	5.00	0	0	2	8.8721	6.4256	92	8	-0.0048	-0.0291
32	1	0	1	420	440	20	23	0	3	1.96	420	480	25	60	10	10	0	15	6.00	0	0	1	8.4378	5.6384	94	6	0.0000	-0.0316
33	1	0	1	570	600	30	40	5	5	1.96	510	630	50	120	20	20	0	30	6.00	0	0	1	11.1948	7.1504	98	2	-0.0052	-0.0095
34	1	1	0	450	470	20	25	0	5	1.30	450	487	10	37	15	10	0	2	2.00	0	0	1	9.3521	7.6916	84	16	0.0000	-0.0584
35	1	1	0	390	425	35	39	2	2	1.30	390	495	60	105	20	10	12	3	5.00	0	0	1	7.8326	5.2892	93	7	-0.0087	-0.0266
36	1	0	0	465	475	10	20	5	5	1.30	435	500	30	65	30	0	0	5	7.00	0	0	1	9.0063	6.2006	94	6	-0.0171	-0.0209
37	1	1	0	370	420	50	55	0	5	1.30	370	480	72	110	5	10	20	3	7.00	0	0	1	7.3931	4.1476	96	4	0.0000	-0.0137
38	1	0	0	380	395	15	18	0	3	1.30	465	508	15	43	10	15	0	3	5.00	0	0	1	7.4748	6.7352	68	32	0.0000	-0.1182
39	1	0	0	465	480	15	22	1	6	1.30	450	480	19	30	1	5	0	5	2.00	0	0	1	9.1998	7.9706	77	23	-0.0136	-0.0828
40	1	0	1	470	495	25	32	1	6	1.96	450	492	20	42	3	10	7	2	7.00	0	0	1	9.3813	5.9876	97	3	-0.0019	-0.0179
41	1	0	0	420	435	15	28	10	3	1.30	420	510	55	90	30	5	0	0	7.00	0	0	1	7.7148	5.5766	89	11	-0.0633	-0.0386
42	1	0	0	460	470	10	20	5	5	1.30	470	495	10	25	5	5	0	5	2.00	0	0	1	8.9013	8.4306	62	38	-0.1153	-0.1406
43	1	1	0	510	515	5	30	20	5	1.30	510	537	10	27	5	10	0	2	2.00	0	0	1	9.5516	9.0716	62	38	-0.4587	-0.1398
44	1	0	0	420	465	45	58	3	10	1.30	540	589	30	49	5	2	12	0	7.50	0	0	1	7.8558	8.3336	38	62	-0.1111	-0.2257
45	1	0	0	450	470	20	24	0	4	1.30	420	480	30	60	20	10	0	0	5.00	0	0	1	8.8983	5.9792	95	5	0.0000	-0.0187
46	1	1	0	400	430	30	43	10	3	1.30	390	465	45	75	10	5	10	5	7.00	0	0	1	7.6091	4.8866	94	6	-0.0370	-0.0225
47	1	0	0	390	430	40	60	5	15	1.30	360	420	15	60	25	5	0	15	7.00	0	0	1	7.1523	4.1966	95	5	-0.0148	-0.0181
48	1	1	0	570	600	30	60	20	10	1.30	480	572	55	92	5	15	15	2	7.00	0	0	1	10.5791	6.3986	98	2	-0.0181	-0.0055
49	1	0	0	420	435	15	17	0	2	1.30	420	505	59	85	5	10	10	1	5.00	0	0	1	8.3148	5.9792	91	9	0.0000	-0.0323
50	1	1	1	480	525	45	46	0	1	1.96	405	500	40	95	20	5	0	30	6.50	0	0	1	9.9191	5.4020	99	1	0.0000	-0.0060
MEAN	1	0	0	447	478	31	40	4	5	1.41	432	500	32	68	12	8	6	10	5.34	0	0	1	8.7519	6.2486	92	8	-0.0173	-0.0300
STDEV	1	0	0	52	51	16	19	6	3	0.24	45	42	17	26	9	5	8	10	1.81	0	0	0	0.8730	-1.2972	90	10	-0.0366	-0.0070
MIN	0	0	0	330	350	5	12	0	1	1.30	330	410	5	25	1	0	0	0	2.00	0	0	1	6.5178	5.4896	74	26	0.0000	-0.0963
MAX	1	1	0	570	600	75	110	30	15	1.96	540	630	72	120	35	30	30	40	7.50	0	0	2	9.7301	6.7712	95	5	-0.0888	-0.0272
MEDIA	1	0	0	450	478	30	40	2	5	1.30	435	498	30	69	10	10	0	5	5.90	0	0	1	8.9422	6.0175	95	5	-0.0046	-0.0186

Appendix J:

Questionnaire used to gather
information

Questionnaire - Travel Pattern Behaviour at UCT

Name: Prof./Dr/Mr/Mrs/Ms.....
Department:.....
e-mail address:..... Tel. no.....

Unless otherwise indicated, please tick the appropriate box and **complete both Part A and Part B of this questionnaire.**

What title best describes you?	Ass. Lecturer	Lecturer	Senior Lecturer	Assoc. Prof
Professor	Support Staff	PostGraduate Student	Undergraduate Student	

Which means of travel do you use most often use to travel from your home to work at UCT in the morning?

CAR	OTHER
-----	-------

What is the street address/suburb of the home end of your trip?

.....

PART A - WHEN YOU TRAVEL BY CAR TO UCT

1. What type of parking bay do you use?

RED	YELLOW	WHITE
-----	--------	-------
2. When do you often leave home for work in the morning?h |.....mins
3. When you leave home at that time, at about what time do you normally arrive at UCT?h |.....mins
4. Where do you most prefer to park at UCT?.....
5. With regard to your preferred parking, how long does it take you to:
 - (a) Find parking? (minutes)
 - (b) Walk from your parked car to your office/class?(minutes)
6. How satisfied are you with the security of your car when it is parked at UCT?

VERY SATISFIED	SATISFIED	NOT SURE	DISSATISFIED	VERY DISSATISFIED
----------------	-----------	----------	--------------	-------------------

PART B - WHEN YOU TRAVEL TO UCT OTHER THAN BY CAR

1. What is your alternative transport to UCT in the morning when not using a car?

Train	Bus	Taxi	Shuttle	Motor cycle	Bicycle	Walk	Other (specify below)
-------	-----	------	---------	-------------	---------	------	-----------------------

Other

2. If you use more than one means of transport specify here:.....
.....

3. When do you often leave for work/to attend at UCT? h | mins

4. When you leave home at that time, when do you normally arrive at UCT?
..... h | mins

5. If you walk, cycle or motor cycle the whole way to UCT, roughly how long does it take you?
..... h | mins

6. Where do you normally board your bus/train/taxi from the home end of your journey?.....
(rail station/bus station /taxi rank)

7. Roughly how long does it take you to travel from your home to this station or bus stop? (mins)

8. Roughly how long do you have to wait there? (mins)

9. If your journey includes any changes, about how long do you spend altogether at places where you change:

(a) Walking?(mins) (b) Waiting?(mins)

10. How much do you pay altogether for your journey to UCT in cash at the time?
R.....

If you have a season ticket:

(a) For how long is it valid?(months/weeks)

(b) How much did it cost? R.....

11. Where do you normally get off your bus or train or taxi at the UCT end of your journey?

12. How long do you walk to UCT from this station?.....(mins)

13. How can you describe the security of your PT?

poor	average	good
------	---------	------

14. How do you describe the comfort of your PT?

poor	average	good
------	---------	------

15. How do you describe the frequency of your PT?

frequent	infrequent
----------	------------

16. How do you describe the service of your PT?

reliable	unreliable
----------	------------

Thank you very much for your participation in this study. All the information supplied will be treated with the strictest of confidence.

Return this Questionnaire to Simon Chauke at Civil Eng. Dept. Any queries should also be referred to him at 650 2584 or 686 0043 (H) or at engfac/schauke.